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UNIVERSITY OF CALGARY

Recovery from Cannabis Use Disorders: Abstinence versus Moderation and Treatment-Assisted Recovery versus Natural Recovery

by

Jonathan Norman Stea

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE

DEGREE OF DOCTOR OF PHILOSOPHY

GRADUATE PROGRAM IN CLINICAL PSYCHOLOGY

CALGARY, ALBERTA

OCTOBER, 2013

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Abstract

The recovery process from cannabis use disorders has received little empirical attention. Understanding how and the ways in which individuals with cannabis use disorders recover may help to improve formal treatments and facilitate recovery for those who wish to not seek treatment. The present study was undertaken with two primary objectives in mind. The first primary objective was to provide an exploratory portrait of the recovery process from cannabis use disorders from the perspective of individuals who have recovered. The second primary objective was to explore and systematically describe the similarities and differences between abstinence- and moderation-oriented recoveries, as well as the similarities and differences between treatment-assisted and natural recoveries. The methodology was largely borrowed from the natural recovery literature insofar as recovery was first inferred via the remission of diagnostic symptoms, and then explored predominantly via several interview domains (e.g., reasons for resolution, actions taken to recover, maintenance factors, barriers to treatment seeking). Several interesting and important findings emerged at the level of the total sample (N = 119), as well as at the level of group comparisons between the different recovery pathways. Notably, the findings lend further support to the effectiveness of cognitive, motivational, and behavioural strategies as helpful actions and maintenance factors involved in the recovery process. The findings also generally support the idea that cannabis use disorders lie on a continuum of problem severity, with moderation-oriented and natural recoveries more likely to occur at the lower end of the continuum, and abstinence-oriented and treatment-assisted recoveries more likely to occur at the upper end. Moreover, both similarities and differences among the recovery pathways emerged with respect the recovery process. The findings are discussed in the context of the broader addictions literature and with respect to implications for policy and practice.

Acknowledgements

I am indebted to many individuals who helped to bring this dissertation to fruition. My supervisor, Dr. David C. Hodgins, has been the epitome of supervision excellence, and has guided and coached me from day one. I have appreciated the many collaboration opportunities that he has provided, as well as the time and effort he has invested into my career. Thank you, David, for supporting my decisions, and for being both my mentor and friend.

I would like to thank my dissertation committee, Drs. Kristin Von Ranson and Shawn Currie, as well as my internal examiner, Dr. David Crockford, and my external examiner, Dr. Robert S. Stephens, for their willingness to participate in my defence and for their insightful comments. I would also be remiss if I did not thank my past clinical supervisors who have helped to shape my identity as a clinical psychologist; particularly Drs. Kasia Galperyn, Deborah Brown, Ryan Day, Colleen Miller, and Penny Ford.

The completion of this dissertation would not have been possible without the help of my reliable and enthusiastic research assistants, Syler Hayes, Chris Carroll, Carlie R. Montpetit, Rachel Ferrer, Victoria Enns, and Johanna MacDonell. Additionally, my fellow graduate student and friend, Igor Yakovenko, was instrumental in assisting with aspects of the data analyses. My appreciation also extends to all of the individuals, and their family members and friends, who participated in this dissertation and were willing to share their stories in the name of science. Financially, this dissertation was supported by several generous agencies, including the Canadian Institutes of Health Research (CIHR), the Alberta Innovates Health Solutions (AIHS), and the Killam Trusts.

Finally, I would like to thank my parents, Heidi and Lou, for providing unconditional love and support. Thank you to my family (especially, Harriet, Jill, Matt, Grace, Gino, Sean, Marla, and Ariel) and to the ones who are alive in spirit (Gerry, Vito, and Carmella) for your everlasting encouragement. Thank you to my friends and fellow graduate students for the fun times and memories.

To my mom . . . for always listening and for being herself.

To my dad . . . for teaching me "everything that I know."

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List of Abbreviations

Abbreviation	Definition
AB	Abstinence
ACRA	Adolescent Community Reinforcement Approach
APA	American Psychiatric Association
ANCOVA	Analysis of Covariance
ANOVA	Analysis of Variance
ASSIST	Alcohol, Smoking, and Substance Involvement Screening Test
AUDIT	Alcohol Use Disorders Identification Test
AVE	Abstinence Violation Effect
BSFT	Brief Strategic Family Therapy
CPGI	Canadian Problem Gambling Index
CBD	Cannabidiol
CBT	Cognitive-Behavioural Therapy
CIDI	Composite International Diagnostic Interview
CFREB	Conjoint Faculties Research Ethics Board
CM	Contingency Management
CMA	Cognitive Model of Addiction
DSM	Diagnostic and Statistical Manual of Mental Disorders
ECA	Epidemiologic Catchment Area
FFT	Functional Family Therapy
FSN	Family Support Network
HR	Harm Reduction
ICC	Intra-Class Correlation
ICD	International Classification of Diseases
IDD	Inventory to Diagnose Depression
MDFT	Multidimensional Family Therapy
MET	Motivational Enhancement Therapy
MI	Motivational Interviewing
MMM	Marijuana Motives Measure
MOD	Moderation
MPS	Marijuana Problems Scale
MST	Multisystemic Therapy
MTF	Monitoring the Future
NCS	National Comorbidity Survey
NESARC	National Epidemiologic Survey on Alcohol and Related Conditions
NODS-CLiP	National Opinion Research Center DSM-IV Screen for Gambling Problems, brief version
NR	Natural Recovery
NSDUH	National Survey of Drug Use and Health
NSMHWB	National Survey of Mental Health and Wellbeing
PCA	Principal Components Analysis
PGSI	Problem Gambling Severity Index
RP	Relapse Prevention
SCA	Stepped Care Approach
SDS	Severity of Dependence Scale

Abbreviation	Definition
SLT	Social Learning Theory
SPQ-B	Schizotypal Personality Questionnaire, brief version
TAR	Treatment-Assisted Recovery
THC	Delta-9-tetrahydrocannabinol
TM	Transtheoretical Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action

Epigraph

I stood up and went to the window, searching for the right words. I wanted to say, “I love you and I’m sorry,” and soon would do just that. But at the moment, I was filled with awareness of what I had become.

Roger A. Roffman, *Marijuana Nation*

Chapter One: Introduction

It is both an exciting and challenging time for cannabis research. While cannabis is the most widely used illicit substance in the world, there appears to be a recent trend towards the decriminalization and legalization of cannabis for both medicinal and recreational purposes in North America (Cerda,Wall, Keyes, Galea, & Hasin 2012; Hawken, Caulkins, Kilmer, & Kleiman, 2013). There also remains considerable debate both in the media and the scientific community regarding the relative benefits and harms associated with cannabis, as well as its addictive properties. While cannabis use might be considered less harmful relative to other substances, there is little doubt that cannabis use can cause significant distress and impairment in functioning for a substantial minority of users. Indeed, the majority of individuals who use cannabis do not experience problems associated with their use, but it has been estimated that approximately one in ten people who use cannabis at least once will meet diagnostic criteria for a cannabis dependence disorder at some point in their lives (Anthony, Warner, & Kessler, 1994; Degenhardt, Hall, & Lynskey, 2001b; Hall, 2009; Hall & Pacula, 2003). Moreover, the risk for developing a cannabis use disorder increases with earlier age of cannabis initiation and higher frequency of use. Despite reports that cannabis accounts for the most treatment demand among all illicit substances in North America (United Nations Office on Drugs and Crime, 2012), most people with cannabis use disorders do not seek professional treatment (Agosti & Levin, 2004; Cunningham, 2005; Mojtabai, 2005; Stinson et al., 2006; Teesson, Hall, Lynskey, & Degenhardt, 2000).

From a clinical psychology perspective, it is important to study cannabis use disorders with respect to etiology, treatment, and recovery. While all three domains are inter-related and crucial in order to further our understanding of cannabis use disorders, the recovery process has received the least attention. The present study was therefore aimed at elucidating the recovery process from cannabis use disorders with a particular view towards investigating multiple recovery pathways. Indeed, just as there are many different potential pathways to the development of a disorder (i.e., the principle of equifinality), there are also multiple routes involved in the recovery from a disorder.

It should be stressed that the present study is not an argument for a particular legislative position. Clear, honest, and evidence-based communication regarding the relative benefits and harms of cannabis is what is required to inform legislation. The present study derives from a clinical psychology program, and as such, it was undertaken in the spirit of helping the substantial minority of individuals who do happen to experience cannabis-related problems.

An interesting and unanticipated by-product of the present study was a first-hand experience of the many polarized views among people throughout the world with respect to the benefits and harms of cannabis use. That is, I received both praise and scorn for my role as the lead investigator of the present study via emails, internet comments on newspaper stories, and even telephone voicemails. The messages I received were often misinformed and unbalanced compared to the information that is available in the scientific literature. Misinformation can be dangerous, as it can lead to both stigma and confusion for those who experience cannabis-related problems. This experience has made salient the ethical imperative of clinical psychologists to educate the public, clients, and colleagues about what is known about the science behind cannabis use. Indeed, the dissemination of knowledge to promote human welfare is the underlying value of the fourth-order principle in the Canadian Code of Ethics for Psychologists (Canadian Psychological Association, 2001).

The remaining sections of this manuscript provide a detailed account of the present study and its relation to the cannabis use disorder literature. Specifically, Chapter Two provides a comprehensive literature review that covers a variety of topics related to the recovery from cannabis use disorders, including the epidemiology of cannabis use and cannabis use disorders, the nature of cannabis use disorders, treatment-assisted recovery versus natural recovery, and abstinence- versus moderation-oriented recovery. Chapters Three, Four, and Five provide the rationale, methodology, and results of the present study, respectively. Finally, Chapter 6 provides a discussion of how the results connect to the broader literature, implications for policy and practice, and limitations of the study with directions for future research.

Chapter Two: Literature Review

2.1 Epidemiology of Cannabis Use and Cannabis Use Disorders

2.1.1 Prevalence

Cannabis is the most widely used illicit substance in the world. The United Nations has estimated a global, stable, annual prevalence rate of 2.6% to 5.0% for ages 15 to 64 (estimated between 119 million and 224 million users worldwide), with the highest rates found in Oceania (Australia and New Zealand; 9.1% to 14.6%) and North America (5.2% to 13.5%) (United Nations Office on Drugs and Crime, 2012). While Asia has a prevalence rate of cannabis use that is below the global average, it actually has the highest absolute number of cannabis users given the size of its large population (estimated between 26 million and 92 million users).

In the United States, the annual prevalence rate of cannabis use among the general population and adolescent school-survey respondents has been rising in recent years (Johnston, O'Malley, Bachman, & Schulenberg, 2013; United Nations Office on Drugs and Crime, 2012). In 2011, 7.0% of Americans reported past month cannabis use and 16.7% of past year cannabis users aged 12 or older reported daily or near daily use (Substance Abuse and Mental Health Services Administration, 2012).

In Canada, the prevalence rate of cannabis use has been declining since 2004, albeit it is still fairly high (Health Canada, 2011). In 2011, 39.4% of Canadians reported lifetime use and 9.1% reported past year use—past year rates were approximately three times higher among youth (21.6%) and two times higher among males (12.2%). Interestingly, among individuals who reported past year cannabis use in 2011, approximately one in five reported that they did so for medical purposes; approximately half of which included chronic pain and half of which included a variety of other conditions such as insomnia, depression, and anxiety (Health Canada, 2011). Using Health Canada's 2004 data, Adlaf, Begin, and Sawka (2005) reported that among past year users, 16.0%, 20.3%, and 18.1% were monthly, weekly, and daily users, respectively. Over the past several years, the average age of initiation for cannabis use among youth aged 15 to 24 has remained stable at approximately 15.6 years (Health Canada 2011).

A number of large scale international epidemiological surveys have produced estimates of cannabis use disorders as defined by the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) (Copeland & Swift, 2009). Data from the Epidemiologic Catchment Area (ECA) survey and the National Comorbidity Survey (NCS) have indicated that approximately 3% to 4% of American adults met diagnostic criteria for a lifetime diagnosis of DSM-III or DSM-III-R cannabis dependence (Anthony et al., 1994). Data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) survey reported that approximately 0.3% and 1.3% of American adults met past year and lifetime DSM-IV cannabis dependence criteria, respectively, and approximately 1.1% and 7.2% met past year and lifetime cannabis abuse criteria, respectively (Stinson, Ruan, Pickering, & Grant, 2006). More recently, it has been reported that the number of individuals with cannabis use disorders in the United States has remained stable since 2002; whereby in 2011, 1.6% of the total population aged 12 or older and 63.8% of all individuals classified with illicit drug abuse or dependence met diagnostic criteria for cannabis abuse or dependence (Substance Abuse and Mental Health Services Administration, 2012). Rates in the United States have been similar to those in Australia, whereby results from the 1997 National Survey of Mental Health and Wellbeing (NSMHWB) indicated that approximately 2% of Australian adults were diagnosed with a past year DSM-IV cannabis use disorder, which largely represented cannabis dependence (1.5%) (Swift, Hall, & Teesson, 2001).

It is on the basis of these prevalence surveys that it has been estimated that approximately one in ten people who ever use cannabis at least once will meet diagnostic criteria for a cannabis dependence disorder at some point in their lives (Anthony et al., 1994; Degenhardt et al., 2001b; Hall, 2009; Hall & Pacula, 2003). Indeed, the conditional lifetime prevalence rate (i.e., the prevalence rate among individuals who ever try cannabis) of cannabis dependence was 9.1% in the NCS (Anthony et al., 1994) and the conditional prevalence rate of cannabis use disorders (abuse and dependence) was 31.7% in the NSMHWB (Swift et al., 2001). It is noteworthy that while the absolute prevalence rate of cannabis use disorders is estimated to be the highest among all illicit substances (Anthony et al., 1994; Stinson et al., 2006; Swift et al., 2001), its conditional

prevalence rate has been found to be lower than nicotine (31.9%), heroin (23.1%), cocaine (16.7%), alcohol (15.4%) and stimulant dependence (11.2%) in the NCS, and lower than stimulant use disorders (36.4%) in the NSMHWB (Anthony et al., 1994; Swift et al., 2001). Nevertheless, the risk for developing cannabis dependence has been estimated to increase among youth to approximately one in six or one in seven (Anthony, 2006). Moreover, the risk for developing cannabis dependence has been estimated to increase with frequency of use, such that among those who have used cannabis five or more times, the risk of dependence has been reported to be 17% (Hall, Johnston, & Donnelly, 1999), and among daily or near daily users, the risk is thought to increase to approximately one in two or one in three (Hall & Pacula, 2003; Kandel & Davies, 1992).

2.1.2 Comorbidities

Cannabis use disorders are highly comorbid with other substance use and psychiatric disorders. Using data from the NESARC, Stinson and colleagues (2006) reported that among American respondents with cannabis use disorders, there were very high rates of alcohol (past year: 57.6%; lifetime: 81.5%), nicotine (past year: 53.1%; lifetime: 51.5%), personality (past year: 48.4%; lifetime: 35.9%), mood (past year: 29.9%; lifetime: 39.6%), and anxiety (past year: 24.1%; lifetime: 30.5%) disorders.

Using data from the NSMHWB, Degenhardt, Hall, and Lynskey (2001a; 2001b) reported that among Australian respondents with past year cannabis abuse, there were very high rates of past year alcohol abuse (9.8%), alcohol dependence (27.3%), sedative/stimulant/opiate abuse (4.1%), sedative/stimulant/opiate dependence (1.6%), regular tobacco use (60.1%), mood disorder (18.6%), anxiety disorder (6.4%), and positive screenings for psychosis (3.9%); and among respondents with past year cannabis dependence, there were very high rates of alcohol abuse (8.6%), alcohol dependence (28.6%), sedative/stimulant/opiate abuse (6.2%), sedative/stimulant/opiate dependence (17.6%), regular tobacco use (70.4%), mood disorder (13.6%), anxiety disorder (16.5%), and positive screenings for psychosis (6.8%). Another large survey of 1.8 million inpatients presenting to all hospitals in New South Wales, Australia, from 1 July 2006 to 30 June 2007, using *International Classification of Diseases* (ICD)-10-Australian Modification codes, reported that among respondents with cannabis use disorders, 53.8%

had a current mental health disorder; and specifically, there were very high rates of anxiety disorder (3.4%), bipolar affective disorder (5.7%), major depressive disorder (10.9%), personality disorder (9.2%), schizophrenia (15.0%), and severe stress disorder (8.7%), with the highest rates observed for females and for those aged between 30 and 49 (Lai & Sitharthan, 2012). An additional study of all individuals in Australia (four main urban sites) who made contact with public mental health services during a one month period in 1997 reported that among individuals with ICD-10 defined schizophrenia and other psychoses, 25.1% had a history of cannabis abuse or dependence (Jablensky et al., 2000).

Cannabis use per se has also been linked to concurrent substance use and psychiatric disorders. For example, using data from the NCS, it has been reported that more occasions of cannabis use were associated with a higher risk of having experienced a major depressive episode (Chen, Wagner, & Anthony, 2002). Similarly, in a representative sample of the Ontario, Canada, adult population, both light and heavy cannabis use was associated with increased levels of mood and anxiety disorders in comparison with past 12 month abstainers (Cheung et al., 2010). One integrative study of four longitudinal Australian studies of over 6,900 individuals demonstrated that more frequent cannabis use was associated with modest increases in rates of depressive symptoms and that this association was stronger in adolescence (Horwood et al., 2012). Another recent study using survey data of over 170,000 general population American adults reported that irrespective of adolescent- or adult-onset cannabis initiation, cannabis initiation per se predicted a modest increased risk of a depressive episode, even when controlling for potential confounding variables (Fairman & Anthony, 2012). In an adolescent sample, a longitudinal study of Canadian high school students reported that cannabis use with illicit drug use increased the risk of depression, suicidal ideation, and suicide attempts, whereas heavy cannabis use alone predicted depression but not suicidal ideation or attempts (Rasic, Weerasinghe, Asbridge, & Langille, 2013).

Other rigorous research has demonstrated complex links between cannabis use, cannabis use disorders, and other substance use and psychiatric disorders. For example, using data from the NSMHWB, Degenhardt, Hall, and Lynskey (2001c) reported that

after controlling for demographics, neuroticism, and other drug use, cannabis was not associated with mood or anxiety disorders. However, a 10-year longitudinal study in Germany demonstrated that mood and anxiety disorders, as well as the degree of their comorbidity, were significantly associated with the incidence of cannabis use and the progression to cannabis use disorders, even when controlling for externalizing disorders (Wittchen et al., 2007). Similarly, a 15-year longitudinal study in Australia demonstrated that after controlling for multiple potential confounds, regular (particularly daily) adolescent cannabis use was associated consistently with anxiety disorder, but not depressive disorder, in adolescence and late young adulthood, even among users who then ceased cannabis use (Degenhardt et al., 2013). Additionally, a study using data from the NESARC reported that social anxiety disorder was more likely to be related to cannabis dependence than abuse, and that this relation remained significant after controlling for race, sex, and other substance use and psychiatric disorders; this study also reported that in the majority of cases, but not all cases, the development of social anxiety disorder preceded the development of cannabis use disorders (Buckner et al., 2012b). Alarmingly, it has also been demonstrated that after controlling for demographics, depression, negative affect, and other types of anxiety, there was a robust link between elevated social anxiety and suicidality among daily cannabis users (Buckner, Joiner, Schmidt, & Zvolensky, 2012c). Similarly, a large online study of near daily cannabis users reported that compared to non-anxious heavy cannabis users, clinically anxious heavy cannabis users exhibited more cannabis use, more non-anxiety psychopathological symptoms (e.g., depression, impulsivity, schizotypal personality), and greater cannabis problem severity (Van Dam, Bedi, & Earleywine, 2012); and another study reported that among individuals with anxiety disorders, those who used cannabis regularly reported poorer quality of life compared to non-users, but not occasional users (Lev-Ran, Le Foll, McKenzie, & Rehm, 2012). In a systematic review, it has been reported that cannabis users who also smoke tobacco are more dependent on cannabis, have more psychosocial problems, and have poorer cessation outcomes than those who use cannabis but not tobacco (Peters, Budney, & Carroll, 2012); and a separate review concluded that some mechanisms linking cannabis and tobacco are distinct from

those contributing to co-occurring drug use in general (Agrawal, Budney, & Lynskey, 2012). Finally, there has been a surge of research in recent years that has demonstrated not only robust links between cannabis use and risk of subsequent psychosis, but also a possible causal role of cannabis use in the development of psychosis among a subset of vulnerable individuals (Barkus & Murray, 2010; Dekker et al., 2012; Di Forti et al., 2012; Galvez-Buccollini et al., 2012; Griffith-Lendering, Wigman, van Leeuwen, Huijbregts, & Huizink, 2013; Large, Sharma, Compton, Slade, & Nielsson, 2011; Manrique-Garcia et al., 2012; Moore et al., 2007; Tosato et al., 2013).

2.2 The Nature of Cannabis Use Disorders

2.2.1 Beliefs and Attitudes about Cannabis Use

Beliefs and attitudes about the relative benefits and harms of cannabis use can be characterized by tremendous variability; they have varied over time and location, and between cultures, and they even vary at present among both laypersons and the scientific community (Copeland, 2011; Dennis, Babor, Roebuck, & Donaldson, 2002; Murray, Morrison, Henquet, & Di Forti, 2007; Temple, Brown, & Hine, 2011). While cannabis has been idealized by some cultures and societies, it has been demonized by others; Western society has tended to waver between both extremes (Murray et al., 2007). As a result of this variability, the legal status of cannabis has also been fluid. Indeed, part of the reason for this variability might stem from the fact that cannabis can be both beneficial and harmful to the user and society at large. Consequently, debate surrounding cannabis use is often emotionally charged. Public education regarding the realistic, relative benefits and harms of cannabis use is therefore vital to the maximization of the former and minimization of the latter.

A number of surveys have provided insight into how people perceive cannabis use. For example, one high profile, complex survey in the United Kingdom employed a multicriteria decision analysis by Members of the Independent Scientific Committee on Drugs to determine the relative harmfulness of a variety of drugs (Nutt, King, & Phillips, 2010). It was concluded that alcohol, heroin, and crack cocaine were overall the first, second, and third most harmful drugs, respectively, with cannabis ranked overall as the eighth (out of twenty) most harmful drug. Similarly, in Canada, an online survey of 6000

Alberta residents ranked cannabis as the fifth (out of ten) most addicting problem behaviour; behind cocaine, tobacco, gambling, and eating, but interestingly ahead of alcohol, video gaming, work, sex, and shopping (Wild et al., 2010). Another survey of over 1000 adults reported that 35.8% of the American public believed that any use of cannabis was indicative of harm and required treatment, whereas the same amount (35.9%) believed that daily or more than daily use of cannabis was indicative of harm and required treatment (The National Center on Addiction and Substance Abuse at Columbia University, 2012). Using data from a cross-sectional national survey of Australians aged 15 to 25, one recent study demonstrated how particular moderating variables can influence perceptions of cannabis-related harm. Specifically, this study demonstrated that most young people in Australia were aware of the negative impact of substance use (alcohol, tobacco, and cannabis) on mental disorders, but males, young adults (aged 18-25), and those with higher levels of psychological distress had more favourable attitudes towards substance use (Yap, Reavley, & Jorm, 2012).

Other research has demonstrated how perceptions about cannabis use can influence the prevalence rate of cannabis use and possibly cannabis use disorders, particularly among adolescents. For example, research has shown that the incidence of new cannabis users and the prevalence of past month (current) cannabis use both vary inversely with the perceived risk of harm of cannabis use (Dennis et al., 2002). Using data from Monitoring The Future (MTF), a longitudinal, large scale survey of American adolescents and adults that has been conducted annually since 1975, it has been demonstrated that while there was a long and gradual decline of adolescent cannabis use from 1997 to 2007, there has been a rise in adolescent cannabis use from 2007 to 2011, with this increase coming to a halt in 2012 (Johnston, O'Malley, Bachman, & Schuleberg, 2013). Importantly, this recent rise in adolescent cannabis use (including a rise in daily cannabis use) has been attributed to a decreasing perceived risk of harm associated with cannabis for the past six years, and a decreasing perception of disapproval of cannabis for the past three to four years (Johnston et al., 2013). Data from another large scale survey of American adolescents and adults, the National Survey on Drug Use and Health (NSDUH), are also consistent with these findings; whereby between 2007 and 2011, the

percentage of adolescents who perceived great risk from cannabis use once or twice per week decreased from 54.6% to 44.8%, whereas the rate of past month adolescent cannabis use increased from 6.7% to 7.9% (Substance Abuse and Mental Health Services Administration, 2012). Similarly, one large study of adolescents in 32 European countries demonstrated that decreased perceptions of risk associated with cannabis use were related to increased past 12 month prevalence rates and frequency of cannabis use; this study also demonstrated that increased perceived availability of cannabis and increased numbers of cannabis-using friends were related to increased past 12 month prevalence rates and frequency of cannabis use (Piontek, Kraus, Bjarnason, Demetrovics, & Ramstedt, 2013).

Finally, using data from both the NESARC and the NSDUH, it has been demonstrated that American residents of states with medical marijuana laws had higher prevalence rates of both cannabis use and cannabis use disorders (Cerda et al., 2012). Importantly, the prevalence of cannabis use disorders was not higher among cannabis users in states with medical marijuana laws, which suggests that the higher risk of cannabis use disorders in these states was accounted for by higher rates of cannabis use. However, it remains unclear whether the association between medical marijuana laws and higher rates of cannabis use and cannabis use disorders is causal in nature, or whether the association reflects an underlying common cause, such as cultural and societal norms that are supportive of cannabis use and its legalization (Cerda et al., 2012).

2.2.2 Benefits and Harms of Cannabis Use

A realistic and evidence-based consideration of the relative benefits and harms of cannabis use is warranted in order to further our understanding of cannabis use disorders and to inform policy and practice. As a scientist-practitioner in training in the field of clinical psychology, my role in part involves helping people to understand and manage the harms associated with cannabis use. However, there can be benefits to cannabis use as well, and these benefits require acknowledgement in order to provide a balanced and educated view of the realities of cannabis use.

Indeed, cannabis is thought to possess therapeutic potential and there is evidence that it has been found to beneficial in the management of pain and chemo-therapy

induced side effects, such as nausea, vomiting, and stimulation of appetite (Aggarwal, 2013; Martin-Sanchez, Furukawa, Taylor, & Martin, 2009; Pertwee, 2012). However, more controversial, in my opinion, is the purported potential of cannabidiol (CBD) in the treatment of psychiatric disorders, such as depression, anxiety, and psychosis (Campos, Moreira, Gomes, Del Bel, & Guimaraes, 2012). CBD is the main non-psychoactive phytocannabinoid found in the *Cannabis sativa* plant and it has been documented to have anxiolytic and anti-psychotic properties; as opposed to the more popular and main psychoactive phytocannabinoid, delta-9-tetrahydrocannabinol (THC), which has been documented to have anxiogenic and psychotomimetic effects. The potential of CBD in the treatment of psychiatric disorders stems from research demonstrating that CBD can inhibit THC-induced anxiety and psychotic symptoms (Campos et al., 2012). However, much more research is needed to support this potential use of CBD, especially in light of research demonstrating that CBD does not always exhibit anti-psychotic properties (Almeida et al., 2013), and in light of the fact that it is unclear to what extent CBD contributes to the development of cannabis use disorders and the high comorbidity rates observed between cannabis use and other substance use and psychiatric disorders. It is noteworthy that one recent study has demonstrated that problematic cannabis use among individuals receiving cannabis for medical reasons (physical and mental health conditions) was predicted by the interaction of low levels of emotional clarity (i.e., the extent to which one can identify and understand the type and source of emotions one experiences) and high levels of cognitive reappraisal (i.e., altering how potentially emotion-eliciting situations are construed to change their emotional impact), which highlights the notion that there are moderators to consider when deciding for whom and under which conditions cannabis can be beneficial or harmful (Boden, Gross, Babson, & Bonn-Miller, 2013).

In addition to the potential benefits of cannabis use, there is a burgeoning amount of research demonstrating its potential harms. For example, using Health Canada's 2004 data, Davis, Thomas, Jesseman, and Mazan (2009) demonstrated that 23.7% of lifetime cannabis users reported at least one cannabis-related harm during their lifetime, and 6.4% of past 12 month cannabis users reported at least one cannabis-related harm in the past 12

months; harms were reported in a variety of domains, including friendships or social life, physical health, home life or marriage, work/studies/employment opportunities, financial positions, legal problems, housing problems, and learning problems. This study also demonstrated that 29.5% of weekly/daily cannabis users and 8.4% of monthly cannabis users reported at least one cannabis-related harm in the past 12 months; and these percentages remained approximately the same when controlling for concurrent illicit substance use. Similarly, using Health Canada's 2008 data, Thake and Davis (2011) demonstrated that daily use was particularly predictive of cannabis-related harms and that rates of harms were approximately 20% for those using cannabis less than daily. The authors of these studies note that while frequent cannabis use increases the risk of experiencing cannabis-related harms, many frequent cannabis users do not report any harms from their use. It is also important to be mindful of the fact that it is difficult to ascertain the true nature of cannabis-related harms via survey research, whereby self-reported harms likely represent an underestimation of harms, since non-reporting of harms likely reflects a mixture of genuine lack of harms, unawareness of harms, and denial of harms.

In this vein, more rigorous research is necessary to establish links between cannabis use and potential harms. It should be acknowledged that inferring causal relationships between cannabis use and various harms can be a challenge, and many potential harmful consequences of cannabis use have been identified with varying levels of empirical support (Dennis et al., 2002; Roffman & Stephens, 2012).

For example, the relationship between frequent cannabis use and poorer psychosocial outcomes (e.g., lower educational attainment, greater use of other illicit substances) among adolescents and young adults is robust, even when controlling for potential confounds (Fergusson, Horwood, & Swain-Campbell, 2002). It has also been well established that both acute cannabis intoxication and long-term cannabis use are associated with cognitive and memory impairments (Meier et al., 2012; Solowij et al., 2002; Solowij & Battisti, 2008; Tait, Mackinnon, & Christensen, 2011); however, inferring causality is difficult, there are inconsistent findings with respect to whether cognitive and memory impairment persists once cannabis use has ceased, and there is no

evidence of significant structural damage to the brain from cannabis use across a number of studies (Quickfall & Crockford, 2006; Roffman & Stephens, 2012). As discussed in previous sections of this manuscript, frequent cannabis use has been found to be associated with the development of cannabis use disorders and comorbidity with other substance use and psychiatric disorders; and there is robust evidence that cannabis use increases the risk for developing psychosis, and some evidence that it increases the risk for developing depression, suicidal thoughts, and anxiety (Moore et al., 2007). Physical health problems that have been associated with cannabis use include respiratory problems, increased risk of cardiovascular disease, increased risk of sexually transmitted diseases, and subtle disturbances of cerebral development resulting in cognitive impairment in the offspring of women who used cannabis during pregnancy (Aldington et al., 2007; Boyer et al., 1999; DuRant, Smith, Kriter, & Krowchuk, 1999; Fried, Watkinson, & Gray, 2003; Jayanthi et al., 2010; Mehra, Moore, Crothers, Tetralt, & Fiellen, 2006; Mukamal, Maclure, Muller, & Mittleman, 2008; Richardson, Ryan, Willford, Day, & Goldschmidt, 2002; Schuster, Crane, Mermelstein, & Gonzalez, 2012; Tashkin, 1999). Moreover, while it is almost impossible to estimate the unique effects of cannabis on cancer given high co-occurring rates of cannabis and tobacco use, cannabis has four times the amount of tar as cigarettes and causes similar damage to the mucous membranes in the trachea and bronchi that is associated with increased risk of lung and bronchial cancers (Dennis et al., 2002). Finally, cannabis use has also been associated with motor vehicle accidents and driving impairments, non-traffic injuries, emergency department admissions, drug-related deaths, mortality following treatment of cannabis use disorders, legal problems other than for cannabis possession or trafficking, reduced work commitment, reduced life satisfaction among individuals with cannabis use disorder symptoms, negative psychosocial parameters among patients with fibromyalgia, impulsivity among recreational/non-dependent cannabis users, and alterations of theory of mind network activation (Arendt, Munk-Jorgensen, Sher, & Jensen, 2013; Barrio et al., 2012; Bosker et al., 2012; Dennis et al., 2002; Downey et al., 2013; Hyggen, 2012; Moreno et al., 2012; Roser et al., 2012; Ste-Marie, Fitzcharles, Gamsa, Ware, & Shir, 2012; Swain, Gibb, Horwood, & Fergusson, 2012).

It is worth reiterating, however, that despite the array of potential harms associated with cannabis use, the majority of cannabis users will not experience these harms, in much the same the way that the majority of drinkers or gamblers will not experience problems associated with alcohol use or gambling.

2.2.3 Cannabis Addiction and Cannabis Use Disorders

The construct of addiction has been defined in a multitude of ways (Ries, Fiellin, Miller, & Saitz, 2009; Shaffer, LaPlante, & Nelson, 2012). Irrespective of whether one conceptualizes the construct of addiction as more akin to a brain disease with physiological dependence—with tolerance and withdrawal features, and changes in brain-reward circuitry—or whether one conceptualizes the construct of addiction as more rooted in psychosocial phenomena—such as features of craving, loss of control, compulsive use, negative consequences, habit, or functional impairment—it is clear from a perusal of the scientific literature that cannabis addiction is possible.

With the identification of an endogenous cannabinoid system, cannabinoid receptors, and cannabinoid antagonists, there is now a wealth of evidence that cannabis can produce both tolerance and withdrawal in animals as well as humans (Babor, 2006; Budney, Hughes, Moore, & Vandrey, 2004). Additional evidence has accumulated that has demonstrated that cannabis withdrawal is not rare (Agrawal, Pergadia, & Lynskey, 2008; Hasin et al., 2008), with an estimated 50-95% of participants in cannabis treatment studies reporting withdrawal symptoms in the past year (Budney & Hughes, 2006). Importantly, the withdrawal syndrome has been found to be clinically significant and meaningful, insofar as it can lead to distress, continued use, and relapse (Allsop et al., 2012; Budney, Vandrey, Hughes, Thostenson, & Bursac, 2008; Chung, Martin, Cornelius, & Clark, 2008; Copersino et al., 2006a; Cornelius, Chung, Martin, Wood, & Clark, 2008; Haney et al., 2008; Hasin et al., 2008; Vandrey, Budney, Kamon, & Stanger, 2005). It is noteworthy that while the cannabis withdrawal syndrome might be regarded as less severe than other withdrawal syndromes, such as a heroin withdrawal syndrome, it is of similar magnitude and has similar consequences to nicotine withdrawal, which is a well accepted and clinically valid syndrome (Allsop et al., 2012; Budney et al., 2008; Vandrey et al., 2005; Vandrey, Budney, Hughes, & Liguori, 2008). Indeed, the recently

released DSM-5 now includes cannabis withdrawal as a disorder and withdrawal per se as a criterion for cannabis use disorder (American Psychiatric Association, 2013).

Also in support of the construct of cannabis addiction, research has demonstrated that cannabis cues (such as cannabis per se, or photos of cannabis and paraphernalia, or the scent of cannabis) can trigger self-reports of craving and neural activation in the dopaminergic reward pathway (Filbey & Dewitt, 2012). Other research has directly observed reversible downregulation of CB1 receptors in the brains of daily cannabis smokers, which may be a mechanism for physiological dependence (Hirvonen et al., 2012).

Perhaps the most compelling argument that cannabis addiction is possible is to consider that one of the most popular ways to conceptualize the construct of addiction is to refer to DSM-IV-defined diagnostic criteria for substance abuse and dependence, and to note that, as previously alluded to in this manuscript, cannabis, compared to other illicit substances, is associated with the highest absolute prevalence rate of individuals reporting dependence (and likely abuse) symptoms (Anthony et al., 1994; Stinson et al., 2006; Swift et al., 2001). Indeed, the symptoms of cannabis use disorders (abuse and dependence) as described in the DSM-IV capture many biopsychosocial aspects of addiction, which include: recurrent use resulting in a failure to fulfill major role obligations; recurrent use in physically hazardous situations; continued use despite persistent or recurrent social/interpersonal problems; recurrent legal problems; tolerance; withdrawal; use for longer periods or in larger amounts than intended; persistent desire or unsuccessful attempts to control use; a great deal of time spent in activities related to use; reduced important social, occupational, or recreational activities; and continued use despite physical or psychological problems (American Psychiatric Association, 2000).

2.2.4 Etiology of Cannabis Use Disorders

The etiology of cannabis use disorders is at present poorly understood, but it is thought that it shares many of the same underlying environmental and genetic predisposing risk factors that characterize other addictive disorders (Babor, 2006), which supports the notion of a common syndrome model of addiction (Shaffer et al., 2012). The natural history of cannabis use is such that while most cannabis use remains

experimental and sporadic, the incidence and intensity of use tends to increase over the mid to late teenage years, and then tends to decline in use from the mid 20s, perhaps as a result of new roles and responsibilities (Copeland & Swift, 2009). Rosenberg and Anthony (2001) investigated the natural history of cannabis dependence and found that the onset of symptoms tended to occur within the first 10 years of use; symptoms of loss of control over cannabis (i.e., using larger amounts than intended) and continued cannabis use despite knowledge of harm appeared most rapidly, followed by increased salience (i.e., a large amount of time obtaining, using, and recovering from cannabis); and withdrawal symptoms were reported by the smallest number of users, which occurred at an average age later than all other symptoms. Similarly, among cannabis treatment seekers, Stephens, Roffman, and Simpson (1993) found that the average age of cannabis initiation was 16 years; the average participant had begun daily or near daily use by the age of 20 years; and by the time participants reached their 30s, they had experienced substantial dysfunction as a result of their cannabis use.

There a number of risk factors involved in the development of cannabis use disorders, which interact in a complex and dynamic way. Two particularly strong risk factors are early-onset cannabis use and regular (at least weekly) adolescent cannabis use, which have been associated with later problematic cannabis use, cannabis dependence, other licit and illicit substance use, impaired mental health, delinquency, lower educational achievement, risky sexual behaviour, and criminal offending (Anthony, 2006; Copeland & Swift, 2009; Swift et al., 2012; Swift, Coffey, Carlin, Degenhardt, & Patton, 2008).

These two risk factors per se are influenced by a variety of other risk factors. For example, using data from a longitudinal study of adult male twins, cannabis initiation has been shown to be predicted by high genetic risk for problem cannabis use, high genetic risk of externalizing disorder, high sensation seeking personalities, low parental monitoring, high peer group deviance, and cannabis availability (Gillespie, Lubke, Gardner, Neale, & Kendler, 2012). In another community-based longitudinal study, early initiation of alcohol and nicotine use were associated with early initiation of cannabis use; however, only the association with nicotine use remained after controlling for

externalizing disorders and parental substance dependence (Behrendt et al., 2012). This study also demonstrated that early initiation of alcohol and cannabis, paternal alcohol dependence, and externalizing disorders were associated with cannabis use and a higher risk of developing cannabis use disorders.

Other risk factors have also been shown to be dynamically involved in the development of cannabis use disorders. For example, in a longitudinal study of adolescents and young adults, Swift et al. (2008) demonstrated that there was an independent association between persistent adolescent cigarette smoking and cannabis problems and dependence, which is consistent with evidence of a common vulnerability to both cannabis and nicotine dependence, influenced by shared genetic risk factors and environmental influences, such as a common route of administration and social milieu (Agrawal et al., 2012). Additionally, Swift et al. (2008) found that persistent anxiety and depression were also associated with an increased risk of later cannabis problems and dependence. Another longitudinal study of children and adolescents demonstrated support for a particular developmental pathway to adolescent cannabis use disorders; whereby severity of early childhood maltreatment potentiated less adaptive childhood personality functioning, followed by externalizing problems in preadolescence, and ultimately, adolescent cannabis abuse and dependence symptoms (Oshri, Rogosch, Burnette, & Cicchetti, 2011). Interestingly, a developmental pathway from child maltreatment to adolescent cannabis use disorder symptoms via personality and preadolescent internalizing problems was not supported (Oshri et al., 2011).

Finally, genetically, there is solid evidence that cannabis use and cannabis use disorders are heritable. However, despite twin and family studies showing that cannabis use phenotypes are 40% to 60% heritable, and despite twin studies showing that cannabis use disorders are 50% to 70% heritable, more rigorous genetic research via genome-wide association tests have been unable to pin down or clarify any specific genotypes or candidate genes that can predict cannabis use or cannabis use disorders (Agrawal et al., 2011; Verweij et al., 2012). It is clear that in order to further our understanding of the etiology of cannabis use disorders, continued development and validation of etiological models of cannabis use disorders will be required, which will necessarily involve the

continued use of longitudinal studies and the integration of biopsychosocial areas of research.

2.3 Treatment-Assisted Recovery versus Natural Recovery

2.3.1 Definition of Recovery

In the same way that there are a multitude of definitions of the construct of addiction (Ries et al., 2009; Shaffer et al., 2012), there are also a multitude of definitions of the construct of recovery from addiction (el-Guebaly, 2012; Laudet, 2007). In a recent literature review, it was concluded that a consensual theoretical framework of addiction recovery remains to be explicated, but several major features of, and developments in, recovery can be identified, including: a healing and growth process spanning over years rather than weeks or months; the recognition that recovery and abstinence are not isomorphic concepts; the inclusion of several pathways, such as treatment-assisted recovery and natural recovery; the acceptance of harm reduction approaches (e.g., medication assistance) to the remission of symptoms; and personal characterological change (el-Guebaly, 2012). With respect to cannabis use disorders, the construct of recovery has received little explicit empirical attention, and is often inferred via either abstinence or the remission of problems/symptoms in the context of treatment and epidemiological studies.

2.3.2 Treatment Seeking

Despite the fact that cannabis might be considered to be among the least harmful of the illicit substances, the United Nations has reported that cannabis accounts for the most treatment demand among all illicit substances in Oceania (Australia and New Zealand), North America, and Africa, and it accounts for the second most treatment demand in Europe, behind opiates (United Nations Office on Drugs and Crime, 2012).

In Australia, cannabis has consistently been the second most common primary drug of concern (behind alcohol) among treatment-seekers from 2001 to 2011, with 22% of treatment episodes in the year 2010 sought for cannabis treatment (Australian Institute of Health and Welfare, 2012). Moreover, in the year 2010, among 10 to 19 year-olds, cannabis was the most common primary drug of concern (above alcohol), accounting for 47% of treatment episodes. Interestingly, self-referral was the most common referral

source with cannabis as the primary drug of concern (29% of episodes), and referrals from court diversion programs were also common (20% of episodes). In the year 2010, for primary cannabis admissions, 70% were male, 14% identified as Indigenous, and clients tended to be younger with a median age of 25 compared with 33 for all drug types. Counselling was the most common main treatment type received (39% of episodes), and treatment was most likely to take place in a non-residential facility (62% of episodes).

In the United States, in the year 2010, cannabis was reported to be the third most common primary drug of concern for treatment admissions, behind alcohol and opiates (Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, 2012). For individuals aged 12 or older, cannabis treatment admissions increased from 14% in the year 2000 to 18% in the year 2010. In the year 2010, for primary cannabis admissions, only 16% were self-referred, 74% were male, the average age at admission was 25 years, almost half (47%) were non-Hispanic White, and 58% reported abuse of additional substances (alcohol was reported by 43%). For adolescent treatment admissions, 87% involved cannabis as either a primary or secondary drug of concern, and 41% of these cannabis-involved admissions were referred via the criminal justice system.

In Canada, using data collected between 2001 and 2004, it has been estimated that approximately 25% of clients in Canada (and 22% of clients in Alberta) who enter publicly funded addiction programs report cannabis problems (Rush & Urbanoski, 2007). These clients were predominantly young males with a high rate of legal problems.

Using American data from the NESARC, Stinson and colleagues (2006) were able to examine the specific types of cannabis treatment sought. It was reported that 12-step based programs, physicians, and other health professionals were the most commonly accessed forms of treatment. The lags between disorder onset and first treatment were 5.5 years for cannabis abuse and 3.1 years for cannabis dependence. These findings highlight the importance of educating physicians and other allied health professionals on the nature of cannabis use disorders and their empirically supported assessments and treatments, as well as the need for the dissemination of brief screening tools and interventions in primary care (Gates, Howard, & Sangfal, 2013).

Using data from the NESARC, Stinson and colleagues (2006) also reported that among individuals with lifetime cannabis abuse and dependence, only 9.8% and 34.7% had ever sought professional treatment, respectively; and among individuals with past 12 months cannabis abuse and dependence, only 6.4% and 18.1% sought professional treatment in the past year, respectively. These rates are similar to those obtained using Australian data from the NSMHWB, whereby only 36% of those with a drug use disorder (predominantly cannabis use disorder) had sought professional assistance (primarily from general practitioners) in the past year (Teesson et al., 2000). These rates are also similar to those obtained in another large-scale American-based survey, the NSC, whereby 29% of individuals with cannabis dependence sought treatment during the past year; individuals were more likely to seek treatment if they had concurrent alcohol dependence and major depression, and if they had previously sought professional treatment for other mental health or addiction problems (Agosti & Levin, 2004). In contrast to the robust finding in the alcohol and gambling literatures that greater addiction problem severity is related to treatment seeking (Bischof et al., 2012; Hodgins & el-Guebaly, 2000; Klingemann, Sobell, & Sobell, 2010; Toneatto et al., 2008), it is surprising that Agosti and Levin (2004) did not find an association between greater cannabis dependence severity and likelihood of treatment seeking in the NCS, though the authors acknowledge that small sample size and insufficient power might account for this null finding.

Thus, despite the high demand for cannabis treatment relative to other drugs, the majority of individuals with cannabis use disorders do not seek professional treatment, a finding of which parallels the addictive disorder literature more generally (Cunningham, 2005; Mojtabai, 2005).

Only three published studies (Ellingstad, Sobell, Sobell, Eickleberry, & Golden, 2006; Fernandez-Artamendi, Fernandez-Hermida, Garcia-Fernandez, Secades-Villa, & Garcia-Rodriguez, 2013; Gates, Copeland, Swift, & Martin, 2012) and one non-published study (Kwong, Howard, & Arcuri, 2010) have explicitly examined potential barriers to treatment seeking for cannabis use disorders. In a study of 25 adult former daily cannabis users who without treatment were abstinent in the past year, Ellingstad et al. (2006) reported that the top major barriers to treatment seeking were believing that treatment

was not needed, wanting to quit alone, and stigma. Similarly, Fernandez-Artamendi et al. (2013) reported that among adolescent cannabis users, the top major barriers to treatment seeking were lack of a perceived problem, desire to solve one's problems alone, and fear of the family finding out; adolescents with an intention to change their cannabis use were significantly more likely to endorse the desire to solve the problem alone and fear of the family finding out than adolescents who did not intend to change. Among a total sample of adolescent and adult regular cannabis users in treatment, in the community, and from a widespread online survey, the top major barriers to treatment seeking were the feeling that treatment is not necessary to reduce cannabis (commonly mentioned by participants in the community, particularly female participants), the opinion that cannabis users are not likely to be ready to stop their use (commonly mentioned by participants in cannabis treatment, and younger participants), and a lack of awareness of treatment options (commonly mentioned by older participants) (Gates et al., 2012). Finally, among a sample composed of adult and adolescent participants who reported via a web-based survey that they had significantly ceased or reduced their problematic cannabis use for at least six months without treatment, the top major barriers to treatment seeking were feeling that treatment was unnecessary, aversion to formal treatments, and ashamed/embarrassed to seek support (Kwong et al., 2010).

Thus, a common theme that emerges from these studies is that among the top barriers to treatment seeking for cannabis use disorders in a variety of samples are the belief that treatment is not needed, the desire to resolve the problem alone, and the stigma associated with seeking treatment. These studies also highlight how particular moderators (e.g., type of sample, intention to change, age, gender) can influence barriers to treatment seeking.

2.3.3 Natural Recovery

While it might be alarming that the majority of individuals with cannabis use disorders—and addictive disorders more generally—do not seek professional assistance and remain untreated (Agosti & Levin, 2004; Cunningham, 2005; Mojtabai, 2005; Stinson et al., 2006; Teesson et al., 2000), there is a wealth of research that demonstrates that natural recovery without treatment from any addictive disorder is a common pathway

to recovery (Bischof, Rumpf, & John, 2012; Klingemann & Sobell, 2007; Klingemann et al., 2010). Most natural recovery studies to date have focused on recovery from alcohol dependence, followed by heroin dependence, but other addictive disorders have also been studied (Carballo et al., 2007; Sobell, Ellingstad, & Sobell, 2000).

In a recent overview of the natural recovery literature, Bischof et al. (2012) note several important observations and findings that deserve attention. First, it is noted that researchers and clinicians have used a multitude of interchangeable terms to describe processes of remission without the use of formal help, including *natural recovery, spontaneous remission, natural resolution, maturing out, untreated recovery, remission without formal help, self-healing, self-change,* et cetera. The present study uses the term *natural recovery*, except when referring to research that has used other terminology.

Second, studies of natural recovery have varied with respect to how the construct of recovery is defined and measured. For example, although most natural recovery studies have included participants with lifetime DSM-IV- or ICD-10-defined substance dependence, other studies have included participants with substance abuse or problems. Moreover, the duration of recovery required for study participation has varied between studies, ranging from the most widely used criterion of 12 months sustained full remission, to 5 years of full remission. While 5 years of full remission has been proposed as a way to avoid biased results due to unstable recoveries (Sobell, 2007a), a follow-up of people who naturally recovered from alcohol dependence revealed that most natural recoveries with an initial duration of at least 12 months were stable (Rumpf, Bischof, Hapke, Meyer, & John, 2006). Further, not all studies have used abstinence as an indicator of recovery, and in fact, most studies have reported low-risk use or moderated use as a very frequent occurrence (Sobell, 2007a). Sobell (2007a) noted that this latter finding in the natural recovery literature parallels findings from the treatment literature and suggests that the addiction field ought to develop a conceptualization of recovery that accommodates multiple pathways to recovery, including moderation and harm reduction.

Third, studies of natural recovery have varied with respect to what qualifies as untreated. Whereas some studies have included regular self-help group participation as natural recovery, others have used a more strict definition of natural recovery, excluding

every kind of help exceeding more than two self-help group sessions, and other studies have included participants who received formal treatment (sometimes even inpatient treatment) but did not attribute their recovery to the treatment experience. Bischof et al. (2012) note that while comparisons between treatment-free and minimal-treatment participants have yielded no significant differences, regular self-help group participation ought to be considered as treatment and as an exclusion criterion for natural recovery.

Finally, Bischof et al. (2012) note that studies comparing treatment-assisted recovery and natural recovery have consistently shown more commonalities than differences in the processes of recovery (i.e., reasons for resolution and maintenance factors), with the exceptions that research has consistently shown that natural recovery is more likely among individuals with less severe addiction problems, and treatment-assisted recovery is more likely to be precipitated by major events, such as legal or traumatic events. Klingemann et al. (2010; p. 1513) have referred to these commonalities as the "shrinking gap between the self-change perspective and the treatment outcome literature." Nevertheless, Bischof et al. (2012) note that studies focusing on natural recovery have the potential to help improve formal treatments, contribute to the development of new treatments for people who would otherwise not seek treatment, and deepen our understanding of the natural history of addiction.

As noted by Hodgins and el-Guebaly (2000), in the majority of early natural recovery studies, small groups of recovered individuals were recruited through media advertisements and interviewed via unstructured interviews regarding their experiences. More recent studies, however, have used a more rigorous methodology, whereby they have incorporated larger sample sizes, compared non-treated individuals, verified reports by collaterals, used a strict definition of no treatment, required longer-term recoveries, and used standardized measures where available. In a comment on the current state-of-the-art in natural recovery research, Klingemann et al. (2010) recommended that future natural recovery studies ought to employ survey research to capture drifting or maturing-out processes that the individual may not be explicitly aware; employ longitudinal studies to investigate role changes over the life course and its relation to self-change; compare self-change processes across different types of problem behaviours and cultures with the

use of a common research design to further validate previous self-change research findings; promote combined qualitative-quantitative research designs; integrate self-change research into broader theoretical frameworks; and investigate individuals who do not succeed at self-change.

With respect to cannabis use disorders, very little natural recovery research has been conducted. In the two major systematic reviews of the natural recovery literature that have been conducted thus far (i.e., Carballo et al., 2007; Sobell et al., 2000), a total of 8 studies have involved cannabis (i.e., Boyd et al., 2005; Copeland, 1997; Cunningham, 1999; Cunningham, Koski-Jannes, & Toneatto, 1999; Cunningham, 2000; Ellingstad et al., 2006; Koski-Jannes & Turner, 1999; Price, Risk, & Spitznagel, 2001). While it is promising that there was an increase in the number of cannabis-involved natural recovery studies from the first to the second systematic review (1 study vs. 7 studies), many of these studies were not able to provide an in-depth account of the recovery process from cannabis use disorders.

For instance, in Copeland (1997), 32 women who displayed significant improvement in consumption behaviour from a variety of addictive behaviours and who no longer displayed features of dependence were interviewed about barriers to treatment seeking; however, cannabis was reported to be the drug of dependence for only 5% of the sample. In Koski-Jannes and Turner (1999), 76 participants who had experienced negative consequences from a variety of addictive behaviours, had at least two of five Severity of Dependence (SDS; Gossop et al., 1995) signs of dependence, and who had resolved their problem more than three years ago were interviewed about factors influencing recovery; however, of the 76 participants, only 16 were classified as polydrug abusers, "most" of which had regularly used cannabis. In Price et al. (2001), 841 Vietnam War veterans from the United States who had positive urine tests for a variety of drugs when leaving Vietnam were surveyed at 25-year follow-up. In this study, 82.5% reported that their last cannabis quit attempt was "cold turkey", and 88.3% reported that this attempt was successful; however, approximately 20% of the total sample reported that they had used treatment, and so the natural recovery (abstinence) rate from cannabis can not be inferred.

Two studies from the Carballo et al. (2007) and Sobell et al. (2000) reviews were epidemiological in nature and were consistent with the finding from the addictive disorder literature that natural recovery is common. Specifically, Cunningham (1999) used data from a Canadian drug and alcohol survey and reported that among former regular cannabis users who had not used any cannabis in the past year, 91.0% reported that they had never used any drug or alcohol treatment services, and 94.8% reported that they had never used any drug-related treatment services. However, using data from an American survey and employing more stringently-defined criteria for natural recovery (i.e., individuals who met DSM-IV-defined lifetime cannabis dependence, but not past 12 months cannabis abuse or dependence), Cunningham (2000) reported lower natural recovery rates; namely, 56.1% reported that they had never used any drug or alcohol treatment services, and 72.8% reported that they had never used any drug-related treatment services. It is noteworthy that in both Cunningham (1999) and Cunningham (2000), natural recovery rates for cannabis were higher than all other illicit substances.

The remaining studies from the Carballo et al. (2007) and Sobell et al. (2000) reviews are more in-depth and help to shed some light on the recovery process from cannabis use disorders. Specifically, in a pilot study, participants who had used cannabis at least 50 times in their life but not in the past year reported that their top major reasons for resolution reflected intrapsychic changes, such as growing up or personal decisions, as well as situational changes or new responsibilities, such as family roles; these reasons for resolution were similar to those reported among former crack cocaine users and both abstinent and moderate drinkers (Cunningham et al., 1999).

Boyd et al. (2005) interviewed 65 adult non-treatment seeking cannabis users about their quitting strategies. However, it is difficult to glean information about the natural recovery process per se from this study for a number of reasons, including the fact that 78% of participants reported current cannabis use; 20% reported having attended a self-help group; 9% reported having received counseling or psychotherapy; 5% reported having seen a physician; cannabis problems or cannabis use disorder symptoms were not measured or reported; and to be eligible for the study, participants only had to have made one self-defined "serious" attempt to quit cannabis. Nevertheless, among this particular

sample, it was reported that changing one's environment was rated as the most helpful quitting strategy while seeking help from professionals was the least helpful.

Finally, Ellingstad et al. (2006) interviewed 25 adult former daily cannabis users who without treatment were abstinent from cannabis for at least one year. It was reported that participants' cannabis problems decreased in the year prior to recovery and that the major reasons for resolution were: viewing cannabis as more negative, experiencing negative effects from cannabis, and having social influences to quit. The major maintenance factors reported were: development of/return to interests or activities not related to cannabis, avoidance of triggers, and lifestyle change. As alluded to previously in this manuscript, the major barriers to treatment seeking were: believing that treatment was not needed, wanting to quit alone, and stigma. It is noteworthy that while Ellingstad et al. (2006) is a very important, and the most in-depth, analysis of the natural recovery process from cannabis use disorders to date, this study did not use the remission of cannabis use disorder symptoms as a proxy of recovery, and instead used abstinence from daily cannabis use as a proxy of recovery. This is a somewhat problematic interpretation of recovery given that not all daily cannabis users report cannabis-related problems or diagnostic symptoms (Davis et al., 2009; Hall & Pacula, 2003; Kandel & Davies, 1992; Thake & Davis, 2011). While 72% of participants in this study had a lifetime cannabis dependence diagnosis (which decreased to 56% in the year prior to recovery), it is unclear whether the remaining 28% of participants met cannabis abuse diagnostic criteria, and therefore, whether they could technically be considered as recovered from a cannabis use disorder. However, technicalities aside, it is likely that the participants in this study had indeed recovered from a construct akin to a DSM-IV-defined cannabis use disorder, especially given that the majority of participants reported experiencing negative consequences from their cannabis use, including memory/thinking problems (88%), loss of interest (76%), social/interpersonal problems (68%), and emotional/psychological problems (64%).

One study might be considered to have been overlooked by the Carballo et al. (2007) and Sobell et al. (2000) reviews. Namely, in a one year follow-up of 200 long-term cannabis users (more than half of which were daily users and met dependence

diagnoses), Swift, Hall, and Copeland (2000) reported that nearly two thirds (62%) of their sample had attempted reduce or quit their use in the period between baseline and follow-up, with the majority (92%) doing so unassisted. The top major reasons reported for reducing or quitting were: physical or psychological health concerns (43%), boredom with cannabis use or concerns that they were using too much (27%), lack of money (26%), and life circumstances (12%). Relapse was most commonly due to stress or negative moods (27%), availability (25%), and enjoyment of smoking (18%).

Since the Carballo et al. (2007) and Sobell et al. (2000) reviews, several other studies related to the natural recovery process from cannabis use disorders have been conducted, two of which were epidemiological in nature. One of these epidemiological studies was a prospective longitudinal German study that followed a cohort of 14 to 24 year-olds over a 10 year span. It was reported that 85.4% had a natural recovery rate from DSM-IV-defined cannabis dependence, which was a lower rate compared to tobacco (99.3%), illegal drugs (95.4%), and alcohol (86.9%) (Perkonigg, Rumpf, & Wittchen, 2009). This finding is inconsistent with earlier epidemiological studies, which found that the natural recovery rate for cannabis was higher than all other illicit substances (Cunningham, 1999; 2000). The other epidemiological study used data from the NESARC to examine predictors of recovery from cannabis use disorders as defined by meeting lifetime DSM-IV-defined cannabis dependence, but not current (past 12 months) cannabis abuse or dependence (Agosti & Levin, 2007). It was reported that older age, marriage, and non-daily cannabis use were positively associated with recovery; and of the recovered sample, 65% had naturally recovered, 10% reported cannabis use in the past year (which is suggestive of moderated use), and 22% had a current comorbid addictive disorder.

The remaining studies conducted since the Carballo et al. (2007) and Sobell et al. (2000) reviews have involved more in-depth analyses of non-treatment seeking, active cannabis users who have not yet recovered. Specifically, one of these studies by Copersino et al. (2006b) used the same sample pool as Boyd et al. (2005) in order to interview non-treatment seeking cannabis users about their reasons for quitting cannabis, changes in other substance use during the quit attempt, and reasons for the resumption of

use. It was reported that the top major reasons for quitting were concerns about the adverse impact of cannabis use on health and on self- and social image; the top major reasons for resuming cannabis were relief of stress and enjoyment; and a majority of participants increased their use of alcohol, tobacco, and sleeping aids at the time of their quit attempt, but did not initiate new substance use. However, as with Boyd et al. (2005), it is difficult to glean information about the natural recovery process per se from this study because cannabis problems or cannabis use disorder symptoms were not measured or reported, and to be eligible for the study, participants only had to have made one self-defined "serious" attempt to quit cannabis.

Another interesting study reported that among 19 non-treatment seeking daily cannabis users who intended to quit or reduce on their own in the next month (participants were required to call a phone each night for 28 nights to report cannabis use and reported intentions to change at the end of each week), initial goal selection was a poor predictor of outcome, most users made multiple and short-lived attempts to change, reduced use was as common as abstinence, many attempts to change were initially successful but few persisted, and other drug use (including alcohol, tobacco, caffeine, and use of other illicit drugs) did not appear to worsen with cannabis moderation or abstinence (Hughes, Peters, Callas, Budney, & Livingston, 2008).

As alluded to previously in this manuscript, Gates et al. (2012) examined barriers and facilitators to treatment seeking among a total sample of adolescent and adult regular cannabis users in treatment, in the community, and from a widespread online survey. A number of moderators of barriers to treatment seeking were noted, including age, gender, and treatment status. Whereas participants in treatment typically reported barriers intrinsic to the individual, participants in the community reported barriers relating to available treatments; facilitators to treatment seeking were more homogenous and most commonly related to availability of information.

Fernandez-Artamendi et al. (2013) reported that among adolescent cannabis users who responded to a school-based survey in Spain, 38.7% identified as self-changers (i.e., in the action and maintenance stages, and abstinent from cannabis for at least one month) based on a measure modelled after Prochaska and DiClemente's stages of change

construct in the Transtheoretical Model (DiClemente & Prochaska, 1998). Only 1.9% of the total sample reported having received and completed some type of cannabis treatment beyond the past 12 months. Compared to participants with intention to change (i.e., in the contemplation and preparation stages), it was reported that self-changers had lower rates of cannabis use, started using cannabis significantly later in life, had been using cannabis for a fewer number of years, had lower rates of current cannabis problems and dependence and other substance use, and had lower paranoid symptomatology.

Finally, in a non-published qualitative study among a sample of adult and adolescent participants who reported via a web-based survey that they had significantly ceased or reduced their problematic cannabis use for at least six months without treatment, a number of interesting variables were assessed, including: factors influencing cannabis initiation and continued cannabis use; physical and psychological symptoms experienced while using cannabis; number of quit or reduce attempts and perceptions about why they were unsuccessful; barriers to treatment seeking; reasons for resolution; techniques used to initiate change; maintenance factors; withdrawal symptoms and management; other drug use; and life changes following stopped/reduced cannabis use (Kwong et al., 2010). However, some of the results are confounded by the fact that the mean Severity of Dependence (SDS; Gossop et al., 1995) cannabis score for the total sample was 5.1, with 60% of participants scoring higher than the cut-off point (3 for adults, 4 for adolescents) for a score in the dependent range. It is therefore unclear to what extent this sample could be considered to have recovered from a cannabis use disorder, as the sample was likely composed of both potentially recovered and non-recovered participants.

Thus, of all natural recovery studies to date involving cannabis, the majority have either been epidemiological in nature or have involved in-depth analyses of non-treatment seeking, active cannabis users who have not yet recovered. Only one study has provided an in-depth account of the natural recovery process among participants who have actually recovered (i.e., Ellingstad et al., 2006); and as alluded to earlier, this study (while very important) used abstinence from daily cannabis use as a proxy of recovery rather than remission from cannabis use disorder symptoms. As such, not a single study

to date has interviewed individuals who have recovered specifically from a cannabis use disorder in order to obtain rich, qualitative-quantitative data about the natural recovery process, and the recovery process more generally.

2.3.4 Psychosocial Treatment

The evidence base for the psychosocial treatment of cannabis use disorders is promising, yet still in its infancy relative to other substance use disorders (Budney, Roffman, Stephens, & Walker, 2007; Copeland & Swift, 2009; Roffman & Stephens, 2012). As of Roffman and Stephens' (2012) book chapter, there had been at least 11 systematic studies of treatments for adults with cannabis use disorders. These treatments have largely been adaptations of treatments of alcohol and other substance use disorders and include cognitive-behavioural therapy (CBT), motivational enhancement therapy (MET), and abstinence-based contingency management (CM). In brief, CBT targets cannabis use via various cognitive and behavioural techniques and coping strategies, such as the use of functional analyses, thought monitoring and challenging, avoidance and management of triggers and high-risk situations, management of cravings, and drug refusal skills. MET is based on Miller and Rollnick's (2013) Motivational Interviewing (MI) theory and techniques, as well as personalized and normative feedback regarding cannabis use; the approach involves addressing ambivalence about change, strengthening commitment to change, expressing empathy, supporting self-efficacy, rolling with resistance, and developing discrepancy between behaviours and values. CM is the systematic use of rewards and punishments following a target behaviour, which essentially involves rewarding abstinence and drug testing behaviour with the use of vouchers that have monetary value and can be exchanged for reinforcers other than cannabis.

In general, different combinations of CBT, MET, and CM have been found to be efficacious and effective in reducing cannabis use and cannabis-related problems for adults with cannabis use disorders, in both group and individual formats, and with varying session lengths (Budney et al., 2007; Copeland & Swift, 2009; Roffman & Stephens, 2012). While the combination of all three approaches has been demonstrated to lead to the most enduring abstinence rates, a recent study curiously reported that the

addition of CBT to CM actually worsened outcomes for young adult cannabis dependent clients involved with the criminal justice system; the authors suggest that this might be due to either improper implementation of the protocol or that the combined treatment was not well suited to the particular population (Carroll et al., 2012). It is noteworthy that despite 12-step based programs being among the most accessed forms of cannabis treatment (Stinson et al., 2006), evaluations of the efficacy of 12-step based programs and their potential role as an integrated component in the treatment of cannabis use disorders are noticeably absent from the literature (Danovitch & Gorelick, 2012).

The adolescent literature mirrors the adult literature with respect to demonstrating promising outcomes for different combinations of CBT, MET, and CM in the treatment of cannabis use disorders (Budney et al., 2007). Additionally, while not always specifically focused on the treatment of cannabis use disorders per se, a number of family-based therapies have shown promise, including Functional Family Therapy (FFT; Waldron, Slesnick, Brody, Turner, & Peterson, 2001), Multidimensional Family Therapy (MDFT; Liddle et al., 2001), Multisystemic Therapy (MST; Henggeler et al., 2006), Family Support Network intervention (FSN; Dennis et al., 2004), Adolescent Community Reinforcement Approach intervention (ACRA; Dennis et al., 2004), and Brief Strategic Family Therapy (BSFT; Azrin, Donohue, Besalel, Kogan, & Acierno, 1994). In the largest multisite clinical trial of outpatient treatment for adolescent substance use disorders focused specifically on cannabis use to date (i.e., the Cannabis Youth Treatment Study; Dennis et al., 2004), similar clinical outcomes, with mostly small effect sizes, were reported among CBT-MET, FSN, MDFT, and ACRA; the most cost effective treatments were CBT-MET and ACRA. In another recent clinical trial, CBT and MDFT were reported to be equally effective, with better clinical outcomes for CBT reported among older adolescents and those without comorbid psychiatric problems (i.e., past year conduct or oppositional defiant disorder, and internalizing problems), and better clinical outcomes for MDFT reported among younger adolescents with these comorbid psychiatric problems (Hendriks, van der Schee, & Blanken, 2012).

Despite the promising results in both the adult and adolescent literatures, effect sizes for clinical outcomes in these interventions have been modest at best; and across

these trials, reduced cannabis use rather than complete abstinence has tended to be the more common outcome (Budney et al., 2007; Copeland & Swift, 2009; Dennis et al., 2004; Peters, Nich, & Carroll, 2011). Indeed, Peters et al. (2011) evaluated multiple indicators of cannabis use, cannabis-related problems, and psychosocial functioning from two independent clinical trials—specifically, the Marijuana Yale Study (*N* = 136) (Carroll et al., 2006), and the largest and most comprehensive multisite clinical trial of adult cannabis dependence to date (*N* = 450), the Marijuana Treatment Project (Marijuana Treatment Project Research Group, 2004)—and reported that effect sizes associated with most end-of-treatment outcomes fell within the small to medium range. Moreover, as noted in Budney et al. (2007), even with CBT-MET plus CM, the most highly efficacious treatment for adults, only approximately 50% of those who enrol in treatment achieve an initial 2-week period of abstinence, and among those who do, approximately 50% resume cannabis use within one year (Budney, Moore, Rocha, & Higgins, 2006; Kadden, Litt, Kabela-Cormier, & Petry, 2007). In addition, across studies, 1-year abstinence rates have ranged between 19% and 29% for CBT-MET, and between 9% and 28% for MET; and while an additional percentage of adults have reported a reduction in cannabis use and cannabis-related problems, many have showed no evidence of progress. The adolescent literature is similar insofar as in the Cannabis Youth Treatment study, small effect sizes in clinical outcomes among the various treatments were observed, and abstinence rates at the end of treatment were only 11% to 15% (Dennis et al., 2004). Thus, there exists a need to further improve our psychosocial treatments for cannabis use disorders.

One way in which to further improve treatments is to better understand the mechanisms and active ingredients of change, which can be difficult given that treatments are often evaluated at the level of treatment manuals or entire protocols rather than specific techniques or proposed mechanisms. Unfortunately, little is known about exactly how treatments for cannabis use disorders exert their effects; though some studies have specifically examined mechanisms of change (Litt, Kadden, & Stephens, 2005; Litt, Kadden, Kabela-Cormier, & Petry, 2008; Stephens, Wertz, & Roffman, 1993, 1995).

For example, using data from the Marijuana Treatment Project (Marijuana Treatment Project Research Group, 2004), Litt et al. (2005) examined the role of coping skills and cognitive constructs as mediators of treatment outcome. It was reported that cannabis outcomes up to 15 months were predicted by the use of coping skills, but that the CBT-MET treatment (which is coping skills-oriented) did not result in greater coping skills acquisition than did the MET comparison treatment (which is not coping skills-oriented); this result was consistent with a review on the proposed mechanisms of action of CBT for treatments of alcohol dependence, whereby only one of ten studies provided evidence for a mediational role of coping skills in improving outcomes (Mortgenstern & Longabaugh, 2000). It was also reported in Litt et al. (2005) that self-efficacy in the ability to refrain from cannabis use was a partial mediator of treatment outcome and that increases in self-efficacy from pre- to post-treatment was a more powerful predictor of decreases in cannabis use over the follow-up year than was coping skills change. Similarly, in a separate dismantling study in the context of a clinical trial that compared CBT-MET coping skills training, CM, and CBT-MET plus CM, it was reported that the early use of coping skills significantly predicted long-term outcomes, and that successful outcomes were related to changes in self-efficacy, which in turn was related in part to continuous abstinence during treatment (Litt et al., 2008). Other studies have also demonstrated the predictive validity of self-efficacy (in the ability to refrain from cannabis use) in relation to future cannabis use following treatment (Stephens et al., 1993, 1995).

Another recent study demonstrated that specific types of client statements (i.e., expressions of desire and reasons for change, but not commitment language) were predictive of MI treatment outcomes through 34-month follow-up above and beyond baseline levels of cannabis use or motivation to change (Walker, Stephens, Rowland, & Roffman, 2011b). Another study focused on non-specific treatment factors in the Marijuana Treatment Project and demonstrated that the working alliance was predictive of improved cannabis use outcomes (Gibbons et al., 2010).

In light of high comorbidity rates (Stinson et al., 2006), it is unfortunate that there has been a dearth of research devoted to the treatment of comorbid cannabis use disorders

and other substance use and psychiatric disorders. Indeed, while one small study has used a CM approach to sequentially target cocaine use and then cannabis use (Budney, Higgins, Delaney, Kent, & Bickel, 1991), and two other small studies have tested approaches to reducing cannabis use among methadone maintenance patients (Calsyn & Saxon, 1999; Kidorf, Neufeld, King, Clark, & Brooner, 2007), only two psychosocial interventions to date have been developed to explicitly and concurrently target cannabis use disorders and other substance use or psychiatric disorders (Edwards et al., 2006; Hoch et al., 2012).

In Edwards et al. (2006), a CBT-MET cannabis-focused intervention for youth targeting cannabis use and psychosis was evaluated in a randomized trial; while a reduction in cannabis use was observed, there was no difference in cannabis use or psychosocial outcomes for this treatment compared to a psychoeducational control. In Hoch et al. (2012), participants aged 16 to 44 years with DSM-IV-defined cannabis dependence as the main substance use diagnosis received either a delayed treatment control or an active treatment composed of CBT-MET and sessions specifically designed to target the participants' mental health and psychosocial problems. It was reported that participants who received the active treatment improved significantly in the frequency of cannabis use per week, overall addiction severity, number of disability days, and overall level of psychopathology, with outcomes largely retained through 6-month follow-up. Moreover, abstinence rates were approximately 50%, which are substantially higher than those obtained in other previous studies. Indeed, it is likely that the further development and validation of treatment protocols that explicitly target cannabis use disorders in the context of concurrent disorders might help to raise the small to medium effect sizes for clinical outcomes that have been observed in the literature.

While it is important to improve our treatments for cannabis use disorders via capitalizing on mechanisms of change, targeting comorbidity, and thereby increasing the potency of our interventions, so to speak, it is also important to improve the impact of our treatments via extending their reach. Several studies have attempted to extend the reach of our treatments beyond conventional treatment models in a number of ways, including extending the length of treatment (Roffman & Stephens, 2012), offering brief

interventions and "check-up" approaches that target users who are ambivalent about change (Fischer et al., 2013; Stephens et al., 2004; Walker et al., 2011a), and leveraging technology (Budney et al., 2011; Gates, Norberg, Copeland, & Digiusto, 2012; Norberg, Wright, Hickey, & Copeland, 2012b).

For example, Roffman and Stephens' research group have added repeated brief therapy episodes over 2.5 years to an initial four-session course of CBT-MET, with a view towards the idea that outcomes might be optimized if cannabis use disorders are treated as chronic disorders (no pun intended) that require longer-term treatment (Roffman & Stephens, 2012). However, this particular attempt at using a chronic care model was not entirely successful, as relatively few participants took advantage of the additional sessions despite ongoing dependent cannabis use, and overall outcomes after 3 years were no better than those achieved with a standard nine-session intervention.

Brief interventions and "check up" approaches have also been tested. "Check up" approaches target ambivalence about change and avoid the stigma associated with formal treatment; offer objective assessment and personalized feedback; and employ MI techniques. Evidence for the efficacy of "check-up" approaches has been promising but unfortunately not ideal among both adults and adolescents, and more research is needed to clarify potential mechanisms of change and to address ways to strengthen these approaches (Roffman & Stephens, 2012; Walker et al., 2011a). Recently in Canada, Fischer et al. (2013) tested the feasibility and impact of brief interventions akin to the "check up" approach (i.e., oral and written interventions with non-judgemental information on cannabis-related health risks, concrete suggestions and techniques to modify such risks, and brief motivational components) among frequent cannabis using university students and reported positive outcomes.

Other studies have leveraged technology to extend the reach of our treatments. Recently, Budney et al. (2011) noted that cost and service availability issues have limited access to the deliverance of combinations of CBT, MET, and CM, which is the most efficacious treatment for adults with cannabis use disorders to date. As such, Budney and colleagues have begun to test computer-assisted versions of CBT-MET-CM. In an initial study, preliminary findings suggested that computer-assisted delivery of CBT-MET-CM

was acceptable to outpatients and did not adversely impact compliance or outcomes during treatment (Budney et al., 2011). In a similar vein, Gates et al. (2012) evaluated the efficacy of a telephone-based CBT-MI intervention and demonstrated that compared to controls, intervention participants reported greater reductions in dependence symptoms and cannabis-related problems, greater self-efficacy to reduce cannabis use, and higher abstinence rates at 12-weeks. Lastly, Norberg et al. (2012b) were able to reach rurally-located participants via a mailed format postal intervention of CBT-MI, whereby it was reported that treatment completers demonstrated a significant reduction in cannabis use at 1-month follow-up; however, of the 268 people who expressed interest in the study, only 36 completed treatment.

Thus, much more research is needed to improve our psychosocial treatments for cannabis use disorders. In order to improve the impact of our treatments and to achieve clinically significant improvements in a variety of domains—such as reductions in cannabis use frequency and cannabis-related problems, and improvements in psychosocial functioning—a number of research avenues require further development, which include elucidating mechanisms of change, explicitly developing treatments that target concurrent disorders and their interactions, and extending the reach of our treatments. To increase effectiveness, it is also necessary to track client characteristics and predictors of outcomes in treatment studies. In doing so, evidence-based practitioners in the community will be in a better position to match clients with specific therapeutic modalities and techniques. Finally, while it is common in the natural recovery literature to simply ask participants about what helped them to overcome their problem and to remain problem-free, this approach has been less common in the treatment literature (Orford, 2008), at least with respect to cannabis use disorders. As such, exploratory research of this nature can help generate hypotheses and help to elucidate the mechanisms of change of treatment-assisted recovery more broadly, which can perhaps inform research on the mechanisms of change within particular treatments per se.

2.3.5 Pharmacological Treatment

To date, there have been no formally approved pharmacotherapies for cannabis use disorders (Danovitch & Gorelick, 2012); though in recent years, there has been a surge in interest in their potential for treatment, especially with respect to cannabis withdrawal. Research has evaluated three major treatment strategies for the pharmacological treatment of cannabis use disorders, which include agonist substitution to suppress the withdrawal syndrome (akin to other replacement therapies, such as using an opiate to suppress heroin withdrawal or nicotine to suppress nicotine withdrawal), the use of antagonists to block physiological and subjective effects of cannabis, and modulation of other neurotransmitter systems to reduce reinforcement and cravings from cannabis (Budney et al., 2007; Danovitch & Gorelick, 2012). Of the studies conducted thus far, oral delta-9-tetrahydrocannabinol (THC) or dronabinol (a cannabinoid CB1 receptor agonist), *N*-acetylcysteine (a neuromodulator of glutamate), and buspirone (a neuromodulator that is a serontonin 1A receptor agonist and dopamine D2 receptor antagonist) have been found to be the most promising pharmacotherapies for the treatment of cannabis use disorders (Danovitch & Gorelick, 2012). In light of high comorbidity rates (Stinson et al., 2006), it is noteworthy that comorbid cannabis use disorders and major depression have been targeted with fluoxetine (a selective serotonin reuptake inhibitor) with mixed results (Danovitch & Gorelick, 2012); and with venlafaxine (a selective serotonin and norepinephrine reuptake inhibitor) with results suggesting possible contraindication (Levin et al., 2013). Since Danovitch and Gorelick's (2012) review, gabapentin—an analog of gamma butyric acid (GABA)—has been tested in a pilot study with promising results (Mason et al., 2012), and Sativex—an oral spray that administers a fixed, specified ratio of THC to cannabidiol (CBD)—is currently in the midst of double-blind, randomized, placebo controlled trial in Australia for the treatment of cannabis withdrawal (National Drug and Research Centre, 2013).

2.4 Abstinence versus Moderation

2.4.1 Overview in the Addictive Disorders Literature

Moderation-based research dates back to the 1960s and was originally used to test the popular, but untested disease model of alcoholism (Jellinek, 1960). This type

research quickly became embroiled in emotionally-charged debates between scientific- and belief-based views of alcohol problems, and also threatened an entire culture in the alcohol field founded upon the abstinence-based philosophy of Alcoholics Anonymous (AA) (Saladin & Santa Ana, 2004; Sobell & Sobell, 1995, 2011). Over the following decades, the highly contested issue of abstinence versus moderation has also been debated beyond the alcohol literature to include the addictive disorders literature more generally (Hall, Havassy, & Wasserman, 1990, 1991; Ladouceur, 2005; Marlatt & Donovan, 2005; Sobell, 2007a). Several terms have been employed interchangeably in both research and practice to describe non-abstinence-based treatment goals and recovery, including *moderation, reduced, controlled, low-risk, responsible,* et cetera. The present study uses the term *moderation*, except when referring to research that has used other terminology.

The traditional view that abstinence is the only legitimate pathway to recovery from addictive disorders has been discredited by years of research demonstrating the contrary (Sobell, 2007a). Moreover, research has demonstrated the viability of moderation treatment goals—most often for alcohol use and gambling disorders than for illicit substance use disorders—and has suggested that offering these goals might provide a more realistic, attractive option for clients, and might lead to lower attrition rates by increasing self-efficacy and motivation early in treatment (Blaszczynski, McConaghy, & Frankova, 1991; Booth, Dale, & Ansari, 1984; Ladouceur, Lachance, & Fournier, 2009; Marlatt & Donovan, 2005; Sobell & Sobell, 1995). Beyond a client merely having a moderation goal in treatment, moderation-focused treatments for alcohol use and gambling disorders have been specifically developed and tested that help clients work explicitly towards moderation goals and that incorporate moderation-focused techniques (Dowling, Smith, & Thomas, 2009; Ladouceur et al., 2009; Marlatt & Witkiewitz, 2002; Saladin & Santa Ana, 2004). For example, in the alcohol literature, several treatment approaches to controlled drinking have been found to be efficacious, including behavioural self-control training (Hester, 1995), moderation-oriented cue exposure (Drobes, Saladin, & Tiffany, 2001), guided self-change (Sobell & Sobell, 1993), and

other interventions based on harm reduction principles (Marlatt & Witkiewitz, 2002; Saladin & Santa Ana, 2004).

The acceptance of moderation goals and moderation-focused treatments might vary as a function of culture, attitudes, and beliefs. Indeed, controlled drinking has been found to be more acceptable by healthcare providers in the United Kingdom, Australia, Norway, and Canada than in the United States (Cox, Rosenberg, Hodgins, Macartney, & Maurer, 2004). Sobell and Sobell (2011) opined that despite decades of mounting scientific evidence showing that low-risk drinking outcomes occur and are common, low-risk drinking is still a "closet treatment goal" in the United States, mostly due to the fact that clinicians often ignore the evidence. Moreover, the beliefs, attitudes, and legal status with respect to particular substances might also influence the acceptance of moderation goals and moderation-focused treatments, as some people may believe that particular substances afford no safe levels of use that warrant an attempt at moderation (Lozano, Stephens and Roffman, 2006).

Clinically, it is important to identify who might benefit from abstinence versus moderation goals in treatment. In a self-help manual for controlled drinking, Miller and Munoz (2005) have provided guidelines derived from the literature indicating that moderation is appropriate for individuals who have experienced some negative consequences from their drinking (but not major life disruptions), do not consider themselves to be alcoholic, have little family history of severe alcohol problems, have had alcohol-related problems for less than 10 years, and have not been physically addicted to alcohol; whereas abstinence is appropriate in cases of medical complications, other physical problems that might be exacerbated by moderated alcohol use, pregnancy, loss of control related to alcohol use, the potential of prescription medication to interact with alcohol, and when abstinence has been successful for a year or more. Furthermore, the National Institute on Alcohol Abuse and Alcoholism in the United States has established low-risk drinking guidelines, such that the following limits are recommended: 14 drinks per week and no more than 4 drinks per occasion for men, and 7 drinks per week and no more than 3 per occasion for women and for both sexes over the age of 65 (National Institute on Alcohol Abuse and Alcoholism, 2005).

However, even in the alcohol literature, where this topic has received the most attention, guidelines and predictors of who might benefit from controlled drinking might be considered tentative and controversial. For example, in 1995, Sobell and Sobell (1995) summarized 25 years-worth of research on controlled drinking as a route to recovery from alcohol problems, which yielded three main conclusions: (a) recoveries of individuals who have been severely dependent on alcohol predominantly involve abstinence; (b) recoveries of individuals who have not been severely dependent on alcohol predominantly involve reduced drinking; and (c) the association of outcome type and dependence severity appears to be independent of advice provided in treatment. More recently, Sobell and Sobell (2011) reported that the evidence base supporting these conclusions has strengthened further. Similarly, Rosenberg (1993) reviewed the literature and concluded that lower severity of dependence, a belief in controlled drinking, employment, younger age, psychological and social stability, and female gender have been associated with controlled drinking, but that no single characteristic had been consistently predictive, and the influence of posttreatment factors on controlled drinking had been relatively unexamined. In contrast, Walters (2000) conducted a meta-analysis of randomized controlled trials of behavioural self-control training for controlled drinking and concluded that severity of dependence (seemingly the most robust predictor of controlled drinking) was unrelated to clinical outcomes. Similarly, a review of the controlled drinking literature by Saladin and Santa Ana (2004) also concluded that the efficacy of controlled drinking treatments does not appear to vary as a function of drinking severity, but may vary as a function of drinking-related self-efficacy.

Other than recognizing that it is difficult to compare and summarize studies due to methodological differences (e.g., definitions of moderation-based goals, definitions of outcomes, lengths of follow-up), and that treatment goal selection is not static over time, but rather a fluid construct (Hodgins, Leigh, Milne, & Gerrish, 1997; Ladouceur et al., 2009; Ojehagen & Berglund, 1989), it is unclear as to why the aforementioned literature reviews have arrived at different conclusions with respect to the relationship between problem severity and moderation-oriented recovery. Sobell and Sobell (1995) do note that while it is tempting to view dependence severity as the critical determinant of

whether a moderation outcome is attainable, it is possible that the association between lower dependence severity and a moderation-oriented recovery is an epiphenomenon to other life circumstances often associated with severe dependence, such as lack of social support or poor vocational history. Interestingly, the gambling literature has also produced mixed results with respect to the relationship between problem severity and moderation-oriented recovery. Specifically, whereas one study reported that those who selected abstinence at pretreatment had a greater number of baseline DSM-IV symptoms for pathological gambling (Toneatto & Dragnonetti, 2008), another study reported no association between pretreatment selection of moderated gambling and lower problem severity (Dowling & Smith, 2007). A third study reported that compared to gamblers who could not attain control as outcome, gamblers who successfully achieved control had lower scores on anxiety and depression, higher quality of life scores, made less suicide attempts in the past, spent less money on gambling activities, and had less negative consequences of gambling in their family life, the latter finding of which might be an indication of greater social support (Ladouceur et al., 2009).

As noted in Lozano et al. (2006), another factor that has been consistently associated with controlled drinking goals and outcomes is limited exposure to treatment services (Booth et al., 1984; Elal-Lawrence, Slade, & Dewey, 1986, 1987; Finney & Moos, 1981; Hodgins et al., 1997; Ojehagen & Berglund, 1989), which seems to make sense in light of the Sobell and Sobell (1995, 2011) and Rosenberg (1993) reviews demonstrating associations between lower problem severity and controlled drinking, in conjunction with research demonstrating associations between lower problem severity and natural recovery (Bischof et al., 2012). Additionally, as noted in Lozano et al. (2006), despite a lack of evidence clearly supporting either abstinence or moderation as a superior drinking goal, a number of studies have demonstrated an association between drinking goal and subsequent achievement of that goal—that is, individuals with abstinence goals are more likely to achieve abstinence and those with moderation goals are more likely to achieve moderated outcomes (Maisto, Sobell, & Sobell, 1980; Booth et al., 1984; Elal-Lawrence et al., 1986, 1987). These latter findings are consistent with Sobell and Sobell's (1995, 2011) conclusion that it is an illusion to suggest that treatment

goals are determined by service providers; and are also consistent with social cognitive theory, which suggests that people will strive harder to attain goals when they play an active role in goal selection rather than when goals are assigned (Bandura, 1986; Sobell, Sobell, Bogardis, Leo, & Skinner, 1992a).

2.4.2 Overview in the Cannabis Use Disorders Literature

The cannabis use disorders literature dramatically lags behind the alcohol use and even the gambling disorders literatures with respect to research and debate on the topic of abstinence versus moderation. To date, only a handful of empirical studies might be considered to have touched upon this topic (Agosti & Levin, 2007; Degenhardt et al., 2010; Hughes et al., 2008; Stephens, Curtin, Simpson, & Roffman, 1994a; Swift et al., 2009), only one small study has evaluated a moderation-focused treatment program (Sobell, Sobell, Wagner, Agrawal, & Ellingstad, 2006), and only one study has specifically examined this topic in-depth and in the context of abstinence-oriented treatment (Lozano et al., 2006).

Three studies that have touched upon this topic been epidemiological in nature. Specifically, in their examination of the predictors of recovery from cannabis use disorders using data from the NESARC, Agosti and Levin (2007) reported that among those who recovered, 10% reported cannabis use in the past year, which is suggestive of moderated use. The other two studies used Australian data from a 10-year longitudinal study. The first reported that a pattern of moderated cannabis use among adolescents was associated with less risk of later cannabis-related problems than a pattern of persistent cannabis use, but risks were still elevated substantially compared with never-users (Swift et al., 2009). The second study reported that adolescents who used cannabis occasionally and who continued occasional use into early adulthood had higher risks of later alcohol, tobacco, and illicit drug use, and were less likely to complete a post-secondary qualification than non-users; further, those who used cannabis at least weekly either during adolescence or at age 20 were at the highest risk of drug use problems in young adulthood (Degenhardt et al., 2010).

Two other studies have shed light on this topic from different perspectives. Specifically, as alluded to previously in this manuscript, Hughes et al. (2008) reported

that among 19 non-treatment seeking daily cannabis users who intended to quit or reduce on their own in the next month, initial goal selection was a poor predictor of outcome, most users made multiple and short-lived attempts to change, reduced use was as common as abstinence, many attempts to change were initially successful but few persisted, and other drug use did not appear to worsen with reduced use or abstinence. Stephens et al. (1994a) tested the abstinence violation effect (AVE; Marlatt & Gordon, 1980) among a sample of 75 adult cannabis users who reported a lapse into cannabis use following completion of either a relapse prevention treatment or social support group treatment. The AVE espouses that the endorsement of stringent abstinence goals increases the probability of a relapse (i.e., a return to regular cannabis use) following a slip (i.e., a distinct episode of cannabis use), due to the cause of the slip being attributed to internal, stable, and global factors; moreover, the experience of loss of control and feelings of guilt have been hypothesized to follow these attributions and further increase the probability of relapse. Stephens et al. (1994a) demonstrated that participants who relapsed following the slip were more likely to report more internal, stable, and global attributions for the cause of the slip, as well as more perceived loss of control, compared to participants who returned to abstinence; feelings of guilt did not distinguish the groups; internal and global attributions predicted cannabis use during the subsequent 6-months follow-up, suggesting that the attributions were more than post-hoc explanations; and interestingly, the tendency to experience the AVE did not differ between participants that received the relapse prevention versus the social support group treatments despite the fact that the relapse prevention treatment was designed to draw attention to, and prevent the AVE.

Only one small study to date has evaluated a treatment program that was compatible with both abstinence and moderation goals (Sobell et al., 2006). This study, published in the form of a book chapter, was a trial that compared an individual versus group format of guided self-change treatment (Sobell & Sobell, 1993). Guided self-change treatment has been described as a moderation-focused treatment and has been found to be efficacious for alcohol and substance use disorders (Saladin & Santa Ana, 2004; Sobell & Sobell, 2005). The treatment essentially involves a brief application of

CBT and MI principles and techniques, whereby treatment goal advice (abstinence versus moderation) is typically given, but clients select their own goal. In Sobell et al. (2006), 17 cannabis users were randomly assigned to four sessions of either individual or group guided self-change; however, only seven participants (41.7%) completed all four sessions. At baseline, 11/17 (64.7%) participants chose a reduced goal over abstinence. Participants substantially decreased their frequency of cannabis use while in treatment, such that post-treatment abstinence was nearly four times that of the year before treatment. However, in contrast to the results from cocaine and alcohol users (who were also enrolled in the study), cannabis users exhibited a decrease in abstinent days following treatment, which suggests a tailing off of treatment effects. Nevertheless, the promising results from this study warrants more rigorous evaluations of this approach that incorporates outcome measures beyond the number of days abstinent, especially given that this approach is compatible with moderation treatment goals.

Only one study to date has provided an in-depth examination of the topic of abstinence versus moderation treatment goals for cannabis use disorders (Lozano et al., 2006). It is noted by the authors that even this study was not specifically designed to investigate treatment goals, as it was a secondary analysis of a previously published abstinence-oriented treatment outcome study of 291 adult cannabis users who were randomly assigned to either a CBT-relapse prevention support group, an individualized assessment and advice group, or a delayed treatment control (Stephens, Roffman, & Curtin, 2000). Nevertheless, several important findings were reported that are consistent with the alcohol and gambling literatures.

First, of the total sample, 71.2% indicated an abstinence goal at baseline, which declined to 48.9% over the course of the study, a finding of which is consistent with research in the alcohol and gambling literatures demonstrating that goal selection is fluid over time (Hodgins et al., 1997; Ladouceur et al., 2009; Ojehagen & Berglund, 1989). For descriptive purposes, it is noteworthy that the majority of participants classified as having moderation goals indicated that they planned to use cannabis no more than two times per day during cannabis-using days. Second, consistent with the Sobell and Sobell (1995, 2011) and Rosenberg (1993) reviews, but not with the Walters (2000) and Saladin

and Santa (2004) reviews, participants with fewer cannabis problems and dependence symptoms were more likely to choose moderation goals than abstinence goals at pretreatment. It was suggested that those who experienced more problem severity might be more motivated to strive for abstinence in order to ameliorate those problems. Third, inconsistent with the alcohol literature (Booth et al., 1984; Elal-Lawrence et al., 1986, 1987; Finney & Moos, 1981; Hodgins et al., 1997; Ojehagen & Berglund, 1989), it was reported that cannabis treatment seeking was unrelated to goal choice (abstinence versus moderation). However, the authors note that this null finding might be accounted for by the fact that participants were screened for alcohol and drug abuse prior to treatment entry and were therefore unlikely to have attended substantial treatment for other substances where the importance of abstinence may have been emphasized; moreover, it is noted that there are fewer 12-step based programs for cannabis use disorders, and hence, less dogma with respect to the importance of abstinence. Fourth, consistent with the alcohol literature (Booth et al., 1984; Elal-Lawrence et al., 1986, 1987; Maisto et al., 1980; Sobell & Sobell, 1995, 2011), it was reported that participants with abstinence goals were more likely to have abstinence outcomes than moderate outcomes and participants with moderation goals were more likely to have moderate outcomes. Fifth, however, compared to abstinence goals, moderation goals were also more strongly associated with non-moderate outcomes at all follow-ups, which is consistent with some research that has demonstrated more favourable outcomes among those with abstinence versus moderation goals (Hall et al., 1990, 1991; Hodgins et al., 1997). Sixth, it was reported that for both abstinence and moderation goals, self-efficacy in achieving one's goal was related systematically to successful achievement of that goal; that is, although not statistically significant at baseline, participants who achieved their stated goals reported higher levels of self-efficacy at the previous assessment than those who did not achieve their goals. This finding is consistent with Saladin and Santa Ana's (2004) conclusion that drinking outcomes in controlled drinking studies are best predicted by drinking-related self-efficacy, as well as research demonstrating the predictive validity of self-efficacy (in the ability to refrain from cannabis use) in relation to future cannabis use (Litt et al., 2005, 2008; Stephens et al., 1993, 1995). Finally, it was reported that after

treatment, but not before treatment, participants with abstinence goals had more self-efficacy for goal achievement than participants with moderation goals; which is interesting in light of other research demonstrating that self-efficacy assessed after treatment is a better predictor of future cannabis use than self-efficacy assessed before treatment, possibly due to the fact that an overconfidence bias might be reduced following change attempts (Stephens et al., 1993, 1995). However, in Lozano et al. (2006), the treatments were abstinence-based, and so it is unclear to what extent the lower self-efficacy observed among participants with moderation goals might be due to the fact that efforts towards moderated use were less supported than abstinence.

It is important to mention exactly how Lozano et al. (2006) defined moderation goals in their study. Specifically, participants were asked at each assessment period to specify their personal goal as either 'to not use marijuana at all' (i.e., abstinence) or 'to use marijuana only in certain ways' (i.e., moderation), and if participants indicated that their goal was 'to use marijuana only in certain ways', they were further prompted to specify the number of days they planned on using marijuana in an average week, the number of times they would use on an average day, and for how many consecutive days they would use marijuana before a period of at least 1 day of abstinence; participants who then indicated that their goal was to use on 3 or less days per week were classified as having moderate use goals and those whose goals involved 4 or more days of use per week were classified as having non-moderation goals. While the authors note that their decision to define moderation in these terms was supported by the high proportion of participants who identified using cannabis in this way, as well as findings from the Marijuana Treatment Project (Marijuana Treatment Project Research Group, 2004) suggesting that problems were less likely when cannabis use was restricted to 3 or less days per week, the authors also note the difficulties in defining moderate levels of use.

The Lozano et al. (2006) study highlights several methodological and practical challenges in the examination of abstinence- versus moderation-oriented recovery with respect to cannabis use. For example, there is currently no gold standard in research or practice for the operational definition of the moderation construct. Although the alcohol literature has no universally accepted definition of what constitutes controlled drinking, it

at least contains references to notions of the standard drink and empirically-based moderation guidelines for the general population (National Institute on Alcohol Abuse and Alcoholism, 2005). No such quantification standards or general population risk guidelines exist in the cannabis literature. While one attempt at a standardized cannabis unit has been made using a cannabis substitute (Norberg, Mackenzie, & Copeland, 2012a), quantification challenges generally include the fact that cannabis use can vary with respect to cannabinoid potency levels and types (e.g., different levels of THC and CBD), preparations (e.g., hash, oil), routes of administration (e.g., smoking, oral), and delivery mechanisms (e.g., bongs, joints). Further, while two studies have used Canadian epidemiological data in an attempt to identify a frequency of use threshold beyond which cannabis-related harms emerge—the first reported that harms were most likely among both weekly and daily users (Davis et al., 2009), whereas the second reported that harms were most likely among daily users (Thake & Davis, 2011)—and it has been estimated that the risk for meeting diagnostic criteria for cannabis dependence is approximately one in two or one in three among daily or near daily cannabis users (Hall & Pacula, 2003; Kandel & Davies, 1992), it nevertheless remains unclear as to how to best define and measure moderated use, especially given that not all frequent cannabis users report harmful use and diagnostic symptoms.

It is also inherently difficult to measure the moderation construct because not only are cannabis use patterns and goals fluid over time (Hughes et al., 2008; Lozano et al., 2006), but the moderation construct itself implicitly conflates two variables; namely, low-frequency/occasional use coupled with non-harmful use. These latter two variables are themselves difficult to measure, as low-frequency/occasional use can be cast in a variety of ways (e.g., use in the past 12 months, use per day), and non-harmful use is often based on self-report with its accompanying biases.

Moreover, difficulties in defining and measuring the moderation construct are exacerbated among individuals with cannabis use disorders, who might be expected to differ from the general population with respect to their ability to achieve moderated use. While it is the case that across psychosocial treatment trials, reduced cannabis use rather than complete abstinence has tended to be the more common outcome (Budney et al.,

2007; Copeland & Swift, 2009; Dennis et al., 2004; Peters et al., 2011), there is no agreement about how to define clinically significant reduction (Peters et al., 2011). For example, whereas Stephens et al. (1994b) has previously defined clinically significant improvement as end-of-treatment frequency of cannabis use as 50% or less of pre-treatment levels and a score of 0 on the Marijuana Problems Scale (MPS; Stephens et al., 1994b, 2000), Carroll et al. (2006) has defined clinically significant improvement as treatment completion plus at least one cannabis-free urine specimen during treatment (indicative of at least 14 days of cannabis abstinence). Indeed, an operational definition of clinically significant improvement might be more difficult to ascertain in the context of moderation-oriented recovery as opposed to abstinence-oriented recovery. Lozano et al. (2006) opine that it may be possible to operationalize moderate use goals idiographically within users whose cannabis use methods and patterns are known and can be monitored over time, which would allow for a more refined and valid test between stated goals and clinical outcomes than was possible in their study.

Finally, unlike the alcohol literature, moderation-focused treatments for cannabis use disorders have yet to be specifically developed and tested, aside from Sobell et al.'s (2006) small evaluation of guided self-change; therefore, no predictors or guidelines exist that indicate who might benefit from moderation-focused treatment (Budney et al., 2007). Ideally, moderation-focused treatments ought to be developed that incorporate techniques shown to be effective in the alcohol literature, and even if they demonstrate limited success among higher severity users, they may still serve as an important first step in a continuum of care model (Lozano et al., 2006; Roffman & Stephens, 2012; Sobell et al., 2006). However, given that cannabis is an illicit substance in most places, it is controversial to recommend moderated use among both clients with cannabis use disorders and in the general population. Moreover, the illicit and unregulated nature of the cannabis industry precludes controls that could be enacted to enhance product safety, as can be done for instance, in the case of alcohol content labelling or the reduction of nicotine content in cigarettes (Swift, Copeland, & Lenton, 2000a).

Chapter Three: Rationale

3.1 Primary Objectives and Unique Contributions

The present study was undertaken with two primary objectives in mind. The first primary objective was to provide an exploratory portrait of the recovery process from cannabis use disorders from the perspective of individuals who have recovered. The second primary objective was to explore and systematically describe the similarities and differences between abstinence- and moderation-oriented recoveries, as well as the similarities and differences between treatment-assisted and natural recoveries.

With respect to cannabis use disorders, the construct of recovery has received little explicit empirical attention. With no consensus on how to define the construct of recovery, the present study borrowed from the natural recovery literature by first inferring recovery via the remission of diagnostic symptoms, and then exploring the recovery process via several interview domains that have often been employed in the context of natural recovery research, but can also readily be applied in the context of treatment-assisted recovery. Especially unique to the present study was its view towards exploring the recovery process by interfacing relatively recent developments in the addiction recovery literature; namely, recognitions that recovery and abstinence are not isomorphic concepts, and the inclusion of both treatment-assisted and natural recovery pathways to recovery (el-Guebaly, 2012). In this way, the present study addresses Klingemann et al.'s (2010) call for future developments in natural recovery research to include comparisons across different types of problem behaviours (e.g., cannabis use), the promotion of combined qualitative-quantitative research designs, and the integration of natural recovery research into broader theoretical frameworks. The present study also addresses Orford's (2008) call for future developments in treatment research to focus more on change processes rather than evaluations of named treatment types.

The current state of the cannabis use disorders literature is such that only one study has provided an in-depth account of the recovery process, albeit exclusively in the context of an abstinence-oriented and natural recovery (Ellingstad et al., 2006); and only one study has specifically investigated the issue of abstinence- versus moderation-oriented recovery, albeit in the context of treatment-assisted recovery via the examination

of future-oriented treatment goals (Lozano et al., 2006). Not a single study to date has specifically interviewed a sample of individuals who have recovered from DSM-IV-defined cannabis use disorders to provide an in-depth, retrospective account of the recovery process in the context of both treatment-assisted and natural recovery, and in the context of both abstinence- and moderation-oriented recovery. Moreover, despite the promising results from the treatment literature—wherein only abstinence-oriented treatment programs have been evaluated, aside from Sobell et al.'s (2006) small evaluation of guided self-change—reduced cannabis use rather than complete abstinence has tended to be the more common outcome, and effect sizes for clinical outcomes have been modest at best, which leaves plenty of room for research to find ways to improve our treatments (Budney et al., 2007; Copeland & Swift, 2009; Dennis et al., 2004; Peters et al., 2011).

Thus, in light of the dearth of research on this topic, and to advance the literature with a view towards informing evidence-based clinical practice, the present study explored the recovery process from cannabis use disorders in the context of multiple recovery pathways. Exploratory research of this nature can deepen our understanding of cannabis use disorders and generate hypotheses for future research. It therefore also has the potential to help improve existing abstinence-oriented treatments, and contribute to the development of new moderation-focused treatments and self-help materials for people who would otherwise not seek treatment.

3.2 Secondary Hypotheses

Although the primary objectives of the present study were exploratory in nature, two specific secondary hypotheses were also tested. First, it was hypothesized that individuals with an abstinence-oriented recovery would exhibit higher levels of lifetime cannabis problem severity than individuals with a moderation-oriented recovery. While this hypothesis is consistent with Rosenberg's (1993) and Sobell and Sobell's (1995, 2011) reviews of the alcohol literature, it is inconsistent with other reviews from the alcohol literature (Saladin & Santa Ana, 2004; Walters, 2000), as well as mixed results that have been reported in the gambling literature (Dowling & Smith, 2007; Ladouceur et al., 2009; Toneatto & Dragonetti, 2008). Nevertheless, this hypothesis is consistent with

the only study to date that has examined abstinence versus moderation treatment goals in the cannabis literature, which found that participants with fewer cannabis problems and dependence symptoms were more likely to choose moderation goals than abstinence goals at pretreatment (Lozano et al., 2006).

Second, it was hypothesized that individuals with a treatment-assisted recovery would exhibit higher levels of lifetime cannabis problem severity than individuals with a natural recovery. This hypothesis is consistent with the more robust finding in both the alcohol and gambling literatures that greater addiction problem severity is related to treatment seeking (Bischof et al., 2012; Klingemann et al., 2010; Hodgins & el-Guebaly, 2000; Toneatto et al., 2008). Interestingly, however, this hypothesis is inconsistent with Agosti and Levin's (2004) report of a lack of association between greater cannabis dependence severity and treatment seeking using data from the National Comorbidity Survey (NCS), though the authors suggest that small sample size and insufficient power might account for this null finding.

3.3 Influential Theoretical Models

The theoretical basis underlying the exploration of the recovery process in the present study was influenced by several theoretical models. A brief explication of these models is warranted in order to ground the present study in theory and to justify the assessment domains.

3.3.1 Transtheoretical Model

The Transtheoretical Model (TM; DiClemente & Prochaska, 1998) is organized around three major constructs in relation to behaviour change: stages of change, processes of change, and levels of change. The stages of change organize behaviour change into five developmental steps (i.e., precontemplation, contemplation, determination, action, and maintenance), whereby the processes of change (i.e., overt and covert activities that people use in making a change) facilitate an individual’s movement through these stages. Ten processes have been identified in a variety of addicted populations that cluster into two groups: the cognitive-experiential cluster (i.e., consciousness raising, dramatic relief, self re-evaluation, social liberation, and environmental re-evaluation) and the behavioural processes cluster (i.e., helping

relationships, stimulus control, counter conditioning, reinforcement management, and self liberation). There is some research supporting the notion that cognitive-experiential processes are more useful at promoting movement in the earlier stages of change and that behavioural processes are important in the later stages (DiClemente & Prochaska, 1998). The third major construct of the TM is level of change, which describes behaviour change as occurring at a variety of hierarchical levels of analysis, including the symptom, cognitive, intrapersonal, interpersonal, and family-systems levels of analysis.

The TM has been criticized on a number of theoretical and psychometric fronts (see Sobell, 2007a). For instance, it has been argued that actual change from addictive behaviours does not move systematically through discrete stages and that behaviour change can be better explained on a continuum (Budd & Rollnick, 1996; Carey, Purnine, Maisto, & Carey, 1999). Similarly, it has been argued that in a true a stage model, all stages must be passed through without stage re-visitation (Bandura, 1997), and that the TM violates this assumption because when individuals relapse, the TM asserts that they must return to an earlier stage (Sobell, 2007a). Moreover, the psychometric literature has provided inconsistent support for the stages of change (Carey et al., 1999), and it has been argued that the TM has difficulty accounting for instances of spontaneous natural recovery, whereby it might be a force fit to explain how individuals pass rapidly through all of the stages (Sobell, 2007a). Similarly, one study that specifically investigated the TM in the context of cannabis treatment studies did not support one assumption of the TM, namely, that individuals remaining in the pre-action stages of change (i.e., precontemplation and contemplation) across time would show little change in cannabis use (Callaghan et al., 2008). Finally, the TM can also be considered to be focused heavily at the individual level of analysis without much emphasis on social influences and environmental context.

Despite the limitations of the TM, however, the model is useful in its postulation that motivation is a state variable that is changeable or malleable (Sobell, 2007b), which is consistent with Motivational Interviewing (MI; Miller & Rollnick, 2013) and research supporting the efficacy of motivational approaches in the treatment of cannabis use disorders (Copeland & Swift, 2009). In addition, the TM has loosely and successfully

been used as a conceptual framework to guide the exploration of the recovery process in the natural recovery literature insofar as the methodological approach in the natural recovery literature has tended to assess variables such as reasons for resolution, the role of life events in recovery, actions taken to facilitate recovery, maintenance factors, and barriers to treatment seeking (e.g., Bischof et al., 2012; Carballo et al., 2007; Hodgins & el-Guebaly, 2000; Sobell, 2007a; Sobell et al., 2000). Thus, the present study was also loosely guided by the TM with respect to assessment of the aforementioned variables in order to further our understanding of the recovery process from cannabis use disorders.

3.3.2 Harm Reduction

The aim of Harm Reduction (HR) is to reduce the harmful consequences of substance use and other high-risk activities via the incorporation of several strategies that range from safer use, to moderated use, to abstinence (Marlatt & Witkiewitz, 2010). Consistent with the spirit of MI, most harm-reduction approaches seek to meet individuals "where they are at", and rather than ignore or condemn harmful behaviours, seek to work with the individual or community to minimize the harmful behaviours. HR has been conceptualized as an option within what Phillip Brickman and colleagues (1982) called the “compensatory model”, which views addictive behaviours as caused by a variety of biopsychosocial risk factors. Treatment options include teaching clients how to cope more effectively with these risk factors and are consistent with many cognitive-behavioural skills training interventions, wherein treatment goal selection includes both abstinence and moderation. Brickman et al. (1982) contrasted the compensatory model with the moral model, the disease model, and the spiritual model, all of which adopt abstinence as the only acceptable treatment goal.

The present study borrows from the HR approach insofar as recovery is conceptualized not in terms of lack of frequency of cannabis use per se (i.e., abstinence), but rather lack of harmful consequences associated with cannabis use. The discussion of HR with respect to cannabis use is a contentious issue, whereby the emotional and often irrational policy debate regarding legalization is a major obstacle to the evaluation and reduction of cannabis-related harm, particularly when the type and magnitude of harms are disputed (Roffman & Stephens, 2012; Swift et al., 2000a). While HR strategies for

cannabis use have been suggested, the development and evaluation of HR strategies for cannabis use are limited to abstinence-based cannabis treatment programs and brief "check-up" interventions that target users who are ambivalent about change. Moderation-based treatment programs have yet to be developed or tested, aside from a small evaluation of guided self-change (Sobell et al., 2006). Notwithstanding the controversy surrounding this topic, the lack of research in this area is hampered by several practical and conceptual difficulties, including lack of standardized operational definitions as to exactly what constitutes cannabis-related harm and moderated use; little research to inform recommended frequency of use risk guidelines; the illicit and unregulated nature of cannabis products; the lack of rigorously designed longitudinal studies that can unequivocally elucidate the extent and nature of cannabis-related harms, especially those that may be subtle and/or may take years to manifest; and the selective use of information about the relative harms and benefits of cannabis use that have been propagated by advocates of cannabis prohibition and policy liberalization, respectively (Roffman & Stephens, 2012; Swift et al., 2000a).

3.3.3 Stepped Care Approach

The Stepped Care Approach (SCA) is a model of care that describes which treatment procedures should be used for a given client at a given time (Sobell & Sobell, 2000). Treatment choice is determined on the basis of clinical judgement and the present knowledge base about the efficacy of available treatments; with attention to individualized case formulations; and the general rule that treatments ought to be as least restrictive as possible (with respect to the client's lifestyle and resources) but still likely to work (Sobell & Sobell, 2000). Decisions about treatment choice, and changes in treatment, should be performance based and guided by the client's functioning. Consequently, more intensive treatments are reserved for more severe problems.

Sobell and Sobell (2000), note, however, that while the use of the SCA appears to be straightforward, its implementation can be difficult and requires attention to issues such as how to determine whether a treatment is working sufficiently and how known risk factors should affect sequential treatment decisions. "Stepping up" treatment may not only include increasing treatment intensity, but may also require changing the type of

treatment (e.g., admission to a residential treatment program or using a different treatment).

Additionally, the SCA can be applied to the broader public health perspective at the societal level, whereby brief and minimal treatments designed to facilitate natural recovery can be employed (Sobell & Sobell, 2000). In this way, less intensive interventions can be the first line of treatments that target healthy populations (primary prevention), those at-risk for the disorder (secondary prevention), and those who have early signs or symptoms of the disorder but have not crossed the threshold into a clinical episode (tertiary prevention).

With respect to cannabis use disorders, two studies have explicitly endorsed a SCA for reducing cannabis use in comorbid populations (Baker, Turner, Kay-Lambkin, & Lewin, 2009; Kidorf et al., 2007), and other research has evaluated brief interventions and "check-up" approaches that target users who are ambivalent about change (Fischer et al., 2013; Stephens et al., 2004). It is noteworthy that only two psychosocial interventions to date have been explicitly developed and evaluated for the targeted treatment of cannabis use disorders and concurrent addictive or psychiatric disorders (Edwards et al., 2006; Hoch et al., 2012), a population of which might represent one of the upper echelons of cannabis problem severity. Consistent with the SCA, the present study explores the recovery process from cannabis use disorders with a view towards the idea that cannabis use disorders lie on a continuum of problem severity. The SCA highlights the importance of investigating how recovery might be facilitated along the continuum of problem severity, and it highlights the importance of assessing for problem severity, natural recovery-related, self help-related, and treatment-related variables.

3.3.4 Cognitive and Behavioural Models

The cognitive model of addiction (CMA) postulates that distorted and dysfunctional beliefs act to drive addictive behaviours (Beck, Wright, Newman, & Liese, 1993). Specifically, Beck et al. espoused that a set of addictive beliefs—such as anticipatory beliefs about the effects of the addictive behaviour, and permissive beliefs that facilitate or justify engagement in the addictive behaviour—are derived from core beliefs about the self, others, and the future. Core beliefs interact with life stressors to

produce emotional intensity, which activate particular addictive beliefs, which in turn lead to cravings and the desire to neutralize the emotional intensity via engagement in the addictive behaviour. Cognitive therapy aims to modify distorted and dysfunctional beliefs and to help individuals regain a sense of control. Indeed, cognitive-behavioural therapies (CBTs) are predicated on the CMA and have shown promise in the treatment of cannabis use disorders (Copeland & Swift, 2009).

Social Learning Theory (SLT; Bandura, 1972) conceptualizes addictive behaviours as acquired behaviour patterns that are influenced by a host of social variables, including parental and peer attitudes, and vicarious sources of positive information about addictive behaviours. CBTs borrow from SLT by taking into account the influence of social variables on the functional role played by addictive behaviours.

Relapse Prevention (RP; Marlatt & Donovan, 2005) is based on a cognitive-behavioural framework and seeks to address the problem of relapse by first identifying warning signs, triggers, and high-risk situations that result in vulnerability to relapse, and then generating cognitive-behavioural techniques for preventing or managing relapse. RP has been described as a tertiary prevention strategy with two specific aims: (1) preventing an initial lapse and maintaining abstinence or harm reduction (e.g., moderation) treatment goals, and (2) providing lapse management if a lapse occurs, to prevent further relapse.

From the perspective of the CMA, SLT, and RP, it is important to assess for a variety of cognitive and behavioural domains in order to help elucidate the functional role of cannabis use and to learn about the recovery process from cannabis use disorders. These domains may include personal beliefs and attitudes about cannabis and its effects; motives for cannabis use (e.g., coping, enhancement, social, conformity); peer and family attitudes regarding cannabis use and the cessation or reduction of cannabis use; abstinence versus moderation recovery goals; and relapse-related variables.

3.3.5 Theory of Planned Behaviour

The predecessor to the Theory of Planned Behaviour (TPB; Ajzen, 1985) is the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980; Fishbein, Middlestadt, & Hitchcock, 1994). Both the TRA and the TPB are predicated on the assumption that

behaviours are under volitional control and posit that behavioural intentions—which are the immediate antecedents to behaviour—are a function of salient information or beliefs about the likelihood that performing a particular behaviour will lead to a specific outcome (Madden, Ellen, & Ajzen, 1992). The beliefs antecedent to behavioural intentions are divided into two factors: behavioural beliefs and normative beliefs. Behavioural beliefs (regarding the consequences toward a contemplated course of action) influence an individual's attitude towards performing the behaviour, whereas normative beliefs influence an individual's subjective norm (the perceived social pressure) about performing the behaviour. Thus, behavioural intentions and subsequent behaviour are affected through both attitudes and subjective norms. A third factor, perceived behavioural control (akin to the concept of self-efficacy), was introduced by Ajzen (1985) during the formulation of the TPB, and refers to the perceived capability of performing the behaviour. Perceived behavioural control is thought to have a direct effect on behaviour as well as an indirect effect on behaviour through behavioural intentions (Madden et al., 1992). Variables external to the TPB are assumed to influence behavioural intentions only to the extent that they affect either attitudes or subjective norms. The magnitude of the relationship between behavioural intentions and behaviour is influenced by three boundary conditions: (a) the degree to which the behavioural intention and behaviour correspond with respect to their levels of specificity, (b) the stability of behavioural intentions between time and performance of the behaviour, and (c) the degree to which carrying out the behavioural intention is under the volitional control of the individual. Additional variables have been proposed to influence both behavioural intentions and behaviour in the TPB, including self-identity (Conner & McMillan, 1999). Self-identity refers to the salient part of an actor's self that relates to a particular behaviour. For example, an individual may use cannabis because being a cannabis user is an important part of their self-identity (Conner & McMillan, 1999).

One meta-analysis has demonstrated that the TRA predicted behavioural intentions and behaviour quite well (Sheppard, Hartwick, & Warshaw, 1988), and the TBP has been successfully applied to the prediction of a number of health behaviours (Conner & McMillan, 1999; Madden et al., 1992). While numerous studies have used the

TRA or the TPB to predict cannabis use (Ajzen, Timko, & White, 1982; Bentler & Speckart, 1979; Bearden & Woodside, 1978; Conner & McMillan, 1999; Hames, Evangeli, Harrop, & di Forti, 2012; Malmberg et al., 2011; Morrisson, Golder, Keller, & Gillmore, 2002; Pomazel & Brown, 1977; Richard, Van der Pligt & de Vries, 1996; Ritter, 1988), no studies to date have tested the TPB to predict cannabis use in a sample of individuals who have recovered from cannabis use disorders.

The TPB is limited insofar as its approach to explaining behaviour change is individually-focused and does not thoroughly consider the roles of environmental and structural factors (Kippax & Crawford, 1993). The model is also limited in that it assumes linearity of the theory components and cannot account for instances where behaviour change occurs first, followed by a change in attitudes and beliefs. Nevertheless, the TPB points to the usefulness of assessing an individual's attitudes, subjective norms, behavioural intentions, and perceived behavioural control (self-efficacy) in the prediction of cannabis use.

Chapter Four: Methodology

The methodology of the present study was modeled after retrospective studies in the natural recovery literature (Bischof et al., 2012; Carballo et al., 2007; Hodgins & el-Guebaly, 2000; Sobell et al., 2000) and incorporated a combined qualitative-quantitative research design (Klingemann et al., 2010), whereby a series of open-ended structured interview questions, checklists, and self-report measures were administered. In total, four interviews were conducted, which are described in detail later in this manuscript: (1) Screening Interview; (2) Participant Interview; (3) Test-Retest Reliability Interview; and (4) Collateral Validation Interview.

The Participant Interview, which was the core interview, consisted of the following seven content domains: (1) demographics and comorbidity variables; (2) cannabis-related variables; (3) reasons for resolution; (4) actions taken; (5) maintenance factors; (6) treatment and self-help variables, and perceived barriers to treatment seeking; and (7) advice, perceived etiology, and perceived reasons for recovery success.

4.1 Power Analyses

A total sample size of 120 participants was initially proposed with the hope that, for purposes of testing the secondary hypotheses and exploring other group comparisons, approximately half of participants could be classified into an abstinence-oriented group and the other half of participants into a moderation-oriented group; and similarly, that approximately half of participants could be classified into a treatment-assisted group and the other half of participants into a natural recovery group. This proposed sample size was first based on an a priori power analysis (Cohen, 1992), which indicated that for a two-group Analysis of Variance (ANOVA) at an alpha of .05, the necessary sample size for power of .80 was 64 per group to detect a medium effect size, and 26 per group to detect a large effect size. Moreover, this proposed sample size was greater than that obtained in other retrospective studies in the natural recovery literature that used a similar methodology with various group comparisons (Hodgins & el-Guebaly, 2000; Ellingstad et al., 2006; Sobell, Sobell, & Toneatto, 1992b; Sobell, Cunningham, Sobell, & Toneatto, 1993), and thus was thought to be reasonable and desirable in order to explore the primary objectives and test the secondary hypotheses of the present study.

Another approach that was used to estimate the appropriate sample size was to conduct two additional power analyses on the basis of what magnitude of difference might be expected to be meaningful between the groups (i.e., abstinence- versus moderation-oriented groups; and treatment-seeking versus natural recovery groups) on the dependent variable of lifetime cannabis problem severity. In the present study, while two measures of lifetime cannabis problem severity were used—namely, the Marijuana Problems Scale (MPS; Stephens et al., 1994b, 2000) total score, and the Composite International Diagnostic Interview (CIDI; Haro et al., 2006; Kessler & Ustun, 2004) cannabis use disorder total symptoms score—the two additional power analyses were based only on the MPS because its extensive use in the cannabis treatment literature has produced the most relevant comparison data.

Specifically, the MPS was used (in a past 90 day version) in Lozano et al. (2006), whereby data were presented for adult treatment-seeking cannabis users with abstinence goals (M = 14.8, SD = 5.9, at baseline) and moderation goals (M = 12.0, SD = 4.7, at baseline); however, it should be noted that a two-point scale version of the MPS (possible range = 0-19) was reported in Lozano et al. rather than the three-point scale version of the MPS (possible range 0-38) that was used in the present study. Nevertheless, based on Lozano et al.'s (2006) data, it was calculated that a meaningful magnitude of difference on the MPS between the abstinence- and moderation-oriented groups in the present study might be a medium effect size (i.e., Cohen's d = .52). Thus, using G*Power software (Faul, Erdfelder, Buchner, & Lang, 2009)—assuming an alpha of .05, power of .80, medium effect size Cohen's d = .52, allocation ratio N2/N1 = 1, two-tailed t-test for the difference between two independent means—a total sample size of 120 would be needed (60 in each group) to detect a medium effect size between the groups.

The three-point scale (past 90 day) version of the MPS was also used in Stephens et al. (2004), which compared adult treatment-seeking cannabis users (M = 9.8, SD = 3.4, at baseline) to near-daily cannabis users who were relatively ambivalent about change (M = 5.9, SD = 3.6, at baseline). Based on Stephens et al.'s (2004) data, it was calculated that a meaningful magnitude of difference between the treatment-assisted and natural recovery groups in the present study might be a large effect size (i.e., Cohen's d = 1.11).

Thus, using G*Power software—assuming an alpha of .05, power of .80, large effect size Cohen's d = 1.11, allocation ratio N2/N1 = 1, two-tailed t-test for the difference between two independent means— a total sample size of 30 would be needed (15 in each group) to detect a large effect size between the groups.

The latter two power analyses suggested that a total sample size of 120 participants would be sufficient to detect meaningful differences of medium to large effect sizes between the groups on tests of the secondary hypotheses. While it might have been a stretch to have used the comparison data from Lozano et al. (2006) and Stephens et al. (2004) to estimate the required sample size for the present study—given that the sample characteristics in those studies only somewhat approximated those in the present study—the estimated required total sample size of 120 was consistent with the original a priori power analysis based on Cohen (1992), and was also larger than sample sizes typically obtained in studies using similar methodology.

4.2 Advertising Strategy

Participants were solicited via several media outlets, including newspaper stories, classified Ads, radio, television, internet websites, and flyers posted throughout the city of Calgary, AB. All media outlets either displayed verbatim or alluded to the following eligibility information to potential participants: *Have you successfully overcome a marijuana problem? The University of Calgary is interested in interviewing anyone who has overcome a marijuana problem. If you have had a marijuana problem in the past and have been problem-free for at least 1 year, we feel that you could provide valuable information about your recovery, which may help us design future treatment programs for other people. Confidentiality of all those applying or participating in the study will be strictly maintained. Eligible participants will receive $20 at the completion of the study.* A study website (www.Calgary-Marijuana-Study.ca) was also used to provide eligibility and contact information. See Figures A1, A2, and A3 in Appendix A for a screenshot of the homepage from www.Calgary-Marijuana-Study.ca, an image of the flyer that was posted throughout the city of Calgary, and the classified Ad that was used in several newspapers, respectively. Participants who completed the Participant Interview were compensated $20 and reimbursed for parking expenses.

4.3 Eligibility Requirements

Based on the results from the Screening Interview, respondents were considered eligible if they met the following criteria: (a) were at least 18 years-old; (b) had the ability to fluently read, write, and understand English; (c) had the ability to participate in a face-to-face meeting at the University of Calgary; (d) agreed to refrain from using any alcohol or drugs (with the exception of nicotine and prescription medication) at least 8 hours prior to the Participant Interview; (e) based on the CIDI, met lifetime (greater than past 12 months) DSM-IV-defined criteria for either cannabis abuse or cannabis dependence; and (f) based on the CIDI, did not meet current (less than past 12 months) DSM-IV-defined criteria for both cannabis abuse and cannabis dependence. During the Screening Interview, respondents were also asked whether they would be willing to provide the name and contact information of at least one close family member or friend who would be able to speak with the research team via the telephone in a brief 10 to 20 minute interview to corroborate their cannabis use history. However, the ability to provide a collateral was not an eligibility requirement.

It is noteworthy that based on these eligibility requirements, recovery from cannabis use disorders was inferred by the remission of diagnostic symptoms rather than the remission of cannabis use per se, which allows for the ability to compare abstinence- versus moderation-oriented groups. Indeed, this method of inferring recovery has often been employed in previous epidemiological studies of alcohol and drug use, as well as in the natural recovery literature, and many studies have reported low-risk use or moderated use as a very frequent occurrence (Agosti & Levin, 2007; Bischof et al., 2012; Hodgins, Wynne, & Makarchuk, 1999; Sobell, 2007a).

It is also noteworthy that with respect to the duration of recovery required for study participation, the most widely used criterion has been 12 months sustained full remission (Bischof et al., 2012). While 5 years of sustained full remission has been proposed as a way to avoid biased results due to unstable recoveries (Sobell, 2007a), a follow-up of people who naturally recovered from alcohol dependence revealed that most natural recoveries with an initial duration of at least 12 months were stable (Rumpf et al., 2006). In the present study, the duration of recovery required for study participation was

12 months sustained full remission from cannabis abuse and/or 12 months sustained partial remission from cannabis dependence. With respect to cannabis dependence, the decision was made to include participants with sustained partial remission (as opposed to sustained full remission) because these participants can technically still be considered as recovered (i.e., they no longer meet the diagnostic cut-off for dependence, which is three of seven symptoms). Moreover, given that participants with moderation-oriented recoveries were a focus of the present study, the exclusion of participants that currently used cannabis and met criteria for tolerance and/or withdrawal, but were otherwise in remission from diagnostic symptoms, ran the risk of potentially reifying an artificially created group of moderation-oriented users that did not experience any physiologically dependent symptoms; this in turn might have also limited the variability of individuals with a moderation-oriented recovery.

4.4 Procedure

Individuals who contacted our laboratory first provided verbal informed consent to participate in the Screening Interview, and were then screened for eligibility, which took approximately 20 minutes (Appendix B). Eligible respondents were then invited to our laboratory at the University of Calgary to take part in the core interview—the Participant Interview—which took approximately 2 hours to complete. Upon arrival to the laboratory, verbal informed consent was obtained (Appendix C); the Participant Interview was conducted (Appendix D); participants were debriefed (Appendix E); and then participants were compensated with $20 and reimbursed for parking expenses. Immediately following completion of the Participant Interview, a suicide risk assessment (Appendix F)—based on the Scale of Suicide Ideation (Beck, Kovacs, & Weissman, 1979)—was conducted only if a positive response (higher than 0) was indicated for a current suicidal ideation question derived from the Inventory to Diagnose Depression (IDD; Zimmerman, 1994) in the Participant Interview. Approximately one to two weeks after completion of the Participant Interview, collaterals were contacted via the telephone, provided verbal informed consent, and then participated in the Collateral Validation Interview (Appendix G), which took approximately 20 minutes to complete. Additionally, approximately one to two weeks after completion of the Participant

Interview, participants were re-contacted via the telephone to participate in the Test-Retest Reliability Interview (Appendix H), which took approximately 5 minutes to complete.

4.5 Screening Interview

The Screening Interview (Appendix B) consisted of: a demographics questionnaire; eligibility requirement-related questions; the Alcohol, Smoking, and Substance Involvement Screening Test, cannabis section (ASSIST; WHO ASSIST Working Group, 2002); and the Composite International Diagnostic Interview, lifetime and current cannabis items (CIDI; Haro et al., 2006; Kessler & Ustun, 2004). This author and three research assistants conducted the interviews.

The 6-item cannabis section of the ASSIST was used to assess cannabis-related problems in the past 3 months. Scores between 4 and 26 are indicative of harmful use and moderate risk of harm as a result of cannabis use, whereas scores of 27 or higher are indicative of high risk of dependence and likelihood of health, social, financial, legal, and relationship problems as a result of cannabis use. The ASSIST has been shown to have excellent psychometric properties (Henry-Edwards, Humeniuk, Ali, Poznyak, & Monteiro, 2003; Hides et al., 2009; Humeniuk, 2006; Humeniuk et al., 2008) and has been used in major Canadian epidemiological studies (Adlaf et al., 2005; Health Canada, 2011). The ASSIST was included in the Screening Interview for test-retest reliability purposes and did not inform the eligibility requirements.

The CIDI was the primary tool used to determine eligibility via providing lifetime and current DSM-IV-defined diagnoses of cannabis abuse and dependence. The CIDI is a fully structured lay-administered psychiatric diagnostic interview that has been used extensively in psychiatric epidemiology research throughout the world and can provide both ICD-10 and DSM-IV diagnoses (Kessler & Ustun, 2004). The CIDI has been validated against the Structured Clinical Interview for DSM-IV (SCID; First, Spitzer, Gibbons, & Williams, 2002) for lifetime prevalence of substance use disorders and has been shown to have good concordance, with lifetime CIDI prevalence estimates reported as more conservative than SCID estimates (Haro et al., 2006). In the present study, only

the DSM-IV-based lifetime and current cannabis items from the Illegal Substance Use module were administered.

4.6 Participant Interview

The Participant Interview (Appendix D) consisted of the following seven content domains: (1) demographics and comorbidity variables; (2) cannabis-related variables; (3) reasons for resolution; (4) actions taken; (5) maintenance factors; (6) treatment and self-help variables, and perceived barriers to treatment seeking; and (7) advice, perceived etiology, and perceived reasons for recovery success. This author and three research assistants conducted the interviews.

4.6.1 Domain 1: Sample Characteristics

Sample characteristics were assessed via the use of a demographics questionnaire and the following items and measures to tap comorbid conditions: adapted CIDI alcohol and substance use disorder lifetime items; the Alcohol Use Disorders Identifications Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001); the item, "have you ever tried to stop, cut down, or control your alcohol use?"; the item, "in the past 3 months, how frequently have you smoked cigarettes?"; the item, "have you ever tried to stop, cut down, or control your cigarette smoking?"; the Problem Gambling Severity Index (PGSI) from the Canadian Problem Gambling Index (CPGI; Ferris & Wynne, 2001); the National Opinion Research Center DSM-IV Screen for Gambling Problems, three-item short version (NODS-CLiP; Toce-Gerstein, Gerstein, & Volberg, 2009); the Inventory to Diagnose Depression (IDD; Zimmerman, 1994); four items related to the perceived interaction of cannabis use and depression; and the Schizotypal Personality Questionnaire: Brief Version (SPQ-B; Raine & Benishay, 1995).

A brief overview of the CIDI is presented in section 4.5. In the Participant Interview, the CIDI items from the Alcohol Use and Illegal Substance Use modules were adapted such that only lifetime (not current) symptoms were assessed for alcohol and substance use disorders (other than cannabis). Moreover, the items were adapted such that participants were prompted to verbally report the particular substances related to the items rather than the interviewer asking participants about each substance relative to the items. While it is recognized that adaptation of standardized assessment instruments

potentially invalidates the measure, this decision was made in order to reduce the length of the interview and response burden on participants. As such, while reports of alcohol abuse and dependence symptoms were straightforward to classify from participant responses, the substance use disorders abuse and dependence symptoms were classified with discretion into higher-order categories. Specifically, the following substance use disorder categories were used, which were modelled after DSM-5 (American Psychiatric Association, 2013) higher-order categories: opioid use disorder, stimulant use disorder, sedative-hypnotic-anxiolytic use disorder, hallucinogen use disorder (including both phencyclidine use disorder and other hallucinogen disorder), and other substance use disorder. These categories did not include tobacco use disorder or behavioural addictions, as participants were instructed during the Participant Interview to not report those addictive behaviours in the context of the CIDI questionnaire. While the categories were modelled after the DSM-5 in order to parsimoniously measure lifetime comorbidity, the variables were based on the CIDIs assessment of DSM-IV criteria. See Table I1 in Appendix I for the full range of participant responses that comprised the CIDI substance use disorder categories.

The popular 10-item AUDIT was used to assess current alcohol-related problems. Total AUDIT scores ranging between 0 and 7 have been suggested to be an indicator of low-risk drinking or abstinence; scores between 8 and 15 have been suggested to indicate medium-risk drinking; and obtained scores of 16 or above have been suggested to indicate high-risk drinking, with scores of 20 or above warranting further diagnostic evaluation for alcohol dependence (Babor et al., 2001). The AUDIT has demonstrated favourable psychometric properties (Allen, Litten, Fertig, & Babor, 1997).

The 9-item PGSI was used to assess current problematic gambling behaviour. Total scores can be used to categorize individuals as non-problem, low-risk, moderate-risk, and problem gamblers. The PGSI has been shown to have good concurrent validity with other measures of gambling problems, good internal reliability, and adequate test-retest reliability (Ferris & Wynne, 2001).

The 3-item NODS-CLiP was used as an indicator for possible lifetime gambling problems. The three items pertaining to loss of control, lying, and preoccupation have

been shown to have excellent sensitivity and specificity for NODS constructs in American community samples (Toca-Gerstein et al., 2009).

The lifetime version of the 22-item Inventory to Diagnose Depression (IDD; Zimmerman, 1994) was used as a measure of lifetime DSM-IV-defined major depressive disorder. The IDD is a self-report scale that provides both a continuous score reflecting depression severity as well as a dichotomous DSM-IV-based diagnosis for major depressive disorder. As reported in its manual, the IDD has been evaluated in numerous studies and has been shown to have strong psychometric properties (Zimmerman,1994). The lifetime version of the IDD specifically asks respondents to complete the questionnaire with respect to thinking about the worst week in their lives when they felt the most depressed. The lifetime version has specifically been shown to have test-retest reliability and discriminant validity (Sakado, Sato, Uehara, Sato, & Kameda, 1996; Sato et al., 1996), and the current version has been shown to reliable and valid among participants with alcohol dependence (Hodgins, Dufour, & Armstrong, 2000). Since the IDD is under copyright, its items from the Participant Interview are not displayed in the Appendices.

Finally, the 22-item SPQ-B was used to assess schizotypal traits. The measure yields a total score as well as scores for three factors or subscales: Cognitive-Perceptual, Interpersonal, and Disorganized. The SPQ-B has demonstrated favourable psychometric properties (Raine & Benishay, 1995), produces essentially the same three-factor structure as the full-length SPQ, and norms exist for undergraduate students, inpatients, and Australian adults (Raine & Benishay, 1995). It is noteworthy that cannabis users have been found to have higher scores on the full-length SPQ than past users and controls (Skosnik, Spatz-Glenn, & Park, 2001).

4.6.2 Domain 2: Cannabis-Related Variables

The following items and measures were used to assess a variety of cannabis-related variables: cannabis use history and related problems questions developed by this author; the CIDI, lifetime and current cannabis items; past 3 months and modified lifetime versions of the Marijuana Problems Scale (MPS; Stephens et al., 1994b, 2000); the ASSIST, cannabis section; past 3 and 12 months versions of the Severity of

Dependence Scale (SDS; Gossop et al., 1995); and the Marijuana Motives Measure (MMM; Simons, Correia, Carey, & Borasari, 1998). Brief overviews of the CIDI and ASSIST are presented in section 4.5.

The cannabis use history and related problems questions developed by this author were a series of either dichotomous or continuous single-item variables pertaining to a number of areas thought to be related to the recovery process from cannabis use disorders (e.g., beliefs, attitudes, motivations, self-efficacy, environmental influences on cannabis use and recovery, et cetera).

The 19-item MPS was used to measure cannabis-related problems, including, but not limited to, cognitive, interpersonal, school/employment, guilt, low energy, medical, sleep disturbance, financial, and legal problems. The item list was originally adapted from other drug use severity instruments and modified on the basis of prior research with cannabis users in treatment (Stephens et al., 1994b, 2000). Participants respond to each item using a three-point scale, spanning from no problem (0), to minor problem (1), to serious problem (2). Aside from reported alpha levels that are high, to this author's knowledge, there is no published study to date evaluating the psychometric properties of the MPS, despite its widespread use (e.g., Callaghan et al., 2008; Lozano et al., 2006; Marijuana Treatment Project Research Group, 2004; Stephens et al., 2000, 2004). In the present study, the original past 3 months version was administered, as well as a lifetime version that was modified by this author.

It is noteworthy that a modified lifetime version of the MPS was necessary to administer in order to test the secondary hypotheses, as there are currently no available adult lifetime versions of self-report measures of cannabis-related problems in the literature, aside from symptom counts derived from structured or semi-structured diagnostic interviews, such as the CIDI (Bashford, date unknown). The MPS was specifically chosen to be modified—as opposed to other problem measures available in the literature—because of its extensive use in cannabis treatment studies and because its items were more readily adaptable to a lifetime format relative to other measures.

The 5-item SDS was used as another measure of cannabis-related problems, specifically related to psychological aspects of dependence (i.e., control over use, anxiety

about use, difficulty stopping use). The SDS has been used specifically for cannabis and has been reported to have favourable psychometric properties (Darke, Ross, & Hall, 1996; Ferri, Mardsen, de Araujo, Laranjeira, & Gossop, 2000; Gossop et al., 1995; Gossop, Best, Marsden, & Strang, 1997; Swift, Copeland, & Hall, 1998; Swift, Hall, Didcott, & Reilly, 1998). A cut-off score of three for adults and four for adolescents has been reported as optimal for detecting at least moderate levels of cannabis dependence (Bashford, date unknown). In the present study, past 3 and 12 months versions were administered. Although a lifetime version of the SDS has at least twice been used in published studies (Kedzior & Martin-Iverson, 2007, 2010), a perusal of the item content reveals that the items are confusing in a lifetime format and therefore not readily adaptable to a lifetime version.

Finally, the 25-item MMM yields five motive subscales with respect to lifetime cannabis use: enhancement (e.g., “I use marijuana to get high”), coping (e.g., “I use marijuana to forget my worries”), social (e.g., “I use marijuana to be sociable), conformity (e.g., “I use marijuana so I won’t feel left out”), and expansion (e.g., “I use marijuana to expand my awareness”). The MMM has demonstrated favourable psychometric properties (Simons et al., 1998) and the measure has been used extensively in the cannabis literature (e.g., Bujarski, Norberg, & Copeland, 2012; Chabrol, Duconge, Casas, Roura, & Carey, 2005; Fox, Towe, Stephens, Walker, & Roffman, 2011; Zvolensky et al., 2007.)

4.6.3 Domain 3: Reasons for Resolution

In a semi-structured interview format, two interview methods were used to assess reasons for resolution: open-ended questions and a checklist. Participants were first asked to recall their stated date of resolution—which was obtained earlier in the Participant Interview in response to the question, "on approximately which date (i.e., month/year) did you first decide to quit or cut-down/control using marijuana"—and were then asked the following open-ended question: "Please describe the reasons that led you to overcome your marijuana problem (either by quitting completely, or cutting-down/controlling your use of marijuana, or both)." Responses were probed and followed-up with other open-ended and five-point scaled questions designed to elicit

particular life-event related reasons for resolution, the degree to which abstinence was planned post-resolution, the degree to which the participant was motivated towards abstinence post-resolution, and the degree to which change was a conscious choice. Responses were manually recorded in paper-and-pencil format by the interviewer.

After the open-ended and follow-up responses were obtained, participants were then asked to use a checklist with a five-point scale to rate the extent to which each reason affected their decision to quit/cut-down/control their use of marijuana (1 = no effect at all, 3 = somewhat affected, 5 = greatly affected). The items were adapted from checklists and categorizations of open-ended responses for reasons for resolution from previous studies in the natural recovery literature (Cunningham, Sobell, Sobell, & Kapur, 1995; Cunningham, Sobell, Sobell, & Gaskin, 1994; Ellingstad et al., 2006; Hodgins & el-Guebaly, 2000; Sobell et al., 1993; Hughes et al., 2008; Toneatto et al., 2008).

4.6.4 Domain 4: Actions Taken

A similar interview process was used to assess actions taken. Specifically, participants were first asked the following question and were engaged in an open-ended interview: "Did you consciously do anything to help you overcome you marijuana problem?" Responses were probed and additional follow-up questions were asked pertaining to whether participants quit cold turkey versus gradually cut-down, whether participants quit/reduced/controlled their use at particular times of the day, and whether they planned to either increase, decrease, or quit their use of other substances to help them overcome their cannabis problem. Responses were manually recorded in paper-and-pencil format by the interviewer.

After the open-ended and follow-up responses were obtained, participants completed a modified version of the Processes of Change Questionnaire (PoC; Prochaska, Velicer, DiClemente, & Fava, 1988). Derived from the Transtheoretical Model (TM; DiClemente & Prochaska, 1998), the 30-item PoC was originally developed to measure the change processes of cigarette smoking cessation, and it has been modified for use with other problem behaviour areas (Hodgins, 2001). Ten processes have been identified in a variety of addicted populations that cluster into two groups: the cognitive-experiential cluster (consciousness raising, dramatic relief, self-re-evaluation, social-

liberation, and environmental re-evaluation) and the behavioural processes cluster (helping relationships, stimulus control, counter conditioning, reinforcement management, and self-liberation). Since no studies have measured the processes of change in recovery from cannabis use disorders, this author modified the 30-items to reflect cannabis use change. Each item was rated on a five-point scale (1 = never, 2 = seldom, 3 = occasionally, 4 = frequently, 5 = repeatedly), according to how often the participant made use of a process in helping to change their cannabis use.

4.6.5 Domain 5: Maintenance Factors

To assess maintenance factors, participants were first asked the following open-ended question: "Describe what factors helped you to avoid a relapse or to avoid a return to having marijuana problems after you overcame your problem. In other words, describe what things helped you to remain problem-free from marijuana." Responses were probed and followed-up with questions designed to glean information about relapse-related variables, recovery orientation (abstinence versus moderation) switching, and actual changes in other addictive behaviours post-resolution. Responses were manually recorded in paper-and-pencil format by the interviewer.

After the open-ended and follow-up responses were obtained, participants were then asked to use a checklist with a five-point scale to rate the extent to which each factor helped/helps them to remain problem-free from marijuana (1 = no help, 3 = helped somewhat, 5 = helped very much). The items were adapted from checklists and categorizations of open-ended responses for maintenance factors from previous studies in the natural recovery literature (Hodgins & el-Guebaly, 2000; Sobell et al., 1993; Tucker, Vuchinich, & Gladsjo, 1994).

4.6.6 Domain 6: Treatment-Related Variables

In this section of the Participant Interview, lifetime and current cannabis treatment and self-help information was obtained via a semi-structured interview format, including helpfulness ratings, estimated number of occasions and sessions, and types of treatment sought and self-help materials used. The same information was also obtained with respect to other mental health or addiction problems.

After the treatment and self-help information was obtained, the following question was posed to cannabis treatment-assisted participants to engage in an open-ended discussion: "Was there anything that delayed you, or 'got in the way' of your willingness to seek professional assistance sooner for your marijuana problem?" Similarly, for naturally recovered participants (i.e., those who reported never seeking cannabis treatment), the following open-ended question was asked: "What are some reasons that you decided not to seek professional treatment for your marijuana problem? Did anything prevent/stop you?" Responses were probed and manually recorded in paper-and-pencil format by the interviewer.

After the open-ended responses were obtained, all participants (irrespective of whether they were cannabis treatment-assisted or naturally recovered) were then asked to use a checklist with a five-point scale to rate the extent to which each potential barrier prevented or 'got in their way'/delayed them from seeking help for their cannabis problem (1 = not at all prevented you/'got in your way', 5 = very much prevented you/'got in your way'). The items were adapted from checklists and categorizations of open-ended responses for barriers to treatment seeking from previous studies in the natural recovery literature (Hodgins & el-Guebaly, 2000; Pulford et al., 2009; Sobell et al., 1992b; Suurvali, Cordingley, Hodgins, & Cunningham, 2009).

4.6.7 Domain 7: Recovery Advice and Reflections

At the end of the Participant Interview, following the lead of Toneatto et al. (2008), participants were asked the following open-ended question: "What advice would you give to help another person with a marijuana problem?" Additionally, participants were asked about their recommendations with respect to different recovery pathways (i.e., abstinence versus moderation and treatment-assisted recovery versus natural recovery).

After the advice and recommendation responses were obtained, participants were asked to reflect on the etiology of their cannabis use disorder via the following open-ended question: "Many people who try marijuana develop a problem, and many people who try marijuana do not develop a problem. What is your understanding of why you in particular developed a marijuana problem?"

Finally, participants were asked to reflect on the causes of their recovery success via the following open-ended question: "Some people take longer than others to overcome their marijuana problem, while some people may never overcome their problem. What is your understanding of why you in particular were able to overcome your marijuana problem?" All open-ended responses were probed and manually recorded in paper-and-pencil format by the interviewer.

4.7 Collateral Validation Interview

In order to address the issue of validity of self-report, Collateral Validation Interviews were conducted. During the Screening Interview, participants were asked whether they would be willing to provide the name and contact information of a close family member or friend who would be able to corroborate their cannabis use history; however, this was not an eligibility requirement for study participation. During the Participant Interview, the name and contact information of collaterals were collected. Approximately one to two weeks following the Participant Interview, a member of the research team, blind to the Participant Interviews, telephoned one collateral for each participant and conducted the Collateral Validation Interview. All collateral interviews were conducted by the same research assistant.

The Collateral Validation Interview consisted of the following items and measures that were modified by this author to a format suitable for collateral reports: selected cannabis use history and related problems questions developed by this author; past 3 months and modified lifetime versions of the MPS; the ASSIST, cannabis section; past 3 and 12 months versions of the SDS; the MMM; and lifetime and current cannabis treatment questions. Brief overviews of these variables are presented in sections 4.5 and 4.6. Collaterals were also asked to rate the certainty of each of their responses using the following scale: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

4.8 Test-Retest Reliability Interview

In order to examine the test-retest reliability of some of the variables in the present study, a member of the research team, blind to the Participant Interviews, re-contacted participants via telephone approximately one to two weeks following the Participant Interview to conduct a quick Test-Retest Reliability Interview. This author

and three research assistants conducted the interviews. The Test-Retest Reliability Interview consisted of only a few items related to the participant's frequency of past cannabis use, an item related to the participant's future cannabis use frequency goal, and the past 3 months and modified lifetime versions of the MPS.

4.9 Ethical Considerations

Several ethical considerations related to the methodology of the present study are noteworthy. First, given that participants were asked to reflect upon their past and current substance use behaviour, mental health, and potentially negative life events, it was possible that participants could become distressed during the course of the study. Therefore, it was ethically incumbent upon the researchers to provide information to participants about accessing services in which their distress and potential substance use and mental health problems could be addressed. As such, information regarding access to Alberta mental health and addiction services was provided to all participants during both the informed consent and debriefing procedures. Participants were also made aware during the informed consent procedure that they were free to withdraw from the study at any time with their confidentiality ensured.

A second, closely related ethical consideration involves one item on the IDD, which asked about lifetime suicidal ideation. Given that this item had the potential to activate current suicidal ideation, an item related to current suicidal ideation was added to the Participant Interview solely for the purpose of prompting a possible suicide risk assessment in the case of a positive response to this item. The suicide risk assessment involved expressing concern about the suicidal thoughts, administering and scoring the Scale of Suicide Ideation (Beck et al., 1979), and assessing for available resources (e.g., therapist, family, friends, family doctor, et cetera). All situations that required the administration of the suicide risk assessment involved documentation of the rationale and actions by the interviewer and were reviewed by this author and his supervisor (Dr. David C. Hodgins). Fortunately, administration of the suicide risk assessment was a rare occurrence.

Third, given that cannabis is an illegal substance in Calgary, AB, anonymity and confidentiality of participants and collaterals were especially important. To this end,

standard ethical protocols were followed with approval obtained from the University of Calgary's Conjoint Faculties Research Ethics Board (CFREB), as well as Mount Royal University's Human Research Ethics Board. At the request of the CFREB, verbal informed consent was obtained throughout the study. While collaterals were necessarily privy to corresponding participant names and contact information, and vice versa, blind Collateral Validation Interviews ensured that information gleaned from Participant Interviews was not shared with collaterals; and similarly, information obtained from the Collateral Validation Interviews was not shared with participants. Both participants and collaterals were made aware during the informed consent process that information would not be shared.

Finally, an ethical dilemma that arose during the data collection phase of the present study involved solicitation from the media for requests to interview participants, which would have facilitated data collection due to media exposure. Some colleagues suggested that allowing participants to speak to the media might be ethically justified under the condition that the informed consent procedure specified the possible risks and benefits; indeed, this ethical reasoning approach would be consistent with the Canadian Code of Ethics for Psychologists' first-order principle of Respect for the Dignity of Persons (Canadian Psychological Association, 2001). On the other hand, other colleagues and the CFREB suggested that the potential costs to the participant would outweigh the benefits to the study, which would suggest that in this particular case, the second-order principle of Responsible Caring ought to trump the first-order principle of Respect for the Dignity of Persons. It was ultimately decided that the possible risks to participants (e.g., damaged reputation) were too great and therefore, participants were not made aware about this media opportunity.

Chapter Five: Results

5.1 Preliminary Analyses

5.1.1 Phases of the Study and Excluded Participants

Figure 1 displays a flow diagram of the progress through the phases of the present study. As can be seen in the figure, a total of 295 individuals were assessed for eligibility at the Screening Interview. Of these 295 individuals, 169 did not further participate in the study. Of these 169 individuals, 116 (68.6%) did not meet eligibility criteria, 45 (26.6%) met eligibility criteria but withdrew from the study prior to participating in the Participant Interview, and 8 (2.7%) met eligibility criteria and should have participated in the Participant Interview but were unfortunately overlooked by the research team. Thus, a total of 126 individuals participated in the Participant Interview and were then followed-up to participate in both the Collateral Validation and Test-Retest Reliability Interviews.

Of the 126 participants, 94 (74.6%) Collateral Validation Interviews were completed. Of the remaining 32 (25.4%) Collateral Validation Interviews that were not conducted, 18 (56.3%) collaterals could not be reached after several contact attempts via telephone; 8 (25.0%) participants refused to provide the name of a collateral due to either confidentiality concerns or because they reported an inability to provide the name of a close family member or friend who would be in the position to corroborate their cannabis use history; 5 (15.6%) collaterals were reached via telephone but refused to participate in the study; and 1 (3.1%) collateral was reached but reported that he/she was unaware that the corresponding participant ever used cannabis.

Of the 126 participants, 114 (90.5%) Test-Retest Reliability Interviews were completed. The remaining 9 (7.1%) Test-Retest Reliability Interviews were not conducted because those participants could not be reached after several contact attempts via telephone.

Finally, of the 126 participants, a total sample of 119 (94.4%) were included in the data analyses. Seven participants (5.6%) were excluded from the data analyses because it was discovered post-hoc that these participants did not meet the eligibility criteria for the present study—that is, these participants met current cannabis abuse

criteria (as assessed by the CIDI) at either the Screening or Participant Interviews, and therefore, cannot be considered to have recovered from a cannabis use disorder. Of the total sample of 119 participants, data analyses were conducted based on two primary groupings: recovery orientation and recovery type. With respect to recovery orientation, participants were grouped into an abstinence-oriented group (AB; n = 68) and a moderation-oriented group (MOD; n = 51) based on their past 12 month frequency of cannabis use. With respect to recovery type, participants were grouped into a treatment-assisted recovery group (TAR; n = 53) and a natural recovery group (NR; n = 66) based on their reports of ever seeking formal or professional treatment for a cannabis problem.

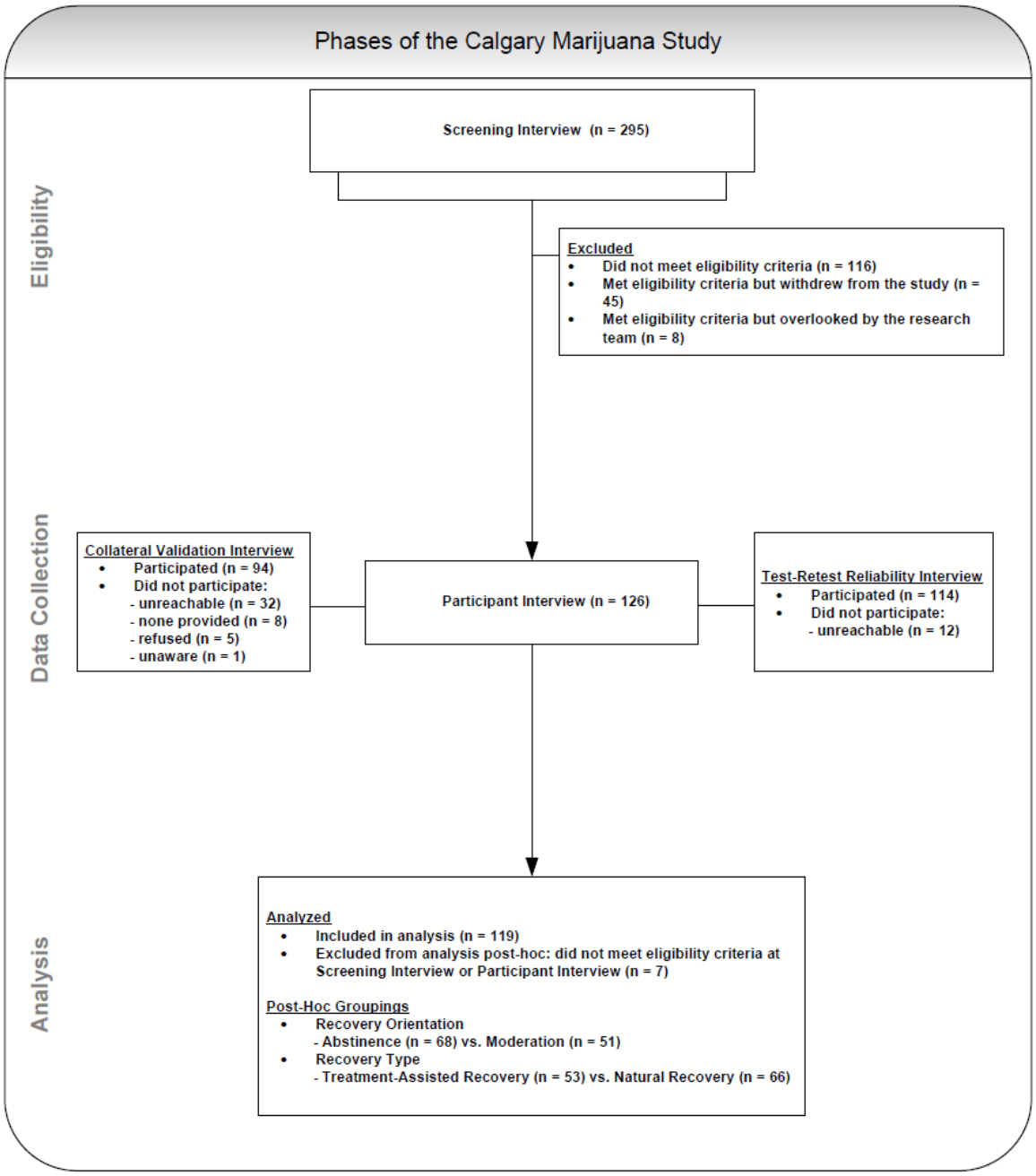

Figure 1. Flow diagram of the phases of the Calgary Marijuana Study.

5.1.2 Advertisement Success

During the Participant Interview, participants were asked the question, "How did you hear about our study?" Table 1 displays the number of participants that heard about the study via various advertisement avenues (all 126 individuals who completed the Participant Interview were included in this particular analysis). As can be seen from the table, the majority of participants heard about the study via various newspaper stories (i.e., Calgary Sun, Calgary Herald, Metro News Calgary, Edmonton Journal), flyers that were posted around the city (i.e., at local hospitals, the University of Calgary, local restaurants and stores), and various classified print and online Ads (i.e., Calgary Sun, Kijiji, Fast Forward Weekly, Facebook). The remaining participants heard about the study via various internet websites (i.e., University of Calgary, Facebook, Calgary 420 Cannabis Community), television (i.e., City TV Calgary, Global TV Calgary), radio (CBC Calgary, QR77 Calgary), and word of mouth (i.e., from a friend or family member).

Table 1

Number of Participants that Heard about the Study via Various Advertisement Avenues (N = 126)

Advertisement Avenue, *N* (%)	Participants
Newspaper stories	37 (29.4)
Flyers	31 (24.6)
Classified Ads	23 (18.2)
Internet websites	11 (8.7)
Television	10 (7.9)
Radio	8 (6.3)
Word of mouth	6 (4.8)

5.1.3 Screening Interview Data

Table 2 displays the Screening Interview data for the total sample (*N* = 119) that was included in the analysis and compares this group's sample characteristics (as collected during the Screening Interview) to those of excluded participants: specifically, those who did not meet the eligibility criteria for the study (*n* = 123, from which 116 individuals were screened out at the Screening Interview and 7 individuals were excluded from the analysis post-hoc), as well as those participants who met eligibility criteria but withdrew from the study prior to participating in the Participant Interview (*n* = 45).

As can be seen in the table, statistical comparisons at the Screening Interview between participants included versus excluded revealed several differences. First, compared to participants who were included in the analysis, those participants who did not meet eligibility criteria were significantly younger (*M* = 32.3 years vs. 37.3 years); were significantly different in marital status (i.e., were more likely to be single and dating, and were less likely to be married, in a common law relationship, and separated or divorced or widowed); were significantly less likely to meet criteria for lifetime cannabis abuse (85.2% vs. 98.3%) and reported significantly less lifetime cannabis abuse symptoms (*M* = 1.9 vs. 2.7); were significantly more likely to meet criteria for current cannabis abuse disorder (74.6% vs. 0.0%) and reported significantly more current cannabis abuse symptoms (*M* = 1.1 vs. 0.0); were significantly less likely to meet criteria for lifetime cannabis dependence disorder (66.1% vs. 94.1%) and reported significantly less lifetime cannabis dependence symptoms (*M* = 3.7 vs. 5.3); were significantly more likely to meet criteria for current cannabis dependence disorder (53.7% vs. 0.0%) and reported significantly more current cannabis dependence symptoms (*M* = 2.8 vs. 0.1); were significantly less likely to meet criteria for lifetime cannabis use disorder (86.9% vs. 100.0%) and reported significantly less lifetime cannabis use disorder symptoms (*M* = 5.6 vs. 7.9); were significantly more likely to meet criteria for current cannabis use disorder (84.4% vs. 0.0%) and reported significantly more current cannabis use disorder symptoms (*M* = 3.9 vs. 0.1); were significantly less likely to have recovered from a cannabis use disorder (2.5% vs. 100.0%)—this 2.5% represents 3 of the 7 individuals who were excluded from the analysis post-hoc, as they reported being recovered during

the Screening Interview but not during the Participant Interview; and finally, scored significantly higher on the ASSIST (*M* = 17.6 vs. 12.1).

In sum, these differences broadly suggest that those who were ineligible for the study were composed largely of individuals who were younger, single or dating, and who met criteria for a current cannabis use disorder (84.4%), yet reported fewer lifetime symptoms. While the mean lifetime cannabis use disorder symptoms is less among those individuals who were ineligible, it is possible that this can be accounted for by the low symptom counts from ineligible individuals who did not meet criteria for lifetime cannabis use disorder (13.1%).

Finally, the only differences discovered between participants included in the analysis versus those who met eligibility criteria but withdrew from the study prior to participating in the Participant Interview was that those participants who withdrew were significantly different in their employment status (i.e., were less likely to be students and more likely to be employed, unemployed, and in the Other category), and were less likely to meet lifetime cannabis dependence criteria (81.8% vs. 94.1%). However, this difference in likelihood of meeting lifetime cannabis dependence appears less compelling in light of the fact that there was no difference between the mean number of lifetime cannabis dependence symptoms (*M* = 5.0 vs. 5.3).

Table 2

Screening Interview Data for the Total Sample and Comparisons with Excluded Participants

Variable	Total Sample (N = 119)	Did Not Meet Eligibility Criteria (n = 123)	t-test / χ^2	Met Eligibility Criteria but Withdrew from the Study (n = 45)	t-test / χ^2
Age in years, *M* (*SD*)	37.3 (12.8)	32.3 (12.0)	3.1**	34.1 (11.1)	1.5
Gender (% male)	70.0	78.9	2.6	70.5	0.0
Marital status (%)			18.9***		7.4
Single	35.3	57.7		52.3[a]	
Dating	11.8	16.3		13.6[a]	
Married	18.5	8.9		20.5[a]	
Common law	19.3	8.1		9.1[a]	
Separated/divorced/widowed	15.1	8.9		4.5[a]	
Education (%)			6.4		6.3[ii]
No degree/certificate/diploma	14.3	16.4[b]		19.5[c]	
Secondary (high school) graduation certificate/diploma	34.5	44.0[b]		46.3[c]	
Trades certificate/diploma	13.4	9.5[b]		7.3[c]	
Other non- university certificate/diploma	9.2	3.4[b]		9.8[c]	
University certificate/diploma below bachelor level	7.6	5.2[b]		2.4[c]	
Bachelor's degree	15.1	17.2[b]		14.6[c]	
University certificate/diploma/degree above bachelor level	5.9	4.3[b]		0.0[c]	

Variable	Total Sample (N = 119)	Did Not Meet Eligibility Criteria (n = 123)	t-test / χ^2	Met Eligibility Criteria but Withdrew from the Study (n = 45)	t-test / χ^2
Employment (%)			6.9		12.8[*ii]
Employed full-time	51.3	56.9		58.1[k]	
Employed part-time	10.1	9.8		18.6[k]	
Unemployed	9.2	14.6		14.0[k]	
Student – employed	15.1	8.1		0.0[k]	
Student – unemployed	7.6	8.1		0.0[k]	
Other	6.7	2.4		9.3[k]	
Approx. net yearly income ($), *M* (*SD*)	40623.66 (28499.49)[d]	42980.22 (37693.16)[e]	0.5	55978.57 (80218.51)[f]	1.6
Self-identified ethnicity (%)			3.9		1.9[ii]
Caucasian	84.9	74.6[g]		84.1[a]	
Aboriginal	4.2	7.4[g]		9.1[a]	
Other	10.9	18.0[g]		6.8[a]	
Religion (% affiliated)	31.9	24.4	1.4	27.9	0.2
Religious importance[iii], *M* (*SD*)	2.2 (1.1)	2.2 (1.0)	0.1	2.1 (1.0)	0.6
Spirituality importance[iii], *M* (*SD*)	3.1 (1.0)	3.2 (0.9)	0.4	2.8 (1.1)	1.6
CIDI lifetime cannabis abuse (% yes)	98.3	85.2[g]	13.5[***]	97.7	*ns*[i]
CIDI lifetime cannabis abuse symptoms, *M* (*SD*)	2.7 (0.9)	1.9 (1.2)[g]	5.8[**]	2.7 (1.0)	0.5
CIDI current cannabis abuse (% yes)	0.0	74.6[g]	142.6[***]	0.0	
CIDI current cannabis abuse symptoms, *M* (*SD*)	0.0 (0.0)	1.1 (1.0)[g]	12.6[***]	0.0 (0.0)	
CIDI lifetime cannabis dependence (% yes)	94.1	66.1[h]	29.4[***]	81.8	*s*[*i]
CIDI lifetime cannabis dependence symptoms, *M*	5.3 (1.7)	3.7 (2.0)[h]	6.4[***]	5.0 (2.2)	0.8

Variable	Total Sample (N = 119)	Did Not Meet Eligibility Criteria (n = 123)	t-test / χ^2	Met Eligibility Criteria but Withdrew from the Study (n = 45)	t-test / χ^2
(*SD*)					
CIDI current cannabis dependence (% yes)	0.0	53.7[h]	85.8***	0.0	
CIDI current cannabis dependence symptoms, *M* (*SD*)	0.1 (0.4)	2.8 (2.1)[h]	13.8***	0.2 (0.5)	0.9
CIDI lifetime cannabis use disorder (% yes)	100.0	86.9[g]	16.7***	100.0	
CIDI lifetime cannabis use disorder symptoms, *M* (*SD*)	7.9 (2.3)	5.6 (2.9)[h]	6.9***	7.7 (2.9)	0.5
CIDI current cannabis use disorder (% yes)	0.0	84.4[g]	147.7***	0.0	
CIDI current cannabis use disorder symptoms, *M* (*SD*)	0.1 (0.4)	3.9 (2.7)[h]	15.2***	0.2 (0.5)	0.9
CIDI recovered cannabis use disorder (% yes)	100.0	2.5[h]	228.3***	100.0	
ASSIST total score, *M* (*SD*)	12.1 (4.9)	17.6 (7.4)[j]	6.7***	12.7 (5.7)[k]	0.6

Note. Chi-square values represent Pearson chi-square values. Absolute t-values and Pearson chi-square values are reported. ASSIST = Alcohol, Smoking, and Substance Involvement Screening Test, Cannabis Section; CIDI = Composite International Diagnostic Interview.
[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.
[ii] Cells have expected count less than 5.
[iii] Scale: 1 = Not important at all; 2 = Not very important; 3 = Somewhat important; 4 = Very important.
[a] n = 44. [b] n = 116. [c] n = 41. [d] n = 93. [e] n = 91. [f] n = 28. [g] n = 122. [h] n = 121. [j] n = 120. [k] n = 43.
* $p < .05$. ** $p < .01$. *** $p < .001$.

5.1.4 Collateral Validation Interview Data

From the total sample of 119 participants, 91 (76.5%) Collateral Validation Interviews were analyzed. The mean number of days elapsed between the Participant Interview to the Collateral Validation Interview was 10.3 (*SD* = 7.7) days. Table 3 displays the inter-rater reliability (intra-class correlations and kappa coefficients) and mean/percentage differences (*t*-test/chi-square statistics) between variables that were assessed at the Participant Interview and the Collateral Validation Interview. The particular kind of intra-class correlation that was calculated was based on the guidelines provided by Shrout and Fleiss (1979); and given that there is no consensus as to what constitutes qualitatively good, medium, or poor levels of the magnitude of intra-class correlations (Weir, 2005), the interpretation of the intra-class correlations was based on the general rule of thumb that higher values reflect greater agreement. Kappa coefficients were interpreted based on the guidelines by Landis and Koch (1977), whereby values that ranged from 0.00 to 0.20 were considered low, 0.21 to 0.40 were fair, 0.41 to 0.60 were moderate, 0.61 to 0.80 were substantial, and 0.80 to 1.00 were almost perfect.

As can be seen from the table, the intra-class correlations and kappa coefficients for most variables demonstrated adequate agreement overall, thereby supporting the reliability of the participant's self-report in general. It is noteworthy that the relatively more behavioural and objective variables (i.e., Resolution time in years, Past 12 and 3 months cannabis use frequency, Future 12 month cannabis use frequency goal, Lifetime cannabis treatment, Helpfulness of lifetime cannabis treatment) achieved the highest levels of agreement. Of the variables that demonstrated statistically significant agreement, the values of the intra-class correlations ranged from 0.21 to 0.80, and the values of the two kappa coefficients were 0.35 (fair) and 0.45 (moderate).

Table 3

Inter-Rater Reliability and Mean/Percentage Differences for Variables Assessed at the Participant and Collateral Validation Interviews (N = 91)

Variable	Participant Interview	Collateral Validation Interview	*t*-test / χ^2	ICC / κ
Perceived lifetime cannabis problem[iii], *M* (*SD*)	4.1 (1.0)	3.6 (1.3)	2.9**	0.29**
Perceived current cannabis problem[iii], *M* (*SD*)	1.0 (0.1)	1.1 (0.6)[a]	1.9	-0.02[a]
Resolution time in years, *M* (*SD*)	7.6 (7.7)	6.1 (6.6)[b]	1.4	0.63***[b]
Past 12 month cannabis use frequency[iv], *M* (*SD*)	1.8 (1.2)	1.7 (1.2)[a]	0.9	0.70***[a]
Past 3 month cannabis use frequency[iv], *M* (*SD*)	1.7 (1.5)	1.5 (1.1)	1.1	0.80***
Lifetime cannabis use frequency[iv], *M* (*SD*)	5.0 (0.1)	4.8 (0.5)	3.0**	0.07
12 month post-resolution frequency[iv], *M* (*SD*)	2.2 (1.4)	1.8 (1.3)[c]	1.7	0.24*[c]
Future 12 month cannabis use frequency goal[iv], *M* (*SD*)	1.5 (1.2)	1.4 (1.0)[a]	0.7	0.68***[a]
SDS past 12 months total score, *M* (*SD*)	0.7 (1.2)[a]	1.1 (2.4)[a]	1.7	0.31**[d]
SDS past 3 months total score, *M* (*SD*)	0.3 (0.8)[a]	0.7 (1.6)[a]	1.8	0.10[d]
MPS lifetime total score, *M* (*SD*)	16.9 (8.7)	13.3 (9.5)[e]	2.6**	0.35***[e]
MPS past 3 months total score, *M* (*SD*)	0.8 (1.6)	1.2 (2.6)[e]	1.4	0.11[e]
ASSIST total score, *M* (*SD*)	12.0 (5.3)	11.7 (5.5)[f]	0.4	0.21*[f]
MMM, social motives, *M* (*SD*)	17.1 (5.3)	16.9 (5.8)[d]	0.2	0.41***[d]
MMM, coping motives, *M* (*SD*)	16.7 (5.8)	16.1 (6.1)[g]	0.6	0.35***[g]
MMM, enhancement motives, *M* (*SD*)	20.3 (3.8)	18.7 (5.0)[g]	2.5*	0.11[g]
MMM, conformity motives, *M* (*SD*)	10.8 (5.8)	11.7 (5.8)[c]	1.0	0.28**[c]
MMM, expansion motives, *M* (*SD*)	14.2 (6.1)	12.4 (5.6)[c]	2.0*	0.22*[c]
Lifetime cannabis treatment[ii] (% yes)	48.4	36.3	19.2***	0.45***
Helpfulness of lifetime cannabis treatment[iii], *M* (*SD*)	3.7 (1.6)[h]	4.6 (1.1)[j]	2.6**	0.60*** [k]
Current cannabis treatment[ii] (% yes)	10.0	11.1	*s***[i]	0.35***[a]
Helpfulness of current cannabis treatment[iii], *M* (*SD*)	4.0 (1.4)[l]	4.4 (1.2)[m]	0.5	0.80[n]

Note. Intra-class correlations refer to a two-way random (generalizing) model, single measure, consistency type. ASSIST = Alcohol, Smoking, and Substance Involvement Screening Test, Cannabis Section; ICC = Intra-class correlation; MMM = Marijuana Motives Measure; MPS = Marijuana Problems Scale; SDS = Severity of Dependence Scale.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[ii] A kappa coefficient was calculated instead of an intra-class correlation because this is a categorical variable.

[iii] Scale range from 1 (Not at all) to 5 (Extremely).

[iv] Scale: 1 = Never; 2 = Once or twice; 3 = Monthly; 4 = Weekly; 5 = Daily or almost daily.

[a] $n = 90$. [b] $n = 85$. [c] $n = 87$. [d] $n = 89$. [e] $n = 84$. [f] $n = 86$. [g] $n = 88$. [h] $n = 43$. [j] $n = 31$. [k] $n = 24$. [l] $n = 9$. [m] $n = 12$. [n] $n = 4$.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$

For those variables that did not achieve statistically significant inter-rater reliability, a closer examination of the data revealed several possible explanations as to why inter-rater reliability was not achieved. Specifically, the magnitude of the intra-class correlations of two variables (Perceived Current Cannabis Problem and Lifetime Cannabis Use Frequency) were affected by lack of variability in the data, which can depress the magnitude of intra-class correlations (Weir, 2005). Indeed, for the variable Perceived Current Cannabis Problem, only two out of five values were rated by participants (97.5% of participants rated their current problem as a "1", meaning "no problem at all"), whereas five out of five values were rated by collaterals (92.2% of collaterals rated the participant's current problem as "1", meaning "no problem at all"). Similarly, for the variable Lifetime Cannabis Use Frequency, only two out of five values were rated by participants (97.5% of participants rated their lifetime frequency of cannabis use as a "5", meaning "daily or almost daily"), whereas five out of five values were rated by collaterals (86.8% of collaterals rated the participant's lifetime frequency of cannabis use as "5", meaning "daily or almost daily"). Another two variables (SDS past 3 months total score and MPS past 3 months total score) were affected by highly skewed data, which might have depressed the magnitude of the intra-class correlations. Indeed, for the SDS past 3 months total score, 79.7% of participants scored a 0 on the SDS, whereas 73.3% of collaterals reported a score of 0; and for the MPS past 3 months total score, 73.1% of participants scored a 0 on the MPS, whereas 65.5% of collaterals reported a score of 0. Another variable (MMM Enhancement Motives) might have been affected by a genuine lack of agreement between participants and collaterals, as no outliers were found and the data were not affected by lack of variability or extreme skewness. Finally, for the variable Helpfulness of Current Cannabis Treatment, this variable might have been affected by small sample size (n = 4), and the rate of agreement was almost statistically significant (p = .052). To sum, of the variables that did not achieve statistically significant inter-rater reliability, only one variable (MMM Enhancement Motives) might reflect a genuine lack of agreement between participants and collaterals, as the other variables might have been affected by lack of variability and high skewness in the data.

As can also be seen in Table 3, the differences in means and percentages between variables suggest that collaterals under-reported the lifetime severity of participant's cannabis problems and lifetime frequency of cannabis use. Additionally, collaterals under-reported the extent to which participant's used cannabis for enhancement and expansion purposes; under-reported the extent to which they thought participant's ever sought cannabis treatment; over-reported the extent to which they thought participant's benefited from lifetime cannabis treatment; and slightly over-reported the extent to which they thought participant's were currently seeking cannabis treatment (although the statistical significance of this variable might not be useful based on extremely unequal cell sizes and the fact that both participants and collaterals report very similar proportions of current cannabis treatment). Taken together, these findings are not surprising in light of the notion that collaterals are not privy to all of the cannabis use information that is at the disposal of participants (particularly with respect to treatment), and that under-reporting of addictive behaviours in general by collaterals is common (Borsari & Muellerleile, 2009; Hodgins & Makarchuk, 2003). Moreover, these findings are not surprising in light of research suggesting that collateral reports for cannabis use may be unreliable in general and that collaterals may be better able to report when a participant does not use cannabis as opposed to how much cannabis is being used (Norberg, Mackenzie, & Copeland, 2012a).

Finally, Table 4 displays the mean degree of confidence endorsed by collaterals for each variable assessed. As can be seen from the table, collaterals reported that on average, they were certain to very certain with respect to their degrees of confidence in their responses. Only one variable, resolution time in years (M = 2.9, SD = 1.0, n = 89), fell within the range of between uncertain and certain, albeit much closer to the certain degree of confidence; this variable, however, demonstrated good agreement (intra-class correlation = 0.63, $p < .001$) and no statistical difference was found between participant and collateral reports.

Table 4

Mean Degrees of Confidence Endorsed by Collaterals

Variable, *M* (*SD*)	Degree of Confidence[i] (*N* = 91)
Perceived lifetime/current cannabis problem	3.8 (0.4)[a]
Resolution time in years	2.9 (1.0)[b]
Past 12 month cannabis use frequency	3.7 (0.6)
Past 3 month cannabis use frequency	3.8 (0.5)
Lifetime cannabis use frequency	3.7 (0.8)[c]
12 month post-resolution frequency	3.2 (1.0)[b]
Future 12 month cannabis use frequency goal	3.7 (0.6)
SDS	3.7 (0.5)[b]
MPS	3.2 (0.9)
ASSIST	3.6 (0.6)[a]
MMM	3.3 (0.6)[a]
Lifetime cannabis treatment and helpfulness	3.6 (0.8)[b]
Current cannabis treatment and helpfulness	3.9 (0.4)[c]

Note. ASSIST = Alcohol, Smoking, and Substance Involvement Screening Test, Cannabis Section; MMM = Marijuana Motives Measure; MPS = Marijuana Problems Scale; SDS = Severity of Dependence Scale.
[i] Scale: 1 = Very uncertain; 2 = Uncertain; 3 = Certain; 4 = Very certain.
[a] *n* = 90. [b] *n* = 89. [c] *n* = 88.

5.1.5 Test-Retest Reliability Interview Data

From the total sample of 119 participants, 107 (89.1%) Test-Retest Reliability interviews were analyzed. The following are the mean number of days elapsed between the Screening, Participant, and Test-Retest Reliability interviews: Screening Interview to the Participant Interview, 13.9 (*SD* = 25.2) days; Screening Interview to the Test-Retest Reliability Interview, 23.5 (*SD* = 29.0) days; Participant Interview to the Test-Retest Reliability Interview, 9.6 (*SD* = 13.1) days. Table 5 displays the intra-class correlations between variables that were assessed more than once at either the Screening, Participant, or Test-Retest Reliability Interviews.

As can be seen from the table, all but one of the intra-class correlations were statistically significant and ranged from 0.35 to 0.94, thereby demonstrating good overall test-retest reliability of the various measures and variables. With respect to the remaining non-significant correlation between Lifetime Cannabis Use Frequency assessed at the Participant Interview and the Test-Retest Reliability Interview, an examination of the individual cases revealed only 3 instances of discrepancy between the Participant and Test-Retest Reliability Interviews, thereby providing confidence in the test-retest reliability of this variable as well. It should be noted that while the interviewers for the Test-Retest Reliability Interview were blind to the Participant Interview, the same interviewer often conducted both the Screening and Participant Interviews, thereby possibly undermining the strength of the test-retest reliability obtained for those measures (i.e., the CIDI and ASSIST).

Table 5

Means, Standard Deviations, and Intra-Class Correlations for Variables Assessed at the Screening, Participant, and Test-Retest Reliability Interviews

Variable, *M* (*SD*)	Screening Interview (*N* = 119)	Participant Interview (*N* = 119)	Test-Retest Reliability Interview (*N* = 107)	ICC
CIDI lifetime cannabis abuse symptoms	2.7 (0.9)	2.7 (1.0)		0.73***
CIDI current cannabis abuse symptoms	0.0 (0.0)	0.0 (0.0)		
CIDI lifetime cannabis dependence symptoms	5.3 (1.7)	5.3 (1.9)		0.84***
CIDI current cannabis dependence symptoms	0.1 (0.4)	0.1 (0.3)		0.35***
CIDI lifetime cannabis use disorder symptoms	7.9 (2.3)	8.0 (2.5)		0.85***
CIDI current cannabis use disorder symptoms	0.1 (0.4)	0.1 (0.3)		0.35***
ASSIST total score	12.1 (4.9)[a]	11.7 (5.1)[a]		0.45***[a]
Past 3 month cannabis use frequency[i]		1.6 (1.1)[b]	1.5 (1.1)[b]	0.94***[b]
Past 12 month cannabis use frequency[i]		1.7 (1.1)[c]	1.7 (1.1)[c]	0.91***[c]
Lifetime cannabis use frequency[i]		5.0 (0.1)[b]	5.0 (0.1)[b]	-0.01[b]
Future 12 month cannabis use frequency goal[i]		1.5 (1.0)[c]	1.4 (1.0)[c]	0.91***[c]
MPS lifetime total score		17.1 (8.3)[d]	16.2 (9.6)[d]	0.80***[d]
MPS past 3 months total score		0.6 (1.4)[d]	0.5 (1.2)[d]	0.43***[d]

Note. Intra-class correlations refer to a two-way mixed (non-generalizing) model, single measure, consistency type. ASSIST = Alcohol, Smoking, and Substance Involvement Screening Test, Cannabis Section; CIDI = Composite International Diagnostic Interview; ICC = Intra-class correlation; MPS = Marijuana Problems Scale.

[i] Scale: 1 = Never; 2 = Once or twice; 3 = Monthly; 4 = Weekly; 5 = Daily or almost daily.

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

[a] $n = 118$. [b] $n = 107$. [c] $n = 106$. [d] $n = 105$.

5.2 Data Analytic Approach

5.2.1 Operational Definitions for Group Comparisons

With respect to recovery orientation (abstinence- versus moderation-oriented recovery), the decision was made to operationally define the groups based on participant reports of frequency of cannabis use in the past 12 months. Specifically, the abstinence-oriented group consisted of participants who were abstinent from cannabis in the past 12 months, whereas the moderation-oriented group consisted of participants who were non-abstinent in the past 12 months. Using this operational definition, of the total sample of 119 participants, 68 (57.1%) fell into the abstinence-oriented group, and 51 (42.9%) fell into the moderation-oriented group. Among the 51 participants that fell into the moderation-oriented group, 30 (58.8%) reported using cannabis once or twice, 10 (19.6%) reported monthly use, 3 (5.9%) reported weekly use, and 8 (15.7%) reported daily or near daily use. It is noteworthy that with respect to the frequency of cannabis use scale that was used in the present study (1 = never; 2 = once or twice; 3 = monthly; 4 = weekly; 5 = daily or almost daily), similar frequency rates of past use and future goals were reported within the abstinence-oriented group (past 12 month cannabis use: $M = 1.0$, $SD = 0.0$; future 12 month frequency of cannabis use goals: $M = 1.0$, $SD = 0.2$) and within the moderation-oriented group (past 12 month cannabis use: $M = 2.8$, $SD = 1.1$; future 12 month frequency of cannabis use goals: $M = 2.1$, $SD = 1.4$). Indeed, past 12 month cannabis use and future 12 month frequency of cannabis use goals were highly correlated ($r = .83$, $p < .001$).

With respect to recovery type (treatment-assisted recovery versus natural recovery), the decision was made to operationally define the groups based on participant reports of ever seeking formal or professional treatment for a cannabis problem. Specifically, the treatment-assisted group consisted of participants who reported ever seeking cannabis treatment, whereas the natural recovery group was composed of participants who reported never seeking cannabis treatment. Using this operational definition, of the total sample of 119 participants, 53 (44.5%) fell into the treatment-assisted recovery group, and 66 (55.5%) fell into the natural recovery group. Of the 53 participants in the treatment-assisted group, 24 (45.3%) estimated having over fifty

sessions, 8 (15.1%) had approximately between ten and fifty sessions, 16 (30.2%) had approximately between two and eight sessions, and only 5 (9.4%) reported one session. Of the 5 participants that reported only one session of treatment, 2 reported that treatment was extremely helpful, whereas 3 reported that treatment was not at all helpful.

It is also important to note that the recovery orientation groups and the recovery type groups in the present study were not isomorphic but were significantly related to each other. That is, a 2 (Recovery Orientation; abstinence vs. moderation) X 2 (Recovery Type: treatment-assisted versus natural recovery) chi-square analysis revealed that Recovery Orientation was significantly related to Recovery type (χ^2 (1) = 4.5, $p < .05$), such that participants in the abstinence-oriented group were significantly more likely to have sought professional treatment for their cannabis problem than moderation-oriented participants (52.9% vs. 33.3%). More specifically, of the 68 participants in the abstinence-oriented group, 36 (52.9%) and 32 (47.1%) had ever sought and not sought cannabis treatment, respectively; and of the 51 participants in the moderation-oriented group, 17 (33.3%) and 34 (66.7%) had ever sought and not sought cannabis treatment, respectively.

5.2.2 Statistical Approach and Issues

The general statistical approach in the present study was to first report descriptive statistics for the total sample, and then to compare the descriptive statistics among the recovery orientation and recovery type groups. Given that the recovery orientation and recovery type groups were significantly related (χ^2 (1) = 4.5, $p < .05$), the decision was made to compare the descriptive statistics among the groups by conducting multiple 2 (Recovery Orientation; abstinence vs. moderation) X 2 (Recovery Type: treatment-assisted versus natural recovery) analyses of variance (ANOVAs) for continuous variables in order to control for the effects of each factor on the dependent variables. In cases where the assumption of homogeneity of variance was violated, a more stringent alpha level (i.e., .025 for a moderate violation and .01 for a severe violation) was employed when evaluating main effects and interactions (Tabachnick & Fidell, 2007, p. 86). Given that Tabachnick and Fidell have not specified exactly what constitutes a moderate or severe violation, the arbitrary decision was made to define instances where

Levene's test of equality of error variances was significant at alpha levels between .05 and .01 as a moderate violation, and significant at less than .01 as a severe violation.

To compare the recovery orientation and recovery type groups for non-continuous variables, Pearson's chi-square and Fisher's exact tests were used. In cases where a significant result was obtained on a particular dependent variable for both the recovery orientation and recovery type groups, follow-up tests were conducted that controlled for the effects of each respective factor in order to elucidate the relationship with the dependent variable.

Gender analyses were not a focus of the present study and therefore were not conducted, though the impact of gender on the recovery process is important and ought to be explored in future studies.

Two statistical issues in the present study are important to highlight. First, a substantial number of multiple group comparisons were explored in the context of the results from the content analyses and checklists. The exploratory nature of the data analyses in the present study could have justified the approach that statistical correction for multiple comparisons (e.g., Bonferroni correction) was not necessary (Silverstein, 1986). Indeed, in previous exploratory research in the natural recovery literature that has involved multiple comparisons between groups, statistical correction has not been used (e.g., Cunningham et al., 1994, 1995; Hodgins & el-Guebaly, 2000; Toneatto et al., 2008). However, in the present study, results were presented both with and without corrected Bonferroni alpha levels in order to strengthen the confidence in the findings that emerged.

The second statistical issue concerned the fact that minor instances of missing data were prevalent for many variables. The approach to handling missing data was simply to employ casewise deletion. This approach was the most reasonable given the exploratory nature of the results (i.e., prior knowledge could not be used to impute missing data), the large number of variables with missing data in the present study, and the fact that instances of missing data occurred most often with only few cases and on different variables (Tabachnick & Fidell, 2007).

5.2.3 Content Analysis

With the aid of NVivo software (NVivo, 2010), the qualitative data analytic technique of content analysis (Braun & Clarke, 2006; Elo & Kyngas, 2008; Hsiu-Fang & Shannon, 2005; Miles & Huberman, 1994) was used to derive categories from all open-ended responses in the present study. Content analysis is a method that can be used to identify patterns across text-based data and provide frequency counts to allow for quantitative analyses of initially qualitative data (Braun & Clarke, 2006). Through content analysis, it is possible to distil words into fewer content-related categories, such that particular categories of words and phrases share the same meaning (Elo & Kyngas, 2008). The aim is to attain a condensed and broad description of the phenomenon, whereby the outcome of the analysis produces categories that describe the phenomenon. As might be expected, the method has been criticized by some as not lending itself well to detailed statistical analyses, whereas others have criticized it for not being sufficiently qualitative in nature (Elo & Kyngas, 2008). Nevertheless, it is a content-sensitive and flexible approach that has been used extensively in the natural recovery literature (e.g., Ellingstad et al., 2006; Hodgins & el-Guebaly, 2000; Sobell et al, 1992b., 1993; Toneatto et al., 2008).

Elo and Kyngas (2008) note that while there are no systematic rules with respect to content analysis, the key feature of all content analysis is that the many words of text are classified into much smaller content categories. Further, content analysis can be represented by three main phases: preparation, organizing, and reporting. In the preparation phase, the researcher becomes immersed in the data, whereby written material is read through several times to allow the researcher to gain familiarity with the data. The organizing phase can either be inductive or deductive; in the present study, the approach was inductive given that the goal was to explore the data and derive categories in a bottom-up way that combines words or phrases into larger categories (the deductive approach involves theory testing and re-testing existing data in a new context). The inductive organizing phase involves open coding (notes and headings are created during perusal of the text), creating categories (lists of categories are grouped under higher order headings), and abstraction (categories are named using content-characteristic words).

During the process of deriving categories, the researcher arrives at a decision through interpretation as to which data belong in the same category. This process continues in an iterative fashion for as long as is deemed reasonable and possible. Finally, inter-rater reliability with respect to the content of the derived categories may be calculated, although various opinions about seeking agreement exist given that each researcher interprets the data according to their own subjective perspective and co-researchers could arrive at an alternative interpretation (Elo & Kyngas, 2008).

Thus, in the present study, content analysis was used to derive categories from the responses to all open-ended questions in the Participant Interview. This author was solely responsible for the preparation, organizing, and abstraction phases of the content analysis. After the categories were derived, an independent rater, who was not a member of the research team, was provided with a categorization sheet containing the labels for each category and a brief (e.g., one sentence) description for each category label. The independent rater then used the categorization sheet to place the open-ended responses into categories, and inter-rater reliability (kappa coefficients and percentage agreement) was calculated. Kappa coefficient levels of .80 or higher were desired and considered as good agreement. In the present study, all inter-rater reliability calculations achieved a kappa coefficient level of .80 or higher on the first attempt at establishing inter-rater reliability, and thus, a third independent rater was not sought for a second reliability check. Disagreements with respect to categorization were discussed and resolved via consensus between this author and the independent rater. After the final categories were determined, quantitative analyses were conducted on the frequency counts of participants who endorsed each category. It is noteworthy that participant responses could be coded into more than one category for a particular open-ended question given the nature of the open-ended questions (e.g., participants often provided more than one response when asked to describe their reasons for resolution, and as such, these responses would be coded into more than one category that reflect different reasons for resolution).

5.3 Sample Characteristics

5.3.1 Demographics

Demographic variables collected during the Participant Interview are presented in Table 6. As can be seen in the table, the total sample was on average 37.4 years-old; 70.0% were male; only 37.0% were married or in a common-law relationship; approximately half of the sample had a post-secondary education (56.3%); approximately half were employed full-time (52.1%); the sample was predominantly Caucasian (79.8%); only 32.8% were affiliated with a religion; religion was on average not very important to the sample; and spirituality was on average somewhat important to the sample.

As can also be seen in the table, there were only two demographic differences between the abstinence- and moderation-oriented recovery groups; the abstinence-oriented group was significantly older (40.8 years vs. 32.8 years) and reported on a four-point scale that spirituality was significantly more important in their lives (M = 3.3 vs. 2.8). However, Levene's test was significant for both variables, and only the difference in age remained statistically significant after adjustment. Similarly, the only demographic difference between the treatment-assisted and natural recovery groups was that the treatment-assisted group reported that spirituality was significantly more important in their lives (M = 3.4 vs. 2.9); but an adjustment for the significant Levene's test rendered this difference no longer significant.

Table 6

Demographics for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Variable	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	F-test / χ^2	TAR (n = 53)	NR (n = 66)	F-test / χ^2
Age in years, M (SD)	37.4 (12.9)	40.8 (13.5)	32.8 (10.5)	9.5[**i]	39.0 (13.0)	36.1 (12.8)	0.6[i]
Gender (% male)	70.0	67.6	72.5	0.3	64.2	74.2	1.4
Marital status (%)				4.0			3.7
Single	36.1	30.9	43.1		34.0	37.9	
Dating	10.9	8.8	13.7		13.2	9.1	
Married	20.2	25.0	13.7		20.8	19.7	
Common law	16.8	17.6	15.7		11.3	21.2	
Separated/divorced/widowed	16.0	17.6	13.7		20.8	12.1	
Education (%)				2.6[ii]			2.9[ii]
No degree/certificate/diploma	13.4	14.7	11.8		17.0	10.6	
Secondary (high school) graduation certificate/diploma	30.3	33.8	25.5		30.2	30.3	
Trades certificate/diploma	16.8	14.7	19.6		15.1	18.2	
Other non- university certificate/diploma	10.1	8.8	11.8		13.2	7.6	
University certificate/diploma below bachelor level	9.2	7.4	11.8		7.5	10.6	
Bachelor's degree	12.6	11.8	13.7		11.3	13.6	
University certificate/diploma/degree above bachelor level	7.6	8.8	5.9		5.7	9.1	

Variable	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Employment (%)				3.1[ii]			3.0[ii]
Employed full-time	52.1	52.9	51.0		52.8	51.5	
Employed part-time	10.1	13.2	5.9		5.7	13.6	
Unemployed	10.9	8.8	13.7		13.2	9.1	
Student – employed	12.6	13.2	11.8		11.3	13.6	
Student – unemployed	8.4	7.4	9.8		9.4	7.6	
Other	5.9	4.4	7.8		7.5	4.5	
Approx. net yearly income ($), M (SD)	43168.32 (29415.01)[a]	45406.78 (32043.68)[b]	40023.81 (25307.61)[c]	0.3	46880.95 (31895.56)[c]	40525.42 (27487.68)[b]	0.9
Self-identified ethnicity (%)				0.2[ii]			0.1[ii]
Caucasian	79.8	79.4	80.4		79.2	80.3	
Aboriginal	5.0	4.4	5.9		5.7	4.5	
Other	15.1	16.2	13.7		15.1	15.2	
Religion (% affiliated)	32.8	30.9	35.3	0.3	30.2	34.8	0.3
Religious importance[ii], M (SD)	2.1 (1.0)	2.2 (1.0)	2.0 (1.1)	0.7	2.0 (1.0)	2.2 (1.1)	0.7
Spirituality importance[ii], M (SD)	3.1 (1.1)	3.3 (0.9)	2.8 (1.2)	4.4[*i]	3.4 (0.9)	2.9 (1.1)	4.5[*i]

Note. Chi-square values represent Pearson chi-square values. Absolute Pearson chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Levene's test of equality of error variances was significant.

[ii] Cells have an expected count less than 5.

[ii] Scale: 1 = Not important at all; 2 = Not very important; 3 = Somewhat important; 4 = Very important.

[a] n = 101. [b] n = 59. [c] n = 42.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

5.3.2 Comorbidity Variables

Comorbidity variables are presented in Table 7. As can be seen in the table, the total sample was highly comorbid with lifetime alcohol and substance use disorders, and major depression. Specifically, 79.8% and 52.1% of the sample met lifetime alcohol and substance abuse criteria, respectively; and 52.9% and 36.1% met lifetime alcohol and substance dependence criteria, respectively. The most prevalent lifetime substance use disorders were stimulant use disorders (37.0% for abuse, 27.7% for dependence) and hallucinogen use disorders (32.8% for abuse, 14.3% for dependence). In addition, 71.8%, 77.3%, and 14.3% of the sample reported ever trying to stop, cut down, or control their alcohol use, cigarette smoking, and gambling, respectively. In terms of depression, 83.1% of the sample met DSM-IV-defined diagnostic criteria for lifetime major depressive disorder, whereby 62.2% reported using cannabis during their worst week of depression, 41.9% believed that cannabis made their depression worse, 30.5% believed that cannabis made their depression better, and 18.9% believed that cannabis caused their depression. In terms of schizotypal personality, the total score on the SPQ-B for the total sample (M = 9.7, SD = 4.1) was similar to that of a sample of 220 male and female undergraduates (M = 9.6, SD = 5.3) (Raine & Benishay, 1995).

Few differences in comorbidity variables were found between the abstinence- and moderation-oriented recovery groups. Specifically, the abstinence-oriented group was significantly more likely to meet lifetime substance abuse (60.3% vs. 41.2%), and particularly, lifetime hallucinogen abuse (42.6% vs. 19.6%). However, when Recovery Type was controlled for, there was no longer a significant relationship between lifetime substance abuse and Recovery Orientation (treatment-assisted participants, χ^2 (1) = 0.6, *ns*; naturally recovered participants, χ^2 (1) = 2.1, *ns*); but a significant relationship remained between lifetime hallucinogen abuse and Recovery Orientation among treatment-assisted participants (55.6% vs. 23.5%) (treatment-assisted participants, χ^2 (1) = 4.8, $p < .05$; naturally recovered participants, χ^2 (1) = 1.0, *ns*). Additionally, significantly more participants in the abstinence-oriented group reported ever trying to stop, cut down, or control their alcohol use (80.3% vs. 60.8%), but this difference did not remain significant when Recovery Type was controlled for (treatment-assisted participants, χ^2 (1)

= 0.6, *ns*; naturally recovered participants, χ^2 (1) = 3.5, *ns*). Participants in the moderation-oriented group scored significantly higher on the AUDIT (*M* = 10.1 vs. 7.1).

Relatively more differences in comorbidity variables were found between the treatment-assisted and natural recovery groups. Specifically, the treatment-assisted group was significantly more likely to meet lifetime diagnoses on the following variables: substance abuse (66.0% vs. 40.9%), substance dependence (50.9% vs. 24.2%), opioid abuse (11.3% vs. 1.5%), stimulant abuse (54.7% vs. 22.7%), stimulant dependence (41.5% vs. 16.7%), hallucinogen abuse (45.3 vs. 22.7%), IDD major depression (92.5% vs. 75.4%), and they were also significantly more likely to report ever trying to stop, cut down, or control their alcohol use (82.4% vs. 63.6%). However, when Recovery Orientation was controlled for, there was no longer a significant relationship between Recovery Type and lifetime substance abuse (abstinence-oriented participants, χ^2 (1) = 2.7, *ns*; moderation-oriented participants; χ^2 (1) = 3.3, *ns*) and reports of ever trying to stop, cut down, or control alcohol use (abstinence-oriented participants, χ^2 (1) = 1.1, *ns*; moderation-oriented participants; χ^2 (1) = 2.6, *ns*); but there remained a significant relationship between Recovery Type and lifetime hallucinogen abuse among abstinence-oriented participants (55.6% vs. 28.1%) (abstinence-oriented participants, χ^2 (1) = 5.2, $p < .05$; moderation-oriented participants; χ^2 (1) = 0.2, *ns*). Additionally, the treatment-assisted group scored significantly higher on the following lifetime symptom severity variables, all of which remained significant after alpha level adjustments for the significant Levene's tests: alcohol use disorder (*M* = 5.9 vs. 4.3); substance use disorder (*M* = 8.3 vs. 3.4); a composite score of poly-substance use and alcohol use disorder symptoms (*M* = 14.2 vs. 7.7); stimulant use disorder (*M* = 4.0 vs. 1.7); and the IDD total depression score (*M* = 49.4 vs. 39.1).

Finally, there was also a significant interaction effect on hallucinogen use disorder severity, F (1, 115) = 7.7, $p = .007$, which remained significant after adjustment for the significant Levene's test, whereby abstinence-oriented participants reported higher hallucinogen use disorder severity compared to moderation-oriented participants only among those who sought treatment (*M* = 2.9 vs. 0.7, F (1, 115) = 8.9, $p < .01$), not those who naturally recovered (*M* = 0.7 vs. 1.2, F (1, 115) = 8.9, *ns*).

Table 7

Comorbidity Variables for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Variable	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	F-test / χ^2	TAR (n = 53)	NR (n = 66)	F-test / χ^2
CIDI lifetime alcohol abuse (% yes)	79.8	80.9	78.4	0.1	86.8	74.2	2.9
CIDI lifetime alcohol dependence (% yes)	52.9	57.4	47.1	1.2	60.4	47.0	2.1
CIDI lifetime alcohol use disorder symptoms, *M* (*SD*)	5.0 (3.6)	5.5 (3.7)	4.5 (3.4)	1.4	5.9 (3.8)	4.3 (3.3)	4.0^{*}
CIDI lifetime substance abuse (% yes)	52.1	60.3	41.2	4.3^{*}	66.0	40.9	7.4^{**}
CIDI lifetime substance dependence (% yes)	36.1	41.2	29.4	1.7	50.9	24.2	9.1^{**}
CIDI lifetime substance use disorder symptoms, *M* (*SD*)	5.6 (7.8)	6.4 (8.6)	4.4 (6.5)	0.3^{ii}	8.3 (9.5)	3.4 (5.3)	9.4^{**ii}
CIDI poly-substance use disorder symptoms (including alcohol and other substance use disorder), *M* (*SD*)	10.6 (8.9)	11.9 (9.6)	8.9 (7.5)	2.0^{ii}	14.2 (10.6)	7.7 (5.8)	13.2^{***ii}
CIDI lifetime opioid abuse (%)	5.9	5.9	5.9	ns^{i}	11.3	1.5	s^{*i}
CIDI lifetime opioid dependence (% yes)	7.6	8.8	5.9	ns^{i}	11.3	4.5	ns^{i}
CIDI lifetime opioid use disorder symptoms, *M* (*SD*)	0.6 (2.3)	0.7 (2.3)	0.6 (2.3)	0.0^{ii}	1.0 (2.9)	0.3 (1.6)	1.9^{ii}
CIDI lifetime stimulant abuse (%)	37.0	42.6	29.4	2.2	54.7	22.7	12.9^{***}
CIDI lifetime stimulant dependence (% yes)	27.7	30.9	23.5	0.8	41.5	16.7	9.0^{**}

Variable	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
CIDI lifetime stimulant use disorder symptoms, *M* (*SD*)	2.7 (4.0)	3.0 (4.1)	2.2 (3.8)	0.3[ii]	4.0 (4.3)	1.7 (3.5)	8.9**[ii]
CIDI lifetime sedative-hypnotic-anxiolytic abuse (%)	4.2	4.4	3.9	*ns*[i]	5.7	3.0	*ns*[i]
CIDI lifetime sedative-hypnotic-anxiolytic dependence (% yes)	3.4	1.5	5.9	*ns*[i]	5.7	1.5	*ns*[i]
CIDI lifetime sedative-hypnotic-anxiolytic use disorder symptoms, *M* (*SD*)	0.3 (1.4)	0.3 (1.4)	0.4 (1.5)	0.5	0.4 (1.9)	0.3 (1.0)	0.7
CIDI lifetime hallucinogen abuse (%)	32.8	42.6	19.6	7.0**	45.3	22.7	6.8**
CIDI lifetime hallucinogen dependence (% yes)	14.3	16.2	11.8	0.5	20.8	9.1	1.9
CIDI lifetime hallucinogen use disorder symptoms, *M* (*SD*)	1.5 (2.6)	1.8 (2.9)	1.0 (2.0)	3.2[ii]	2.2 (3.2)	0.9 (1.9)	3.4[ii]
CIDI lifetime other substance abuse (%)	5.9	8.8	2.0	*ns*[i]	9.4	3.0	*ns*[i]
CIDI lifetime other substance dependence (% yes)	5.0	7.4	2.0	*ns*[i]	7.5	3.0	*ns*[i]
CIDI lifetime other substance use disorder symptoms, *M* (*SD*)	0.4 (1.7)	0.6 (2.0)	0.2 (1.1)	1.1[ii]	0.7 (2.3)	0.2 (1.0)	1.9[ii]
AUDIT total score, *M* (*SD*)	8.4 (7.3)[a]	7.1 (6.0)[b]	10.1 (8.4)[c]	4.1*	8.0 (7.5)[d]	8.7 (7.1)[e]	0.1
Ever tried to stop, cut down, or control your alcohol use? (% yes)	71.8	80.3	60.8	5.4*	82.4	63.6	5.0*
Cigarettes past 3 months frequency[iii], *M* (*SD*)	2.5 (1.8)	2.2 (1.7)	2.8 (1.9)	1.3	2.6 (1.9)	2.4 (1.8)	1.4

Variable	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Ever tried to stop, cut down, or control your cigarette smoking? (% yes)	77.3	75.0	80.4	0.5	81.1	74.2	0.8
PGSI total score, *M* (*SD*)	0.5 (1.7)	0.7 (2.1)	0.3 (0.8)	0.9[ii]	0.7 (2.2)	0.4 (1.1)	0.5[ii]
NODS-CLiP #1 (% yes)	14.3	13.2	15.7	0.1	17.0	12.1	0.6
NODS-CLiP #2 (% yes)	10.1	10.3	9.8	0.0	7.5	12.1	0.7
NODS-CLiP #3 (% yes)	5.9	5.9	5.9	*ns*[i]	5.7	6.1	*ns*[i]
NODS-CLiP total score, *M* (*SD*)	0.3 (0.8)	0.3 (0.8)	0.3 (0.8)	0.0	0.3 (0.7)	0.3 (0.8)	0.0
IDD total score, *M* (*SD*)	43.8 (16.5)[f]	43.5 (17.7)[e]	44.0 (14.8)	0.9[ii]	49.4 (14.1)[g]	39.1 (16.9)[h]	12.9[***ii]
IDD DSM-IV lifetime major depression (% meets criteria)	83.1[j]	82.1[k]	84.3	0.1	92.5	75.4[l]	6.0[*]
Cannabis use during worst week of depression (% yes)	62.2	55.9	70.6	2.7	67.9	57.6	1.4
Belief that cannabis made depression worse (% yes)	41.9	50.0	31.9	3.5	48.9	36.2	1.7
Belief that cannabis made depression better (% yes)	30.5	25.9	36.2	1.3	29.8	31.0	0.0
Belief that cannabis caused depression (% yes)	18.9	25.4	10.6	3.7	22.9	15.5	0.9
SPQ-B total score, *M* (*SD*)	9.7 (4.1)[m]	9.4 (3.9)	10.2 (4.4)[n]	0.7	9.8 (3.9)	9.7 (4.4)[e]	0.0
SPQ-B, cognitive perceptual factor, *M* (*SD*)	3.3 (2.0)[j]	3.4 (2.0)	3.2 (2.0)[c]	0.3	3.2 (1.9)	3.5 (2.1)[l]	0.2
SPQ-B, interpersonal factor, *M* (*SD*)	3.6 (2.1)	3.4 (2.0)	3.7 (2.3)	0.4	3.6 (1.8)	3.5 (2.3)	0.0
SPQ-B, disorganized factor, *M* (*SD*)	2.9 (1.7)[j]	2.7 (1.7)	3.1 (1.8)[c]	2.5	3.0 (1.8)	2.8 (1.7)[o]	0.6

Note. Chi-square values represent Pearson chi-square values. Absolute Pearson chi-square values are reported. AB = abstinence; AUDIT = Alcohol Use Disorders Identification Test; CIDI = Composite International Diagnostic Interview; DSM = Diagnostic and Statistical Manual of Mental Disorders; IDD = Inventory to Diagnose Depression; MOD = moderation; NODS-CLiP = National Opinion Research Center DSM-IV Screen for Gambling Problems, brief

version; NR = natural recovery; PGSI = Problem Gambling Severity Index; SPQ-B = Schizotypal Personality Questionnaire, brief version; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[ii] Levene's test of equality of error variances was significant.

[iii] Scale: 1 = Never; 2 = Once or twice; 3 = Monthly; 4 = Weekly; 5 = Daily or almost daily.

[a] $n = 112$. [b] $n = 62$. [c] $n = 50$. [d] $n = 48$. [e] $n = 64$. [f] $n = 115$. [g] $n = 52$. [h] $n = 63$. [j] $n = 118$. [k] $n = 67$. [l] $n = 65$. [m] $n = 117$. [n] $n = 49$. [o] $n = 66$.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

5.4 Cannabis-Related Variables

5.4.1 Lifetime Problem Severity and Tests of Secondary Hypotheses

Table 8 displays the lifetime cannabis problem severity variables that were collected during the Participant Interview. The secondary hypotheses (i.e., that the abstinence-oriented recovery group would exhibit higher levels of lifetime cannabis problem severity than the moderation-oriented recovery group, and that the treatment-assisted recovery group would exhibit higher levels of lifetime cannabis problem severity than the natural recovery group) were supported with small to medium effect sizes after controlling for either recovery orientation or recovery type—as defined by ranges of small (η^2 = .01), medium (η^2 = .09), and large (η^2 = .25) (Tabachnick & Fidell, 2007). Specifically, the abstinence-oriented participants demonstrated significantly higher lifetime problem severity scores compared to the moderation-oriented participants on the MPS (abstinence-oriented group: M = 18.8, SD = 8.1; moderation-oriented group: M = 14.6, SD = 8.2; F (1, 115) = 4.1, $p < .05$, η^2 = .03) and the CIDI cannabis use disorder symptoms measure (abstinence-oriented group: M = 8.5, SD = 2.2; moderation-oriented group: M = 7.3, SD = 2.8; F(1, 115) = 3.9, p = .05, η^2 = .03); and the treatment-assisted participants demonstrated significantly higher lifetime problem severity scores compared to the natural recovery participants on the MPS (treatment-assisted group: M = 20.4, SD = 7.7; natural recovery group: M = 14.3, SD = 8.0; F (1, 115) = 14.2, $p < .001$, η^2 = .10) and the CIDI cannabis use disorder symptoms measure (treatment-assisted group: M = 9.0, SD = 2.1; natural recovery group: M = 7.2, SD = 2.6; F (1, 115) = 11.8, $p < .001$, η^2 = .09). However, Levene's test was significant for the ANOVA that tested the CIDI cannabis use disorder symptoms measure, and after statistical adjustment, only the main effect for recovery type remained significant.

Table 8

Lifetime Cannabis Problem Severity Variables for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Variable	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	F-test / χ^2	TAR (n = 53)	NR (n = 66)	F-test / χ^2
MPS lifetime total score, *M* (*SD*)	17.0 (8.4)	18.8 (8.1)	14.6 (8.2)	4.1[*]	20.4 (7.7)	14.3 (8.0)	14.2[***]
CIDI lifetime cannabis abuse (% yes)	98.3	98.5	98.0	*ns*[i]	100.0	97.0	*ns*[i]
CIDI lifetime cannabis abuse symptoms, *M* (*SD*)	2.7 (1.0)	2.9 (0.9)	2.4 (1.0)	5.0[*]	3.2 (0.7)	2.3 (0.9)	26.7[***]
CIDI lifetime cannabis dependence (% yes)	86.6	92.6	78.4	5.1[*]	90.6	83.3	1.3
CIDI lifetime cannabis dependence symptoms, *M* (*SD*)	5.3 (1.9)	5.6 (1.7)	5.0 (2.1)	2.3[ii]	5.8 (1.7)	5.0 (1.9)	4.3[*ii]
CIDI lifetime cannabis use disorder (% yes)	100.0						
CIDI lifetime cannabis use disorder symptoms, *M* (*SD*)	8.0 (2.5)	8.5 (2.2)	7.3 (2.8)	3.9[*ii]	9.0 (2.1)	7.2 (2.6)	11.8[***ii]
Perceived lifetime cannabis problem[iii], *M* (*SD*)	4.2 (1.0)	4.4 (0.9)	3.8 (1.1)	10.9[***ii]	4.5 (0.9)	3.9 (1.0)	5.5[*ii]

Note. Chi-square values represent Pearson chi-square values. Absolute Pearson chi-square values are reported. AB = abstinence; CIDI = Composite International Diagnostic Interview; MOD = moderation; MPS = Marijuana Problems Scale; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[ii] Levene's test of equality of error variances was significant.

[iii] Scale range from 1 (Not at all) to 5 (Extremely).

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

In order to more rigorously test the hypotheses, two separate 2 (Recovery Orientation; abstinence vs. moderation) X 2 (Recovery Type: treatment-assisted versus natural recovery) analyses of covariance (ANCOVAs) were conducted to control for the effects of potential confounding demographic and comorbidity variables. In the first ANCOVA, the lifetime MPS total score was used as the dependent variable, and in the second ANCOVA, the lifetime CIDI cannabis use disorder total symptoms score was used as the dependent variable.

In both ANCOVAs, the choice of covariates was based on the demographic and comorbidity group differences observed in the present study and guided by the logic of covariate selection in Tabachnick and Fidell (2007). That is, in the present study, the results demonstrated Recovery Orientation group differences in age, CIDI lifetime hallucinogen abuse, and AUDIT scores; and Recovery Type group differences in CIDI lifetime substance dependence, a composite variable of CIDI poly-substance use and alcohol use disorder symptoms, opioid abuse, stimulant abuse and dependence, hallucinogen abuse, and IDD (lifetime depression) variables. Tabachnick and Fidell (2007; p. 212) suggest that when selecting covariates, the goal is to identify a small set of covariates that are uncorrelated with each other but are correlated with the dependent variable. In light of this suggestion, age was not selected as a covariate because it was uncorrelated with both of the dependent variables. The CIDI poly-substance use and alcohol use disorder symptoms variable (a composite of all CIDI alcohol and substance use disorder symptoms) was selected as a covariate to parsimoniously obviate the selection of the many other substance use comorbidity variables; and indeed, this variable was positively correlated with both of the dependent variables (lifetime MPS total score, $r = .30$, $p < .001$; lifetime CIDI cannabis use disorder total symptoms score, $r = .28$, $p < .01$). The IDD total depression score was selected as the other covariate because it was positively correlated with both of the dependent variables (lifetime MPS total score, $r = .40$, $p < .001$; lifetime CIDI cannabis use disorder total symptoms score, $r = .34$, $p < .001$). While both covariates were significantly correlated with each other ($r = .25$, $p < .01$), the decision was made to retain both in the ANCOVA analyses given that both

variables represented different aspects of comorbidity and that the correlation between them was not substantial.

With respect to the first ANCOVA, with the lifetime MPS total score as the dependent variable, the assumptions of ANCOVA were satisfactorily met regarding normality of sampling distributions, linearity, homogeneity of variance, homogeneity of regression, and reliability of covariates. The analysis revealed that after adjustment for the covariates, there was a main effect for Recovery Orientation, F (1, 109) = 6.3, $p < .05$, $\eta^2 = .04$, but no main effect for Recovery Type, F (1, 109) = 3.3, *ns*, $\eta^2 = .02$; there was also no interaction. These results suggest that after controlling for the effects of the covariates on the lifetime MPS total score, only Recovery Orientation (and not Recovery Type) varied significantly with lifetime MPS total scores, with an effect size between small and medium. Additionally, the IDD total depression score was significant, F (1, 109) = 13.8, $p < .001$, $\eta^2 = .09$, indicating that the IDD total depression score also varied significantly with lifetime MPS total scores after adjusting for the other covariates and independent variables.

With respect to the second ANCOVA, with the lifetime CIDI cannabis use disorder symptoms measure as the dependent variable, all but one of the assumptions of ANCOVA were satisfactorily met; namely, Levene's test was significant. The analysis revealed that after adjustment for the covariates, there was a main effect for Recovery Orientation, F (1, 109) = 4.6, $p < .05$, $\eta^2 = .03$, but no main effect for Recovery Type, F (1, 109) = 3.2, *ns*, $\eta^2 = .02$; there was also no interaction. These results suggest that after controlling for the effects of the covariates on the lifetime CIDI cannabis use disorder symptoms measure, only Recovery Orientation (and not Recovery Type) varied significantly with lifetime CIDI cannabis use disorder symptoms, with an effect size between small and medium. However, with the statistical adjustment for the significant Levene's test, no main effect for Recovery Orientation would be observed. Again, the IDD total depression score was significant, F (1, 109) = 8.0, $p = .006$, $\eta^2 = .06$, indicating that the IDD total depression score also varied significantly with lifetime CIDI cannabis use disorder symptoms after adjusting for the other covariates and independent variables, and after adjusting for the significant Levene's test.

In sum, while the original ANOVAs generally supported the hypotheses with small to medium effect sizes after controlling for the effects of recovery orientation and recovery type, a more rigorous test of the hypotheses using the ANCOVAs demonstrated that only Recovery Orientation, and not Recovery Type, independently varied with lifetime cannabis problem severity with effect sizes between small and medium (and if a stringent test of the effects in the second ANCOVA was used to compensate for the violation of the assumption of homogeneity of variance, Recovery Orientation independently varied only with lifetime MPS total scores, and not lifetime CIDI cannabis use disorder symptoms). Taken together, these results largely support the hypotheses, albeit also suggest that when lifetime comorbidity variables are taken into account, only Recovery Orientation, and not Recovery Type, generally varies with lifetime cannabis problem severity.

Finally, additional evidence in support of the hypotheses was provided by merely asking participants the extent to which they perceived themselves to have ever had a cannabis problem. As can be seen in Table 8, the abstinence-oriented participants perceived themselves to have had a significantly more severe lifetime cannabis problem compared to moderation-oriented participants (abstinence-oriented group: $M = 4.4$, $SD = 0.9$; moderation-oriented group: $M = 3.8$, $SD = 1.1$; F (1, 115) = 10.9, $p < .001$, $\eta^2 = .08$); and the treatment-assisted participants perceived themselves to have had a significantly more severe lifetime cannabis problem compared to the natural recovery participants (treatment-assisted group: $M = 4.5$, $SD = 0.9$; natural recovery group: $M = 3.9$, $SD = 1.0$; F (1, 115) = 5.5, $p = .02$, $\eta^2 = .04$). Moreover, there was a significant interaction, F (1, 115) = 4.1, $p = .045$, $\eta^2 = .03$, whereby abstinence-oriented participants reported higher perceived lifetime cannabis problem severity compared to moderation-oriented participants only among those who sought treatment ($M = 4.8$ vs. 3.8, F (1, 115) = 12.1, $p < .001$), not those who naturally recovered ($M = 4.0$ vs. 3.8, F (1, 115) = 1.0, *ns*). However, after adjustment for the significant Levene's test ($p = .003$), only the main effect for Recovery Orientation remained significant, which is consistent with the results of the ANCOVAs, whereby Recovery Orientation was found to be more strongly related to lifetime cannabis problem severity than Recovery Type.

5.4.2 Cannabis History, Frequency of Use, and Current Problem Severity

Table 9 displays cannabis-related history, frequency of use, and current problem severity variables collected during the Participant Interview. As can be seen in the table, the total sample reported that they have been in recovery for an average of 7.6 years, and it is noteworthy that on a scale from 1 (not at all confident) to 5 (extremely confident), participants reported that they were very confident in this self-report (M = 4.4, SD = 0.9). Participants reported initiating cannabis use on average at 14.7 years of age; perceived that their use became problematic on average at 20.0 years of age; reported daily use during the height of their cannabis problem; reported using with a frequency between once or twice and monthly during the 12-months following their resolution date; reported using with a frequency between never and once or twice in the past 12 and 3 months; and reported planning to use with a frequency between never and once or twice in the next 12 and 3 months. Participants also reported very low levels of current cannabis problem severity (as indicated by the MPS, CIDI, ASSIST, SDS, and Perceived Current Cannabis Problem variable)—while the ASSIST total score (M = 11.9) fell into the moderate risk of harm range, this score is composed of not only current cannabis problem items, but also a current frequency of use item and two lifetime cannabis problem items. As indicated by the MMM variables, the total sample reported most often using cannabis during their lifetime for enhancement motives, followed by social, coping, expansion, and conformity motives. Approximately half (50.4%) of participants reported ever using cannabis to manage physical pain, while only 4.4% reported using cannabis to currently manage physical pain; 4.2% reported ever having been medically prescribed cannabis while only 0.8% reported being currently prescribed cannabis. Approximately one-third (31.4%) of participants reported at least one cannabis-related arrest during their lifetime, whereby an average of 2.6 arrests were reported among those who had been arrested. Finally, the vast majority (88.2%) reported ever experiencing cannabis cravings, whereby when participants' cannabis problems were the worst, cravings were reported to occur with an average frequency between weekly and daily, whereas currently, cravings were reported to occur with an average frequency between never and once or twice. Given that

craving information was collected, it was possible to create variables based on the DSM-5 diagnosis of cannabis use disorder, the data of which are presented in Appendix J.

Several differences among these variables were found between the abstinence-oriented and moderation-oriented recovery groups. Specifically, the moderation-oriented group reported significantly more frequency of cannabis use in the 12-months post-resolution, in the past 12 months (by definition), and in the past 3 months, and they reported planning to use significantly more cannabis in the next 12 and 3 months; all differences of which remained significant after adjustment for significant Levene's tests. It is noteworthy that the moderation-oriented group reported using cannabis with a frequency between once or twice and monthly in the past 12 and 3 months and reported planning to use cannabis approximately once or twice in the next 12 and 3 months. In contrast, the abstinence-oriented group reported that in the 12-months post-resolution, they used cannabis once or twice, but had not used in the past 12 and 3 months, and had no intentions of using cannabis in the next 12 and 3 months. Interestingly, the moderation-oriented group also scored significantly higher on the current cannabis problem severity measures (i.e., MPS, CIDI, and ASSIST), albeit the scores were still very low, and there were no differences on the SDS or the Perceived Current Cannabis Problem variable. These differences remained significant after adjusting for the significant Levene's tests. While the abstinence-oriented group reported that they were more likely to use cannabis during their lifetime for enhancement purposes (M = 20.6 vs. 19.7), this difference did not remain significant after adjusting for the significant Levene's test. Finally, the moderation-oriented group was significantly more likely to report that they were currently using cannabis to manage physical pain (10.9% vs. 0.0%), and they reported higher levels of current cannabis cravings (M = 1.9 vs. 1.7).

A distinct set of differences emerged between the treatment-assisted and natural recovery groups. Specifically, the treatment-assisted group scored significantly higher on the ASSIST (M = 13.9 vs. 10.3), which remained significant after adjustment for a significant Levene's test; reported that they were more likely to use cannabis during their lifetime for coping (M = 18.7 vs. 14.8) and expansion (M = 15.6 vs. 13.1) motives; were

significantly more likely to report ever using cannabis to manage physical pain (64.2% vs. 39.4%); and reported higher levels of current cannabis cravings (M = 2.0 vs. 1.6).

Finally, two interactions emerged from the analyses. First, there was a significant interaction on the ASSIST total score, F (1, 115) = 4.3, $p < .05$, whereby abstinence-oriented participants reported much lower ASSIST total scores compared to moderation-oriented participants among those who sought treatment (M = 11.8 vs. 18.1, F (1, 115) = 21.6, $p < .001$) as opposed to those who naturally recovered (M = 8.9 vs. 11.5, F (1, 115) = 5.4, $p < .05$). However, after adjustment for the significant Levene's test, the interaction was no longer significant. Second, there was a significant interaction on the Enhancement motives scale from the MMM, F (1, 115) = 10.9, $p < .001$, which remained significant after adjustment for the significant Levene's test, whereby abstinence-oriented participants reported higher levels of enhancement motives compared to moderation-oriented participants only among those who sought treatment (M = 21.2 vs. 17.4, F (1, 115) = 12.0, $p < .001$), not those who naturally recovered (M = 20.0 vs. 20.9, F (1, 115) = 1.0, *ns*).

Table 9

Cannabis-Related History, Frequency of Use, and Current Problem Severity Variables for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Variable	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	F-test / χ^2	TAR (n = 53)	NR (n = 66)	F-test / χ^2
Resolution time in years, *M* (*SD*)	7.6 (7.9)	9.0 (9.0)	5.8 (5.5)	3.5[ii]	8.5 (8.4)	6.8 (7.3)	0.8[ii]
Age in years cannabis initiation, *M* (*SD*)	14.7 (3.0	14.9 (3.1)	14.4 (2.9)	2.6	13.3 (3.1)	15.0 (2.9)	3.5
Age in years perceived cannabis problem onset, *M* (*SD*)	20.0 (6.5)[a]	20.8 (7.6)[b]	18.9 (4.5)[c]	2.1[ii]	20.1 (7.4)[d]	19.9 (5.8)[e]	0.0[ii]
Lifetime cannabis use frequency[iii], *M* (*SD*)	5.0 (0.2)	5.0 (0.2)	5.0 (0.0)	2.5[ii]	5.0 (0.0)	5.0 (0.2)	2.5[ii]
12 month post-resolution cannabis use frequency[iii], *M* (*SD*)	2.3 (1.4)	2.0 (1.4)	2.6 (1.3)	6.9**	2.3 (1.5)	2.2 (1.2)	0.5
Past 3 month cannabis use frequency[iii], *M* (*SD*)	1.7 (1.2)	1.0 (0.0)	2.5 (1.4)	84.9***[ii]	1.6 (1.2)	1.7 (1.1)	1.2[ii]
Past 12 month cannabis use frequency[iii], *M* (*SD*)	1.8 (1.1)	1.0 (0.0)	2.8 (1.1)	176.7***[ii]	1.7 (1.2)	1.9 (1.1)	2.2[ii]
Future 3 month cannabis use frequency goal[iii], *M* (*SD*)	1.4 (1.0)	1.0 (0.0)	2.0 (1.4)	38.7***[ii]	1.4 (1.1)	1.4 (0.9)	1.9[ii]
Future 12 month cannabis use frequency goal[iii], *M* (*SD*)	1.5 (1.0)	1.0 (0.2)	2.1 (1.4)	40.2***[ii]	1.5 (1.1)	1.5 (1.0)	1.5[ii]
MPS past 3 months total score, *M* (*SD*)	0.6 (1.4)	0.3 (0.7)	1.1 (1.9)	11.2***[ii]	0.7 (1.4)	0.6 (1.4)	1.2[ii]
CIDI current cannabis abuse (% yes)	0.0						
CIDI current cannabis abuse symptoms, *M* (*SD*)	0.0 (0.0)						
CIDI current cannabis dependence (% yes)	0.0						

Variable	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
CIDI current cannabis dependence symptoms, *M* (*SD*)	0.1 (0.3)	0.0 (0.0)	0.1 (0.4)	6.8[**ii]	0.0 (0.2)	0.1 (0.3)	0.1[ii]
CIDI current cannabis use disorder (% yes)	0.0						
CIDI current cannabis use disorder symptoms, *M* (*SD*)	0.1 (0.3)	0.0 (0.0)	0.1 (0.4)	6.8[**]	0.0 (0.2)	0.1 (0.3)	0.4[ii]
CIDI recovered cannabis use disorder (% yes)	100.0						
ASSIST total score, *M* (*SD*)	11.9 (5.3)	10.5 (4.3)	13.7 (6.0)	25.6[***ii]	13.9 (4.9)	10.3 (5.2)	29.2[***ii]
SDS past 12 months total score, *M* (*SD*)	0.8 (1.6)[f]	0.5 (1.7)	1.1 (1.5)[g]	3.8	0.9 (2.0)[d]	0.7 (1.3)	1.4
SDS past 3 months total score, *M* (*SD*)	0.4 (1.3)[f]	0.4 (1.5)	0.5 (1.1)[g]	0.5	0.5 (1.8)[d]	0.4 (0.9)	0.4
Perceived current cannabis problem[iv], *M* (*SD*)	1.0 (0.2)	1.0 (0.2)	1.0 (0.1)	0.0[ii]	1.1 (0.2)	1.0 (0.0)	3.6[ii]
MMM, social motives, *M* (*SD*)	17.4 (5.2)	17.7 (5.3)	16.9 (5.0)	0.8	18.3 (5.7)	16.7 (4.7)	1.4
MMM, coping motives, *M* (*SD*)	16.5 (5.7)	17.4 (5.6)	15.4 (5.6)	1.9	18.7 (5.2)	14.8 (5.4)	11.7[***]
MMM, enhancement motives, *M* (*SD*)	20.2 (4.0)	20.6 (3.8)	19.7 (4.1)	4.0[*ii]	20.0 (4.2)	20.4 (3.7)	2.6[ii]
MMM, conformity motives, *M* (*SD*)	11.1 (5.6)	12.0 (6.0)	9.8 (4.9)	3.1[ii]	11.9 (5.8)	10.4 (5.5)	1.6[ii]
MMM, expansion motives, *M* (*SD*)	14.2 (5.8)	14.3 (6.1)	14.0 (5.5)	0.3	15.6 (5.9)	13.1 (5.5)	5.5[*]
Ever used cannabis to manage physical pain (% yes)	50.4	45.6	56.9	1.5	64.2	39.4	7.2[**]
Currently use cannabis to manage physical pain (% yes)	4.4[h]	0.0	10.9	*s*[**i]	7.7	1.6	*ns*[i]
Ever medically prescribed cannabis (% yes)	4.2	2.9	5.9	*ns*[i]	5.7	3.0	*ns*[i]

Variable	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Currently medically prescribed cannabis (% yes)	0.8	0.0	2.0	*ns*[i]	1.9	0.0	*ns*[i]
Cannabis-related arrest (% yes)	31.4[f]	29.9[j]	33.3	0.2	39.6	24.6[k]	3.1
Number of cannabis-related arrests, *M* (*SD*)	2.6 (3.6)[l]	3.4 (4.4)[m]	1.7 (1.3)[n]	0.7[ii]	3.6 (4.1)[o]	1.2 (0.6)[p]	3.1[ii]
Ever experienced intense cravings (% yes)	88.2	91.2	84.3	1.3	92.5	84.8	1.6
Lifetime craving frequency[iii], *M* (*SD*)	4.6 (1.0)[a]	4.7 (1.0)[j]	4.5 (1.1)[q]	0.6	4.8 (0.9)[d]	4.5 (1.1)[e]	1.3
Current craving frequency[iii], *M* (*SD*)	1.8 (1.0)	1.7 (0.9)	1.9 (1.1)	4.0[*]	2.0 (1.1)	1.6 (0.9)	5.7[*]

Note. Chi-square values represent Pearson chi-square values. Absolute Pearson chi-square values are reported. AB = abstinence; ASSIST = Alcohol, Smoking, and Substance Involvement Screening Test, Cannabis Section; CIDI = Composite International Diagnostic Interview; MMM = Marijuana Motives Measure; MOD = moderation; MPS = Marijuana Problems Scale; NR = natural recovery; SDS = Severity of Dependence Scale; TAR = treatment-assisted recovery.
[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.
[ii] Levene's test of equality of error variances was significant.
[iii] Scale: 1 = Never; 2 = Once or twice; 3 = Monthly; 4 = Weekly; 5 = Daily or almost daily.
[iv] Scale range from 1 (Not at all) to 5 (Extremely).
[a] n = 114. [b] n = 66. [c] n = 48. [d] n = 52. [e] n = 62. [f] n = 118. [g] n = 50. [h] n = 113. [j] n = 67. [k] n = 65. [l] n = 36. [m] n = 19. [n] n = 17. [o] n = 21. [p] n = 15. [q] n = 47.
[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

5.4.3 Environmental Influences, Beliefs, and Attitudes

Table 10 displays environmental influences, beliefs, and attitudes variables. As can be seen in the table, over half (58.1%) of the total sample reported that their current close friends use cannabis at least weekly, whereas 13.7% and 32.7% of their parents and siblings reportedly use cannabis at least weekly, respectively. On a scale from 1 (not at all) to 5 (extremely), family (M = 4.0) was rated as more supportive than friends (M = 3.0) when participants made family and friends aware of their decision to stop, cut down, or control their cannabis use. Moreover, using the same scale, participants reported that the social pressure to overcome their cannabis problem was quite low from friends (M = 1.4), family (M = 2.5), and society (M = 2.3).

On the same scale, from 1 (not at all) to 5 (extremely), participants reported that they were somewhat apathetic during the time of their cannabis problem (M = 3.2); were less than somewhat motivated to pursue their life goals during the time of their cannabis problem (M = 2.6); reported that cannabis is not helpful to their ability to achieve their life goals (M = 2.0); reported being more than somewhat self-efficacious/confident in their ability to change their cannabis use at the time they decided to change (M = 3.7); reported that they are much more self-efficacious/confident in their ability to maintain their recovery (M = 4.8); reported that cannabis problems are more than somewhat difficult for people to overcome in general (M = 3.7), but believed that their own cannabis problem was relatively easier to overcome and only somewhat difficult (M = 3.1); reported that recreational cannabis is somewhat harmful to society (M = 2.9) and that medicinal cannabis is less than somewhat harmful to society (M = 1.7); reported that cannabis is more than somewhat harmful to themselves in general (M = 3.6) and that the likelihood of personal negative consequences from more than weekly cannabis use is more than somewhat likely (M = 3.6); reported that cannabis is not very helpful to themselves in general (M = 1.9) and that the likelihood of personal positive consequences from more than weekly cannabis use is unlikely (M = 1.5); reported that cannabis was important to their self-identity during their cannabis problem (M = 4.1) but is currently not very important to their self-identity (M = 1.5); and reported that they do not currently think of themselves as cannabis users (M = 1.4).

Table 10

Cannabis-Related Environmental Influences, Beliefs, and Attitudes for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Variable	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	F-test / χ^2	TAR (n = 53)	NR (n = 66)	F-test / χ^2
Current close friends' weekly cannabis use (% yes)	58.1[a]	46.3[b]	74.0[c]	9.0[**]	49.1	65.6[d]	3.3
Parents weekly cannabis use (% yes)	13.7[a]	10.4[b]	18.0[c]	1.4	13.2	14.1[d]	0.0
Siblings weekly cannabis use (% yes)	32.7[e]	26.2[f]	41.7[g]	3.0	30.8[h]	34.4[j]	0.2
Friends support[ii], *M* (*SD*)	3.0 (1.5)[k]	3.0 (1.5)[b]	3.1 (1.5)	0.1	2.8 (1.4)[h]	3.2 (1.5)	1.5
Family support[ii], *M* (*SD*)	4.0 (1.4)[l]	4.1 (1.4)[f]	4.0 (1.4)[m]	0.1	4.2 (1.2)[c]	3.9 (1.5)[d]	1.2
Perceived friends social pressure to overcome cannabis problem[ii], *M* (*SD*)	1.4 (0.9)	1.4 (0.9)	1.4 (0.9)	0.1	1.5 (0.9)	1.3 (0.8)	1.3
Perceived family social pressure to overcome cannabis problem[ii], *M* (*SD*)	2.5 (1.6)	2.6 (1.6)	2.4 (1.6)	0.0	2.8 (1.7)	2.3 (1.5)	3.0
Perceived societal social pressure to overcome cannabis problem[ii], *M* (*SD*)	2.3 (1.3)	2.2 (1.3)	2.5 (1.4)	3.6	2.6 (1.4)	2.1 (1.2)	6.3[*]
Apathy during cannabis problem[ii], *M* (*SD*)	3.2 (1.4)[k]	3.2 (1.5)	3.3 (1.3)[c]	0.5	3.4 (1.3)	3.1 (1.5)[f]	1.3
Motivated to pursue life goals during cannabis problem[ii], *M* (*SD*)	2.6 (1.3)	2.6 (1.3)	2.5 (1.4)	0.5	2.5 (1.2)	2.7 (1.4)	0.5
Helpfulness of cannabis on ability to achieve life goals[ii], *M* (*SD*)	2.0 (1.0)	1.7 (0.8)	2.5 (1.1)	22.9[***i]	1.8 (1.0)	2.2 (1.0)	1.5
Motivated to change post-resolution[ii], *M* (*SD*)	4.3 (1.1)	4.4 (1.1)	4.2 (1.0)	0.2[i]	4.2 (1.3)	4.4 (0.9)	0.4[i]
Self-efficacy/confidence in ability to change post-resolution[ii], *M* (*SD*)	3.7 (1.3)	3.5 (1.4)	3.9 (1.1)	1.1	3.1 (1.4)	4.1 (1.1)	20.6[***]
Self-efficacy/confidence to maintain recovery[ii], *M* (*SD*)	4.8 (0.5)	4.8 (0.5)	4.7 (0.5)	1.1	4.8 (0.4)	4.8 (0.5)	0.0

Variable	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Perceived difficulty for people to overcome a cannabis problem[ii], *M* (*SD*)	3.7 (1.1)	3.8 (1.2)	3.5 (1.0)	2.0	3.9 (1.1)	3.5 (1.1)	3.2
Personal difficulty in overcoming cannabis problem[ii], *M* (*SD*)	3.1 (1.5)	3.2 (1.6)	2.9 (1.4)	0.6	3.5 (1.5)	2.7 (1.4)	6.6[*]
Perceived harm of recreational cannabis use to society[ii], *M* (*SD*)	2.9 (1.5)	3.2 (1.5)	2.4 (1.2)	8.4[**i]	3.0 (1.5)	2.8 (1.4)	0.1[i]
Perceived harm of medicinal cannabis use to society[ii], *M* (*SD*)	1.7 (1.0)[k]	1.9 (1.1)[b]	1.5 (0.8)	5.2[*]	1.8 (1.0)[h]	1.7 (1.0)	0.1
Perceived harm of cannabis to self[ii], *M* (*SD*)	3.6 (1.5)	4.2 (1.3)	2.8 (1.5)	20.0[***i]	4.1 (1.4)	3.2 (1.5)	7.9[**i]
Perceived likelihood of negative consequences for weekly cannabis use[ii], *M* (*SD*)	3.6 (1.5)	4.0 (1.4)	3.1 (1.5)	8.3[**]	4.0 (1.5)	3.3 (1.5)	4.9[*]
Perceived helpfulness of cannabis to self[ii], *M* (*SD*)	1.9 (1.2)	1.6 (0.9)	2.3 (1.4)	11.6[***i]	1.9 (1.3)	1.8 (1.1)	1.3[i]
Perceived likelihood of positive consequences for weekly cannabis use[ii], *M* (*SD*)	1.5 (1.0)[k]	1.3 (0.8)	1.7 (1.1)[c]	7.6[**i]	1.6 (1.1)	1.4 (0.8)[f]	3.0[i]
Importance of cannabis to self-identity during cannabis problem[ii], *M* (*SD*)	4.1 (1.3)	4.1 (1.4)	4.0 (1.1)	0.0	4.3 (1.2)	3.9 (1.3)	3.6
Importance of cannabis to self-identity currently[ii], *M* (*SD*)	1.5 (1.0)	1.4 (1.0)	1.6 (1.0)	2.9[i]	1.8 (1.3)	1.4 (0.7)	8.5[*i]
Self-perception as a cannabis user[ii], *M* (*SD*)	1.4 (0.9)	1.0 (0.2)	1.9 (1.2)	42.7[***i]	1.5 (1.1)	1.4 (0.7)	5.9[*i]

Variable	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Perceived harm of cannabis relative to other drugs[iii], *M* (*SD*)	1.9 (1.0)	2.1 (1.0)	1.5 (0.8)	5.9[*i]	2.2 (1.1)	1.6 (0.8)	10.8[**i]
Perceived harm of cannabis relative to alcohol[iii], *M* (*SD*)	1.9 (1.0)	2.1 (1.0)	1.6 (0.9)	7.6[**]	2.1 (1.1)	1.7 (0.9)	2.2
Perceived harm of cannabis relative to cigarettes[iii], *M* (*SD*)	2.2 (1.2)	2.4 (1.2)	1.9 (1.2)	0.0	2.3 (1.2)	2.2 (1.3)	0.1
Perceived harm of cannabis relative to gambling[iii], *M* (*SD*)	2.0 (1.1)	2.2 (1.0)	1.8 (1.1)	4.7[*]	2.2 (1.1)	1.9 (1.0)	0.4
Perceived harm of cannabis relative to heroin[iii], *M* (*SD*)	1.3 (0.8)	1.5 (0.9)	1.1 (0.4)	6.5[*i]	1.6 (1.0)	1.1 (0.3)	7.1[**i]
Perceived harm of cannabis relative to crack/cocaine[iii], *M* (*SD*)	1.3 (0.8)	1.5 (0.9)	1.1 (0.5)	5.6[*i]	1.6 (1.1)	1.2 (0.4)	6.0[*i]
Perceived harm of cannabis relative to prescription pain drugs[iii], *M* (*SD*)	1.6 (0.9)	1.8 (1.0)	1.4 (0.7)	7.1[**]	1.9 (1.0)	1.4 (0.7)	3.4
Belief in cannabis overall addictive potential[iv], *M* (*SD*)	4.5 (0.9)	4.6 (0.9)	4.4 (0.9)	2.2	4.6 (0.9)	4.4 (0.8)	0.3
Belief in cannabis physical addictive potential[iv], *M* (*SD*)	3.5 (1.5)	3.7 (1.5)	3.2 (1.4)	1.6	3.6 (1.5)	3.4 (1.5)	0.5
Belief in cannabis psychological addictive potential[iv], *M* (*SD*)	4.7 (0.7)	4.8 (0.6)	4.6 (0.8)	2.3	4.8 (0.6)	4.6 (0.8)	0.6
Belief in social acceptance of recreational cannabis use[iv], *M* (*SD*)	3.3 (1.0)	3.3 (0.9)	3.2 (1.2)	1.0[i]	3.2 (1.1)	3.3 (1.0)	0.6[i]
Belief in cannabis recreational decriminalization[iv], *M* (*SD*)	3.6 (1.5)	3.6 (1.5)	3.7 (1.5)	0.0[i]	3.3 (1.7)	3.8 (1.3)	3.5[i]

Variable	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Belief in social acceptance of medicinal cannabis use[iv], *M* (*SD*)	3.9 (0.9)	4.0 (0.8)	3.9 (1.0)	0.9	3.7 (1.1)	4.1 (0.8)	5.8*
Belief in cannabis medicinal decriminalization[iv], *M* (*SD*)	4.4 (1.1)	4.3 (1.2)	4.6 (0.9)	2.0[i]	4.3 (1.2)	4.5 (1.1)	0.8[i]
Belief in cannabis full legalization[iv], *M* (*SD*)	3.1 (1.6)	2.9 (1.6)	3.4 (1.6)	1.9	2.8 (1.8)	3.4 (1.5)	2.2
Belief in cannabis problem natural recovery[iv], *M* (*SD*)	3.6 (1.3)	3.5 (1.3)	3.8 (1.1)	1.2[i]	3.1 (1.4)	4.0 (0.9)	11.8***[i]
Belief in cannabis problem recovery with moderation[iv], *M* (*SD*)	3.0 (1.4)	2.4 (1.3)	3.9 (1.0)	37.3***[i]	2.6 (1.4)	3.4 (1.3)	6.5*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute Pearson chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Levene's test of equality of error variances was significant.
[ii] Scale range from 1 (Not at all) to 5 (Extremely).
[iii] Scale: 1 = Much less harmful; 2 = Less harmful; 3 = Same; 4 = More harmful; 5 = Much more harmful.
[iv] Scale: 1 = Extremely disagree; 2 = Disagree; 3 = Neither agree or disagree; 4 = Agree; 5 = Extremely agree.
[a] n = 117. [b] n = 67. [c] n = 50. [d] n = 64. [e] n = 113. [f] n = 65. [g] n = 48. [h] n = 52. [j] n = 61. [k] n = 118. [l] n = 114. [m] n = 49.
* $p < .05$. ** $p < .01$. *** $p < .001$.

As can also be seen in the table, cannabis was rated as less harmful relative to all other drugs in general, and was rated specifically less harmful than alcohol, cigarettes, gambling, heroin, crack/cocaine, and prescription pain drugs. Finally, using a five-point Likert scale (1 = extremely disagree, 2 = disagree, 3 = neither agree or disagree, 4 = agree, 5 = extremely agree), participants reported that they agreed that cannabis was overall addictive (*M* = 4.5), but more psychologically addictive (*M* = 4.7) than physically addictive (*M* = 3.5); they neither agreed nor disagreed that society accepts recreational cannabis use (*M* = 3.3), but tended to agree that cannabis should be decriminalized for recreational purposes (*M* = 3.6); they agreed that society accepts medicinal cannabis use (*M* = 3.9) and agreed that cannabis should be decriminalized for medicinal purposes (*M* = 4.4); they neither agreed nor disagreed that cannabis should be fully legalized (*M* = 3.1); they tended to agree that people could overcome a cannabis problem via natural recovery (*M* = 3.6); and neither agreed nor disagreed that people could overcome a cannabis problem via moderation (*M* = 3.0). Given that some of these variables are relevant to the Theory of Planned Behaviour (TPB; Ajzen, 1985), a test of the TPB for the prediction of 12 month post-resolution and past 12 month frequency of cannabis use is presented in Appendix K.

Several differences in cannabis-related environmental influences, beliefs, and attitudes emerged between the abstinence-oriented and moderation-oriented recovery groups. Specifically, moderation-oriented participants were significantly more likely to report that their current close friends use cannabis at least weekly (74.0% vs. 46.3%); were more likely to report that cannabis is helpful to their ability to achieve their life goals (*M* = 2.5 vs. 1.7), which remained significant after adjustment for the significant Levene's test; were less likely to perceive recreational cannabis use (*M* = 2.4 vs. 3.2) and medicinal cannabis use as harmful to society (*M* = 1.5 vs. 1.9), the former of which remained significant after adjustment for the significant Levene's test; were less likely to perceive that cannabis is harmful to themselves in general (*M* = 2.8 vs. 4.2) and to report the likelihood of personal negative consequences from at least weekly use (*M* = 3.1 vs. 4.0), the former of which remained significant after adjustment for the significant Levene's test; were more likely to perceive that cannabis is helpful to themselves in

general (*M* = 2.3 vs. 1.6) and to report the likelihood of personal positive consequences from at least weekly use (*M* = 1.7 vs. 1.3), both of which remained significant after adjustment for the significant Levene's tests; were more likely to identify as a current cannabis user (*M* = 1.9 vs. 1.0), which remained significant after adjustment for the significant Levene's test; perceived cannabis as less harmful relative to other drugs in general, and specifically relative to heroin and crack/cocaine, though these differences did not remain significant after adjustment for the significant Levene's tests; perceived cannabis as less harmful relative to alcohol, gambling, and prescription pain drugs; and were more likely to believe that people could overcome a cannabis problem via moderation (*M* = 3.9 vs. 2.4), which remained significant after adjustment for the significant Levene's test.

Again, a relatively distinct set of differences emerged between the treatment-assisted and natural recovery groups. Specifically, the natural recovery group was significant less likely to perceive societal pressure to overcome their cannabis problem (*M* = 2.1 vs. 2.6); were more likely to report having self-efficacy/confidence in their ability to change their cannabis use habits post-resolution (*M* = 4.1 vs. 3.1); were more likely to report that their own cannabis problem was easier to overcome (*M* = 2.7 vs. 3.5); perceived cannabis as less harmful to themselves in general (*M* = 3.2 vs. 4.1) and reported less likelihood of personal negative consequences from at least weekly use (*M* = 3.0 vs. 4.0), the former of which remained significant after adjustment for the significant Levene's test; reported cannabis as currently less important to their self-identity (*M* = 1.4 vs. 1.8), which remained significant after adjustment for the significant Levene's test; were less likely to identify as a current cannabis user (*M* = 1.4 vs. 1.5), though this difference did not remain significant after adjustment for the significant Levene's test; perceived cannabis as less harmful relative to other drugs in general, and specifically relative to heroin and crack/cocaine, only the latter of which did not remain significant after adjustment for the significant Levene's tests; were more likely to report that society accepts medicinal cannabis use (*M* = 4.1 vs. 3.7); and finally, were more likely to believe that people could overcome a cannabis problem via natural recovery (*M* = 4.0 vs. 3.1) and

moderation (M = 3.4 vs. 2.6), only the former of which remained significant after adjustment for the significant Levene's test.

Finally, one significant interaction effect emerged from the analyses on self-perception as a current cannabis user, F (1, 115) = 4.3, $p < .05$, whereby abstinence-oriented participants reported much less self-perceptions as current cannabis users compared to moderation-oriented participants among those who sought treatment (M = 1.1 vs. 2.4, F (1, 115) = 31.4, $p < .001$), as opposed to those who naturally recovered (M = 1.0 vs. 1.7, F (1, 115) = 12.2, $p < .001$)—however, this interaction did not remain significant after adjustment for the significant Levene's test.

At the broadest level, these results suggest that participants from the moderation-oriented and natural recovery groups had relatively more positive views of cannabis compared to participants from the abstinence-oriented and treatment-assisted recovery groups, respectively. By the same token, the fact that relatively distinct sets of differences also emerged between the Recovery Orientation and Recovery Type groups supports the distinction of these recovery constructs and points to some interesting and important implications about these disparate pathways in the recovery process.

5.5 Reasons for Resolution

5.5.1 Reasons for Resolution Categories and Checklist

Two interview methods were used to assess reasons for resolution: open-ended questions and a checklist. For the open-ended questions, content analysis was used to derive categories of responses, whereby most participant responses could be coded into more than one response category. Excellent inter-rater reliability was obtained (κ = .85, percentage agreement = 87.2%). Representative content from participant responses that comprised each category can be seen in Table L1 in Appendix L. Table 11 displays the percentage of participants that endorsed each category. As can be seen in Table 11, the top three major reasons for resolution endorsed by the total sample were: *self-incompatibility* (49.6%), *social-incompatibility* (42.9%), and *mental health concerns* (42.9%). The category of *self-incompatibility* reflected participant responses wherein cannabis use became viewed as incompatible with aspects of the participant's self-identity, such as lifestyle, values, goals, et cetera. The category of *social-incompatibility*

reflected participant responses wherein cannabis use became viewed as incompatible with aspects of the social environment, such as causing interpersonal conflict with family and friends, and difficulty fitting-in with society. The category of *mental health concerns* reflected participant responses wherein mental health concerns related to cannabis use were expressed, such as cannabis use causing anxiety, depression, and psychotic symptoms, as well as cognitive difficulties.

Only two statistically significant differences were observed among the Recovery Orientation and Recovery Type groups. Specifically, with respect to Recovery Orientation, only one difference was observed between the abstinence- and moderation-oriented recovery groups. Namely, the abstinence-oriented group was more likely to endorse the category of *realization of harm* (33.8% vs. 15.7%), which reflected participant responses that described cannabis use as broadly and generally causing negative consequences in the participant's life. Similarly, with respect to Recovery Type, only one difference was observed between the treatment-assisted and natural recovery groups. Namely, the treatment-assisted group was more likely to endorse the category of *experienced a major event* (15.1% vs. 1.5%), which reflected participant responses wherein a perceived major event was an impetus for change, such as a traumatic or humiliating event, or a staged-intervention from a family member or friend. If, however, a Bonferroni statistical correction is employed to correct for 14 comparisons, which would render an alpha level of .004, then no statistical differences would be observed among the Recovery Orientation and Recovery Type groups.

Participants endorsed a mean of 3.5 (SD = 1.6) categories. Group comparisons on the mean number of categories revealed no significant difference between the abstinence- (M = 3.5, SD = 1.5) and moderation-oriented (M = 3.4, SD = 1.8) recovery groups, F (1, 115) = 0.2, *ns*, or between the treatment-assisted (M = 3.5, SD = 1.6) and natural recovery (M = 3.5, SD = 1.6) groups, F (1, 115) = 0.0, *ns*.

Table 11

Percentage of Participants that Endorsed Reasons for Resolution Categories from the Open-Ended Questions for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Category (%)	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	χ^2	TAR (n = 53)	NR (n = 66)	χ^2
Self incompatibility	49.6	47.1	52.9	0.4	49.1	50.0	0.0
Social incompatibility	42.9	42.6	43.1	0.0	45.3	40.9	0.2
Mental health concerns	42.9	41.2	45.1	0.2	37.7	47.0	1.0
Too integral to reality/lost enjoyment	37.0	38.2	35.3	0.1	32.1	40.9	1.0
Financial concerns	34.5	32.4	37.3	0.3	28.3	39.4	1.6
Work/school concerns	29.4	29.4	29.4	0.0	24.5	33.3	1.1
Realization of harm	26.1	33.8	15.7	5.0*	34.0	19.7	3.1
Physical health concerns	24.4	20.6	29.4	1.2	30.2	19.7	1.8
Legal/driving concerns	15.1	16.2	13.7	0.1	20.8	10.6	2.4
Negative social environment	11.8	13.2	9.8	0.3	9.4	13.6	0.5
Lack of control	11.8	13.2	9.8	0.3	17.0	7.6	2.5
Religious/spiritual/moral concerns	11.8	13.2	9.8	0.3	9.4	13.6	0.5
Experienced a major event	7.6	8.8	5.9	*ns*[i]	15.1	1.5	*s*[**i]
Fear of escalation	6.7	8.8	3.9	*ns*[i]	5.7	7.6	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

Table 12 displays the means and standard deviations of the five-point scaled checklist items that were used to assess participants' reasons for resolution. As can be seen in the table, the top three highest rated checklist items for the total sample were: *you wanted to have a major lifestyle change* (M = 4.0), *you thought about how marijuana was affecting you negatively* (M = 3.9), and *you wanted to feel better emotionally (e.g., feel less depressed/anxious)* (M = 3.6). For a principal components analysis (PCA) of the checklist, see Appendix M.

Several differences in the checklist were observed among the Recovery Orientation and Recovery Type groups. Specifically, with respect to Recovery Orientation, the abstinence-oriented group rated the following three reasons as more influential than the moderation-oriented group: *you thought about how marijuana was affecting you negatively* (M = 4.1 vs. 3.6), *incompatible with self-image (i.e., you didn't want to "see" yourself as a cannabis user)* (M = 3.3 vs. 2.7), and *you wanted to overcome your marijuana problem for your family* (M = 3.1 vs. 2.4). In contrast, with respect to Recovery Type, a distinct set of differences were found between the treatment-assisted and natural recovery groups. Namely, the treatment-assisted group rated the following reasons as more influential: *you wanted to feel better emotionally (e.g., feel less depressed/anxious)* (M = 4.0 vs. 3.3), *feeling like you hit rock bottom* (M = 3.8 vs. 2.4), *you experienced a traumatic event* (M = 3.0 vs. 2.3), *you wanted to, or were, decreasing your use of other drugs/addictive behaviours* (M = 3.0 vs. 2.0), *you were having physical health problems* (M = 2.8 vs. 1.9), *you experienced a humiliating event* (M = 2.6 vs. 2.1), *you were having work-related problems* (M = 2.8 vs. 1.8), and *you were having legal problems* (M = 1.8 vs. 1.3)—all of which, except for *you experienced a humiliating event* and *you were having legal problems*, remained significant after necessary adjustments for the significant Levene's tests.

Moreover, three interactions emerged from the analyses. First, there was a significant interaction effect on the item, *your marijuana use caused problems between you and your significant other*, F (1, 115) = 7.7, $p < .01$, whereby abstinence-oriented participants reported higher ratings compared to moderation-oriented participants only among those who naturally recovered (M = 2.9 vs. 2.0, F (1, 115) = 4.8, $p < .05$), not

those who sought treatment (M = 2.5 vs. 3.4, F (1, 115) = 3.2, *ns*). Second, there was a significant interaction effect on the item, *you had social influence to quit from friends, family, significant other*, F (1, 115) = 6.0, $p < .05$, whereby abstinence-oriented participants reported higher ratings compared to moderation-oriented participants only among those who naturally recovered (M = 3.1 vs. 1.9, F (1, 115) = 9.8, $p < .01$), not those who sought treatment (M = 2.3 vs. 2.6, F (1, 115) = 0.3, *ns*). Third, there was a significant interaction effect on the item, *confrontation about your marijuana problem (e.g., from a friend or family member)*, F (1, 115) = 5.5, $p < .05$, which remained significant after adjustment for a significant Levene's test, whereby abstinence-oriented participants reported higher ratings compared to moderation-oriented participants only among those who naturally recovered (M = 2.3 vs. 1.5, F (1, 115) = 5.2, $p < .05$), not those who sought treatment (M = 2.0 vs. 2.5, F (1, 115) = 1.3, *ns*). Taken together, these interactions suggest that abstinence-oriented participants wanted to overcome their cannabis problem due to social pressures more than moderation-oriented participants, but only among those who naturally recovered, not among those who sought treatment.

If, however, a Bonferroni statistical correction is employed to correct for 23 comparisons, which would render an alpha level of .002, then there would be no differences between the Recovery Orientation groups, only two differences between the Recovery Type groups, and no interactions. Namely, the treatment-assisted group would have still rated the following reasons as more influential than the natural recovery group: *feeling like you hit rock bottom* and *you were having work-related problems*.

In order to determine the mean number of items endorsed from the checklist method, it was decided that on the five-point scale, a cut-off rating of 5 ("greatly affected") would be a conservative estimate of a categorical endorsement for a checklist item. In this way, participants endorsed a mean of 5.5 checklist items (SD = 4.3). Group comparisons revealed no differences between the abstinence- (M = 6.2, SD = 4.2) and moderation-oriented (M = 4.4, SD = 4.2) groups, F (1, 115) = 3.0, *ns*, or between the treatment-assisted (M = 6.2, SD = 3.6) and natural recovery (M = 4.8, SD = 4.7) groups, F (1, 115) = 2.7, *ns*.

Table 12

Means and Standard Deviations of Reasons for Resolution Checklist Items for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Checklist Item[i], *M* (*SD*)	Total Sample (*N* = 119)	AB (*n* = 68)	MOD (*n* = 51)	*F*-test	TAR (*n* = 53)	NR (*n* = 66)	*F*-test
You wanted to have a major life-style change	4.0 (1.4)	4.2 (1.4)	3.7 (1.4)	2.3[ii]	4.3 (1.3)	3.8 (1.5)	2.1[ii]
You thought about how marijuana was affecting you negatively	3.9 (1.3)	4.1 (1.2)	3.6 (1.5)	4.0[*]	4.0 (1.3)	3.8 (1.3)	0.2
You wanted to feel better emotionally (e.g., feel less depressed/anxious)	3.6 (1.5)	3.7 (1.5)	3.5 (1.5)	0.0[ii]	4.0 (1.3)	3.3 (1.6)	7.8[**ii]
You wanted to become more motivated/have more energy	3.4 (1.6)	3.3 (1.7)	3.6 (1.5)	0.6	3.3 (1.6)	3.5 (1.5)	0.2
You weighed the pros and cons of changing vs. not changing, and then made your decision	3.3 (1.6)	3.2 (1.7)	3.3 (1.5)	0.1	3.1 (1.6)	3.4 (1.6)	0.2
Incompatible with self-image (i.e., you didn't want to "see" yourself as a cannabis user)	3.1 (1.7)	3.3 (1.6)	2.7 (1.7)	4.7[*]	2.9 (1.7)	3.2 (1.7)	1.5
Feeling like you hit rock bottom	3.0 (1.6)	3.2 (1.6)	2.7 (1.7)	0.7	3.8 (1.4)	2.4 (1.6)	21.4[***]
You began to view marijuana more negatively	2.9 (1.6)	3.0 (1.6)	2.7 (1.7)	1.6	2.6 (1.6)	3.0 (1.6)	1.2
You wanted to overcome your marijuana problem for your family	2.8 (1.6)	3.1 (1.6)	2.4 (1.4)	4.3[*]	3.0 (1.6)	2.6 (1.5)	1.4
You experienced a traumatic event	2.6 (1.7)	2.7 (1.7)	2.5 (1.8)	0.0	3.0 (1.7)	2.3 (1.7)	5.4[*]
Your marijuana use caused problems between you and your significant other	2.6 (1.7)	2.7 (1.7)	2.5 (1.7)	0.0	2.8 (1.8)	2.5 (1.7)	1.8
You were having financial problems	2.6 (1.5)	2.8 (1.6)	2.3 (1.3)	1.4[ii]	2.9 (1.6)	2.3 (1.4)	2.5[ii]
You wanted to, or were, decreasing your use of other drugs/addictive behaviours	2.5 (1.7)	2.8 (1.7)	2.1 (1.5)	3.5	3.0 (1.7)	2.0 (1.5)	6.2[*]
You were having health concerns	2.5 (1.6)	2.6 (1.7)	2.5 (1.6)	0.0	2.8 (1.7)	2.3 (1.6)	2.8

Checklist Item[i], *M* (*SD*)	Total Sample (*N* = 119)	Recovery Orientation AB (*n* = 68)	MOD (*n* = 51)	*F*-test	Recovery Type TAR (*n* = 53)	NR (*n* = 66)	*F*-test
You had social influence to quit from friends, family, significant other	2.4 (1.6)	2.7 (1.6)	2.1 (1.4)	2.5	2.4 (1.5)	2.5 (1.6)	0.0
You were having physical health problems	2.3 (1.6)	2.4 (1.7)	2.1 (1.4)	0.3[ii]	2.8 (1.6)	1.9 (1.4)	3.1[**ii]
You experienced a humiliating event	2.2 (1.6)	2.3 (1.6)	2.1 (1.6)	0.1[ii]	2.6 (1.7)	2.0 (1.5)	4.6[*ii]
You were having work-related problems	2.2 (1.5)	2.4 (1.6)	1.9 (1.5)	0.6[ii]	2.8 (1.7)	1.8 (1.2)	15.5[***ii]
Marijuana was too costly	2.2 (1.4)	2.2 (1.6)	2.3 (1.3)	0.0	2.1 (1.5)	2.3 (1.4)	0.5
Confrontation about your marijuana problem (e.g., from a friend or family member)	2.0 (1.4)	2.2 (1.5)	1.8 (1.3)	0.3	2.1 (1.4)	1.9 (1.5)	1.4
You had a fear of having legal problems	2.0 (1.5)	2.1 (1.5)	2.0 (1.4)	0.0[ii]	2.3 (1.6)	1.8 (1.3)	2.8[ii]
Religious involvement	1.6 (1.3)	1.7 (1.4)	1.5 (1.1)	1.0[ii]	1.5 (1.1)	1.7 (1.4)	1.2[ii]
You were having legal problems	1.5 (1.2)	1.5 (1.2)	1.6 (1.3)	0.7[ii]	1.8 (1.5)	1.3 (0.9)	4.8[*ii]

Note. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Scale range from 1 (Did not at all affect decision to change) to 5 (Greatly affected decision to change).
[ii] Levene's test of equality of error variances was significant.
[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

In order to compare the mean number of reasons for resolution reported when presented with the open-ended questions versus the checklist, the same conservative cut-off rating of 5 was used as an estimate of a categorical endorsement for a checklist item. Even with the use of this conservative cut-off, it is not surprising that participants identified a greater number of reasons when presented with the checklist (M = 5.5, SD = 4.3) than in response to the open-ended questions (M = 3.5, SD = 1.6), t (118) = 5.3, $p <$ .001.

The general pattern of reasons for resolution categories derived from the content analysis appeared consistent with the reasons identified in the checklist. For example, two of the top three categories derived from the content analysis (i.e., *self-incompatibility* and *mental health concerns*) were similar in meaning to the top three rated checklist items (i.e., *you wanted to have a major lifestyle change*, *you thought about how marijuana was affecting you negatively*, and *you wanted to feel better emotionally (e.g., feel less depressed/anxious)*).

However, four categories that emerged from the content analysis appeared to not be covered by the checklist items. Specifically, the categories of *too integral to reality/lost enjoyment* (37.0%), *negative social environment* (11.8%), *lack of control* (11.8%), and *fear of escalation* (6.7%) appeared to be relatively absent from the checklist items. The category of *too integral to reality/lost enjoyment* reflected participant responses wherein cannabis use became viewed as too normal or mundane, so to speak, with an associated inability to get high and derive enjoyment from cannabis. The category of *negative social environment* reflected participant responses wherein cannabis use became associated with non-desired and potentially dangerous social environments. The category of loss of control reflected participant responses wherein cannabis use became viewed as out of one's control with an inability to stop or cut down. The category of *fear of escalation*, endorsed by only 6.7% of the total sample, was nonetheless unique in that it reflected participant responses wherein cannabis use became associated with fear that it would lead to other drug and alcohol use.

5.5.2 Life Event-Related Reasons for Resolution Categories

One particular follow-up question that was posed to participants was: Did any particular life events play a role in your decision to overcome your marijuana problem? A separate content analysis was conducted and excellent inter-rater reliability was obtained (κ = .94, percentage agreement = 95.2%). Representative content from participant responses that comprised each category can be seen in Table L2 in Appendix L. Table 13 displays the percentage of participants that endorsed each category. As can be seen in Table 13, the top three major life event-related reasons for resolution endorsed by the total sample were: *interpersonal event* (31.1%), *work/school-related event* (23.5%), and *experienced a mental health problem* (12.6%); no life event-related reason was reported by 17.6% of the total sample. The fact that *interpersonal event* and *experienced a mental health problem* were among the highest endorsed life event-related reasons is consistent with the results of the previous content analysis, which indicated that *social-incompatibility* and *mental health concerns* were among the highest endorsed reasons for resolution.

Participants, however, reported only a small number of life events in general that contributed to their reasons for resolution (M = 1.2, SD = 0.8). Only one difference emerged among the Recovery Orientation and Recovery Type groups. Namely, the treatment-assisted group was more likely to endorse the category of *legal event* than the natural recovery group (17.0% vs. 1.5%); if, however, the Bonferroni correction alpha level of .004 was used to correct for 12 comparisons, there would be no statistical difference. Group comparisons on the mean number of life events endorsed revealed no significant difference between the abstinence- (M = 1.2, SD = 0.8) and moderation-oriented (M = 1.1, SD = 0.8) recovery groups, F (1, 115) = 0.5, *ns*), or between the treatment-assisted (M = 1.2, SD = 0.8) and natural recovery (M = 1.1, SD = 0.8) groups F (1, 115) = 1.7, *ns*.

Table 13

Percentage of Participants that Endorsed Life Event-Related Reasons for Resolution Categories from the Open-Ended Questions for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Category (%)	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	χ^2	TAR (n = 53)	NR (n = 66)	χ^2
Interpersonal event	31.1	32.4	29.4	0.1	30.2	31.8	0.0
Work/school-related event	23.5	25.0	21.6	0.2	20.8	25.8	0.4
None	17.6	13.2	23.5	2.1	15.1	19.7	0.4
Experienced a mental health problem	12.6	13.2	11.8	0.1	15.1	10.6	0.5
Traumatic/humiliating event	10.1	7.4	13.7	1.3	9.4	10.6	0.0
Confrontation/intervention	8.4	11.8	3.9	*ns*[i]	11.3	6.1	*ns*[i]
Legal event	8.4	8.8	7.8	*ns*[i]	17.0	1.5	*s*[**i]
Financial event	5.9	5.9	5.9	*ns*[i]	5.7	6.1	*ns*[i]
Experienced a physical health problem	5.9	4.4	7.8	*ns*[i]	7.5	4.5	*ns*[i]
Residence change	5.0	4.4	5.9	*ns*[i]	1.9	7.6	*ns*[i]
Religious/spiritual event	4.2	5.9	2.0	*ns*[i]	5.7	3.0	*ns*[i]
Birthday	1.7	1.5	2.0	*ns*[i]	0.0	3.0	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

5.5.3 Plan and Motivation for Abstinence at the Time of Change, and Perception of Change as a Conscious Decision

Finally, participants were also asked to describe, on a five-point scale, the degree to which abstinence was planned at the time they decided to change, the degree to which the participant was motivated towards abstinence at the time they decided to change, and the degree to which change was a conscious choice. Table 14 displays the participant responses to these questions. As can be seen in the table, the total sample reported that on average, they did not fully plan or intend to quit cannabis completely at the time they decided to change (M = 3.9), and similarly, while they were motivated, they were not extremely motivated to quit cannabis completely in order to help them overcome their cannabis problem (M = 4.0). Additionally, for the most part, participants reported that their decision to overcome their cannabis problem was a conscious choice (M = 4.3). No statistically significant differences emerged on these variables among the Recovery Orientation and Recovery Type groups.

Table 14

Plan and Motivation for Abstinence at the Time of Change, and Perception that Change was a Conscious Choice for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Variable, *M* (*SD*)	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	*F*-test	TAR (n = 53)	NR (n = 66)	*F*-test
Plan for abstinence post-resolution[ii]	3.9 (1.5)	4.0 (1.5)	3.8 (1.6)	0.5	3.8 (1.6)	4.0 (1.5)	0.6
Motivated for abstinence post-resolution[iii]	4.0 (1.4)	4.2 (1.3)	3.9 (1.5)	1.2	4.0 (1.4)	4.1 (1.4)	0.1
Perception that change was a conscious choice[iii]	4.3 (1.3)	4.4 (1.2)	4.3 (1.3)	0.0[i]	4.5 (1.1)	4.2 (1.4)	1.7[i]

Note. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Levene's test of equality of error variances was significant.
[ii] Scale range from 1 (I did not at all plan to quit) to 5 (I 100% planned to quit).
[iii] Scale range from 1 (Not at all) to 5 (Extremely).
* $p < .05$. ** $p < .01$. *** $p < .001$.

5.6 Actions Taken

5.6.1 Actions Taken Categories

Content analysis was used to derive sixteen categories of actions taken to recover from cannabis use disorders. Excellent inter-rater reliability was obtained ($\kappa = .92$, percentage agreement = 92.7%). Participants identified a mean of 4.0 ($SD = 1.7$) actions. Group comparisons on the mean number of actions revealed no differences between the abstinence- ($M = 4.0$, $SD = 1.7$) and moderation-oriented ($M = 4.1$, $SD = 1.8$) groups, F (1, 115) = 0.2, *ns*, or between the treatment-assisted ($M = 4.4$, $SD = 1.8$) and natural recovery ($M = 4.4$, $SD = 1.8$) groups, F (1, 115) = 2.8, *ns*. Representative content from participant responses that comprised each category can be seen in Table L3 in Appendix L. Table 15 displays the percentage of participants that endorsed each category. As can be seen in Table 15, the top three major actions reported by the total sample were: *cognitive strategies* (59.7%), *decreased time spent with users/increased time spent with non-users* (54.6%), and *stimulus control/avoidance* (35.3%). The category of *cognitive strategies* reflected a variety of strategies, such as consciously thinking about the negative consequences of cannabis use, thinking about the benefits of not using cannabis, adopting positive thinking and attitudes, and setting and focusing on life goals. The category of *decreased time spent with users/increased time spent with non-users* reflected a mixture of stopping or decreasing time spent with cannabis users and developing new social networks composed of non-users. The category of *stimulus control/avoidance* reflected attempts to limit access to cannabis via limiting and avoiding exposure to particular triggers (e.g., alcohol and other drugs, drug dealers' phone numbers) and high-risk situations (e.g., parties, bars, familiar hang-outs, music concerts). In a similar vein, the category of *discarded cannabis/paraphernalia* (17.6%) was coded separately.

Few differences emerged among the Recovery Orientation and Recovery Type groups. With respect to Recovery Orientation, there were only two differences; the abstinence-oriented group was more likely to endorse the category of *treatment* (44.1% vs. 19.6%), whereas the moderation-oriented group was more likely to endorse the category of *residence change* (17.6% vs. 5.9%). However, when Recovery Type was controlled for, the relationship between *treatment* and Recovery Orientation no longer

remained significant (treatment-assisted participants, Fisher's exact test, *ns*; naturally recovered participants, Fisher's exact test, *ns*). With respect to Recovery Type, the only difference between the groups was that almost by definition, and thus not surprisingly, the treatment-assisted group was more likely to endorse the *treatment* category than the natural recovery group (71.7% vs. 3.0%). When Recovery Orientation was controlled for, this significant relationship remained among both abstinence-oriented participants (80.6% vs. 3.1%, χ^2 (1) = 41.2, $p < .001$) and moderation-oriented participants (52.9% vs. 2.9%, Fisher's exact test, *significant*). With a Bonferroni correction for 16 comparisons ($\alpha = .003$), only the one difference between the Recovery Type groups on the *treatment* action remained statistically significant.

It is noteworthy that two participants in the natural recovery group (3.0%) endorsed the *treatment* category; however, in the case of these two participants, treatment did not reflect cannabis treatment per se, but rather previous treatment for other mental or addiction problems, which later in life reportedly helped them to overcome their cannabis problem. The issue of whether these two participants belong in the treatment-assisted group is addressed in section 6.3. In short, the decision was made to retain the integrity of the treatment-assisted group based on participants' report of ever seeking cannabis treatment per se, not other forms of treatment.

Table 15

Percentage of Participants that Endorsed Actions Taken Categories from the Open-Ended Questions for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Category (%)	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	χ^2	TAR (n = 53)	NR (n = 66)	χ^2
Cognitive strategies	59.7	58.8	60.8	0.0	52.8	65.2	1.8
Decreased time spent with users/increased time spent with non-users	54.6	52.9	56.9	0.2	50.9	57.6	0.5
Stimulus control/avoidance	35.3	32.4	39.2	0.6	39.6	31.8	0.8
Treatment	33.6	44.1	19.6	7.8**	71.7	3.0[ii]	62.1***
Hobbies/distracting activities	31.9	27.9	37.3	1.2	24.5	37.9	2.4
Exercise/diet	31.9	29.4	35.3	0.5	30.2	33.3	0.1
Social/family support	24.4	27.9	19.6	1.1	32.1	18.2	3.1
Work/school involvement	23.5	20.6	27.5	0.8	20.8	25.8	0.4
Religious/spiritual involvement	23.5	29.4	15.7	3.0	26.4	21.2	0.4
Discarded cannabis/paraphernalia	17.6	14.7	21.6	0.9	17.0	18.2	0.0
Increased or substituted other substance or addictive behaviour	16.0	14.7	17.6	0.2	15.1	16.7	0.1
Refusal skills	12.6	14.7	9.8	0.6	9.4	15.2	0.9
Self-help/self-education	10.9	11.8	9.8	0.1	15.1	7.6	1.7
Maintained old social network with users	10.9	8.8	13.7	0.7	9.4	12.1	0.2
Residence change	10.9	5.9	17.6	4.1*	15.1	7.6	1.7
Miscellaneous	7.6	5.9	9.8	*ns*[i]	5.7	9.1	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[ii] Two participants in the NR group reported an action taken as previously seeking treatment for other mental health or addiction problems.

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

5.6.2 Processes of Change Questionnaire Data

All participants also completed the Processes of Change Questionnaire (PoC). Internal consistencies, means, and standard deviations of the 10 processes are displayed in Table 16. Coefficient alphas ranged from 0.62 to .92 (M = 0.80). Only one scale, consciousness raising (0.62), fell below an acceptable level of 0.70 (Field, 2009); however, the coefficient alpha's obtained in the present study were higher than those obtained among a sample of recovered problem gamblers (Hodgins, 2001), whereby four of the ten scales fell below a level of 0.70. The top three used processes of change were: *self-liberation* (M = 11.8), *counter conditioning* (M = 10.6), and *stimulus control* (M = 10.3). The items of *self-liberation* are cognitive in nature and reflect committing oneself to not using cannabis and reminding onself that change is possible and beneficial. The items of *counter conditioning* reflect keeping oneself busy, distracted, and active. The items of *stimulus control* reflect controlling access to cannabis and avoiding cannabis users and places associated with cannabis.

The top three used processes of change are consistent with the results from the content analysis, insofar as cognitive strategies appear to be the most used actions, followed by behavioural strategies that include stimulus control, avoidance of situations and people associated with cannabis use, and engagement in active and distracting activities. Also similar to the content analysis, few differences emerged among the Recovery Orientation and Recovery Type groups.

Specifically, with respect to Recovery Orientation, abstinence- versus moderation-oriented participants reported making more use of the *environmental re-evaluation* (M = 9.5 vs. 7.0) process, which remained significant after adjustment for the significant Levene's test. With respect to Recovery Type, the treatment-assisted group reported making more use of the following processes than the natural recovery group: *environmental re-evaluation* (M = 9.5 vs. 7.5), which remained significant after adjustment for the significant Levene's test; *helping relationship* (M = 9.1 vs. 7.0); *dramatic relief* (M = 7.8 vs. 6.4); and *consciousness raising* (M = 7.0 vs. 5.9), which did not remain significant after adjustment for the significant Levene's test. Finally, a significant interaction effect emerged on the *social liberation* scale, F (1, 115) = 6.3, p <

.05, which remained significant after adjustment for the significant Levene's test, whereby abstinence-oriented participants reported lower scores compared to moderation-oriented participants only among those who sought treatment (M = 5.1 vs. 6.7, F (1, 115) = 4.2, $p < .05$), not those who naturally recovered (M = 5.8 vs. 4.9, F (1, 115) = 2.1, *ns*). However, if the Bonferroni correction was used to correct for 10 comparisons, rendering a new alpha level of .005, then no differences at all would be observed.

Table 16

Internal Consistencies, Means, and Standard Deviations of the Processes of Change Questionnaire (PoC) Processes for the Total Sample and Group Comparisons

			Recovery Orientation			Recovery Type		
Processes, *M* (*SD*)	Cronbach's α (*N* = 119)	Total Sample (*N* = 119)	AB (*n* = 68)	MOD (*n* = 51)	*F*-test	TAR (*n* = 53)	NR (*n* = 66)	*F*-test
Self liberation	0.82	11.8 (3.8)	12.4 (3.6)	11.0 (3.9)	2.8	12.2 (3.7)	11.4 (3.9)	0.3
Counter conditioning	0.87	10.6 (4.0)	10.6 (4.3)	10.7 (3.6)	0.3[i]	11.1 (4.2)	10.2 (4.1)	2.0[i]
Stimulus control	0.86	10.3 (4.3)	10.6 (4.2)	9.9 (4.4)	0.4	11.2 (4.2)	9.6 (4.2)	2.9
Self re-evaluation	0.79	9.1 (3.6)	9.7 (3.4)	8.4 (3.6)	2.1[i]	9.8 (3.5)	8.6 (3.5)	2.6[i]
Environmental re-evaluation	0.92	8.4 (4.3)	9.5 (4.3)	7.0 (3.9)	6.5[*i]	9.5 (4.3)	7.5 (4.1)	5.5[*i]
Helping relationship	0.84[a]	7.9 (4.2)[a]	8.7 (4.3)[b]	6.9 (4.0)	2.8	9.1 (4.2)	7.0 (4.1)[c]	5.4[*]
Reinforcement management	0.79	7.4 (4.1)	8.2 (4.4)	6.4 (3.4)	3.7[i]	8.2 (4.0)	6.9 (4.1)	2.4[i]
Dramatic relief	0.70	7.0 (3.2)	7.7 (3.3)	6.1 (3.0)	3.4	7.8 (3.1)	6.4 (3.3)	5.3[*]
Consciousness raising	0.62[a]	6.4 (2.9)[a]	6.5 (2.8)[b]	6.3 (3.0)	0.0[i]	7.0 (3.2)	5.9 (2.5)[c]	5.1[*i]
Social liberation	0.77	5.5 (2.8)	5.4 (2.8)	6.1 (2.9)	0.4[i]	5.6 (2.8)	5.3 (2.9)	1.2[i]

Note. AB = abstinence; MOD = moderation; NR = natural recovery; PoC = Processes of Change Questionnaire; TAR = treatment-assisted recovery.
[i] Levene's test of equality of error variances was significant.
[a] *n* = 118. [b] *n* = 67. [c] *n* = 65.
[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

5.6.3 Particular Strategies Used for Quitting or Cutting-Down

Finally, Table 17 displays participant responses related to particular strategies that might have been used for quitting or cutting-down cannabis. As can be seen in the table, 50.0% of the total sample reported that they quit cold turkey, whereas 18.2% reported that they gradually cut down then quit, 13.6% gradually cut down but still use, 9.1% quit cold turkey but then started using again, and 9.1% reported having many periods of cutting down and quitting.

Interestingly, 30.6% of the moderation-oriented group reported that they quit cold turkey, yet by definition, these participants had to have reported at least one instance of cannabis use in the past 12 months, suggesting that perhaps these instances were construed as lapses, relapses, or otherwise did not count against quitting cold turkey, so to speak. Indeed, an additional 20.4% of the moderation-oriented recovery group reported quitting cold turkey and then resuming cannabis use; 20.4% reported gradually cutting-down and still using cannabis; 16.3% reported many periods of cutting-down and quitting; and 12.2% reported gradually cutting down then quitting. In contrast, 65.6% of participants in the abstinence-oriented group reported that they quit cold turkey, 23.0% reported gradually cutting-down then quitting, 8.2% reported that they gradually cut down but still use; 3.3% reported many periods of cutting down and quitting, and 0.0% reported quitting cold turkey and then resuming cannabis use. These results highlight the fluidity of goal selection and highlight the complexity involved in delineating the Recovery Orientation construct. While some of these results were statistically significant differences among the Recovery Orientation groups, no differences were observed among the Recovery Type groups.

As can also be seen in Table 17, only 31.1% of the total sample reported quitting or cutting-down their cannabis use at particular times, with the most frequently reported time being before work or school (14.4%). No differences emerged among the Recovery Orientation and Recovery Type groups.

Finally, 46.2% of the total sample reported that they did not have a plan with respect to increasing, decreasing, or quitting their use of other substances to help them overcome their cannabis problem, whereas 37.8% reported that they planned to decrease

their use, 10.1% reported that they planned to increase their use, and 5.9% reported that they planned to decrease some substances and simultaneously increase other substances. While no statistically significant differences emerged among the Recovery Orientation groups, two differences emerged among the Recovery Type groups. Namely, the natural recovery group was more likely to report that they had no plan (57.6% vs. 32.1%), whereas the treatment-assisted group was more likely to report that they had planned to both decrease and increase their use of particular substances.

Table 17

Participant Responses Related to Particular Strategies Used for Quitting or Cutting-Down Cannabis for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Variable	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	χ^2	TAR (n = 53)	NR (n = 66)	χ^2
Did you quit cold turkey or did you gradually cut down your use of marijuana? (%)							
Quit cold turkey	50.0[a]	65.6[b]	30.6[c]	13.3[***]	51.0[c]	49.2[b]	0.0
Gradually cut down then quit	18.2[a]	23.0[b]	12.2[c]	2.1	22.4[c]	14.8[b]	1.1
Gradually cut down but still use	13.6[a]	8.2[b]	20.4[c]	3.4	8.2[c]	18.0[b]	2.2
Quit cold turkey then started using again	9.1[a]	0.0[b]	20.4[c]	*s*[***i]	4.1[c]	13.1[b]	*ns*[i]
Many periods of cutting down and quitting	9.1[a]	3.3[b]	16.3[c]	*s*[*i]	14.3[c]	4.9[b]	*ns*[i]
Did you quit or reduce/control your use of marijuana at particular times? (% yes)	31.1[d]	22.9[e]	40.5[f]	3.2	22.5[g]	38.0[h]	2.5
Particular times (% endorsed)							
Not using before work/school	14.4[d]	8.3[e]	21.4[f]	*ns*[i]	10.0[g]	18.0[h]	*ns*[i]
Not using during daytime	5.6[d]	6.2[e]	4.8[f]	*ns*[i]	0.0[g]	10.0[h]	*ns*[i]
Eliminated the 'wake and bake'	4.4[d]	4.2[e]	4.8[f]	*ns*[i]	2.5[g]	6.0[h]	*ns*[i]
Not using during weekdays	4.4[d]	2.1[e]	7.1[f]	*ns*[i]	2.5[g]	6.0[h]	*ns*[i]
Not using around children/significant other/other people	3.3[d]	2.1[e]	4.8[f]	*ns*[i]	2.5[g]	4.0[h]	*ns*[i]
Not using during pregnancy	2.2[d]	2.1[e]	2.4[f]	*ns*[i]	2.5[g]	2.0[h]	*ns*[i]
Not using while alone	2.2[d]	0.0[e]	4.8[f]	*ns*[i]	5.0[g]	0.0[h]	*ns*[i]

Variable	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	χ^2
Did you plan to either increase or decrease (or quit) your use of other substances to help you overcome your marijuana problem? (%)							
No plan	46.2	45.6	47.1	0.0	32.1	57.6	7.7**
Decrease	37.8	41.2	33.3	0.8	47.2	30.3	3.6
Increase	10.1	7.4	13.7	1.3	9.4	10.6	0.0
Both increase and decrease	5.9	5.9	5.9	*ns*[i]	11.3	1.5	*s*[*i]

Note. Chi-square values represent Pearson chi-square values. Absolute Pearson chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.
[a] n = 110. [b] n = 61. [c] n = 49. [d] n = 90. [e] n = 48. [f] n = 42. [g] n = 40. [h] n = 50.
[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

5.7 Maintenance Factors

5.7.1 Maintenance Factors Categories and Checklist

Two methods were used to assess the maintenance factors involved in recovery from cannabis use disorders: open-ended questions and a checklist. For the open-ended questions, fourteen categories were derived via content analysis. Excellent inter-rater reliability was obtained ($\kappa = .92$, percentage agreement = 92.6%). Representative content from participant responses that comprised each category can be seen in Table L4 in Appendix L. Table 18 displays the percentage of participants that endorsed each category. As can be seen in Table 18, the top three major maintenance factors endorsed by the total sample were: *cognitive strategies* (69.7%), *hobbies/distracting activities* (33.6%), and *decreased time spent with users/increased time spent with non-users* (31.9%). These top maintenance factors categories were almost identical to the top reported actions taken categories. Again, the category of *cognitive strategies* reflected a variety of strategies, such as consciously thinking about the negative consequences of cannabis use, thinking about the benefits of not using cannabis, adopting positive thinking and attitudes, and setting and focusing on life goals. The category of *hobbies/distracting activities* reflected staying busy, distracted, and active. The category of *decreased time spent with users/increased time spent with non-users* reflected a mixture of stopping or decreasing time spent with cannabis users and developing new social networks composed of non-users.

Table 18

Percentage of Participants that Endorsed Maintenance Factors Categories from the Open-Ended Questions for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Category (%)	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	χ^2	TAR (n = 53)	NR (n = 66)	χ^2
Cognitive strategies	69.7	72.1	66.7	0.4	64.2	74.2	1.4
Hobbies/distracting activities	33.6	25.0	45.1	5.3*	28.3	37.9	1.2
Decreased time spent with users/increased time spent with non-users	31.9	32.4	31.4	0.0	35.8	28.8	0.7
Social support/accountability	29.4	32.4	25.5	0.7	41.5	19.7	6.7**
Work/school involvement	20.2	20.6	19.6	0.0	18.9	21.2	0.1
Exercise/diet	20.2	17.6	23.5	0.6	20.8	19.7	0.0
Stimulus control/avoidance	19.3	11.8	29.4	5.8*	24.4	15.2	1.7
Treatment/self-help	19.3	27.9	7.8	7.6**	37.7	4.5	20.8***
Religious/spiritual involvement	16.8	23.5	7.8	5.1*	17.0	16.7	0.0
Financial concerns	8.4	2.9	15.7	*s*[*i]	7.5	9.1	*ns*[i]
Helping others	7.6	10.3	3.9	*ns*[i]	15.1	1.5	*s*[**i]
Miscellaneous	6.7	5.9	7.8	*ns*[i]	7.5	6.1	*ns*[i]
Increased or substituted other substance or addictive behaviour	4.2	2.9	5.9	*ns*[i]	3.8	4.5	*ns*[i]
Residence change	4.2	2.9	5.9	*ns*[i]	5.7	3.0	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

Several statistically significant differences were observed among the Recovery Orientation and Recovery Type groups. With respect to Recovery Orientation, the moderation-oriented group was more likely to endorse the categories of *hobbies/distracting activities* (45.1% vs. 25.0%), *stimulus control/avoidance* (29.4 vs. 11.8%), and *financial concerns* (15.7% vs. 2.9%), whereas the abstinence-oriented group was more likely to endorse the categories of *treatment/self-help* (27.9% vs. 7.8%) and *religious/spiritual involvement* (23.5% vs. 7.8%). However, when Recovery Type was controlled for, there was no longer a significant relationship between *treatment/self-help* and Recovery Orientation (treatment-assisted participants, χ^2 (1) = 4.3, *ns*; naturally recovered participants, Fisher's exact test, *ns*). With respect to Recovery Type, compared to the natural recovery group, the treatment-assisted group was more likely to endorse the categories of *social support/accountability* (41.5% vs. 19.7%), *treatment/self-help* (37.7% vs. 4.5%), and *helping others* (15.1% vs. 1.5%). However, when Recovery Orientation was controlled for, there remained a significant relationship between *treatment/self-help* and Recovery Type among abstinence-oriented participants (47.2% vs. 6.2%, χ^2 (1) = 14.1, $p < .001$), but not among naturally recovered participants (Fisher's exact test, *ns*). If, however, the Bonferroni correction was applied to correct for 14 comparisons, rendering a new alpha level of .004, then the only difference that would remain statistically significant among both the Recovery Orientation and Recovery Type groups would be the higher endorsement of the *treatment/self-help* category by the treatment-assisted group compared to the natural recovery group. With respect to the three participants (4.5%) in the natural recovery group who endorsed the *treatment/self-help* category, two were referring to self-help materials for cannabis, whereas one was referring to current attendance at AA for alcohol (which he reported helps him emotionally, and in turn, helps him to remain problem-free from cannabis).

Participants endorsed a mean of 2.9 (*SD* = 1.6) categories. Group comparisons on the mean number of categories revealed no significant difference between the abstinence- (*M* = 2.9, *SD* = 1.7) and moderation-oriented (*M* = 2.9, *SD* = 1.3) recovery groups, *F* (1, 115) = 0.2, *ns*. In contrast, the treatment-assisted group (*M* = 3.3, *SD* = 1.7) endorsed

significantly more categories than the natural recovery group (*M* = 2.6, *SD* = 1.4), *F* (, 115) = 4.5, *p* < .05.

Table 19 displays the means and standard deviations of the five-point scaled checklist items that were used to assess participants' maintenance factors. As can be seen in the table, the top three highest rated checklist items for the total sample were: *major positive lifestyle change (i.e., you have had a major positive lifestyle change and want to maintain it)* (*M* = 4.1), *goal commitment (i.e., commitment to staying problem-free)* (*M* = 4.1), and *self-control/will power (i.e., you use your self-control/will power)* (*M* = 4.1). For a principal components analysis (PCA) of the checklist, see Appendix N.

Several differences in the checklist were observed among the Recovery Orientation and Recovery Type groups. Specifically, with respect to Recovery Orientation, the abstinence-oriented group rated the following maintenance factors as more helpful than the moderation-oriented group: *goal commitment (i.e., commitment to staying problem-free)* (*M* = 4.4 vs. 3.8); *sense of accomplishment* (*M* = 4.4 vs. 3.5), *personal pride (i.e., you don't want to hurt your personal pride)* (*M* = 4.2 vs. 3.2); *change in friends* (*M* = 3.5 vs. 2.9), which did not remain significant after adjustment for the significant Levene's test; *respect gained from other people (i.e., you don't want to lose respect)* (*M* = 3.4 vs. 2.5); *family support* (*M* = 3.2 vs. 2.3); and *other self-help group (i.e., Alcoholics Anonymous)* (*M* = 2.3 vs. 1.5), which did not remain significant after adjustment for the significant Levene's test. In contrast, the moderation-oriented group rated the item, *you have increased your alcohol consumption*, as significantly more helpful than the abstinence-oriented group (*M* = 1.7 vs. 1.2), which remained significant after adjustment for the significant Levene's test.

Table 19

Means and Standard Deviations of Maintenance Factors Checklist Items for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Checklist Item[i], *M* (*SD*)	Total Sample (*N* = 119)	AB (*n* = 68)	MOD (*n* = 51)	*F*-test	TAR (*n* = 53)	NR (*n* = 66)	*F*-test
Major positive lifestyle change (i.e., you have had a major positive lifestyle change and want to maintain it)	4.1 (1.3)	4.3 (1.2)	3.8 (1.3)	2.6	4.4 (1.1)	3.9 (1.4)	2.4
Goal commitment (i.e., commitment to staying problem-free)	4.1 (1.3)[a]	4.4 (1.2)[b]	3.8 (1.4)	5.3[*]	4.3 (1.2)	4.0 (1.40)[c]	1.5
Self-control/will power (i.e., you use your self-control/will power)	4.1 (1.2)	4.0 (1.4)	4.3 (1.0)	1.6[ii]	4.0 (1.4)	4.3 (1.1)	0.5[ii]
Sense of accomplishment	4.0 (1.3)	4.4 (1.2)	3.5 (1.4)	9.7[**]	4.2 (1.3)	3.9 (1.4)	0.6
Past marijuana problems recalled (i.e., you think about your past marijuana problems)	3.7 (1.5)	3.8 (1.5)	3.6 (1.5)	0.1[ii]	4.1 (1.3)	3.4 (1.6)	5.4[*ii]
Personal pride (i.e., you don't want to hurt your personal pride)	3.7 (1.4)	4.2 (1.3)	3.2 (1.5)	12.9[***]	4.0 (1.3)	3.5 (1.5)	0.9
Social life activities change	3.5 (1.5)	3.7 (1.5)	3.3 (1.4)	2.4	3.6 (1.4)	3.5 (1.5)	0.0
Change in friends	3.2 (1.6)	3.5 (1.6)	2.9 (1.6)	4.1[*ii]	3.5 (1.5)	3.0 (1.7)	1.3[ii]
Wanting to maintain better physical health	3.2 (1.6)	3.3 (1.6)	3.1 (1.5)	0.1	3.3 (1.7)	3.1 (1.5)	0.8
Recreational/leisure activities change	3.1 (1.5)	3.1 (1.6)	3.1 (1.3)	0.0[ii]	3.2 (1.5)	3.1 (1.5)	0.0[ii]
Respect gained from other people (i.e., you don't want to lose respect)	3.0 (1.6)	3.4 (1.6)	2.5 (1.5)	6.3[*]	3.3 (1.5)	2.8 (1.6)	1.6
Family support	2.8 (1.6)	3.2 (1.7)	2.3 (1.4)	7.4[**]	3.2 (1.6)	2.6 (1.6)	2.2
Significant other support	2.7 (1.8)	2.9 (1.8)	2.4 (1.7)	3.1	2.7 (1.8)	2.7 (1.7)	0.4
Concern about worsening physical health	2.6 (1.6)	2.7 (1.6)	2.6 (1.5)	0.0	2.9 (1.7)	2.4 (1.5)	3.3
You have decreased your alcohol consumption	2.4 (1.7)[a]	2.7 (1.8)[b]	2.0 (1.5)	2.3[ii]	2.9 (1.8)	1.9 (1.5)	8.7[**ii]
Change in jobs	2.4 (1.7)	2.5 (1.7)	2.4 (1.6)	0.1	2.6 (1.7)	2.3 (1.6)	0.3

Checklist Item[i], *M* (*SD*)	Total Sample (*N* = 119)	Recovery Orientation AB (*n* = 68)	MOD (*n* = 51)	*F*-test	Recovery Type TAR (*n* = 53)	NR (*n* = 66)	*F*-test
Financial status change (i.e., you have less money to spend on marijuana)	2.4 (1.5)	2.2 (1.5)	2.7 (1.4)	3.4	2.4 (1.5)	2.4 (1.5)	0.2
Friends support	2.4 (1.5)[a]	2.7 (1.5)	2.2 (1.4)[d]	2.2	2.7 (1.6)	2.2 (1.3)[c]	2.0
Residence change	2.3 (1.6)	2.4 (1.6)	2.1 (1.6)	0.6	2.3 (1.6)	2.2 (1.6)	0.1
Self-help materials (e.g., books, internet websites)	2.1 (1.5)	2.3 (1.5)	1.9 (1.4)	0.2[ii]	2.8 (1.6)	1.6 (1.2)	18.0[***ii]
Change in diet	2.1 (1.5)	2.3 (1.6)	1.7 (1.3)	2.7[ii]	2.5 (1.6)	1.8 (1.3)	5.1[*ii]
Religious influence	2.0 (1.6)	2.2 (1.7)	1.7 (1.4)	2.8[ii]	1.9 (1.5)	2.0 (1.6)	0.1[ii]
Other self-help group (e.g., Alcoholics Anonymous)	1.9 (1.6)	2.3 (1.8)	1.5 (1.2)	4.4[*ii]	2.9 (1.8)	1.2 (0.7)	35.3[***ii]
You have decreased other drug use	1.9 (1.6)	2.2 (1.8)	1.5 (1.2)	3.8[ii]	2.3 (1.8)	1.6 (1.2)	5.2[*ii]
You have decreased your nicotine use	1.9 (1.4)	1.9 (1.5)	1.8 (1.4)	0.1	2.1 (1.6)	1.7 (1.3)	2.0
Employer's support	1.5 (1.1)	1.6 (1.3)	1.2 (0.9)	1.8[ii]	1.7 (1.3)	1.3 (0.9)	2.6[ii]
You have increased your nicotine use	1.5 (1.0)	1.4 (1.0)	1.6 (1.0)	2.3[ii]	1.7 (1.2)	1.3 (0.8)	5.8[*ii]
You have increased your alcohol consumption	1.4 (0.9)	1.2 (0.6)	1.7 (1.1)	8.7[**ii]	1.4 (0.9)	1.4 (0.9)	0.1[ii]
You have increased other drug use	1.2 (0.8)	1.1 (0.7)	1.3 (0.9)	3.0[ii]	1.2 (0.8)	1.2 (0.7)	1.7[ii]
Marijuana Anonymous	1.1 (0.7)	1.2 (0.8)	1.1 (0.4)	0.5[ii]	1.3 (1.0)	1.0 (0.0)	4.3[*ii]

Note. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Scale range from 1 (Did not help at all) to 5 (Helped very much).
[ii] Levene's test of equality of error variances was significant.
[a] $n = 118$. [b] $n = 67$. [c] $n = 65$. [d] $n = 50$.
[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

With respect to Recovery Type, the treatment-assisted group rated the following items as more helpful compared to the natural recovery group: *past marijuana problems recalled (i.e., you think about your past marijuana problems* (M = 4.1 vs. 3.4), which remained significant after adjustment for the significant Levene's test; *you have decreased your alcohol consumption* (M = 2.9 vs. 1.9), which remained significant after adjustment for the significant Levene's test; *self-help materials (e.g., books, internet websites)* (M = 2.8 vs. 1.6), which remained significant after adjustment for the significant Levene's test; *change in diet* (M = 2.5 vs. 1.8), *other self-help groups (e.g., Alcoholics Anonymous)* (M = 2.9 vs. 1.2), which remained significant after adjustment for the significant Levene's test; *you have decreased other drug use* (M = 2.3 vs. 1.6), which did not remain significant after adjustment for the significant Levene's test; *you have increased your nicotine use* (M = 1.7 vs. 1.3), which did not remain significant after adjustment for the significant Levene's test; and *Marijuana Anonymous* (M = 1.3 vs. 1.0), which did not remain significant after adjustment for the significant Levene's test. Moreover, there was one interaction on the item, *you have increased other drug use*, F (1, 115) = 10.9, $p < .001$, which remained significant after adjustment for the significant Levene's test, whereby abstinence-oriented participants rated this item lower compared to moderation-oriented participants only among those who sought treatment (M = 1.0 vs. 1.7, F (1, 115) = 10.7, $p < .001$), not those who naturally recovered (M = 1.3 vs. 1.1, F (1, 115) = 1.5, *ns*).

A few robust differences still emerged even after employing a Bonferroni correction for 30 comparisons, which rendered a new alpha level of .002. Namely, with the Bonferroni correction, the abstinence-oriented group still rated the item, *personal pride (i.e., you don't want to hurt your personal pride)*, as more helpful than the moderation-oriented group; and the treatment-assisted group still rated the items, *other self-help groups (e.g., Alcoholics Anonyomous)* and *self-help materials (e.g., books, internet websites)* as more helpful than the natural recovery group. The one interaction also remained significant.

In order to determine the mean number of items endorsed from the checklist method, it was decided that on the five-point scale, a cut-off rating of 5 ("helped very

much") would be a conservative estimate of a categorical endorsement for a checklist item. In this way, participants endorsed a mean of 7.2 items (*SD* = 5.5). Group comparisons revealed that the abstinence-oriented group (*M* = 8.9, *SD* = 5.5) endorsed significantly more items than the moderation-oriented group (*M* = 5.0, *SD* = 4.7), F (1, 115) = 13.0, $p < .001$, and the treatment-assisted group (*M* = 8.8, *SD* = 5.7) endorsed significantly more items than the natural recovery group (*M* = 5.9, *SD* = 5.0), F (1, 115) = 4.6, $p < .05$.

In order to compare the mean number of maintenance factors reported when presented with the open-ended questions versus the checklist, the same conservative cut-off rating of 5 was used as an estimate of a categorical endorsement for a checklist item. Even with the use of this conservative cut-off, it is not surprising that participants identified a greater number of factors when presented with the checklist (*M* = 7.2, *SD* = 5.5) than in response to the open-ended questions (*M* = 2.9, *SD* = 1.6), t (118) = 9.0, $p < .001$.

The general pattern of maintenance factors categories derived from the content analysis was consistent with the factors identified in the checklist. For example, the top six items identified in the checklist were all cognitive in nature, which is consistent with the fact that the category of *cognitive strategies* in the content analysis emerged by far as the top maintenance factor in the content analysis (i.e., more than doubled the second highest maintenance factor in percentage of participants endorsed). Relatively more behaviourally-based maintenance factors followed in both the checklist and content analysis. Moreover, the categories that emerged from the content analysis appeared for the most part to be covered by the checklist items.

5.7.2 Relapse-Related Variables and Recovery Orientation Switching

Several follow-up questions were posed to participants that were designed to glean information about relapse-related variables and recovery orientation (abstinence versus moderation) switching. This information is displayed in Table 20. As can be seen in the table, 31.1% of total sample reported that they had ever relapsed to problematic cannabis use after they had already begun to overcome their problem. The estimated number of relapses was a mean of 1.8 (*SD* = 5.0). Based on a five-point scale (1 = none,

5 = extreme), participants reported overall feeling guilty (*M* = 4.0) when they relapsed, and did not report an extreme sense of loss of control (*M* = 3.3). Participants were asked to describe the situations that they perceived had caused them to relapse, and a separate content analysis was conducted to derive categories based on responses to this question. Excellent inter-rater reliability was obtained (κ = .89, percentage agreement = 92.4%). Representative content from participant responses that comprised each category can be seen in Table L5 in Appendix L. As can be seen in Table 20, of the 31.1% of participants who reported that they had ever relapsed, the top causes endorsed were *exposure to triggers/peer pressure* (18.5% of the total sample) and *cope with stress/pain* (16.8% of the total sample). Only one difference emerged among all of the relapse-related variables among the Recovery Orientation and Recovery Type groups. Namely, the moderation-oriented recovery group was significantly more likely to report that they had ever relapsed compared to the abstinence-oriented group (41.9% vs. 23.9%).

As can also be seen in Table 20, 41.2% of the total sample reported that they had ever switched from initially cutting-down/reducing their cannabis use to eventually quitting completely, with the average number of switches being a mean of 2.7 (*SD* = 4.0) times. Participants were asked to describe why they had decided to change from cutting-down to quitting, and a separate content analysis was conducted to derive categories based on responses to this question. Excellent inter-rater reliability was obtained (κ = .85, percentage agreement = 90.0%). Representative content from participant responses that comprised each category can be seen in Table L6 in Appendix L. As can be seen in Table 20, of the 41.2% of participants who reported that they had ever switched from cutting-down (i.e., moderation) to quitting (i.e., abstinence), the top reasons endorsed were *ultimately wanted abstinence* (10.9% of the total sample) *external/social pressures* (8.4% of the total sample), and *realization of harm* (7.6% of the total sample). No differences emerged on these variables among the Recovery Orientation and Recovery Type groups.

Table 20

Relapse and Recovery Orientation Switching Data for the Total Sample and Group Comparisons

Variable	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Ever had a relapse, (% yes)	31.1[a]	23.9[b]	41.2	4.0[*]	34.6[c]	28.8	0.5
Number of relapses, *M* (*SD*)	1.8 (5.0)[a]	2.2 (6.3)[b]	1.3 (2.2)	0.6	2.0 (5.3)[c]	1.6 (4.8)	0.2
Guilt over relapse[iii], *M* (*SD*)	4.0 (1.3)[d]	4.3 (1.2)[e]	3.8 (1.4)[f]	1.5	4.2 (1.2)[g]	3.9 (1.4)[g]	0.2
Loss of control from relapse[iii], *M* (*SD*)	3.3 (1.5)[d]	3.3 (1.5)[e]	3.3 (1.6)[f]	0.0	3.5 (1.5)[g]	3.2 (1.6)[g]	0.3
Relapse causes (% endorsed)							
Exposure to triggers/peer pressure	18.5	13.2	25.5	2.9	15.1	21.2	0.7
Cope with stress/pain	16.8	13.2	21.6	1.4	20.8	13.6	1.1
Beliefs that relapse will not happen	6.7	5.9	7.8	*ns*[i]	9.4	4.5	*ns*[i]
Boredom/Habit/Enjoyment	6.7	5.9	7.8	*ns*[i]	7.5	6.1	*ns*[i]
Other	1.7	1.5	2.0	*ns*[i]	1.9	1.5	*ns*[i]
Ever switched from MOD to AB (% yes)	41.2	38.2	45.1	0.6	41.5	40.9	0.0
Number of times switched from MOD to AB, *M* (*SD*)	2.7 (4.0)[h]	1.8 (1.9)[j]	3.5 (5.2)[k]	1.7[ii]	2.3 (2.0)[g]	3.0 (5.0)[l]	0.3[ii]
Switched from MOD to AB reasons (% endorsed)							
Ultimately wanted AB	10.9	8.8	13.7	0.7	11.3	10.6	0.0
External/social pressures	8.4	8.8	7.8	*ns*[i]	7.5	9.1	*ns*[i]
Realization of harm	7.6	7.4	7.8	*ns*[i]	9.4	6.1	*ns*[i]
MOD did not work	6.7	4.4	9.8	*ns*[i]	11.3	3.0	*ns*[i]
Lost desire to use	6.7	10.3	2.2	*ns*[i]	1.9	10.6	*ns*[i]

Variable	Total Sample (N = 119)	Recovery Orientation: AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type: TAR (n = 53)	NR (n = 66)	F-test / χ^2
Ever switched from AB to MOD (% yes)	36.1[a]	13.4[b]	66.7	35.4***	28.3	43.1[m]	2.7
Number of times switched from AB to MOD, *M* (*SD*)	3.3 (3.9)[n]	3.4 (3.1)[o]	3.2 (4.1)[p]	0.0	3.0 (3.6)[q]	3.4 (4.1)[l]	0.9
Switched from AB to MOD reasons (% endorsed)							
Social reasons	10.9	4.4	19.6	6.9**	5.7	15.2	2.7
Beliefs that relapse will not happen	10.1	2.9	19.6	8.9**	1.9	16.7	7.1**
Boredom/enjoyment	9.2	1.5	19.6	*s****[i]	13.2	6.1	*ns*[i]
Cope with stress	5.0	5.9	3.9	0.2	3.8	6.1	*ns*[i]
Other	5.0	0.0	11.8	*s***[i]	7.5	3.0	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute Pearson chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.
[ii] Levene's test of equality of error variances was significant.
[iii] Scale range from 1 (None) to 5 (Extreme).
[a] n = 118. [b] n = 67. [c] n = 52. [d] n = 40. [e] n = 18. [f] n = 22. [g] n = 20. [h] n = 47. [j] n = 23. [k] n = 24. [l] n = 27. [m] n = 65. [n] n = 42. [o] n = 9. [p] n = 33. [q] n = 15.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Similarly, 36.1% of the total sample reported that they had ever switched from initially quitting cannabis completely to resuming cannabis use again occasionally without having any problems; the average number of switches was a mean of 3.3 (*SD* = 3.9) times. Participants were asked to describe why they had decided to change from quitting to using again occasionally, and a separate content analysis was conducted to derive categories based on responses to this question. Excellent inter-rater reliability was obtained (κ = .97, percentage agreement = 98.0%). Representative content from participant responses that comprised each category can be seen in Table L7 in Appendix L. As can be seen in Table 20, of the 36.1% of participants who reported that they had ever switched from quitting (i.e., abstinence) to using again occasionally (i.e., moderation), the top reasons endorsed were *social reasons* (10.9% of the total sample), *beliefs that relapse will not happen* (10.1% of the total sample), and *boredom/enjoyment* (9.2% of the total sample).

Several differences emerged on these variables among the Recovery Orientation and Recovery Type groups. With respect to Recovery Orientation, the moderation-oriented group was significantly more likely to report that they had ever switched from initially quitting cannabis completely to resuming cannabis use again occasionally without having any problems (66.7% vs. 13.4%); and they were more likely to report all of the categories for the reasons of the switch from abstinence to moderation (i.e., *social reasons, beliefs that relapse will not happen, boredom/enjoyment*, and *other*) except for the category of *cope with stress*. However, when Recovery Type was controlled for, there was no longer a significant relationship between *beliefs that relapse will not happen* and Recovery Orientation (treatment-assisted participants, Fisher's exact test, *ns*; naturally recovered participants, Fisher's exact test, *ns*). The only difference reported on these variables with respect to Recovery Type was that the natural recovery group was more likely to report the category of, *beliefs that relapse will not happen* (16.7% vs. 1.9%), as a reason for the switch from abstinence to moderation. However, when Recovery Orientation was controlled for, there was no longer a significant relationship between *beliefs that relapse will not happen* and Recovery Type (abstinence-oriented

participants, Fisher's exact test, *ns*; moderation-oriented participants; Fisher's exact test, *ns*).

5.7.3 Changes in Other Addictive Behaviours Post-Resolution

Finally, participants were asked about whether a variety of other addictive behaviours actually increased or decreased after they had resolved their cannabis problem. This information is displayed in Table 21. As can be seen in the table, the total sample reported both increases and decreases in addictive behaviours. For the most part, the addictive behaviours decreased more than they increased, except for caffeine, sleeping pills, and gambling, which increased more than they decreased. The largest percentages of increased and decreased addictive behaviours were for alcohol and cigarettes, whereby with respect to alcohol, 24.4% of the total sample reported an increase and 40.3% reported a decrease; and with respect to cigarettes, 20.2% reported an increase and 25.2% reported a decrease.

Several differences emerged with respect to the Recovery Orientation and Recovery Type groups. With respect to Recovery Orientation, the moderation-oriented group reported significantly more increases in alcohol (43.1% vs. 10.3%) and cigarettes (27.5% vs. 14.7%), whereas the abstinence-oriented group reported significantly more decreases in cigarettes (32.4% vs. 15.7%), prescription pills (10.3% vs. 0.0), and LSD (19.1% vs. 2.0%). With respect to Recovery Type, only one difference emerged, namely that the treatment-assisted group reported significantly more decreases in crack/cocaine than the natural recovery group (18.9% vs. 4.5%).

Table 21

Percentage of Increased and Decreased Addictive Behaviours Post-Resolution for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Variable (%)	Total Sample (*N* = 119)	AB (*n* = 68)	MOD (*n* = 51)	χ^2	TAR (*n* = 53)	NR (*n* = 66)	χ^2
Alcohol							
Increase	24.4	10.3	43.1	17.1***	18.9	28.8	1.6
Decrease	40.3	47.1	31.4	3.0	49.1	33.3	3.0
Cigarettes							
Increase	20.2	14.7	27.5	2.9	24.5	16.7	1.1
Decrease	25.2	32.4	15.7	4.3*	28.3	22.7	0.5
Caffeine							
Increase	24.4	27.9	19.6	1.1	32.1	18.2	3.1
Decrease	7.6	10.3	3.9	*ns*[i]	13.2	3.0	*ns*[i]
Mushrooms							
Increase	2.5	0.0	5.9	*ns*[i]	1.9	3.0	*ns*[i]
Decrease	16.8	20.6	11.8	1.6	18.9	15.2	0.3
LSD							
Increase	1.7	0.0	3.9	*ns*[i]	0.0	3.0	*ns*[i]
Decrease	11.8	19.1	2.0	8.3**	15.1	9.1	1.0
Crack/cocaine							
Increase	1.7	0.0	3.9	*ns*[i]	0.0	3.0	*ns*[i]
Decrease	10.9	13.2	7.8	0.9	18.9	4.5	6.2*
Other							
Increase	5.9	4.4	7.8	*ns*[i]	7.5	4.5	*ns*[i]
Decrease	7.6	11.8	2.0	*ns*[i]	9.4	6.1	*ns*[i]
Ecstasy							
Increase	2.5	1.5	3.9	*ns*[i]	1.9	3.0	*ns*[i]
Decrease	8.4	10.3	5.9	*ns*[i]	11.3	6.1	*ns*[i]

		Recovery Orientation			Recovery Type		
Variable (%)	Total Sample (*N* = 119)	AB (*n* = 68)	MOD (*n* = 51)	χ^2	TAR (*n* = 53)	NR (*n* = 66)	χ^2
Prescription pills							
Increase	4.2	2.9	5.9	*ns*[i]	3.8	4.5	*ns*[i]
Decrease	5.9	10.3	0.0	*s*[*i]	9.4	3.0	*ns*[i]
Sleeping pills							
Increase	6.7	8.8	3.9	*ns*[i]	7.5	6.1	*ns*[i]
Decrease	1.7	2.9	0.0	*ns*[i]	1.9	1.5	*ns*[i]
Gambling							
Increase	5.0	7.4	2.0	*ns*[i]	9.4	1.5	*ns*[i]
Decrease	3.4	4.4	2.0	*ns*[i]	3.8	3.0	*ns*[i]
Methamphetamine							
Increase	0.0						
Decrease	4.2	7.4	0.0	*ns*[i]	7.5	1.5	*ns*[i]
Salvia							
Increase	0.8	0.0	2.0	*ns*[i]	0.0	1.5	*ns*[i]
Decrease	2.5	4.4	0.0	*ns*[i]	3.8	1.5	*ns*[i]
Heroin							
Increase	0.8	1.5	0.0	*ns*[i]	0.0	1.5	*ns*[i]
Decrease	2.5	4.4	0.0	*ns*[i]	5.7	0.0	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute Pearson chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$

5.8 Treatment-Related Variables

5.8.1 Cannabis Treatment and Self-Help Materials

Lifetime and current cannabis treatment information is displayed in Table 22. As is shown in the table, 44.5% of the total sample reported that they had ever sought formal or professional treatment for their cannabis problem—these participants composed the treatment-assisted recovery group in the present study. In terms of the total sample, from most common to least common, the types of lifetime cannabis treatment sought included outpatient addiction centres (21.8%), psychologists/counselors/therapists (19.3%), 12-step programs (17.6%), residential treatment (13.4%), physicians/psychiatrists (10.1%), other support groups (4.2%), other kinds of treatment (4.2%), detox centres (3.4%), helplines (2.5%), and inpatient treatment (1.7%). It is important to note that these treatments were not mutually exclusive, as participant responses could be classified into more than one category. In instances where more than one helpfulness of treatment rating was provided, the highest rating informed the analyses. To this end, based on a five-point scale (1 = not at all helpful, 5 = extremely helpful), lifetime cannabis treatment was rated overall as between somewhat helpful and helpful (M = 3.7, SD = 1.7). The estimated number of separate occasions sought for lifetime cannabis treatment was a mean of 2.6 (SD = 2.3), and the estimated number of lifetime cannabis treatment sessions was a mean of 49.3 (SD = 45.2). It is important to note that these estimations of treatment occasions and sessions were very rudimentary, as participants found these variables difficult to estimate, especially in relation to particular kinds of treatment, such as 12-step programs or residential treatment. Nevertheless, of the 53 participants who reported ever seeking cannabis treatment, 24 (45.3%) estimated having over fifty sessions, 8 (15.1%) had approximately between ten and fifty sessions, 16 (30.2%) had approximately between two and eight sessions, and only 5 (9.4%) reported one session. Of the 5 participants that reported only one session of treatment, 2 reported that treatment was extremely helpful, whereas 3 reported that treatment was not at all helpful. A brief discussion about how this information relates to the composition of the treatment-assisted recovery group in the present study can be found in section 6.3.

Table 22

Cannabis Treatment Variables for the Total Sample and Recovery Orientation Groups

Variables	Total Sample (N = 119)	Recovery Orientation: AB (n = 68)	Recovery Orientation: MOD (n = 51)	t-test / χ^2
Lifetime cannabis treatment (% yes)	44.5	52.9	33.3	4.5[*]
Helpfulness of lifetime cannabis treatment[ii], *M* (*SD*)	3.7 (1.7)[a]	3.9 (1.6)[b]	3.2 (1.7)[c]	1.4
Estimated number of lifetime cannabis treatment occasions, *M* (*SD*)	2.6 (2.3)[d]	2.6 (2.3)[e]	2.8 (2.5)[c]	0.4
Estimated number of lifetime cannabis treatment sessions, *M* (*SD*)	49.3 (45.2)[d]	56.8 (44.2)[e]	33.5 (44.5)[c]	1.8
Type of lifetime cannabis treatment (%)				
Outpatient addiction centre	21.8	27.9	13.7	3.4
Psychologist/counselor/therapist	19.3	20.6	17.6	0.2
12-step program	17.6	23.5	9.8	3.8
Residential	13.4	17.6	7.8	2.4
Physician/psychiatrist	10.1	8.8	11.8	0.3
Other support group	4.2	4.4	3.9	*ns*[i]
Other	4.2	5.9	2.0	*ns*[i]
Detox	3.4	4.4	2.0	*ns*[i]
Helplines	2.5	1.5	3.9	*ns*[i]
Inpatient	1.7	2.9	0.0	*ns*[i]
Current cannabis treatment (% yes)	9.2	10.3	7.8	*ns*[i]
Helpfulness of current cannabis treatment[ii], *M* (*SD*)	4.2 (1.3)[f]	4.9 (0.4)[g]	3.0 (1.6)[h]	3.0[*]

Variables	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	t-test / χ^2
Type of current cannabis treatment (%)				
12-step program	5.9	10.3	0.0	s^{*i}
Outpatient addiction centre	1.7	0.0	3.9	ns^{i}
Other support group	1.7	1.5	2.0	ns^{i}
Physician/psychiatrist	0.8	0.0	2.0	ns^{i}
Psychologist/counselor/therapist	0.8	0.0	2.0	ns^{i}

Note. Chi-square values represent Pearson chi-square values. Absolute t-values and Pearson chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.
[ii] Scale range from 1 (Not at all helpful) to 5 (Extremely helpful).
[a] n = 52. [b] n = 35. [c] n = 17. [d] n = 53. [e] n = 36. [f] n = 11. [g] n = 7. [h] n = 4.
[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

As can also be seen in Table 22, only 9.2% of the total sample reported that they were currently receiving cannabis treatment, which mostly consisted of 12-step programs (5.9%), followed by outpatient addiction centres (1.7%), other support groups (1.7%), physicians/psychiatrists (0.8%), and psychologists/counselors/therapists (0.8%). Based on the same five-point scale (1 = not at all helpful, 5 = extremely helpful), current cannabis treatment was rated as helpful (*M* = 4.2, *SD* = 1.3).

With respect to Recovery Orientation, significantly more participants in the abstinence-oriented group reported lifetime cannabis treatment compared to the moderation-oriented group (52.9% vs. 33.3%). Additionally, among those participants who reported current cannabis treatment, significantly more participants in the abstinence-oriented group found treatment to be helpful (*M* = 4.9 vs. 3.0) and reported current attendance at 12-step programs (10.3% vs. 0.0%) compared to the moderation-oriented group.

Table 23 displays lifetime and current cannabis self-help materials information for the total sample and group comparisons. As can be seen in the table, 34.5% of the total sample reported ever using self-materials to help overcome their cannabis problem. In terms of the total sample, from most common to least common, the types of lifetime cannabis self-help materials used included books (16.0%), 12-step materials (10.9%), Internet (5.9%), other treatment resource materials (5.9%), religious/spiritual materials (5.0%), recovery success stories (3.4%), DVD/audio (2.5%), and personal journals (1.7%). It is important to note that these self-help materials were not mutually exclusive, as participant responses could be classified into more than one category. Among the self-help materials reported, only 9 (7.6%) were specifically related to cannabis, wherein 7 of these were Internet resources. In instances where more than one helpfulness of self-help materials rating was provided, the highest rating informed the analyses. To this end, based on a five-point scale (1 = not at all helpful, 5 = extremely helpful), lifetime cannabis self-materials were rated overall as helpful (*M* = 4.2, *SD* = 0.9). Further, 15.5% of the total sample reported that they currently used self-help materials for their cannabis problem, with the most used type being 12-step materials (7.6%), followed by books (5.0%), religious/spiritual materials (4.2%), other treatment resource materials (2.5%),

personal journals (1.7%), DVD/audio (0.8%), and recovery success stories (0.8%). Among these currently used materials, only 1 (0.8%) was specifically related to cannabis. Nevertheless, based on the same five-point scale, the current use of these self-help materials was rated as between helpful and extremely helpful (M = 4.4, SD = 0.9).

Several differences emerged among the Recovery Orientation and Recovery Type groups. With respect to Recovery Orientation, the abstinence-oriented group was significantly more likely to use 12-step materials (16.2% vs. 3.9%) and religious/spiritual materials (8.8% vs. 0.0%) during their lifetime compared to the moderation-oriented group. However, when Recovery Type was controlled for, there was no longer a significant relationship between use of 12-step materials and Recovery Orientation (treatment-assisted participants, Fisher's exact test, *ns*; naturally recovered participants, χ^2 or Fisher's exact test was not calculated because no one in the natural recovery group reported use of 12-step materials). With respect to Recovery Type, the treatment-assisted group was significantly more likely to report ever using self-materials for their cannabis problem compared to the natural recovery group (53.8% vs. 19.7%), and specifically, were significantly more likely to use books (24.5% vs. 9.1%), 12-step materials (24.5% vs. 0.0%), and other treatment resource materials (13.2% vs. 0.0%) during their lifetime. However, when Recovery Orientation was controlled for, there was only a significant relationship between use of 12-step materials and Recovery Type among abstinence-oriented participants (30.6% vs. 0.0%, χ^2 (1) = 11.7, $p < .001$), not moderation-oriented participants (Fisher's exact test, *ns*). The treatment-assisted group was also significantly more likely to report current use of self-help materials for their cannabis problem (25.0% vs. 7.8%), and specifically, were significantly more likely to currently use 12-step materials (17.0% vs. 0.0%).

Table 23

Cannabis Self-Help Variables for the Total Sample and Group Comparisons

Variables	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Lifetime cannabis self-help materials (% yes)	34.5	39.7	28.0	1.7	53.8	19.7	15.0***
Helpfulness of lifetime cannabis self-help materials[iii], *M* (*SD*)	4.2 (0.9)[a]	4.2 (1.0)[b]	4.1 (0.8)[c]	0.1	4.1 (0.9)[d]	4.4 (0.9)[e]	1.3
Type of lifetime cannabis self-help materials (%)							
Books	16.0	17.6	13.7	0.3	24.5	9.1	5.2*
12-step materials	10.9	16.2	3.9	4.5*	24.5	0.0	18.2***
Internet	5.9	4.4	7.8	*ns*[i]	3.8	7.6	*ns*[i]
Other treatment resource materials	5.9	5.9	5.9	*ns*[i]	13.2	0.0	*s***[i]
Religious/spiritual	5.0	8.8	0.0	*s**[i]	5.7	4.5	*ns*[i]
Recovery success stories	3.4	1.5	5.9	*ns*[i]	3.8	3.0	*ns*[i]
DVD/audio	2.5	0.0	5.9	*ns*[i]	3.8	1.5	*ns*[i]
Personal journal	1.7	0.0	3.9	*ns*[i]	1.9	1.5	*ns*[i]
Current cannabis self-help materials (% yes)	15.5	17.9	12.2	0.7	25.0	7.8	6.5*
Helpfulness of current cannabis self-help materials[iii], *M* (*SD*)	4.4 (0.9)[f]	4.7 (0.5)[g]	4.0 (1.3)[h]	1.6[ii]	4.6 (0.7)[e]	4.0 (1.2)[j]	0.8[ii]
Type of current cannabis self-help materials (%)							
12-step materials	7.6	11.8	2.0	*ns*[i]	17.0	0.0	*s****[i]
Books	5.0	5.9	3.9	*ns*[i]	7.5	3.0	*ns*[i]
Religious/spiritual	4.2	5.9	2.0	*ns*[i]	3.8	4.5	*ns*[i]
Other treatment resource materials	2.5	1.5	3.9	*ns*[i]	5.7	0.0	*ns*[i]

Variables	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Personal journal	1.7	0.0	3.9	*ns*[i]	1.9	1.5	*ns*[i]
DVD/audio	0.8	0.0	2.0	*ns*[i]	1.9	0.0	*ns*[i]
Recovery success stories	0.8	1.5	0.0	*ns*[i]	1.9	0.0	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute Pearson chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[ii] Levene's test of equality of error variances was significant.

[iii] Scale range from 1 (Not at all helpful) to 5 (Extremely helpful).

[a] n = 41. [b] n = 27. [c] n = 14. [d] n = 28. [e] n = 13. [f] n = 18. [g] n = 12. [h] n = 6. [j] n = 5.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

5.8.2 Other Mental Health or Addiction Treatment and Self-Help Materials

Table 24 displays other mental health or addiction treatment and self variables. As can be seen in the table, 62.2% of the total sample reported that they had ever sought formal or professional treatment for any other mental health or addiction problem. In terms of the total sample, from most common to least common, the types of lifetime mental health or addiction problems included depression (31.1%), other problems (18.5%), alcohol (15.1%), anxiety (15.1%), cocaine (9.2%), other addictions (9.2%), psychosis (4.2%), and family conflict (4.2%). These problems were not mutually exclusive, as participant responses could be classified into more than one category. In terms of the total sample, from most common to least common, the types of lifetime mental health or addiction treatment included psychologists/counselors/therapists (46.2%), physicians/psychiatrists (27.7%), 12-step programs (13.4%), outpatient addiction centres (7.6%), residential treatment (6.7%), inpatient treatment (5.0%), detox centres (4.2%), other support groups (3.4%), helplines (2.5%), and other (2.5%). Again, these treatments were not mutually exclusive, as participant responses could be classified into more than one category. In instances where more than one helpfulness of treatment rating was provided, the highest rating informed the analyses. To this end, based on a five-point scale (1 = not at all helpful, 5 = extremely helpful), lifetime other mental health or addiction treatment was rated overall as helpful (M = 3.9, SD = 1.5). The estimated number of separate occasions sought for lifetime other mental or addiction treatment was a mean of 2.5 (SD = 2.8), and the estimated number of lifetime cannabis treatment sessions was a mean of 41.9 (SD = 44.0).

Table 24

Other Mental Health or Addiction Treatment and Self-Help Variables for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Variables	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	F-test / χ^2	TAR (n = 53)	NR (n = 66)	F-test / χ^2
Lifetime mental health or addiction treatment (% yes)	62.2	63.2	60.8	0.1	83.0	45.5	17.6[***]
Helpfulness of lifetime mental health or addiction treatment[iii], *M* (*SD*)	3.9 (1.5)[a]	4.2 (1.4)[b]	3.5 (1.7)[c]	3.4	4.0 (1.4)[d]	3.8 (1.7)[e]	0.0
Estimated number of lifetime mental health or addiction treatment occasions, *M* (*SD*)	2.5 (2.8)[f]	2.9 (3.5)[g]	2.0 (1.4)[c]	0.4[ii]	3.2 (3.4)[b]	1.4 (0.6)[e]	6.7[*ii]
Estimated number of lifetime mental health or addiction treatment sessions, *M* (*SD*)	41.9 (44.0)[f]	57.1 (46.9)[g]	22.4 (31.0)[c]	8.9[**ii]	56.3 (44.6)[b]	21.1 (34.1)[e]	9.5[**ii]
Type of lifetime mental health or addiction treatment (%)							
Psychologist/counselor/therapist	46.2	42.6	51.0	*ns*[i]	66.0	30.3	15.1[***]
Physician/psychiatrist	27.7	27.9	27.5	0.0	35.8	21.2	3.1
12-step program	13.4	16.2	9.8	1.0	22.6	6.1	6.9[**]
Outpatient addiction centre	7.6	8.8	5.9	*ns*[i]	13.2	3.0	*ns*[i]
Residential	6.7	10.3	2.0	*ns*[i]	13.2	1.5	*s*[*i]
Inpatient	5.0	7.4	2.	*ns*[i]	11.3	0.0	*s*[**i]
Detox	4.2	4.4	3.9	*ns*[i]	5.7	3.0	*ns*[i]
Other support group	3.4	2.9	3.9	*ns*[i]	5.7	1.5	*ns*[i]
Helplines	2.5	2.9	2.0	*ns*[i]	3.8	1.5	*ns*[i]
Other	2.5	2.9	2.0	*ns*[i]	5.7	0.0	*ns*[i]

Variables	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Type of lifetime mental health or addiction treatment problem (%)							
Depression	31.1	29.4	33.3	0.2	45.3	19.7	9.0**
Other problems	18.5	17.6	19.6	0.1	28.3	10.6	6.1*
Alcohol	15.1	19.1	9.8	2.0	26.4	6.1	9.5**
Anxiety	15.1	17.6	11.8	0.8	11.3	18.2	1.1
Cocaine	9.2	11.8	5.9	*ns*[i]	11.3	7.6	*ns*[i]
Other addiction	9.2	1.8	5.9	*ns*[i]	15.1	4.5	*ns*[i]
Psychosis	4.2	2.9	5.9	*ns*[i]	9.4	0.0	*s*[*i]
Family conflict	4.2	4.4	3.9	*ns*[i]	3.8	4.5	*ns*[i]
Current mental health or addiction treatment (% yes)	19.3[h]	21.9[j]	16.0[k]	0.6	32.7[l]	9.2[m]	9.8**
Helpfulness of current mental health or addiction treatment[iii], M (SD)	4.3 (1.2)[n]	4.6 (1.1)[o]	3.9 (1.4)[p]	0.4	4.1 (1.4)[q]	4.8 (0.4)[r]	1.8
Type of current mental health or addiction treatment (%)							
Psychologist/counselor/therapist	9.2	10.3	7.8	*ns*[i]	13.2	6.1	*ns*[i]
Physician/psychiatrist	5.0	5.9	3.9	*ns*[i]	5.7	4.5	*ns*[i]
12-step program	5.0	5.9	3.9	*ns*[i]	11.3	0.0	*s*[**i]
Outpatient addiction centre	0.8	0.0	2.0	*ns*[i]	1.9	0.0	*ns*[i]
Other support group	0.8	1.5	0.0	*ns*[i]	1.9	0.0	*ns*[i]

Variables	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Type of current mental health or addiction treatment problem (%)							
Depression	8.4	7.4	9.8	*ns*[i]	13.2	4.5	*ns*[i]
Anxiety	5.0	7.4	2.0	*ns*[i]	3.8	6.1	*ns*[i]
Other problems	5.0	5.9	3.9	*ns*[i]	7.5	3.0	*ns*[i]
Alcohol	4.2	4.4	3.9	*ns*[i]	9.4	0.0	*s*[*i]
Other addiction	2.5	4.4	0.0	*ns*[i]	5.7	0.0	*ns*[i]
Psychosis	2.5	1.5	3.9	*ns*[i]	5.7	0.0	*ns*[i]
Cocaine	1.7	2.9	2.0	*ns*[i]	3.8	0.0	*ns*[i]
Lifetime mental health or addiction self-help materials (% yes)	39.7[s]	41.2	37.5[t]	0.2	51.9[u]	29.7[j]	5.9[*]
Helpfulness of lifetime mental health or addiction self-help materials[iii], *M* (*SD*)	3.9 (1.1)[v]	4.3 (0.8)[w]	3.3 (1.3)[q]	7.4[**]	4.0 (1.2)[w]	3.8 (1.2)[q]	0.0
Type of lifetime mental health or addiction self-help materials (%)							
Books	25.2	27.9	21.6	0.6	26.4	24.2	0.1
Other treatment resource materials	7.6	7.4	7.8	*ns*[i]	13.2	3.0	*ns*[i]
Internet	6.7	5.9	7.8	*ns*[i]	7.5	6.1	*ns*[i]
12-step materials	5.9	10.3	0.0	*s*[*i]	11.3	1.5	*s*[*i]
Religious/spiritual	4.2	7.4	0.0	*ns*[i]	5.7	3.0	*ns*[i]
DVD/audio	3.4	1.5	5.9	*ns*[i]	7.5	0.0	*s*[*i]
Seminars	1.7	2.9	0.0	*ns*[i]	3.8	0.0	*ns*[i]
Recovery success stories	1.7	2.9	0.0	*ns*[i]	3.8	0.0	*ns*[i]

Variables	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Type of lifetime mental health or addiction self-help problem (%)							
Other problems	16.8	11.8	23.5	2.9	20.8	13.6	1.1
Depression	16.0	17.6	13.7	0.3	26.4	7.6	7.8[**]
Anxiety	8.4	10.3	5.9	*ns*[i]	11.3	6.1	*ns*[i]
Alcohol	5.9	10.3	0.0	*s*[*i]	7.5	3.5	*ns*[i]
Other addiction	5.9	5.9	5.9	*ns*[i]	11.3	1.5	*s*[*i]
Cocaine	1.7	2.9	0.0	*ns*[i]	1.9	1.5	*ns*[i]
Psychosis	0.8	1.5	0.0	*ns*[i]	1.9	0.0	*ns*[i]
Current mental health or addiction self-help materials (% yes)	12.7[x]	14.7	9.5[b]	0.6	18.0[k]	8.3[y]	2.3
Helpfulness of current mental health or addiction self-help materials[iii], *M* (*SD*)	4.2 (1.2)[o]	4.7 (0.5)[p]	3.3 (1.7)[z]	2.0	4.0 (1.3)[p]	4.8 (0.5)[z]	4.0
Type of current mental health or addiction self-help materials (%)							
Books	6.7	7.4	5.9	*ns*[i]	7.5	6.1	*ns*[i]
12-step materials	4.2	7.4	0.0	*ns*[i]	7.5	1.5	*ns*[i]
Other treatment resource materials	3.4	2.9	3.9	*ns*[i]	7.5	0.0	*s*[*i]
DVD/audio	1.7	1.5	2.0	*ns*[i]	3.8	0.0	*ns*[i]
Internet	1.7	1.5	2.0	*ns*[i]	0.0	3.0	*ns*[i]
Religious/spiritual	1.7	2.9	0.0	*ns*[i]	1.9	1.5	*ns*[i]
Seminars	0.8	1.5	0.0	*ns*[i]	1.9	0.0	*ns*[i]
Recovery success stories	0.8	1.5	0.0	*ns*[i]	1.9	0.0	*ns*[i]

Variables	Total Sample (N = 119)	Recovery Orientation AB (n = 68)	MOD (n = 51)	F-test / χ^2	Recovery Type TAR (n = 53)	NR (n = 66)	F-test / χ^2
Type of current mental health or addiction self-help problem (%)							
Other problems	4.2	2.9	5.9	*ns*[i]	5.7	3.0	*ns*[i]
Other addiction	3.4	4.4	2.0	*ns*[i]	7.5	0.0	*s*[*i]
Alcohol	1.7	2.9	0.0	*ns*[i]	1.9	1.5	*ns*[i]
Anxiety	1.7	2.9	0.0	*ns*[i]	1.9	1.5	*ns*[i]
Depression	1.7	2.9	0.0	*ns*[i]	3.8	0.0	*ns*[i]
Cocaine	0.8	1.5	0.0	*ns*[i]	0.0	1.5	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute Pearson chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[ii] Levene's test of equality of error variances was significant.

[iii] Scale range from 1 (Not at all helpful) to 5 (Extremely helpful).

[a] n = 73. [b] n = 42. [c] n = 31. [d] n = 44. [e] n = 29. [f] n = 71. [g] n = 40. [h] n = 114. [j] n = 64. [k] n = 50. [l] n = 49. [m] n = 65. [n] n = 22. [o] n = 13. [p] n = 9. [q] n = 16. [r] n = 6. [s] n = 116. [t] n = 48. [u] n = 52. [v] n = 41. [w] n = 25. [x] n = 110. [y] n = 60. [z] n = 4.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

As can also be seen in Table 24, 19.3% of the total sample reported that they were currently receiving treatment for some other mental health or addiction problem, the problems of which mostly consisted of depression (8.4%), followed by anxiety (5.0%), other problems (5.0%), alcohol (4.2%), other addictions (2.5%), psychosis (2.5%), and cocaine (1.7%). These treatments mostly consisted of psychologists/counselors/therapists (9.2%), followed by physicians/psychiatrists (5.0%), 12-step programs (5.0%), outpatient addiction centres (0.8%), and other support groups (0.8%). Based on the same five-point scale (1 = not at all helpful, 5 = extremely helpful), current treatment for other mental health or addiction problems was rated as helpful (M = 4.3, SD = 1.2).

Several differences emerged among the Recovery Orientation and Recovery Type groups. With respect to Recovery Orientation, the abstinence-oriented group reported significantly more estimated number of treatment sessions during their lifetime compared to the moderation-oriented group (M = 57.1 vs. 22.4), which remained significant after adjustment for the significant Levene's test. With respect to Recovery Type, the treatment-assisted group was significantly more likely to report ever seeking treatment for any other mental health or addiction problem (83.0% vs. 45.5%), which suggests that it is likely that the majority of cannabis treatment sought occurred in the context of seeking other concurrent disorder treatment. It is also noteworthy that of the 66 participants in the natural recovery group, 30 (45.5%) reported some other form of lifetime mental health or addiction treatment, whereas 36 (54.5%) reported never seeking any form of mental health or addiction treatment whatsoever. A brief discussion about how this information relates to the composition of the natural recovery group in the present study can be found in section 6.3. In any event, the treatment-assisted group also reported significantly more estimated number of treatment occasions (M = 3.2 vs. 1.4) and sessions (M = 56.3 vs. 21.1) during their lifetime, which remained significant after adjustment for the significant Levene's test. Specifically, they were more likely to have sought lifetime treatment from psychologists/counselors/therapists (66.0% vs. 30.3%), 12-step programs (22.6% vs. 6.1%), residential treatment (13.2% vs. 1.5%), and inpatient treatment (11.3% vs. 0.0%) compared to the natural recovery group. They were also more likely to have sought lifetime treatment for depression (45.3% vs. 19.7%), other

problems (28.3% vs. 10.6%), alcohol (26.4% vs. 6.1%), and psychosis (9.4% vs. 0.0%). Moreover, the treatment-assisted group was significantly more likely to report that they were currently receiving treatment for any other mental health or addiction problem (32.7% vs. 9.2%), and this was mostly for alcohol (9.4% vs. 0.0) in the context of 12-step programs (11.3% vs. 0.0%).

As can also be seen in Table 24, 39.7% of the total sample reported that they had ever used self-help materials for any other mental health or addiction problem, whereby these materials mostly consisted of books (25.2%), other treatment resource materials (7.6%), Internet (6.7%), 12-step materials (5.9%), religious/spiritual materials (4.2%), DVD/audio (3.4%), seminars (1.7%), and recovery success stories (1.7%). These materials were used to help overcome other problems (16.8%), depression (16.0%), anxiety (8.4%), alcohol (5.9%), other addictions (5.9%), cocaine (1.7%), and psychosis (0.8%). Again, these self-help materials and associated problems were not mutually exclusive. Based on the same five-point scale (1 = not at all helpful, 5 = extremely helpful), lifetime self-help materials for other mental health or addiction problems was rated as helpful (M = 3.9, SD = 1.1). Moreover, 12.7% of the total sample reported that they currently use self-help materials, and that they are currently helpful (M = 4.2, SD = 1.2) for other problems (4.2%), other addictions (3.4%), alcohol (1.7%), anxiety (1.7%), depression (1.7%), and cocaine (0.8%). These self-help materials mostly consisted of books (6.7%), followed by 12-step materials (4.2%), other treatment resource materials (3.4%), DVD/audio (1.7%), Internet (1.7%), religious spiritual materials (1.7%), seminars (0.8%), and recovery success stories (0.8%).

Finally, with respect to Recovery Orientation, the abstinence-oriented group reported that they found the self-help materials to be significantly more helpful during their lifetime than the moderation-oriented group (M = 4.3 vs. 3.3), and specifically, the use of 12-step materials (10.3% vs. 0.0%) for alcohol problems (10.3% vs. 0.0%). However, when Recovery Type was controlled for, there was no longer a significant relationship between use of 12-step materials and Recovery Orientation (treatment-assisted participants, Fisher's exact test, *ns*; naturally recovered participants, Fisher's exact test, *ns*). With respect to Recovery Type, the treatment-assisted group was

significantly more likely to report the lifetime use of self-help materials (51.9% vs. 29.7%), and specifically, 12-step materials (11.3% vs. 1.5%) and DVD/audio (7.5% vs. 0.0%) for depression (26.4% vs. 7.6%) and other addictions (11.3% vs. 1.5%). However, when Recovery Orientation was controlled for, there was no longer a significant relationship between use of 12-step materials and Recovery Type (abstinence-oriented participants, Fisher's exact test, *ns*; moderation-oriented participants; χ^2 or Fisher's exact test was not calculated because no one in the moderation-oriented group reported use of 12-step materials). Compared to the naturally recovered group, the treatment-assisted group was also significantly more likely to report current use of other treatment resource materials (7.5% vs. 0.0%) for other addictions (7.5% vs. 0.0%).

5.8.3 Barriers to Treatment Seeking Categories and Checklist

Two interview methods were used to assess barriers to cannabis treatment seeking: open-ended questions and a checklist. For those who had already sought cannabis treatment, barriers were assessed in terms of what delayed treatment seeking. For the open-ended questions, the content analysis was used to derive categories of responses, whereby most participant responses could be coded into more than one response category. Excellent inter-rater reliability was obtained (κ = .80, percentage agreement = 82.1%). Representative content that comprised each category can be seen in Table L8 in Appendix L. Table 25 displays the percentage of participants that endorsed each category, and as can be seen, the top three major barriers to treatment seeking endorsed by the total sample were: *not believing there is a problem* (37.0%), *wanted to do it on my own* (30.3%), and *stigma/pride* (16.0%). The category of *not believing there is a problem* reflected participant responses wherein the participant perceived their cannabis use to genuinely not be a problem; while similar to the category of *not wanting to admit a problem/denial/self-deception* (15.1%), this latter category reflected participant responses wherein there was some acknowledgement of a problem. The category of *wanted to do it on my own* simply reflected participant responses wherein participants wanted to overcome the problem without formal or professional help. The category of *stigma/pride* reflected participant responses wherein the stigma of treatment or asking other people for help were perceived as barriers.

Table 25

Percentage of Participants that Endorsed Barriers to Treatment Seeking Categories from the Open-Ended Questions for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Category (%)	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	χ^2	TAR (n = 53)	NR (n = 66)	χ^2
Not believing there is a problem	37.0	30.9	45.1	2.5	18.9	51.5	13.4***
Wanted to do it on my own	30.3	23.5	39.2	3.4	15.1	42.4	10.4***
Stigma/pride	16.0	16.2	15.7	0.0	15.1	16.7	0.0
Not wanting to admit a problem/denial/self-deception	15.1	16.2	13.7	0.2	20.8	10.6	2.4
Enjoyable/did not want to stop or cut down	10.9	11.8	9.8	0.1	17.0	6.1	3.6
Treatment accessibility	9.2	7.4	11.8	*ns*[i]	3.8	13.6	*ns*[i]
Mistrust of treatment providers	9.2	5.9	13.7	*ns*[i]	13.2	6.1	*ns*[i]
Never thought about it	8.4	5.9	11.8	*ns*[i]	0.0	15.2	*s*[**i]
Too busy with life/dealing with other problems	7.6	7.4	7.8	*ns*[i]	7.5	7.6	*ns*[i]
Treatment availability	6.7	4.4	9.8	*ns*[i]	7.5	6.1	*ns*[i]
Not wanting to face issues/fear of facing issues	6.7	5.9	7.8	0.2	11.3	3.0	*ns*[i]
Was not directed/coerced/compelled to treatment	4.2	5.9	2.0	*ns*[i]	9.4	0.0	*s*[*i]
Cannabis was socially acceptable	3.4	5.9	0.0	*ns*[i]	7.5	0.0	*s*[*i]
No answer provided	3.4	4.4	2.0	*ns*[i]	5.7	1.5	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

While no statistically significant differences emerged between the Recovery Orientation groups, several differences emerged between the Recovery Type groups. Namely, the natural recovery group was significantly more likely to endorse the categories of *not believing there is a problem* (51.5% vs. 18.9%), *wanted to do it on my own* (42.4% vs. 15.1%), and *never thought about it* (15.2% vs. 0.0%), whereas the treatment-assisted group was more likely to endorse the categories of *was not directed/coerced/compelled to treatment* (9.4% vs. 0.0%) and *cannabis was socially acceptable* (7.5% vs. 0.0%). Three of these differences were statistically robust, as even with a Bonferroni correction for 14 comparisons, rendering a new alpha level of .004, the differences on the following categories remained significant: *not believing there is a problem*, *wanted to do it on my own*, and *never thought about it*.

Participants endorsed a mean of 1.6 (SD = 0.9) categories. Group comparisons on the mean number of categories revealed that the moderation-oriented group (M = 1.9, SD = 0.9) endorsed significantly more barriers than the abstinence-oriented group (M = 1.5, SD = 0.9), F (1, 115) = 4.1, $p < .05$. In contrast, there was no significant difference between the treatment-assisted (M = 1.5, SD = 0.9) and natural recovery (M = 1.8, SD = 1.0) groups, F (1, 115) = 1.1, *ns*.

Table 26 displays the means and standard deviations of the five-point scaled checklist items that were used to assess participants' barriers to treatment seeking. As can be seen in the table, the top three highest rated checklist items for the total sample were: *wanting to resolve problem alone* (M = 3.9), *believing that help was not needed* (M = 3.8), and *believing there wasn't a problem* (M = 3.4). For a principal components analysis (PCA) of the checklist, see Appendix O.

Table 26

Means and Standard Deviations of the Barriers to Treatment Seeking Checklist Items for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Checklist Item[i], *M* (*SD*)	Total Sample (*N* = 119)	AB (*n* = 68)	MOD (*n* = 51)	*F*-test	TAR (*n* = 53)	NR (*n* = 66)	*F*-test
Wanting to resolve problem alone	3.9 (1.5)	3.7 (1.7)	4.1 (1.3)	1.7[ii]	3.7 (1.7)	4.0 (1.4)	1.3[ii]
Believing that help was not needed	3.8 (1.5)	3.7 (1.6)	3.8 (1.4)	0.1[ii]	4.0 (1.2)	3.5 (1.6)	3.2[ii]
Believing there wasn't a problem	3.4 (1.6)	3.4 (1.7)	3.4 (1.6)	0.5	4.0 (1.3)	2.9 (1.7)	15.2[***ii]
Unwillingness to admit a problem	3.1 (1.7)	3.1 (1.7)	3.1 (1.7)	0.6	3.9 (1.4)	2.4 (1.6)	22.2[***]
Being too proud to seek help	2.7 (1.6)	2.6 (1.7)	2.8 (1.5)	1.3	3.1 (1.6)	2.4 (1.6)	5.4[*]
Feeling ashamed or embarrassed for yourself or family	2.3 (1.6)	2.4 (1.6)	2.2 (1.4)	0.1	2.7 (1.6)	2.0 (1.5)	5.4[*]
Not being aware that treatment was available	2.2 (1.6)	2.3 (1.6)	2.2 (1.6)	0.0	2.3 (1.7)	2.2 (1.5)	0.3
Thinking that services would treat you like an addict/mentally ill	2.2 (1.5)	2.2 (1.5)	2.3 (1.4)	1.0[ii]	2.6 (1.7)	1.9 (1.2)	9.1[**ii]
Being too overwhelmed by other problems to seek help	2.1 (1.4)	2.3 (1.5)	1.8 (1.3)	0.7[ii]	2.8 (1.6)	1.5 (1.0)	24.6[***ii]
Feeling pressured by friends, family, or community to continue using marijuana	2.1 (1.3)	2.1 (1.4)	2.0 (1.3)	0.1[ii]	2.4 (1.5)	1.8 (1.2)	3.8[ii]
Planning to get help but not getting around to it	2.0 (1.4)	2.2 (1.5)	1.7 (1.5)	1.4[ii]	2.6 (1.5)	1.5 (1.0)	19.2[***ii]
Being too busy trying to address other problems	2.0 (1.4)	2.0 (1.4)	1.9 (1.3)	0.3[ii]	2.5 (1.5)	1.5 (1.0)	17.6[***ii]
Not having enough encouragement from friends, family, or community to seek help	2.0 (1.3)	2.0 (1.3)	2.0 (1.3)	0.3[ii]	2.4 (1.4)	1.7 (1.2)	8.1[**ii]
Concerns about your confidentiality	1.9 (1.4)	2.0 (1.6)	1.7 (1.0)	1.2[ii]	2.2 (1.5)	1.6 (1.2)	5.3[*ii]
Having had bad experiences of seeking help for other problems in the past	1.7 (1.2)	1.6 (1.2)	1.7 (1.2)	0.8[ii]	2.0 (1.4)	1.4 (1.0)	6.8[*ii]
Having too many commitments to seek help	1.7 (1.1)	1.8 (1.2)	1.6 (1.0)	0.0[ii]	2.0 (1.3)	1.4 (0.9)	8.1[**ii]

Checklist Item[i], *M* (*SD*)	Total Sample (*N* = 119)	Recovery Orientation AB (*n* = 68)	MOD (*n* = 51)	*F*-test	Recovery Type TAR (*n* = 53)	NR (*n* = 66)	*F*-test
Not being able to get the service at the time or place wanted	1.6 (1.2)	1.6 (1.1)	1.7 (1.3)	1.0[ii]	1.9 (1.3)	1.4 (1.1)	6.8*[ii]
Not wanting to use a face to face service	1.5 (1.2)	1.6 (1.3)	1.4 (0.9)	0.2[ii]	1.7 (1.4)	1.4 (0.9)	2.1[ii]
Difficulty being able to attend a face to face service	1.5 (1.1)	1.6 (1.2)	1.4 (0.9)	1.0	1.6 (1.1)	1.4 (1.0)	0.3
Not wanting to use a telephone service	1.3 (0.9)	1.3 (0.9)	1.4 (0.9)	0.4	1.4 (1.1)	1.1 (0.5)	1.0
Not wanting to use an online service	1.3 (0.9)[a]	1.3 (1.0)[b]	1.3 (0.8)	0.0[ii]	1.4 (1.1)	1.2 (0.7)[c]	1.9[ii]
Having had bad experiences of seeking help for marijuana problems in the past	1.3 (0.9)	1.3 (1.0)	1.3 (0.8)	0.1[ii]	1.6 (1.2)	1.1 (0.4)	11.2***[ii]
Thinking the service would not relate to your culture	1.2 (0.8)	1.3 (0.8)	1.2 (0.7)	0.1[ii]	1.4 (1.0)	1.2 (0.8)	2.8[ii]
Language concerns	1.1 (0.5)	1.1 (0.5)	1.1 (0.6)	0.0	1.1 (0.6)	1.1 (0.5)	0.3

Note. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Scale range from 1 (Not at all prevented you/'got in your way') to 5 (Very much prevented you/'got in your way').
[ii] Levene's test of equality of error variances was significant.
[a] $n = 118$. [b] $n = 67$. [c] $n = 65$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

As with the content analysis, no differences in the checklist were observed between the Recovery Orientation groups and several differences were observed between the Recovery Type groups. Specifically, the general pattern was that the treatment-assisted group rated the barriers as more influential than the natural recovery group, whereby there were 14 statistically significant differences among the 24 items, only 3 of which no longer remained significant after adjusting for significant Levene's tests. With a Bonferroni correction for 24 comparisons ($\alpha = .002$), 6 differences remained significant. Namely, the treatment-assisted group rated the following barriers as more influential: *believing there wasn't a problem* ($M = 4.0$ vs. 2.9), *unwillingness to admit a problem* ($M = 3.9$ vs. 2.4), *being too overwhelmed by other problems to seek help* ($M = 2.8$ vs. 1.5), *planning to get help but not getting around to it* ($M = 2.6$ vs. 1.5), *being too busy trying to address other problems* ($M = 2.5$ vs. 1.5), and *having had bad experiences of seeing help for marijuana problems in the past* ($M = 1.6$ vs. 1.1).

In order to determine the mean number of items endorsed from the checklist method, it was decided that on the five-point scale, a cut-off rating of 5 ("very much prevented you/'got in your way'") would be a conservative estimate of a categorical endorsement for a checklist item. In this way, participants endorsed a mean of 3.2 checklist items ($SD = 3.4$). Group comparisons revealed that there was no significant difference between the abstinence-oriented ($M = 3.5$, $SD = 3.9$) and natural recovery ($M = 2.8$, $SD = 2.7$) groups, F (1, 115) = 0.3, *ns*. In contrast, the treatment-assisted group ($M = 4.5$, $SD = 4.1$) endorsed significantly more items than the natural recovery group ($M = 2.2$, $SD = 2.3$), F (1, 115) = 11.9, $p < .001$, even after adjustment for a significant Levene's test.

In order to compare the mean number of barriers to treatment seeking reported when presented with the open-ended questions versus the checklist, the same conservative cut-off rating of 5 was used as an estimate of a categorical endorsement for a checklist item. Even with the use of this conservative cut-off, it is not surprising that participants identified a greater number of barriers when presented with the checklist ($M = 3.2$, $SD = 3.4$) than in response to the open-ended questions ($M = 1.6$, $SD = 0.9$), t (118) = 5.1, $p < .001$.

The general pattern of barriers to treatment seeking categories derived from the content analysis appeared consistent with the barriers identified in the checklist. For example, two of the top three categories derived from the content analysis (i.e., *not believing there is a problem* and *wanted to do it on my own*) were identical in meaning to two of the top three rated checklist items (i.e., *believing there wasn't a problem*, and *wanting to resolve problem alone*). However, it is unclear as to why in the content analysis, the natural recovery group was significantly more likely to endorse the category of *not believing there is a problem* compared to the treatment-assisted group, whereas in the checklist, the opposite finding emerged, whereby the treatment-assisted group was more likely to rate the item, *believing there wasn't a problem*, as significantly higher than the natural recovery group. It is possible that the scale used in this particular checklist was confusing to some participants in the natural recovery group, as the scale implicitly requires the assumption that the item is true in order for it to be rated accordingly. It is also possible the differences between the groups on the checklist could be accounted for by a response bias given that the treatment-assisted group rated the items as substantially higher than the natural recovery group. Indeed, the results from the open-ended questions appear to be more intuitive.

Several categories that emerged from the content analysis appeared to not be covered by the checklist items. Specifically, the categories of *enjoyable/did not want to stop or cut down* (10.9%), *mistrust of treatment providers* (9.2%), *never thought about it* (8.4%), *not wanting to face issues/fear of facing issues* (6.7%), *was not directed/coerced/compelled to treatment* (4.2%), and *cannabis was socially acceptable* (3.4%) appeared to be relatively absent from the checklist items. Again, representative content that comprised these categories can be seen in Table L8 in Appendix L.

5.9 Recovery Advice and Reflections

5.9.1 Advice

Content analysis was used to derive thirteen categories of hypothetical advice provided by participants to help another person with a cannabis problem. Excellent inter-rater reliability was obtained ($\kappa = .90$, percentage agreement = 91.0%). Participants identified a mean of 1.8 ($SD = 1.7$) categories. Group comparisons on the mean number

of categories revealed no differences between the abstinence- (M = 1.9, SD = 0.9) and moderation-oriented (M = 1.7, SD = 0.9) groups, F (1, 115) = 2.3, *ns*, or between the treatment-assisted (M = 1.7, SD = 0.9) and natural recovery (M = 1.9, SD = 0.9) groups, F (1, 115) = 0.8, *ns*. Representative content from participant responses that comprised each category can be seen in Table L9 in Appendix L. Table 27 displays the percentage of participants that endorsed each category. As can be seen in Table 27, the top three major advice categories reported by the total sample were: *seek help/social support* (37.8%), *reflect on reasons for change* (26.1%), and *engage in hobbies/distracting activities* (25.2%). The category of *seek help/social support* reflected advice to seek a variety of forms of help, including from friends, family, and/or formal or professional help. The category of *reflect on reasons for change* reflected advice to think about the negative consequences of cannabis use, the reasons to change, and how life can be better without cannabis. The category of *engage in hobbies/distracting activities* reflected advice to occupy oneself via the pursuit of goals, hobbies, and other activities.

Several differences emerged among the group pathways. With respect to Recovery Orientation, there was only one difference; the abstinence-oriented group was more likely to endorse the category of *seek help/social support* compared to the moderation-oriented group (47.1% vs. 25.1%); however, when Recovery Type was controlled for, there was no longer a significant relationship (treatment-assisted participants, χ^2 (1) = 3.2, *ns*; naturally recovered participants, χ^2 (1) = 0.2, *ns*). With respect to Recovery Type, the treatment-assisted group was more likely to endorse the category of *seek help/social support* (64.2% vs. 16.7%)—this relationship remained significant after controlling for Recovery Orientation (treatment-assisted participants, 72.2% vs. 18.8%, χ^2 (1) = 19.4, $p < .001$; naturally recovered participants, 47.1% vs. 14.7%, Fisher's exact test, *sig.*)—whereas the natural recovery group was more likely to endorse the categories of *reflect on reasons for change* (33.3% vs. 17.0%), *engage in hobbies/distracing activities* (33.3% vs. 15.1%), and *stimulus control/avoidance/change social environment* (28.8% vs. 13.2%). With a Bonferroni correction for 13 comparisons (α = .004), only the difference between the treatment-assisted group and the natural recovery group on the *seek help/social support* category remained statistically significant.

Table 27

Percentage of Participants that Endorsed Advice Categories from the Open-Ended Questions for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Category (%)	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	χ^2	TAR (n = 53)	NR (n = 66)	χ^2
Seek help/social support	37.8	47.1	25.5	5.8*	64.2	16.7	28.2***
Reflect on reasons for change	26.1	22.1	31.4	1.3	17.0	33.3	4.1*
Engage in hobbies/distracting activities	25.2	23.5	27.5	0.2	15.1	33.3	5.2*
Stimulus control/avoidance/change social environment	21.8	19.1	25.5	0.7	13.2	28.8	4.2*
Think positively	14.3	14.7	13.7	0.0	9.4	18.2	1.8
Face denial/self-deception	13.4	16.2	9.8	1.0	13.2	13.6	0.0
Change is a personal decision	11.8	13.2	9.8	0.3	7.5	15.2	*ns*[i]
Find underlying issue/motive for use	9.2	8.8	9.8	*ns*[i]	13.2	6.1	*ns*[i]
Quit	7.6	10.3	3.9	*ns*[i]	5.7	9.1	*ns*[i]
Research cannabis/addiction	5.0	4.4	5.9	*ns*[i]	5.7	4.5	*ns*[i]
Seek spiritual/religious guidance	5.0	7.4	2.0	*ns*[i]	3.8	6.1	*ns*[i]
Moderate use	2.5	4.4	0.0	*ns*[i]	3.8	1.5	*ns*[i]
Not sure/no answer	2.5	1.5	3.9	*ns*[i]	5.7	0.0	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

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

Participants were also asked to provide a number of recommendations about different recovery pathways, the results of which are displayed in Table 28. The majority of the total sample reported that they would recommend professional treatment (79.1%) and self-help materials (76.9%) for a cannabis problem, and a little over half (53.2%) would recommend natural recovery (i.e., that a hypothetical person with a cannabis problem try to overcome the problem on their own without professional assistance). Interestingly, with respect to the Recovery Orientation groups, the moderation-oriented group was significantly more likely to recommend natural recovery than the abstinence-oriented group (67.4% vs. 42.9%); however, when Recovery Type was controlled for, this relationship only remained significant among treatment-assisted participants (53.3% vs. 20.0%, Fisher's exact test, *sig.*), not naturally recovered participants (χ^2 (1) = 0.0, *ns*). With respect to the Recovery Type group, the treatment-assisted group was significantly more likely to recommend self-materials (86.8% vs. 68.8%), whereas the natural recovery group was significantly more likely to recommend natural recovery (72.9% vs. 30.0%); however, when Recovery Orientation was controlled for, this latter relationship only remained significant among abstinence-oriented participants (71.4% vs. 20.0%, χ^2 (1) = 16.8, $p < .001$), not moderation-oriented participants (Fisher's exact test, *ns*).

When asked whether a person should reduce/cut-back or quit their cannabis use completely, the most popular response was to *quit* (48.7%), followed by *depends on the person* (24.4%), *reduce/cut back* (19.3%), and *neither or both* (7.6%). With respect to Recovery Orientation, the abstinence-oriented group was significantly more likely to recommend that people quit (58.8% vs. 35.3%); however, when Recovery Type was controlled for, this relationship no longer remained significant (treatment-assisted participants, χ^2 (1) = 2.5, *ns*; naturally recovered participants, χ^2 (1) = 2.1, *ns*). Moreover, the moderation-oriented group was significantly more likely to recommend that people reduce/cut-back (27.5% vs. 13.2%). With respect to Recovery Type, the treatment-assisted group was significantly more likely to recommend that people quit compared to the natural recovery group (62.3% vs. 37.9%); however, when Recovery Orientation was controlled for, this relationship no longer remained significant (abstinence-oriented participants, χ^2 (1) = 3.6, *ns*; moderation-oriented participants, χ^2 (1) = 1.5, *ns*).

Table 28

Participant Recommendations for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Variable	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	χ^2	TAR (n = 53)	NR (n = 66)	χ^2
Recommend professional treatment for cannabis problem (% yes)	79.1[a]	79.1[b]	79.2[c]	0.0	86.5[d]	73.0[e]	3.1
Recommend self-help materials for cannabis problem (% yes)	76.9[f]	79.4	73.5[g]	0.6	86.8	68.8[h]	5.3[*]
Recommend natural recovery for cannabis problem (% yes)	53.2[j]	42.9[e]	67.4[k]	6.4[*]	30.0[l]	72.9[m]	20.0[***]
Recommend AB vs. MOD (%)							
Quit	48.7	58.8	35.3	6.5[*]	62.3	37.9	7.0[**]
Depends on the person	24.4	19.1	31.4	2.4	17.0	30.3	2.8
Reduce/cut-back	19.3	13.2	27.5	3.8[*]	15.1	22.7	1.1
Neither or both	7.6	8.8	5.9	*ns*[i]	5.7	9.1	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.
[a] n = 115. [b] n = 67. [c] n = 48. [d] n = 52. [e] n = 63. [f] n = 117. [g] n = 49. [h] n = 64. [j] n = 109. [k] n = 46. [l] n = 50. [m] n = 59.
[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

5.9.2 Perceived Etiology

Content analysis was used to derive ten categories of participants' perceived etiology of their cannabis use disorder. Excellent inter-rater reliability was obtained (κ = .88, percentage agreement = 89.8%). Participants identified a mean of 1.6 (*SD* = 0.7) categories and group comparisons revealed no differences between the abstinence- (*M* = 1.7, *SD* = 0.7) and moderation-oriented (*M* = 1.6, *SD* = 0.8) groups, F (1, 115) = 0.1, *ns*, or between the treatment-assisted (*M* = 1.7, *SD* = 0.8) and natural recovery (*M* = 1.6, *SD* = 0.7) groups, F (1, 115) = 0.4, *ns*. Representative content that comprised each category can be seen in Table L10 in Appendix L. Table 29 displays the percentage of participants that endorsed each category. The top three categories reported were: *used cannabis to cope* (43.7%), *environment/social influence* (41.2%), and *enjoyment/boredom/positive perceptions of cannabis* (23.5%). The category of *used cannabs to cope* reflected participant responses wherein cannabis was used to escape, self-medicate, and avoid emotional problems. The category of *environment/social influence* reflected participants responses wherein peer pressure and being around cannabis users was thought to contribute to the development of the cannabis problem. The category of *enjoyment/boredom/positive perceptions of cannabis* reflected participant responses wherein enjoyment of the high, boredom, and positive perceptions of cannabis being helpful or fun in some way (e.g., mind enhancing/expanding, creating a philosophical and/or silly environment) was thought to contribute to the development of the cannabis problem.

While no differences emerged between the Recovery Orientation groups, three differences emerged between the Recovery Type groups. Specifically, the treatment-assisted group was more likely to endorse the categories of *used cannabis to cope* (54.7% vs. 34.8%) and *genetics/predisposition* (20.8% vs. 1.5%), whereas the natural recovery group was more likely to endorse the category of *enjoyment/boredom/positive perceptions of cannabis* (31.8% vs. 13.2%). With a Bonferroni correction for 10 comparisons (α = .005), only the difference between the treatment-assisted group and the natural recovery group on the *genetics/predisposition* category remained statistically significant.

Table 29

Percentage of Participants that Endorsed Perceived Etiology Categories from the Open-Ended Questions for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Category (%)	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	χ^2	TAR (n = 53)	NR (n = 66)	χ^2
Used cannabis to cope	43.7	47.1	39.2	0.7	54.7	34.8	4.7*
Environment/social influence	41.2	38.2	45.1	0.6	39.6	42.4	0.1
Enjoyment/boredom/positive perceptions of cannabis	23.5	20.6	27.5	0.8	13.2	31.8	5.7*
Addictive personality	14.3	11.8	17.6	0.8	17.0	12.1	0.6
Genetics/predisposition	10.1	14.7	3.9	3.7	20.8	1.5	12.0***
Habit/dependence/addiction	9.2	11.8	5.9	*ns*[i]	7.5	10.6	*ns*[i]
Loss of control	7.6	8.8	5.9	*ns*[i]	9.4	6.1	*ns*[i]
Cannabis per se causes the addiction	6.7	5.9	7.8	*ns*[i]	1.9	10.6	*ns*[i]
No problem actually existed	4.2	5.9	2.0	*ns*[i]	0.0	7.6	*ns*[i]
Denial/self-deception/ignorance/choice	3.4	1.5	5.9	*ns*[i]	3.8	3.0	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

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

5.9.3 Perceived Causes of Recovery Success

Finally, content analysis was used to derive twelve categories of participants' perceived causes of their recovery success. Excellent inter-rater reliability was obtained (κ = .81, percentage agreement = 83.3%). Participants identified a mean of 1.5 (*SD* = 0.8) categories. Group comparisons on the mean number of categories revealed no differences between the abstinence- (*M* = 1.5, *SD* = 0.7) and moderation-oriented (*M* = 1.6, *SD* = 0.8) groups, *F* (1, 115) = 0.1, *ns*, or between the treatment-assisted (*M* = 1.5, *SD* = 0.7) and natural recovery (*M* = 1.6, *SD* = 0.8) groups, *F* (1, 115) = 0.2, *ns*. Representative content from participant responses that comprised each category can be seen in Table L11 in Appendix L. Table 30 displays the percentage of participants that endorsed each category. As can be seen in Table 30, the top three major categories reported by the total sample were: *focused on reasons for change* (36.1%), *goal commitment to change* (31.9%), and *conquered denial/self-deception* (25.2%). The category of *focused on reasons for change* reflected participant responses wherein recovery success was attributed to thinking about reasons for change and goal pursuit. The category of *goal commitment to change* reflected participant responses wherein recovery success was attributed to having strong motivation and commitment to change. The category of *conquered denial/self-deception* reflected participant responses wherein recovery success was attributed to a found sense of self-awareness or realization that cannabis was a problem.

While no differences emerged between the Recovery Orientation groups, five differences emerged between the Recovery Type groups. Specifically, the treatment-assisted group was more likely to endorse the categories of *treatment/self-help* (24.5% vs. 4.5%) and *conquered underlying issues* (11.3% vs. 0.0%), whereas the natural recovery group was more likely to endorse the categories of *focused on reasons for change* (47.0% vs. 22.6%), *will power* (15.2% vs. 3.8%), and *lost enjoyment/lifestyle change* (13.6% vs. 1.9%). With a Bonferroni correction for 12 comparisons (α = .004), only the difference between the treatment-assisted group and the natural recovery group on the *treatment/self-help* category remained statistically significant.

Table 30

Percentage of Participants that Endorsed Perceived Causes of Recovery Success Categories from the Open-Ended Questions for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Category (%)	Total Sample (N = 119)	AB (n = 68)	MOD (n = 51)	χ^2	TAR (n = 53)	NR (n = 66)	χ^2
Focused on reasons for change	36.1	35.3	37.3	0.0	22.6	47.0	7.5**
Goal commitment to change	31.9	30.9	33.3	0.1	35.8	28.8	0.7
Conquered denial/self-deception	18.5	14.7	23.5	1.5	18.9	18.2	0.0
Treatment/self-help	13.4	16.2	9.8	1.0	24.5	4.5	10.1***
Religious/spiritual guidance	12.6	14.7	9.8	0.6	13.2	12.1	0.0
Will power	10.1	13.2	5.9	1.7	3.8	15.2	4.2*
Lost enjoyment/lifestyle change	8.4	5.9	11.8	*ns*[i]	1.9	13.6	*s*[*i]
Social support	8.4	7.4	9.8	*ns*[i]	11.3	6.1	*ns*[i]
Stimulus control/avoidance/changed social environment	5.9	4.4	7.8	*ns*[i]	5.7	6.1	*ns*[i]
Conquered underlying issues	5.0	7.4	2.0	*ns*[i]	11.3	0.0	*s*[**i]
Luck/lack of cravings or withdrawal	3.4	1.5	5.9	*ns*[i]	3.8	3.0	*ns*[i]
Helping others	1.7	2.9	0.0	*ns*[i]	0.0	3.0	*ns*[i]

Note. Chi-square values represent Pearson chi-square values. Absolute chi-square values are reported. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.

[i] Fisher's exact test was used instead of Pearson chi-square because expected cell counts were less than 5.

[*] $p < .05$. [**] $p < .01$. [***] $p < .001$

Chapter Six: Discussion

6.1 Summary of Results and Connections to the Literature

The two primary objectives of the present study were to (a) provide an exploratory portrait of the recovery process from cannabis use disorders from the perspective of individuals who have recovered; and (b) to explore and systematically describe the similarities and differences between abstinence- and moderation-oriented recoveries, as well as the similarities and differences between treatment-assisted and natural recoveries. With respect to cannabis use disorders, the construct of recovery has received little explicit empirical attention. With no consensus on how to define the construct of recovery (el-Guebaly, 2012), the present study borrowed from the natural recovery literature insofar as it first inferred recovery via the remission of diagnostic symptoms, and then explored the recovery process predominantly via several interview domains that have often been employed in the context of natural recovery research (but could also readily be applied in the context of treatment-assisted recovery). Moreover, with no consensus on how to demarcate the different recovery pathways of interest, reasoned and literature-informed decisions were made to operationally define recovery orientation (abstinence versus moderation) in relation to reports of cannabis use in the past 12 months; and recovery type (treatment-assisted versus natural recovery) in relation to reports of ever seeking cannabis treatment. Several interesting and important findings emerged at the level of the total sample, as well as at the level of group comparisons between the different recovery pathways.

Given the vast amount of data that was analyzed in the present study, only the findings that have been deemed most important are discussed in the following sections. Moreover, the findings that are discussed account for statistical adjustments due to significant Levene's tests of equality of error variances, but do not account for Bonferroni statistical adjustments due to multiple comparisons.

6.1.1 Sample Characteristics

Participants in the present study were on average 37 years-old, and were approximately 70% male and 80% Caucasian. The fact that the sample was mostly male is not uncommon for a cannabis using population (Copeland & Swift, 2009; Khan et al.,

2013); and while the construct of ethnicity is often ill-defined, including in the present study, the fact the majority of the sample self-identified as Caucasian is representative of the population of Calgary, AB (Statistics Canada, 2011). Only one demographic difference emerged among the different recovery pathways. Abstinence-oriented participants were significantly older than moderation-oriented participants, a finding of which is consistent with the alcohol literature (Booth et al., 1994; Hodgins et al., 1997) but curiously inconsistent with the gambling literature (Dowling & Smith, 2007; Ladouceur et al., 2009). This finding is also consistent with reports that cannabis using populations tend to be young males (Copeland & Swift, 2009).

Participants reported high lifetime comorbidity rates of alcohol and other substance use disorders, and major depression, which is consistent with reports of similar high comorbidity rates among individuals with cannabis use disorders (Degenhardt et al., 2001a, 2001b; Stinson et al., 2006). After statistical adjustments, the only difference between abstinence- and moderation-oriented participants was that the former reported higher levels of hallucinogen use disorder severity among only treatment-assisted participants, whereas the latter scored higher on a measure of current alcohol problem severity. In contrast, treatment-assisted participants, compared to naturally recovered participants, generally reported higher lifetime rates of alcohol and other substance use disorders, and major depression. These results suggest that the degree of comorbidity of addictive and psychiatric disorders might be a predictor of who might benefit from a particular recovery type pathway, whereby individuals with higher comorbidity might benefit most from a treatment-assisted recovery pathway.

The idea that degree of addictive and psychiatric comorbidity might act as a predictor of recovery pathway success has received some attention in the abstinence versus moderation and natural recovery literatures. In the abstinence versus moderation literature, psychological stability has been found to be associated with controlled drinking (Rosenberg, 1993), and lower scores on psychiatric comorbidity variables (i.e., anxiety, depression, suicide attempts) and higher scores on quality of life have been found to be associated with controlled gambling success (Ladouceur et al., 2009). The results from the present study, however, suggest that comorbidity is not a useful predictor of

abstinence- versus moderation-oriented recovery among individuals with cannabis use disorders. In the natural recovery literature, while two studies have reported that psychiatric comorbidity was not associated with treatment-seeking for alcohol use (Bischof, Rumpf, Meyer, Hapke, & John, 2005) and gambling disorders (Hodgins & el-Guebaly, 2000), another study reported that problematic substance use comorbidity in gamblers was associated with treatment-assisted recovery as opposed to natural recovery (Nett, Schatzmann, Klingemann, & Gerber, 2003, as cited in Toneatto & Nett, 2007). The results from the present study are more consistent with this latter study and suggest that addictive and psychiatric comorbidity might be an important variable in the development of guidelines for who might benefit from particular recovery type pathways from cannabis use disorders. In the context of a stepped care approach (Sobell & Sobell, 2000), higher degrees of comorbidity might indicate that facilitation towards a treatment-assisted recovery pathway is warranted. Further, this upper echelon of concurrent disorder severity suggests that a concurrent disorder treatment approach is warranted. Unfortunately, there is a dearth of research on this topic, as only two psychosocial concurrent disorder treatment approaches specifically for cannabis use disorders have been evaluated (Edwards et al., 2006; Hoch et al., 2012).

6.1.2 Cannabis-Related Variables

Participants reported that they began cannabis use at approximately 15 years of age and first perceived their cannabis use as problematic at approximately 20 years of age, at which point they were using cannabis daily. These results parallel those found in the Stephens et al. (1993) treatment sample. By the time of the Participant Interview, participants had been in recovery for an average of 7.6 years—that is, it had been 7.6 years since their stated resolution date. Collateral Validation Interviews confirmed the reliability of participants' self-reports of their resolution date and current cannabis problem severity—albeit also underestimated their lifetime cannabis problem severity, which is not uncommon in the addictive behaviours literature (Borsari & Muellerleile, 2009; Hodgins & Makarchuk, 2003). During the 12 months following their resolution date, participants reported that their cannabis use decreased to less than monthly use; whereby some participants became or eventually became abstinent and others remained

non-abstinent, and some sought formal or professional treatment for their cannabis problem and others did not.

Some important differences in cannabis problem severity, cannabis history, and frequency of use variables emerged as a function of different recovery pathways. Specifically, the results largely supported the secondary hypotheses with small to medium effect sizes after controlling for recovery orientation and recovery type, whereby the abstinence-oriented and treatment-assisted participants exhibited higher levels of lifetime cannabis problem severity than the moderation-oriented and naturally recovery participants, respectively. However, a more rigorous test of the secondary hypotheses that took into account the relationship between comorbidity (of alcohol, substance use, and depression severity) and lifetime cannabis problem severity revealed that only recovery orientation, and not recovery type, was related to lifetime cannabis problem severity. These findings are somewhat inconsistent with the literature insofar as in the alcohol and gambling literatures, the robustness of the relationship between recovery orientation and lifetime problem severity is weaker (i.e., there are more mixed findings) compared to the robustness of the relationship between recovery type and lifetime problem severity (see section 3.2). The findings, however, are consistent with the results in the present study, which found that relative to recovery orientation, recovery type was more associated with comorbidity variables. This suggests that the variance accounted for by recovery type in lifetime cannabis problem severity might largely be attributed to the variance accounted for by comorbidity in lifetime cannabis problem severity.

In terms of recovery orientation, it was found that compared to abstinence-oriented participants, moderation-oriented participants reported that they had scored higher on some measures of current cannabis problem severity. While these findings might represent a challenge to whether moderation-oriented participants ought to be considered recovered, it is nonetheless the case that none of them met current diagnostic criteria for a cannabis use disorder in the past 12 months, and their scores on the measures of current cannabis problem severity were very low. Moderation-oriented participants also used more cannabis during the 12 months following their resolution date

than abstinence-oriented participants, reported more future intentions of cannabis use in the next 12 months, and reported more current cannabis cravings.

A very interesting and important finding is that moderation-oriented participants reported using cannabis on average with a frequency between once or twice and monthly in the past 12 months, and similarly, reported planning to use cannabis with a frequency of approximately once or twice in the next 12 months. Given the absence of frequency of use risk guidelines for cannabis use, this empirically-derived, data-driven finding suggests that at least among individuals who have recovered from a cannabis use disorder, moderation-oriented or low-risk use might be best represented as less than monthly cannabis use. This frequency of use risk cut-off is lower than reports based on the Canadian general population that cannabis-related harms might be best avoided by less than weekly or less than daily use (Davis et al., 2009; Thake & Davis, 2011). Nevertheless, individuals who have recovered from cannabis use disorders ought to be considered distinct from the general population with respect to their proclivity towards cannabis-related harm, and therefore, a more conservative cut-off for this population might be warranted. While research suggests that the choice of abstinence versus moderation is often unaffected by the influence of treatment providers (Sobell & Sobell, 1995, 2011) and that client goal selection is related to outcome (Lozano et al., 2006), this proposed frequency of use risk guideline of less than monthly cannabis use might serve as a useful benchmark for normative feedback in the provision of moderation-focused treatments for cannabis use disorders.

Participants reported that while they did not feel much social pressure from family, friends, and society to overcome their cannabis problem, their family, and to a lesser extent, their friends, were nevertheless generally supportive of their recovery. Moreover, participants' recovery occurred in a social context wherein over half of their current close friends reportedly used cannabis at least weekly, and approximately 14% and 33% of their parents and siblings reportedly used cannabis at least weekly, respectively. These rates of cannabis use are higher than those reported in the general population (Health Canada, 2011), which suggests that cannabis use might be perceived by participants as more normative than it is in reality. Additionally, these higher

prevalence rates of cannabis use in the social environment of participants suggest that behaviourally-based strategies (e.g., stimulus control, avoidance of triggers and high-risk situations) might be particularly important in the maintenance of recovery from cannabis use disorders. Moreover, perhaps not surprisingly, moderation-oriented participants reported that more of their current close friends used cannabis at least weekly compared to abstinence-oriented participants, a finding of which suggests that behaviourally-based strategies might be especially important in the facilitation of a moderation-oriented recovery. Indeed, as discussed in section 6.1.5, moderation-oriented participants were more likely than abstinence-oriented participants to endorse particular behaviourally-based strategies (i.e., hobbies/distracting activities, stimulus control/avoidance) as maintenance factors in their recovery.

Participants held a number of beliefs and attitudes related to cannabis and to their recovery that are worthy of discussion. Specifically, participants reported that they were only somewhat apathetic and somewhat less than motivated to pursue their life goals during the height of their cannabis problem. Given that participants in the present study were at one time daily cannabis users that scored quite high on levels of lifetime cannabis problem severity, the fact that high levels of apathy and low levels of motivation were not reported contributes to the inconclusive findings reported in the literature with respect to the existence of an amotivational syndrome that is purportedly associated with frequent and long-term cannabis use (Lynskey & Hall, 2000).

Participants reported the perception that cannabis is generally harmful to themselves, but that recreational and medicinal cannabis use is only somewhat harmful and less than somewhat harmful to society, respectively. Interestingly, participants also rated cannabis as less harmful relative to a variety of other addictive behaviours (i.e., alcohol, cigarettes, gambling, heroin, crack/cocaine, prescription pain drugs). These beliefs, however, varied as a function of recovery pathway, whereby in general, moderation-oriented and naturally recovered participants viewed cannabis as less harmful overall compared to abstinence-oriented and treatment-assisted participants, respectively. The fact that there was variability in the perception of harms associated with cannabis among individuals who have recovered from a cannabis use disorder is not surprising

given the tremendous variability associated with the relative benefits and harms of cannabis more generally (Copeland, 2011; Dennis et al., 2002; Murray et al., 2007; Temple et al., 2011). Moreover, in light of research that has demonstrated inverse associations between frequency of cannabis use and perception of risk associated with cannabis use (Dennis et al., 2002; Johnston et al., 2013; Piontek et al., 2013; Substance Abuse and Mental Health Services Administration, 2012), it is not surprising that moderation-oriented participants were more likely to view cannabis as less harmful in general compared to abstinence-oriented participants. However, participants were also relatively homogenous on their endorsement of other beliefs and attitudes. That is, participants reported the belief that while cannabis can be addictive, it is more psychologically addictive than physically addictive; and they tended to report that cannabis should be decriminalized, but were torn (neither agreed nor disagreed) as to whether it should be fully legalized.

In terms of beliefs and attitudes towards their recovery, participants reported that they believed cannabis problems were difficult to overcome for people in general, but believed that their own cannabis problem was relatively easier to overcome and only somewhat difficult. Indeed, they also reported that they were self-efficacious/confident in their ability to change their cannabis use at the time they decided to change, and were even more self-efficacious/confident in their ability to maintain their recovery. These results are consistent with research demonstrating the predictive validity of self-efficacy (in the ability to refrain from cannabis use) in relation to future cannabis use (Litt et al., 2005, 2008; Stephens et al., 1993, 1995). Moreover, the results did not demonstrate that self-efficacy varied as a function of recovery orientation, which is consistent with Saladin and Santa Ana's (2004) conclusion that drinking outcomes in controlled drinking studies are best predicted by drinking-related self-efficacy; as well as Lozano et al.'s (2006) finding that self-efficacy in achieving one's cannabis treatment goal (both abstinence and moderation) was related to successful achievement of that goal. Self-efficacy, however, did vary as a function of recovery type, whereby compared to treatment-assisted participants, naturally recovered participants reported that their cannabis problem was easier to overcome and that they had greater self-efficacy at the time they decided to

change, but not afterwards. These results are consistent with the fact that naturally recovered participants did not seek treatment for their cannabis problem, as they were more likely to perceive that their cannabis use was not a problem (see section 6.1.6).

Finally, an interesting finding was that participants reported that cannabis was important to their identity during the height of their cannabis problem, and that cannabis was currently unimportant to their self-identity. Self-identity has been suggested to be an important predictor of cannabis use, as individuals may use cannabis because being a cannabis user is an important part of their self-identity (Conner & McMillan, 1999). While moderation-oriented participants were more likely to identify themselves as current cannabis users, they did not differ with abstinence-oriented participants in terms of the importance of cannabis to their self-identity either during their lifetime or currently. In contrast, while treatment-assisted and naturally recovered participants did not differ with respect to their self-perceptions as current cannabis users, or with respect to the importance of cannabis to their self-identities during their lifetime, the treatment-assisted group reported that cannabis was more important to their self-identities at the current time. One explanation of these latter findings is that treatment per se might increase the salience of cannabis to one's self-identity.

6.1.3 Reasons for Resolution

The most popular reasons to change reported were that cannabis became viewed as incompatible with both self-identity (e.g., lifestyle, values, goals) and aspects of the social environment (e.g., causing interpersonal conflict, difficulty fitting-in with society), and that cannabis use was causing mental health concerns (e.g., anxiety, depression, psychotic symptoms, cognitive difficulties). These results are generally consistent with previous studies that have examined reasons for quitting among current and former cannabis users (Copersino et al., 2006b; Cunningham et al., 1999; Ellingstad et al., 2006; Kwong et al., 2010; Swift et al., 2000). Interestingly, these results differ from the natural recovery literature in general insofar as the top rated reasons for resolution across a number of studies have not included self-incompatibility concerns, but instead have included family-, health-, and finance-related concerns, and negative personal effects (Bischof et al., 2012; Carballo et al., 2007; Sobell et al., 2000)—an exception is Toneatto

et al. (2008), which reported that self image/concept conflict was a top reason for quitting gambling among both naturally recovered and treatment-assisted recovered gamblers. In conjunction with the general finding that self-incompatibility concerns seem to be relatively more endorsed among current and former cannabis users relative to other types of addictive behaviours, these results suggest that self-incompatibility concerns might be particularly important to individuals who want to overcome cannabis use disorders. Moreover, given that self-incompatibility concerns were endorsed among approximately half of participants, irrespective of their status as naturally recovered or treatment-assisted, it is possible that the MI-based approach of facilitating salience of the discrepancy between an individual's cannabis use and their self-identity might be a particularly effective technique in treatment, which ought to also be incorporated in the provision of self-help materials. While the yearning to develop of a new sense of identity might be especially important in overcoming cannabis use disorders, it has also been suggested to be an important element in overcoming gambling (Hodgins & el-Guebaly, 2000; Toneatto et al., 2008) and alcohol use disorders (Ungar, Hodgins, & Ungar, 1998), as well as in general behaviour change (Heatherton & Nichols, 1994).

Overall, few life events were reported as reasons for resolution, whereby the most popular, endorsed by less than one third and one quarter of participants, were interpersonal events and work/school-related events, respectively. This finding is consistent with research in the natural recovery literature suggesting that reasons for resolution often involve a process of change rather than a reaction to a specific event (Sobell et al., 2001). While few life events were reported as reasons for resolution in the present study, treatment-assisted participants were more likely than naturally recovered participants to report that experiencing major events (e.g., traumatic or humiliating event, or intervention from family members of friends), and particularly, legal events, were reasons for resolution.

Interestingly, a study by Cunningham, Blomqvist, Koski-Jannes, and Cordingley (2005) reported that maturing/drifting out reasons for resolution (e.g., desire for good health, wanting a better future) were more prevalent among individuals with less severe alcohol problems, whereas consequence-related reasons (e.g., particular life events,

health problems, financial concerns) were more prevalent among those with more severe alcohol problems. In light of this study, and in light of the notion that cannabis-related harms might be considered to be less tangible and more insidious relative to some other addictive disorders (Swift et al., 2000a), the pattern of results in the present study—whereby relatively more maturing/drifting out reasons and fewer life event-related reasons for resolution were reported—can be better understood.

The reasons for resolution reported via the open-ended questions and the checklist were generally similar in pattern, although four unique categories emerged from the content analysis that were not present in the checklist. One of these categories, endorsed by more than one third of participants and dubbed, *too integral to reality/lost enjoyment*, might represent a relatively unique reason for resolution with respect to cannabis use disorders, as it is absent in reviews of the natural recovery literature (Bischof et al., 2012; Carballo et al., 2007; Sobell & Sobell, 2000), and similar categories have emerged (e.g., *boredom with cannabis use or concerns they were using too much*, *reduced dependence/got bored/moved on*, *desire to do other things*) in two studies that have examined reasons for wanting to decrease cannabis use among current cannabis users (Kwong et al., 2010; Swift et al., 2000). Another one of these categories, *fear of escalation*, might also be relatively unique to cannabis use disorders, as it represented a fear that cannabis would lead to other drug and alcohol use. While this category is reminiscent of the gateway hypothesis, it was only endorsed by approximately 7% of participants, and indeed, evidence for the gateway hypothesis has been equivocal given the complexity of the relationship between cannabis use and other substance use (Hall & Lynskey, 2005). The other two categories that were unique to the content analysis (i.e., *negative social environment* and *lack of control*) are more generalizable to other addictive disorders, and it is therefore interesting and unclear as to why they were absent from the checklist, which was informed by commonly reported reasons for resolution in the natural recovery literature.

In terms of different recovery pathways, few differences in reasons for resolution emerged among the groups via the open-ended questions, whereas several differences emerged via the checklist method. The general pattern of differences that emerged from

the checklist method was that the abstinence-oriented and treatment-assisted participants rated the reasons for resolution as more influential than the moderation-oriented and naturally recovered participants, respectively. This finding makes sense in light of the findings that the abstinence-oriented and treatment-assisted groups exhibited relatively higher levels of lifetime cannabis problem severity, and therefore, their reasons for wanting to change might have been relatively more salient. Even with the Bonferroni correction, treatment-assisted participants were more likely to endorse feelings of hitting rock bottom and work-related problems than the natural recovery group, which is also consistent with the finding that treatment-assisted participants reported higher lifetime cannabis problem severity. Thus, overall, it might be the case that differences in reasons for resolution among recovery pathways are influenced by lifetime cannabis problem severity and may differ more in magnitude rather than in kind. At least with respect to recovery type, this assertion is consistent with Klingemann et al.'s (2010) contention that there exists a shrinking gap between the natural recovery and treatment outcome literature. One departure from this assertion, however, was the findings from the interactions, which taken together, suggested that the abstinence-oriented participants were more influenced by social pressures to overcome their cannabis problem than moderation-oriented participants, but only among those who had naturally recovered, not among those who had sought treatment. This finding suggests that social pressure from family and friends towards abstinence might be one way to facilitate natural recovery.

Finally, participants reported that at the time they decided to change, they did not fully plan to become abstinent, nor were they extremely motivated for abstinence. Moreover, their decision to overcome their cannabis problem was predominantly a conscious choice. No differences emerged on these variables with respect to the different recovery pathways. The lack of differences found between the abstinence- and moderation-oriented participants are particularly interesting, as they suggest that while the decision to overcome a cannabis problem might be a conscious decision, goal choice at the time of change might be unrelated to the actual recovery orientation pathway that is eventually adopted. In other words, these results suggest that goal choice at the time of change might be a weak predictor of actual recovery orientation, a finding of which is

consistent with literature suggesting that goal selection is fluid (Hodgins et al., 1997; Hughes et al., 2008; Ladouceur et al., 2009; Lozano et al., 2006; Ojehagen & Berglund, 1989), and that initial goal selection might be a poor predictor of outcome (Hughes et al., 2008).

6.1.4 Actions Taken

Participants identified a number of helpful actions taken to recover from cannabis use disorders. In both the content analysis and the Processes of Change Questionnaire (PoC), the most helpful actions identified were cognitive strategies (e.g., thinking about the negative consequences of cannabis use, thinking about the benefits of not using cannabis, adopting positive thinking and attitudes, setting and focusing on life goals), followed by behavioural strategies (e.g., limiting access to cannabis, avoiding exposure to triggers and high-risk situations, decreasing time spent with cannabis users and developing new social networks composed of non-users, keeping oneself busy and distracted). These findings are not entirely surprising given the success of CBT-MET approaches in the treatment of cannabis use disorders (Copeland & Swift, 2009; Roffman & Stephens, 2012), though there is much room for improvement given that modest effect sizes at best have been observed (Budney et al., 2007; Dennis et al., 2004; Peters et al., 2011). These results suggest that an increased dose of cognitive and motivational strategies might be one way to improve our psychosocial treatments.

The results are inconsistent with Boyd et al. (2005), which reported that changing one's environment was rated as the most helpful quitting strategy while seeking help from professionals was the least helpful. However, it is unclear as to whether the sample of mostly current cannabis users in Boyd et al. could be considered to be recovered, as cannabis problems or cannabis use disorder symptoms were not measured or reported, and to be eligible for the study, participants only had to have made one self-defined "serious" attempt to quit cannabis. Thus, it is unclear whether the helpful actions reported in Boyd et al. were actually successful in facilitating recovery.

Very few differences emerged in the content analysis and PoC among the different recovery pathways, suggesting that similar actions were used to overcome the cannabis use disorders irrespective of recovery orientation and recovery type. A few

differences, however, emerged in the PoC. Notably, both abstinence-oriented and treatment-assisted participants, compared to moderation-oriented and naturally recovered participants, respectively, made more use of the *environmental re-evaluation* process of change, which reflects realizing and thinking about the negative impact of cannabis use on other people in one's life. This finding is consistent with the finding that moderation-oriented participants reported having relatively more current close cannabis-using friends, which would render them less likely to consider the negative impact of their cannabis use on their social environment; moreover, treatment per se is likely to increase the salience of the negative impact of one's substance use on the social environment. Compared to naturally recovered participants, treatment-assisted participants also made more use of the *helping relationship* and *dramatic relief* processes, which are also processes likely to be underscored in treatment, whereby the former reflects the use of social support, and the latter reflects heightened emphasis of the negative consequences of use. In addition, one interaction effect was observed, whereby abstinence-oriented participants made more use of the *social liberation* process than moderation-oriented participants, but only among those who sought treatment, and not among those who naturally recovered. Given that the process of *social liberation* reflects noticing how society acknowledges cannabis-related harms and noticing how other people have quit or cut-down their cannabis use, it would make sense that this process would be used more by individuals who subscribe to abstinence and have been in treatment (which is most often abstinence-based).

The results are both consistent and inconsistent with previous research that has used the PoC to evaluate change processes among addictive disorders. For example, in a sample of recovered gamblers, Hodgins (2001) reported that the most frequently used processes were *self re-evaluation*, *environmental re-evaluation*, and *dramatic relief*, which in the present study, corresponded to the fourth, fifth, and eighth most frequently used processes, respectively. An interesting difference between the present study and Hodgins (2001) is that participants in the present study made more use of certain behavioural processes (i.e., *counter conditioning* and *stimulus control*). Consistent with the present study, Hodgins (2001) reported that treatment-assisted gamblers made more use of the majority of processes of change than naturally recovered gamblers. In

addition, Prochaska and DiClemente (1985) have reported identical processes of change used among people attempting to quit cigarette smoking, lose weight, and battle emotional distress, whereby *helping relationship*, *consciousness raising*, and *self liberation* were the most common, and *reinforcement management* and *stimulus control* were the least-used processes. This pattern of findings is mostly inconsistent with the present study. It is unclear as to whether the change process actually differs for cannabis use disorders, gambling disorders, and other behaviour changes. Both the present study and Hodgins (2001) involved participants in the maintenance stage (i.e., already successful at change), whereas Prochaska and DiClemente (1985) assessed participants at various stages of change. Thus, it is difficult to point to methodological differences to explain the discrepancy of findings between the present study and Hodgins (2001).

Finally, participants reported that they generally did not quit or reduce cannabis at any particular times and did not plan to modify their use of alcohol or other substances to help them overcome their cannabis problem. Moreover, the results hinted at the fluidity of goal selection and highlighted the complexity involved in delineating the recovery orientation construct insofar as proportions of both abstinence- and moderation-oriented participants reported that they had quit cold turkey, gradually cut down then quit, gradually cut down but still use, and have had many periods of cutting down and quitting. It is interesting that almost one third of moderation-oriented participants reported that they had quit cold turkey and yet by definition, reported at least one instance of cannabis use in the past 12 months, suggesting that perhaps these instances were construed as lapses, relapses, or otherwise did not count against quitting cold turkey. These findings are consistent with literature suggesting that goal selection is fluid (Hodgins et al., 1997; Hughes et al., 2008; Ladouceur et al., 2009; Lozano et al., 2006; Ojehagen & Berglund, 1989), and that initial goal selection might be a poor predictor of outcome (Hughes et al., 2008).

6.1.5 Maintenance Factors

The factors involved in maintaining recovery from cannabis use disorders were similar to the actions that were identified to initially overcome the problem. That is, in both the content analysis and the checklist, the top maintenance factors reported were

cognitive in nature, followed by behaviourally-based factors. This pattern of results differs from the natural recovery literature insofar as across a number of previous studies, the top maintenance factors have tended to be more behavioural rather than cognitive in nature (Bischof et al., 2012; Carballo et al., 2007; Sobell et al., 2000). Moreover, it has been suggested that independent of treatment status, a difference between alcohol and drug problems with respect to maintenance factors is that people who abuse drugs are more likely to leave the environment in which drugs are consumed and are more likely to break off social relationships with drug-consuming friends (Bischof et al., 2012; Sobell et al., 2000). Thus, the results from the present study suggest that individuals with cannabis use disorders might be relatively unique compared to other addictive disorders insofar as maintenance factors that were cognitive in nature were by far the most frequently endorsed (i.e., approximately 70% of participants endorsed *cognitive strategies* as the top factor in the content analysis compared to *hobbies/distracting activities*, which was the second most endorsed factor at approximately 34%; and the top 6 rated checklist items were all cognitive in nature). These results suggest that a relatively stronger dose of cognitive and motivational therapy elements, compared to behavioural therapy elements, might be particularly useful in the development of long-term treatment and self-help protocols for cannabis use disorders. While Roffman and Stephens' research group have attempted to treat cannabis use disorders in the context of a chronic care model by adding repeated brief therapy episodes over 2.5 years to an initial four-session course of CBT-MET, the authors have noted that this approach achieved little success and called for variations on the chronic care theme to improve treatment outcomes (Roffman & Stephens, 2012)—one such variation might be to heavily focus on cognitive and motivational elements at the expense of behavioural elements.

It is noteworthy that the only other study to examine the recovery process from cannabis use disorders among individuals who have recovered (Ellingstad et al., 2006) reported that the top maintenance factors were behavioural in nature (i.e., avoidance of situations in which cannabis was used, changes in lifestyle, and the development on non-cannabis-related activities). However, this study only examined the recovery process among abstinence-oriented, naturally recovered individuals, a group of which represented

only approximately 27% of the total sample in the present study. Further, this study did not assess for remission of cannabis use disorder symptoms and instead used abstinence from daily cannabis use as a proxy of recovery, which is somewhat problematic given that not all daily cannabis users report cannabis-related problems or diagnostic symptoms (Davis et al., 2009; Hall & Pacula, 2003; Kandel & Davies, 1992; Thake & Davis, 2011).

In contrast to the lack of differences found in the actions used to initially overcome the cannabis use disorder, several differences in maintenance factors emerged among the different recovery pathways. Specifically, with respect to recovery orientation in the content analysis, abstinence-oriented participants were more likely to endorse using *religious/spiritual involvement*, whereas moderation-oriented participants were more likely to endorse the behavioural factors of *hobbies/distracting activities* and *stimulus control/avoidance*, as well as *financial concerns*. The fact the moderation-oriented participants reported that they found these particular behavioural maintenance factors as more helpful is consistent with their report that relatively more of their current close friends use cannabis at least weekly. Indeed, it might be expected that as exposure to cannabis in one's environment increases, behaviourally-based strategies might increase in importance. With respect to recovery type, treatment-assisted participants were not surprisingly more likely than naturally recovered participants to endorse *social support/accountability*, *treatment/self-help* (only among abstinence-oriented participants), and *helping others*. These results are consistent with a study of recovered gamblers, which found that the only difference in maintenance factors between treatment-assisted and naturally recovered gamblers was that the former group reported that family support was more helpful (Toneatto et al., 2008). Moreover, the factors of *social support/accountability* and *helping others* tend to be especially fostered in 12-step based treatments (Laudet, Morgan, & White, 2006), which suggests that these programs might be an important aftercare component in recovery from cannabis use disorders. The checklist method also revealed several differences among the different recovery pathways, although in general, the abstinence-oriented and treatment-assisted participants reported more use of the maintenance factors compared to the moderation-oriented and naturally recovered participants, respectively.

Nearly one third of the total sample reported that they had relapsed to problematic cannabis use after they had already begun to overcome their problem, with an average of approximately two relapses per participant who relapsed. The top reported causes for relapse were *exposure to triggers/peer pressure* and to *cope with stress/pain*. These top cited causes for relapse are consistent with previous research that has examined self-reported causes for relapse among current cannabis users (Buckner, Crosby, Silgado, Wonderlich, & Schmidt, 2012a; Copersino et al., 2006b; Cornelius et al., 2003; Swift et al., 2000). While one study has reported that poor sleep quality is a risk factor for lapse following a cannabis quit attempt (Babson, Boden, Harris, Stickle, & Bonn-Miller, 2013), this variable did not emerge as a cause for relapse in the content analysis.

The only difference that emerged among the different recovery pathways with respect to relapse-related variables was that moderation-oriented participants were more likely to report that they had relapsed compared to abstinence-oriented participants. These results might be construed as consistent with Lozano et al. (2006) insofar as those with moderation goals in Lozano et al. reported using more cannabis than intended at all follow-ups during the course of abstinent-based treatment. In addition, with the caveat that the present study was not designed to test the abstinence violation effect (AVE), these results are inconsistent with the AVE insofar as the results did not demonstrate that participants in the abstinence-oriented group would exhibit more relapses with higher ratings of guilt and loss of control than participants in the moderation-oriented group. However, unlike Stephens et al. (1994a), which found support for the AVE, the present study did not truly test the AVE by evaluating the likelihood of a relapse following a slip.

More evidence was also provided that goal selection is a fluid construct, which again is consistent with the literature (Hodgins et al., 1997; Hughes et al., 2008; Ladouceur et al., 2009; Lozano et al., 2006; Ojehagen & Berglund, 1989). In the present study, approximately 41% of the total sample reported that they had switched from moderation to abstinence, primarily because they *ultimately wanted abstinence*, had *external/social pressures*, and *realized the harm* associated with cannabis. Similarly, approximately 36% of the total sample reported that they had switched from abstinence to moderation, primarily due to *social reasons*, *beliefs that relapse will not happen*, and

boredom/enjoyment. Not surprisingly, moderation-oriented participants were more likely to report switching from abstinence to moderation, and were also more likely to endorse *social reasons*, *boredom/enjoyment*, and *other* reasons for the switch. Moreover, they were not more likely to endorse switching due to the category of *cope with stress*, which supports the notion that these participants genuinely adopted a moderation-oriented recovery and did not merely relapse.

Finally, while the majority of participants did not initially plan to increase or decrease their use of alcohol or other substances to help them overcome their cannabis use disorder, participants reported that in hindsight, there were both increases and decreases in a variety of addictive behaviours during the recovery process. Most addictive behaviours decreased post-resolution, except for caffeine, sleeping pills, and gambling, which increased. The largest percentages of increased and decreased addictive behaviours were for alcohol and cigarettes, whereby nearly 25% and approximately 40% of participants increased and decreased their alcohol consumption, respectively; and approximately 20% and 25% increased and decreased their cigarette smoking, respectively. With respect to cannabis use disorders, the role played by addictive behaviour substitution in recovery has received little attention. Whereas Copersino et al. (2006b) reported that quit attempts among non-treatment-seeking current cannabis users were associated with increases in the use of legal substances (e.g., alcohol, cigarettes, sleeping aids) but not with the initiation of new substance use, Hughes et al. (2008) reported that among non-treatment-seeking daily cannabis users, other drug use (e.g., alcohol, cigarettes, caffeine, other illicit drugs) did not increase with cannabis reduction or abstinence. In an attempt to address the discrepancies in the literature, Peters and Hughes (2010) prospectively examined the patterns of non-treatment-seeking daily cannabis users who were not trying to stop or reduce their cannabis use, but participated in a 13-day abstinent period; it was reported that there was no increase in the use of substances, except for alcohol use among those with a past history of alcohol use disorders.

An examination of the increases and decreases in addictive behaviours among the different recovery pathways helps to clarify the discrepancies in the literature.

Specifically, with respect to recovery orientation, moderation-oriented participants were more likely to increase their use of alcohol and cigarettes, whereas abstinence-oriented participants were more likely to decrease their use of cigarettes, prescription pills, and LSD. It is noteworthy that moderation-oriented participants also scored higher on a measure of current alcohol-related problems (i.e., the AUDIT) compared to abstinence-oriented participants. With respect to recovery type, treatment-assisted participants were more likely to decrease their use of crack/cocaine than naturally recovered participants. Interestingly, in the maintenance factors checklist, participants reported that increasing their use of nicotine, alcohol, and other drugs were not helpful maintenance factors in general. These results largely suggest that moderation-oriented recovery from cannabis use disorders might be associated with increases in other addictive behaviours (particularly alcohol and cigarettes) despite reports that it is not helpful to overcoming one's cannabis use disorder.

6.1.6 Treatment-Related Variables

Among the treatment-assisted recovery group (44.5% of the total sample), the most common types of lifetime cannabis treatment received were outpatient addiction centres, psychologists/counselors/therapists, 12-step programs, residential treatment, and physicians/psychiatrists. Treatment was rated overall as between somewhat helpful and helpful. Only approximately 9% of participants reported that they were currently seeking cannabis treatment, which mostly consisted of attendance at 12-step programs. In addition, approximately 62% of the total sample reported having received similar types of other lifetime mental health or addiction treatment, primarily for depression, other problems, alcohol, anxiety, cocaine, and other addictions, whereby treatment was rated overall as helpful. Nearly one fifth of the total sample reported that they were currently receiving treatment for other mental health or addiction problems, most commonly from psychologists/counselors/therapists, followed by physicians/psychiatrists and 12-step programs for depression, anxiety, and other problems. The finding that 83% of the cannabis treatment-assisted group reported receiving other lifetime mental health or addiction treatment suggests that it is likely that the majority of cannabis treatment received had occurred in the context of seeking treatment for other concurrent disorders

as well. These findings are consistent with the high comorbidity rates observed between cannabis use disorders and other mental health and addiction problems, as well as Stinson et al.'s (2006) findings using data from the NESARC that drug treatment is often not drug specific and that the most commonly accessed forms of treatment reported for cannabis use disorders were 12-step programs, physicians, and other health professionals.

These findings highlight two glaring concerns with respect to cannabis use disorder treatment in the community. First, while the findings suggest that the majority of cannabis treatment received might have occurred in the context of seeking other concurrent disorder treatment, the majority of treatments that have been evaluated in the scientific literature have not been concurrent disorder focused, whereby to date, only two psychosocial concurrent disorder treatment approaches specifically for cannabis use disorders have been evaluated (Edwards et al., 2006; Hoch et al., 2012). Moreover, it is unclear to what extent treatment providers in the community are able or willing to deliver evidence-based treatments for cannabis use disorders (Manuel, Hagedorn, & Finney, 2011; Miller, Sorensen, Selzer, & Brigham, 2006), let alone concurrent disorder treatments that are likely most efficient and effective in the context of multi- and inter-disciplinary outpatient team settings (Drake & Mueser, 2000). The second concern is that despite 12-step based programs being among the most commonly accessed forms of treatment, evaluations of the efficacy and effectiveness of 12-step based programs and their potential role as an integrated component in the treatment of cannabis use disorders are noticeably absent from the literature (Danovitch & Gorelick, 2012).

With respect to recovery orientation, abstinence-oriented participants were more likely to have received lifetime cannabis treatment than moderation-oriented participants. This finding is consistent with previous research demonstrating that controlled drinking goals and outcomes are associated with limited exposure to treatment services (Booth et al., 1984; Elal-Lawrence et al., 1986, 1987; Finney & Moos, 1981; Hodgins et al., 1997; Ojehagen & Berglund, 1989), which in turn, is consistent with research demonstrating associations between lower problem severity and controlled drinking (Rosenberg, 1993; Sobell & Sobell, 1995, 2011) in conjunction with research demonstrating associations between lower problem severity and natural recovery (Bischof et al., 2012). However, as

noted in Sobell and Sobell (2011), it remains unclear as to how many people might seek treatment if moderation-focused treatments and harm reduction were promoted in treatment and supported in the community.

Approximately 35% of the total sample reported lifetime use of self-help materials to help overcome their cannabis use disorder, whereby the most common types included books, 12-step materials, use of the Internet, other treatment resource materials, and religious/spiritual materials. However, only approximately 8% of the total sample reported using self-help materials that were specifically related to cannabis, wherein the majority were Internet resources. Despite the non-specificity of these materials, participants rated them to be overall helpful. Similar to the results with respect to treatment seeking, approximately 40% of participants reported lifetime use of self-help materials for other mental health and addiction problems, whereby there was substantial overlap between the materials used for cannabis and those used for other problems. In general, the abstinence-oriented and treatment-assisted recovery groups were more likely to use self-help materials than moderation-oriented and naturally recovered participants, respectively. As might be the case with the development of moderation-focused treatments, the development of cannabis use disorder-specific self-help materials that incorporate both abstinence- and moderation-oriented goals might be one way to reach problematic cannabis users who may otherwise not seek treatment or use self-help materials. Unlike for alcohol use (Moyer, Finney, Swearingen, & Vergun, 2002) and gambling disorders (Hodgins, Stea, & Grant, 2011), to this author's knowledge, cannabis use disorder-specific self-help materials have only been evaluated in one recent study to date with promising results (Fischer et al., 2013). Not only might the provision of these materials be effective in their own right for particular sub-populations (i.e., possibly those with lower levels of cannabis problem severity), but perhaps structured workbooks that are more comprehensive than personalized feedback reports can increase the impact of existing brief interventions and "check up" approaches (Stephens et al., 2004; Walker et al., 2011a).

Participants reported in both the content analysis and the checklist that the top major barriers and delays to treatment seeking were *not believing there is a problem*,

wanted to do it on my own, *stigma/pride*, and *believing that help was not needed*. In the content analysis, naturally recovered participants were more likely to cite, *not believing there is a problem*, *wanted to do it on my own*, and *never thought about it*, as barriers that prevented them from seeking treatment, whereas treatment-assisted participants were more likely to cite, *was not directed/coerced/compelled to treatment* and *cannabis was socially acceptable*, as barriers that delayed them from seeking treatment. While several differences between the treatment-assisted and naturally recovered participants emerged in the checklist, the wording of the scale on the checklist might not have been well suited to the naturally recovered participants (and consequently, confused them), and treatment-assisted participants in general were substantially more likely to provide higher ratings to the checklist items; thereby suggesting that a response bias might account for the discrepancy with the results from the content analysis. Nevertheless, in general, the results are very consistent with previous research that has examined barriers to treatment seeking among current and former cannabis users (Ellingstad, et al., 2006; Fernandez-Artamendi et al., 2013; Gates et al., 2012; Kwong et al., 2010), as well as with previous research that has examined barriers to treatment seeking among individuals who have naturally recovered from other addictive disorders (Bischof et al., 2012; Carballo et al., 2007; Sobell et al., 2000). In both the content analysis and checklist, there were no differences between the recovery orientation group pathways. Taken together, these results suggest that barriers and delays to treatment seeking are generally similar across recovery pathways and types of addictive behaviours. Moreover, the finding that 16% of the total sample identified *stigma/pride* as a barrier to treatment seeking suggests that public campaigns aimed at shifting beliefs and attitudes towards treatment seeking for cannabis use disorders are warranted.

6.1.7 Recovery Advice and Reflections

Participants were asked to provide advice and recommendations to help another hypothetical person with a cannabis problem. The content analysis revealed that the top cited advice categories were to *seek help/social support*, *reflect on reasons for change*, and *engage in hobbies/distracting activities*. No differences emerged between the abstinence- and moderation-oriented participants. Whereas treatment-assisted

participants were more likely to endorse the category of *seek help/social support* naturally recovered participants were more likely to endorse the categories of *reflect on reasons for change*, *engage in hobbies/distracting activities*, and *stimulus control/avoidance/change social environment*.

These results are somewhat similar to the advice provided by a sample of mostly cannabis dependent, non-treatment-seekers, whereby the top cited advice categories were to encourage the use of MI techniques, isolate from triggers, and enlist support (Kwong et al., 2010). In contrast, the results differ from the advice provided by a sample of recovered gamblers (Toneatto et al., 2008), whereby it was mostly indicated that there was nothing that could be done to aid in the decision to cease or reduce gambling, with a smaller proportion suggesting awareness-raising strategies (e.g., pointing out the negative consequences of problem gambling and arousing cognitive dissonance).

The majority of participants reported that they would recommend treatment and self-help materials to a hypothetical person with a cannabis problem. However, treatment-assisted participants were more likely to recommend self-help materials compared to naturally recovered participants, whereas the latter group was more likely to recommend natural recovery (i.e., try to resolve the cannabis problem without professional assistance), albeit only among those who were abstinence-oriented. Interestingly, moderation-oriented participants were more likely to recommend natural recovery compared to abstinence-oriented participants, albeit only among those who were treatment-assisted. It is unclear to what extent these recommendations might be influenced in the future if moderation-focused treatments for cannabis use disorders become widely available. Additionally, the majority of participants reported that they would recommend abstinence to a hypothetical person with a cannabis problem, and not surprisingly, moderation-oriented participants were more likely to recommend moderation compared to abstinence-oriented participants.

Participants were also asked to explain their understanding of why they developed a cannabis problem. The content analysis revealed that the top cited reasons were *used cannabis to cope*, *environmental/social influence*, and *enjoyment/boredom/positive perceptions of cannabis*. These results suggest that participants likely had some insight

into the etiology of their cannabis use disorders insofar as coping motives for cannabis use have been found to be associated with the development of cannabis use disorders (Bujarski et al., 2012; Fox et al., 2011); environmental and social influences such as low parental monitoring, high peer group deviance, and cannabis availability have been found to predict cannabis initiation (Gillespie et al., 2012); and perceived risk of harm has been found to be inversely associated with frequency of cannabis use (Dennis et al., 2002; Johnston et al., 2013). Interestingly, results from the MMM indicated that participants reported that they most often used cannabis for enhancement motives during their lifetime, followed by social, coping, expansion, and conformity motives. This suggests that while participants believed that coping motives were the strongest contributor to the development of their cannabis problem, they more often used cannabis for other purposes (i.e., enhancement and social reasons), which highlights the pervasiveness of cannabis use during their lifetime.

Moreover, treatment-assisted participants were more likely to endorse the reasons of *used cannabis to cope* and *genetics/predisposition* compared to naturally recovered participants, whereas the latter group was more likely to endorse the reason of *enjoyment/boredom/positive perceptions of cannabis*. These results are consistent with the finding that treatment-assisted participants scored higher on the coping motives scale of the MMM compared to naturally recovered participants, as well as the likelihood that treatment-assisted participants were more likely to have received messages in treatment that altered their positive perceptions of cannabis. The fact that treatment-assisted participants more readily identified *genetics/predisposition* as an etiological category also might suggest that they were taught this treatment, but it is also possible that their cannabis use disorders were relatively and genuinely more influenced by genetics factors in light of their more frequent reports of family addiction problems. There is indeed solid evidence that cannabis use and cannabis use disorders have heritable components (Agrawal et al., 2011; Verweij et al., 2012).

Finally, participants were asked to explain their understanding of why they were able to overcome their cannabis problem. The content analysis revealed that the top cited reasons were *focused on reasons for change*, *goal commitment to change*, and *conquered*

denial/self-deception. While there were no differences with respect to the recovery orientation pathway groups, treatment-assisted participants were more likely to perceive that they overcame their cannabis problem due to reasons of *treatment/self-help* and *conquered underlying issues*, whereas naturally recovered participants were more likely to cite the categories of *focused on reasons for change*, *will power*, and *lost enjoyment/lifestyle change*. These results suggest that participants attributed their recovery success to cognitive and motivational factors, which is consistent with the previous content analyses demonstrating that cognitive strategies were the most helpful actions taken and maintenance factors involved in recovery. Again, these results support CBT-MET approaches to the treatment of cannabis use disorders and suggest that an increased focus on cognitive and motivational techniques might be one way to improve our psychosocial treatments.

6.2 The Bigger Picture: Implications for Policy and Practice

It is certainly timely to conduct research into the recovery process from cannabis use disorders. There has been an ongoing and fervent debate surrounding cannabis legalization in North America, and at the same time, cannabis has accounted for the most treatment demand among all illicit substances (United Nations Office on Drugs and Crime, 2012). With what appears to be a recent trend towards cannabis decriminalization and legalization (Cerda et al., 2012; Hawken et al., 2013), it remains unclear to what extent these legal changes might impact the incidence of cannabis use disorders. While the majority of individuals who use cannabis will not develop a problem, the substantial minority of individuals who will develop a problem deserve greater access to non-stigmatizing and improved treatment options (Roffman & Stephens, 2012). With a view towards informing evidence-based clinical practice, the present study explored the recovery process from cannabis use disorders in the context of multiple recovery pathways, the findings of which hold a number of implications for policy and practice.

First, in light of the promising evidence base for CBT-MET treatments for cannabis use disorders (Budney et al., 2007; Copeland & Swift, 2009; Roffman & Stephens, 2012), the findings from the present study lend further support to the effectiveness of cognitive, motivational, and behavioural strategies as helpful actions and

maintenance factors involved in the recovery process from cannabis use disorders, irrespective of recovery pathway. It is therefore incumbent upon policy makers to ensure that these evidence-based treatments are being disseminated to, and employed in, addiction treatment programs. Unfortunately, despite the high treatment demand for cannabis use disorders, most evidence-based substance use treatments do not easily find their way into practice (Manuel et al., 2011; Miller et al., 2006), and this challenge might be expected to be exacerbated with respect to treatments that are specific to cannabis use disorders given the lag in its evidence base relative to alcohol and other substance use disorder treatments.

Second, the finding that self-incompatibility concerns were rated as among the top reasons for resolution, coupled with the findings that cognitive strategies were rated as the most helpful actions taken and maintenance factors involved in the recovery process, suggests that one way in which to improve the small to medium effect sizes of cannabis use disorder psychosocial treatments that have been observed in the literature (Budney et al., 2007; Dennis et al., 2004; Peters et al., 2011) might be to increase the dose or potency of cognitive and motivational components in our treatments relative to behavioural components. The use of a dismantling study (Kazdin, 2007) might be a particularly useful way to test this hypothesis.

Third, the findings are consistent with a harm reduction approach (Marlatt & Witkiewitz, 2010; Roffman & Stephens, 2012; Swift et al., 2000a) to the treatment of cannabis use disorders insofar as the results broadly support the notion that recovery from cannabis use disorders is possible via both abstinence and moderation. Clinically, the results suggest that moderation might be more suitable for those with lower levels of lifetime cannabis problem severity, and that what is actually meant by moderation for individuals in recovery from cannabis use disorders can best be described as frequency of cannabis use that is less than monthly. It is likely that moderated cannabis use can involve a higher frequency of use risk guideline for those in the general population, such as less than weekly or daily use (Davis et al., 2009; Thake & Davis, 2011).

Moreover, the findings suggest that abstinence-oriented and moderation-oriented recoveries are both similar and dissimilar with respect to the recovery process. The

results suggest that the pathways are similar insofar as they might include similar reasons for resolution and actions taken that are helpful to initially overcome the cannabis use disorder. In contrast, the pathways appear to be dissimilar insofar as moderation-oriented individuals might be more likely to relapse to problematic cannabis use, to increase their use of alcohol and cigarettes post-resolution, and to find relatively more benefit from the use of behavioural strategies as maintenance factors. The findings also suggest that moderation-oriented individuals are likely to have more cannabis-using peers; however, this difference may disappear as cannabis becomes more socially acceptable and legally available. Thus, clinically, individuals who choose moderation might benefit particularly from a heavier focus on behavioural relapse prevention strategies that target cannabis use in one's social environment and stifle any increases in other addictive behaviours. The development of moderation-focused treatments can incorporate these findings and be modelled after those in the controlled drinking literature (Saladin & Santa Ana, 2004). However, the findings also support the notion that recovery orientation is not static, and therefore, both clinical and research attempts to promote moderation-focused treatments ought to include ways to manage the fluidity of the recovery orientation construct, which might mean adopting a MI approach that is open to goal switching. With the exception of a small evaluation of guided self-change (Sobell et al., 2006), moderation-based treatment programs for cannabis use disorders have yet to be developed or tested, and it remains unclear to what extent the development and dissemination of these treatments might affect treatment seeking.

Fourth, the findings suggest that treatment-assisted and natural recoveries are for the most part similar with respect to the recovery process, which is consistent with Klingemann et al.'s (2010) contention that there exists a shrinking gap between the natural recovery and treatment outcome literature. However, some notable differences between these recovery pathways did emerge. The findings suggest that individuals who seek cannabis treatment might be more likely to have less self-efficacy for reducing cannabis use, to use cannabis to cope with negative emotions, and to make more use of social support, social accountability, and helping other people, as maintenance factors in their recovery. Clinically, these results suggest that increasing self-efficacy, emotional

coping skills, and social support networks might be particularly helpful for cannabis treatment-seekers.

Overall, the findings largely support the idea that cannabis use disorders lie on a continuum of problem severity, with moderation-oriented and natural recoveries more likely to occur at the lower end of the continuum, and abstinence-oriented and treatment-assisted recoveries more likely to occur at the upper end. In this vein, the findings also support the idea that a stepped care approach (SCA; Sobell & Sobell, 2000) to the treatment of cannabis use disorders might be viable in facilitating recovery along the continuum. At the lower end, the provision of cannabis specific self-help materials—which participants in the present study reported are not readily available—might be a beneficial way to facilitate natural recovery and to extend the reach of our treatments, so to speak, to those individuals with lower levels of cannabis problem severity who would otherwise not seek treatment. Moreover, the finding that moderation-oriented participants were also likely to be naturally recovered suggests that these self-help materials ought to promote moderation in addition to abstinence in order to increase their acceptance and to even further extend our reach to problematic users.

At the upper end of the continuum, more intensive treatments that target concurrent cannabis use and other mental health and addiction disorders might be the most beneficial. The findings support the idea that individuals with higher levels of cannabis problem severity also have higher levels of comorbidity, and suggest that facilitation of treatment-assisted recovery might be the most beneficial recovery pathway for highly comorbid problematic cannabis users. Given that the results suggested that the majority of cannabis treatment received by participants likely occurred in the context of seeking other concurrent disorder treatment, it is disconcerting that to date, only two psychosocial concurrent disorder treatment approaches specifically developed for cannabis use disorders have been evaluated (Edwards et al., 2006; Hoch et al., 2012). Indeed, while there is a large but heterogeneous evidence base supporting concurrent disorder treatment for severe mental health and substance use disorders in general (Drake, O'Neal, & Wallach, 2008), there is a need for the further development and evaluation of concurrent disorder treatment that specifically targets cannabis use

disorders, which might be another way to increase the small to medium effect sizes for psychosocial treatments that have been observed in the literature. These treatments are likely to be most efficient and effective in the context of multi- and inter-disciplinary outpatient team settings (Drake & Mueser, 2000).

Finally, the findings generally support a common syndrome model of addiction (Shaffer et al., 2012) insofar as high lifetime comorbidity rates were observed between cannabis use disorders and other mental health and addiction problems. The common syndrome model of addiction is consistent with a concurrent disorder treatment approach to cannabis use disorders, whereby shared components of the syndrome can be targeted with a transdiagnostic approach across addictions and sequelae (e.g., depression and anxiety), and unique components of the syndrome can be targeted with a tailored approach that is sensitive to case formulation and idiosyncrasies that are specific to cannabis use disorders (e.g., pharmacological treatment of cannabis withdrawal and psychoeducation regarding cannabis' widespread use, the insidious nature of its harms, and the variability in beliefs and attitudes regarding its harm and addictive potential).

6.3 Limitations and Directions for Future Research

The findings from the present study ought to be viewed in light of several theoretical and methodological limitations. Theoretically, one of the major challenges in the present study was how to navigate the issue of operationally defining the constructs of abstinence, moderation, treatment-assisted recovery, and natural recovery. Indeed, this challenge is not unique to the present study, as it is intrinsically difficult to carve out groups of participants that can represent different recovery pathways; that is, irrespective of the parameters that are used to define such groups, there will remain the risk that artificially-determined groups will become reified that may or may not approximate the desired constructs. Nevertheless, this challenge should not stifle an attempt to extend our knowledge via group comparisons—but the results need to be interpreted in light of this challenge.

While the arbitrary definition of moderation-oriented recovery in the present study (i.e., non-abstinence in the past 12 months) might be considered to be conservative—because for example, it included participants who reported as little as one

instance of cannabis use in the past 12 months—the use of this non-abstinence cut-off allowed the data (not the researcher) to reflect and describe what was meant by moderation in terms of mean frequency of cannabis use and severity of problems. Although it was tempting to label this group as the "non-abstinent-oriented" group rather than the "moderation-oriented" group, the latter label was retained to reflect the idea that the moderation construct itself implicitly conflates two variables; namely, low-frequency/occasional use coupled with non-harmful use. Indeed, in the present study, the moderation-oriented group was not merely "non-abstinent" in the past 12 months, but also had very low levels of current cannabis problem severity and did not meet diagnostic criteria for a cannabis use disorder in the past 12 months. Moreover, a conceptual challenge in the present study (and in both research and practice more generally) with respect to defining the moderation construct involved how to differentiate between moderation and relapse. Given how the moderation-oriented group was defined in the present study, it was reasonable to assume that this group genuinely reflected a moderation-oriented recovery pathway. In other words, while not all participants in the moderation-oriented recovery group were homogenous in their past 12 month frequency of cannabis use, they were homogenous in the sense that they were all non-abstinent in the past 12 months and yet did not meet diagnostic criteria for a cannabis use disorder. Relapse was defined in the present study as a self-reported return to problematic or harmful cannabis use after participants had already reportedly overcame their cannabis problem, not merely a return to cannabis use per se.

It is also important to note that recovery orientation in the present study was defined in relation to frequency of past cannabis use as opposed to future frequency of cannabis use goals. This decision was made in light of the argument that for a retrospective, cross-sectional study of this nature, past cannabis use might be a relatively more objective measure of recovery orientation than future goals, since goals are dynamic variables and were not followed-up in the present study. Nevertheless, it is assuring that similar frequency rates of past use and future goals were reported within the abstinence- and moderation-oriented groups, and past 12 month cannabis use and future 12 month frequency of cannabis use goals were highly correlated.

With respect to recovery type, while an argument might be made that participants who reported only one or few sessions of cannabis treatment, or that treatment was not helpful, were actually naturally recovered, and therefore should have been excluded from the treatment-assisted recovery group, it can also be argued that it was more conservative to retain the integrity of the group based on the categorical report of ever seeking cannabis treatment. Attempts to eliminate participants from the treatment-assisted recovery group based on participant reports of only experiencing one or few sessions of treatment or not finding treatment helpful assumes that in reality, absolutely no benefit from seeking treatment was imparted to the participant, which might not always be the case; further, it artificially creates a sub-group of treatment-seekers and it is unclear as to how this sub-group would be expected to differ from other groups of treatment-seekers and from individuals who have never sought treatment. Indeed, it is not uncommon for individuals who had been in treatment to report that treatment played no role in their recovery or even that they had recovered despite having been in treatment (Klingemann et al., 2010). Thus, demarcating the groups in the present study according to reports of ever seeking cannabis treatment was the most objective way to proceed insofar as it was free from assumptions about the impact of treatment. As Klingemann et al. (2010; p. 1511) has suggested, "researchers should not become so tied down in methodological particularities (e.g., how many Alcoholics Anonymous (AA) meetings, if any, an observer should be allowed; should a passing comment by a physician that one should cut down drinking be considered treatment) so as to lose sight of the greater question—how does change occur?"

An argument might also be made that even though the naturally recovered group had reported never seeking cannabis treatment, only the participants who had never sought any other forms of mental health and addiction treatment should be considered naturally recovered from cannabis use disorders. Again, however, it was safer and more conservative to demarcate the groups based on the participants' perceptions of ever seeking cannabis treatment, so as to not make any assumptions about the source of change—and in this instance, assumptions particularly about the impact of cross-treatment effects on recovery from cannabis use disorders. Indeed, while cross-treatment

effects might be expected to influence the recovery from any mental health or addiction problem (not just cannabis use disorders), one of the primary objectives of the present study involved exploring natural recovery from cannabis use disorders per se and with a view towards maximizing external validity, not natural recovery from all mental health and addiction problems.

It is also noteworthy that the operational definitions for the recovery orientation and recovery type groups were further validated post-hoc in light of the small to medium effect size differences in lifetime cannabis problem severity (i.e., the tests of secondary hypotheses) that were generally observed even after accounting for each respective factor. That is, even with the arguably conservative and rudimentary operational definition of the groups used in the present study, robust effect sizes still generally emerged with respect to the secondary hypotheses, which suggests that more restrictive or refined definitions of the groups in the present study were not warranted.

Another theoretical issue concerns the broader definition of recovery that was employed in the present study, whereby recovery was defined as 12 months sustained full remission from cannabis abuse and/or 12 months sustained partial remission from cannabis dependence. One concern with this definition is that the 12 month duration of recovery might be considered to be unstable, and indeed, 5 years of sustained full remission has been proposed as a way to avoid biased results due to unstable recoveries (Sobell, 2007a). However, as already noted, the most widely used criterion for recovery in the natural recovery literature has been 12 months sustained full remission (Bischof et al., 2012), and there is evidence that most natural recoveries with an initial duration of at least 12 months are stable (Rumpf et al., 2006). Moreover, this concern is mitigated in light of the findings in the present study that participants were reportedly in both treatment-assisted and natural recovery for a mean of 7.6 years.

Another potential concern with the definition of recovery employed in the present study is that with respect to cannabis dependence, the decision was made to include participants with sustained partial remission as opposed to sustained full remission, despite the fact that sustained full remission has been recommended to ensure stable recoveries (Bischof et al., 2012). This decision was made in light of the fact that

participants with moderation-oriented recoveries were a focus of the present study. More specifically, the exclusion of participants that currently used cannabis and met criteria for tolerance and/or withdrawal, but were otherwise in remission from diagnostic symptoms, ran the risk of potentially reifying an artificially created group of moderation-oriented users that did not experience any physiologically dependent symptoms; this in turn might have also limited the variability of individuals with a moderation-oriented recovery. It is noteworthy that under the new DSM-5 diagnostic system, the specifier for partial remission has been removed, with the exception that criterion A4 (i.e., craving) may be present. Thus, despite the progress that the DSM-5 has made with respect to defining a cannabis use disorder (e.g., recognizing a cannabis withdrawal syndrome), it has become more limited in accommodating moderation-oriented recovery pathways (American Psychiatric Association, 2013).

Yet another objection that might be levied towards the definition of recovery used in the present study is that a rather narrow definition of recovery has been employed that does not fully account for a holistic view of the recovery experience (e.g., does not measure healing and growth processes and personal characterological change). While this objection might be valid, it should balanced with the recognition that the present study did account for other recent developments in the addiction recovery literature, such as the acceptance of harm reduction approaches via the recognition that recovery and abstinence are not isomorphic concepts, and the inclusion of both treatment-assisted and natural recovery pathways (el-Guebaly, 2012). Nevertheless, future research would indeed benefit from an examination of recovery that goes beyond the remission of symptoms to include improvements in psychosocial functioning and personal transformation.

Methodologically, one issue is that the data were derived from self-reported and retrospective accounts of the recovery process from a cross-sectional sample, which raises concerns about the validity of participants' memory of their recoveries. This concern is exacerbated in the case of recovery from cannabis use disorders, whereby long-term cannabis use has been found to be associated with cognitive and memory impairments (Meier et al., 2012; Solowij et al., 2002; Solowij & Battisti, 2008; Tait et al.,

2011). Nevertheless, retrospective research of this nature has by far been the norm in the natural recovery literature and research has shown that both untreated and treated substance abusers tend to provide reasonably accurate accounts of their pre- and post-recovery substance use and related experiences when compared to collateral reports (Bischof et al., 2012; Sobell et al., 2007a). Indeed, in the present study, collateral reports demonstrated that participants' self-reports were generally reliable, whereby the relatively more behavioural and objective variables (e.g., resolution time in years, past cannabis use frequency, future cannabis use frequency goal) achieved the highest levels of agreement. While 23.5% of participants did not provide a collateral, the collateral validation data in the present study might still be considered impressive in light of the fact that the only other in-depth cannabis study in the natural recovery literature did not provide collateral reports (Ellingstad et al., 2006), and in light of research suggesting that collateral reports for cannabis use may be unreliable in general and that collaterals may be better able to report when a participant does not use cannabis as opposed to how much cannabis is being used (Norberg et al., 2012a). Moreover, the following procedures were taken in the present study to maximize the validity of the self-reports: anonymity, confidentiality, established rapport, questions were specific and structured, and interviewers were non-judgmental (Sobell & Sobell, 2003). However, despite the precautions taken to increase the reliability of participants' retrospective self-reports, future research would certainly benefit from the incorporation of real-time data collection procedures—such as ecological momentary assessment (Buckner et al., 2012a)— into prospective, longitudinal designs to investigate multiple recovery pathways (and their vicissitudes) from cannabis use disorders.

Both a methodological limitation and strength of the present study was that its eligibility criteria maximized external validity at the expense of internal validity with respect to comorbidity. That is, by including participants with lifetime or current comorbidity of other addictive and psychiatric disorders, the findings are potentially confounded by variables related to comorbid conditions, which threatens the internal validity of the findings as they specifically relate to recovery from cannabis use disorders. On the other hand, comorbidity of cannabis use disorders with other addictive and

psychiatric disorders has been found to be the rule rather than the exception (Stinson et al., 2006), and therefore, the findings can be considered to be derived from a representative sample of individuals who have had cannabis use disorders and who have both sought and not sought cannabis treatment. In maximizing external validity with respect to comorbidity, the findings become generalizable to individuals with cannabis use disorders and thus transferable to clinical practice.

At the same time, however, the external validity of the findings is threatened by other aspects of the sampling. Specifically, the present study used a media-solicited convenience sample in Calgary, Alberta, and therefore, the findings might not reflect the experiences of individuals in other geographical locations and cultures. Moreover, in the natural recovery literature, media-solicitation has been found to lead to biased samples of strongly dependent participants with higher rates of abstinence compared to general population samples; though variables related to reasons for resolution and maintenance factors have been reported to be less affected (Bischof et al., 2012). Future research is thus needed that examines the recovery process from cannabis use disorders in general population-based random samples, as well as in other cultures and in locations where cannabis is legal.

Another potential methodological concern is that some problem severity self-report questionnaires (i.e., ASSIST, MPS, and SDS) were verbally administered during the various interviews rather than administered in the paper-pencil format in which they were originally standardized. These questionnaires were verbally administered in order to decrease the length of the interview (i.e., participant fatigue) and to ensure consistency of administration across the other various interviews that were conducted via telephone. While it is possible that demand characteristics due to the verbal administration of the questionnaires might have resulted in the under-reporting of problem severity, this possibility is unlikely to have dramatically affected the findings given that participants volunteered for the study and were made aware via the study advertisements and informed consent procedures that participation would involve the disclosure of cannabis-related problems.

A final methodological issue that is not specific to the present study concerns the fact that cannabis can vary with respect to cannabinoid potency levels and types (e.g., different levels of THC and CBD), preparations (e.g., hash, oil), routes of administration (e.g., smoking, oral), and delivery mechanisms (e.g., bongs, joints). With no standardized unit of cannabis available and in light of reports that cannabis THC content (at least in the United States) has more than doubled since the 1980s (United Nations Office on Drugs and Crime, 2012), it is difficult to accurately measure cannabis frequency and problem severity both between and within individuals. It thus remains unclear as to how the variability of cannabis composition and lack of quantification standards has confounded the physiological features of cannabis dependency (i.e., tolerance and withdrawal) and other variables related to the recovery process.

Lastly, the exploratory nature of the present study was successfully able to generate hypotheses and provide directions for future research. The following set of 9 hypotheses, which were alluded to throughout this manuscript, were either derived from, or consistent with, the findings of the present study, and are empirical questions/statements that deserve further attention in future research: 1) An experimental CBT-MET intervention composed of an increased dose of cognitive and motivational strategies relative to behavioural strategies might outperform a standard CBT-MET intervention for cannabis use disorders during both the action and maintenance stages of the recovery process, and consequently, might help to raise the small to medium effect sizes that have been observed in the literature. 2) The development of cannabis-specific concurrent disorder treatments might also raise the small to medium effect sizes that have been observed in the literature, particularly for those with high levels cannabis problem severity and degrees of comorbid conditions. 3) Moderated cannabis use for individuals who have recovered from a cannabis use disorder might be represented best by frequency of cannabis use that is less than monthly, though a higher frequency of use risk guideline for moderated cannabis use might be suitable for those who have not experienced cannabis-related problems. 4) A moderation-oriented recovery pathway might lead to better outcomes for those with lower cannabis problem severity irrespective of comorbid conditions, and an abstinence-oriented recovery pathway might lead to better outcomes

for those with higher cannabis problem severity irrespective of comorbid conditions. 5) Moderation-oriented recovery might be facilitated by a heavier focus on behavioural relapse prevention strategies that target cannabis use in one's social environment and stifle any increases in other addictive behaviours. 6) The development and dissemination of moderation-focused treatments and self-help materials might improve access to treatment resources for those at the lower end of the cannabis problem severity continuum. 7) A public campaign that decreases cannabis treatment stigma and increases awareness of cannabis-specific treatments (both abstinence- and moderation-based) and 12-step based programs might increase treatment seeking. 8) In light of research demonstrating that females with cannabis use disorders demonstrate significantly lower mental health quality of life compared to males (Lev-Ran et al., 2012), future research is warranted that explores gender differences with respect to multiple recovery pathways. 9) Cannabis treatment-seekers might especially benefit from a focus on increasing self-efficacy, emotional coping skills, and social support networks.

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Appendix A: Advertising Strategy Materials

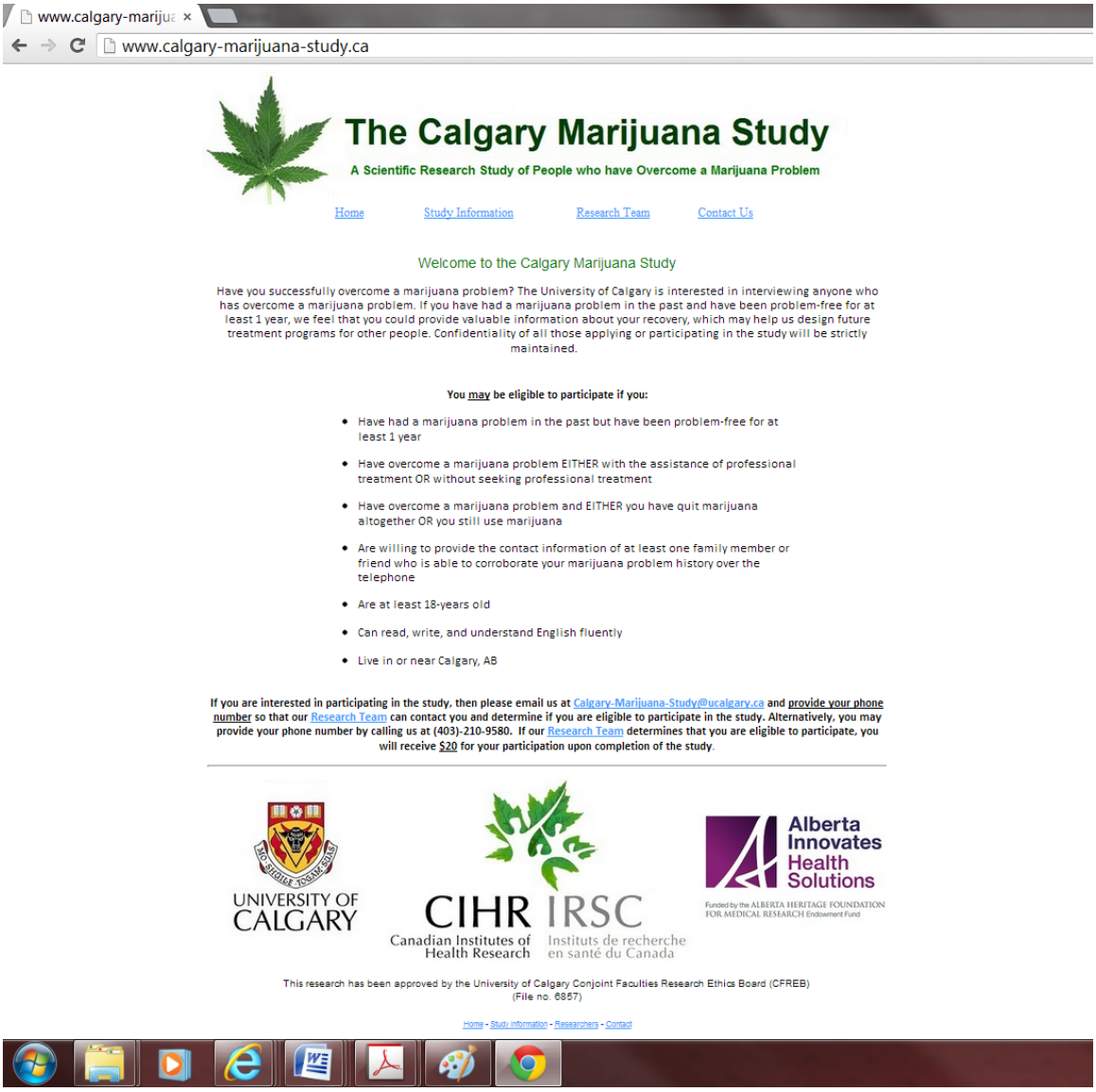

Figure A1. A screenshot of the homepage from www.Calgary-Marijuana-Study.ca.

$20 for Psychology Interview About Your Marijuana Recovery

Have you successfully overcome a marijuana problem? The University of Calgary is interested in interviewing anyone who has overcome a marijuana problem. If you have had a marijuana problem in the past and have been problem-free for at least 1 year, we feel that you could provide valuable information about your recovery, which may help us design future treatment programs for other people. Confidentiality of all those applying or participating in the study will be strictly maintained.

For more information, please visit
www.Calgary-Marijuana-Study.ca
or email
Calgary-Marijuana-Study@ucalgary.ca
or call
(403)-210-9580

UNIVERSITY OF CALGARY

CIHR IRSC
Canadian Institutes of Health Research
Instituts de recherche en santé du Canada

Alberta Innovates Health Solutions
Funded by the ALBERTA HERITAGE FOUNDATION FOR MEDICAL RESEARCH Endowment Fund

$20 for Psychology Interview
www.Calgary-Marijuana-Study.ca

Figure A2. The flyer that was posted throughout the city of Calgary, AB.

Research Participants Needed: $20 for University of Calgary Psychology Interview about your Marijuana Recovery. The University of Calgary is interested in interviewing people in Calgary who have successfully overcome a marijuana problem. If you have had a marijuana problem in the past and have been problem-free for at least 1 year, you may be eligible to participate. For more information, please visit: www.Calgary-Marijuana-Study.ca or Email: Calgary-Marijuana-Study@ucalgary.ca or Call: 403-210-9580

Figure A3. The classified Ad that was used in several newspapers.

Appendix B: Screening Interview

Telephone Screening Protocol

TODAY'S DATE: _____

Telephone Screening Consent Script:

Thank you for your interest in our study. The study is being conducted by Mr. Jonathan N. Stea, Dr. David C. Hodgins, and Mr. Syler Hayes at the Addictive Behaviours Laboratory at the University of Calgary. The title of the project is called Recovery from Cannabis Use Disorders, and the study is sponsored by the Canadian Institutes of Health Research and Alberta Innovates Health Solutions.

Before you can participate in the study, we need to determine whether you are eligible to participate based on whether you meet our inclusion requirements for the study. To determine your eligibility, we will ask you to participate in a screening process, which involves asking you some questions regarding your demographics [i.e., including your age, gender, marital status, area of residence (i.e., urban or rural), education level, occupation, ethnicity, and religion] as well as some questions regarding your past and current marijuana use. Altogether, the questions should take approximately 5-10 minutes to answer.

Once you finish answering the questions, we will take a moment to tally your response profile and will immediately let you know if you are eligible to participate in the study. You will not be provided with monetary compensation for partaking in the screening process.

If you are deemed eligible for the study, we will invite you to our laboratory at a later date to participate in a 2-hour interview for which you will be compensated $20 at completion of the study. If you choose to accept the invitation, we will then collect your personal information (i.e., name, email, telephone, mailing address), schedule your appointment, and provide you with directions to our laboratory. Your personal information will only be collected for the purpose of verifying your identity. Your participation in this screening process is completely voluntary and confidential, and you are free to discontinue participation at any time during the questioning period. No one except the researchers and supervisor will be allowed to see or hear any of your answers to our screening questions. Only group information (i.e., not your personal information) will be summarized for any presentation or publication of results. Your answers will be kept in a locked cabinet only accessible by the researchers and supervisor. The data will be stored indefinitely for the purpose of possible future use on a computer disk. If you choose to withdraw from the screening process, your data will be retained up to the point of your withdrawal. Your data will be retained irrespective of whether you are deemed eligible for the study or not. Again, your personal information will not be released to the public and is strictly confidential.

If you are deemed ineligible for the study, your data from this telephone screening will be retained in an aggregated and anonymous form with no identifying information, you will not be invited to participate in the interview, and we will not collect your personal information, but we thank you for your interest in our study nonetheless. Thus, it is important to know that irrespective of whether you are eligible or ineligible for this study, your answers to the following screening questions will be included as an aggregated and anonymous statistic within the research report, and that your willingness to provide this data will be considered consent for such use.

It is possible that participation in this screening process may cause you distress or trigger concerns regarding addictions problems. If you experience these risks, help is available from a variety of free-of-charge 24-hour help-lines, or possible treatment options could be accessed through Access Mental Health, so please let me know if you would like me to provide you with these resources (**FOR THE INTERVIEWER'S INFORMATION: AADAC: 1-866-322-2322 (Alberta Only); 1-866-33AADAC (Help Line); Distress Centre Calgary: 403-266-HELP (4357); Access Mental Health: 403-943-1500, mental.health@albertahealthservices.ca, www.albertahealthservices.ca**). Your participation in this study has the potential to inform researchers about the causes and various factors involved in the development and resolution of cannabis use disorders (CUDs), as well as new ways to develop and modify treatment approaches for CUDs. It's important to know that this knowledge could potentially help other people that are currently suffering from CUDs.

Screening Interview:

Demographics Questionnaire

DATE OF BIRTH: month: _____ day: _____ year: _____ **AGE:** _____
SEX: ___ male ___ female

MARITAL STATUS:
__ single
__ dating (1 partner)
__ dating (2 or more partners)
__ married (and not separated)
__ common law (living with your significant other)
__ separated/divorced
__ widowed

AREA OF RESIDENCE: ___urban ___ rural
Do you live more than a 1 hour drive from Calgary? No ___ Yes ___

EDUCATION: *(check off highest level only)*
__ No degree, certificate or diploma
If so, please indicate the last grade you completed: ____
__ Secondary (high) school graduation certificate or equivalent
__ Trades certificate or diploma
__ Other non-university certificate or diploma
__ University certificate or diploma below bachelor level
__ Bachelor's degree
__ University certificate or diploma above bachelor level
__ Degree in medicine, dentistry, veterinary medicine or optometry
__ Master's degree
__ Earned doctorate

OCCUPATION:
__ Employed full-time (30 or more hrs/week)
__ Employed part-time (less than 30hrs/week)
__ Unemployed (out of work but looking for work)
__ Student - employed part-time or full-time
__ Student - not employed
__ Retired
__ Homemaker
__ Other *(Specify)*: _____ Position/Job Title: _____

Approximate Net Yearly Income, To the Nearest $1,000: $ _____

ETHNICITY: *(check off all that apply; clarify if necessary)*
__ Aboriginal (Inuit, Métis, North American Indian, etc.)
__ Arab/West Asian (Armenian, Egyptian, Iranian, Lebanese, Moroccan…)
__ Black (African, Haitian, Jamaican, Somali, etc.)
__ Chinese
__ Filipino
__ Japanese
__ Korean
__ Latin American
__ South Asian
__ South East Asian
__ White (Caucasian)
__ Other *(specify)*: _____

RELIGION:
__ Not affiliated with a religious group
__ Affiliated with a religious group
If you are affiliated, please specify:
__ Aboriginal or First Nations spirituality
__ Catholic
__ Muslim
__ Protestant
__ Orthodox
__ Jewish
__ Eastern non-Christian
__ Other *(Specify)*: _____

How Important Is Religion In Your Life?
__ Very important
__ Somewhat important
__ Not very important
__ Not important at all

How Important Is Spirituality In Your Life?
__ Very important
__ Somewhat important
__ Not very important
__ Not important at all

Study-Specific Questions

1. Do you have the ability to fluently read, write, and understand English?
(circle) YES OR NO

2. If you are deemed eligible for the study, would you then be willing to provide the name and contact information of at least one family member or friend who will be able to speak with us over the telephone in a brief 5 minute interview to confirm your marijuana use history?
(circle) YES OR NO

3. If you are deemed eligible for the study, would you agree to refrain from using any drugs and alcohol (with the exception of nicotine and prescription medication) at least 8 hours prior to your participation in our study? Intoxication is prohibited during the study because it could invalidate the results.
(circle) YES OR NO

4. Do you confirm that you are at least 18-years old?
(circle) YES OR NO

5. Do you have the ability to come to our Laboratory to participate in the study, which is located in Calgary, AB?
(circle) YES OR NO
If NO, why? _____

Alcohol, Smoking, and Substance Involvement Screening Test, Cannabis Section (ASSIST)

1. In the past three months, how often have you used cannabis (marijuana, pot, grass, hash, etc.)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily
2. During the past three months, how often have you had a strong desire or urge to use cannabis (marijuana, pot, grass, hash, etc.)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily
3. During the past three months, how often has your use of cannabis (marijuana, pot, grass, hash, etc.) led to health, social, legal or financial problems?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily
4. During the past three months, how often have you failed to do what was normally expected of you because of your use of cannabis (marijuana, pot, grass, hash, etc.)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily
5. Has a friend or relative or anyone else ever expressed concern about your use of cannabis (marijuana, pot, grass, hash, etc.)?
    a. No, Never
    b. Yes, in the past 3 months
    c. Yes, but not in the past 3 months
6. Have you <u>ever</u> tried and failed to control, cut down, or stop using cannabis (marijuana, pot, grass, hash, etc.)?
    a. No, Never
    b. Yes, in the past 3 months
    c. Yes, but not in the past 3 months

Cannabis Item Questions Adapted from the CIDI

Cannabis Abuse Questions

Q1a. Was there **ever** a time in your life when your use of MARIJUANA frequently interfered with your work or responsibilities at school, on a job, or at home? (KEY PHRASE: interfered with your work)
YES .... CIRCLE "INTERFERED WITH YOUR WORK" ...GO TO Q1b.
NO
DK
REF

Q1b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q2a. Was there **ever** a time in your life when your use of MARIJUANA caused arguments or other serious or repeated problems with your family, friends, neighbors, or coworkers? (NO KEY PHRASE)
YES... GO TO Q2b and Q2c.
NO
DK
REF

Q2b. Did you continue to use MARIJUANA even though it caused problems with these people? (KEY PHRASE: caused problems with family or friends)
YES... CIRCLE "CAUSED PROBLEMS WITH FAMILY OR FRIENDS"
NO
DK
REF

Q2c. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q3. Were there **ever** times in your life when you were often under the influence of MARIJUANA in situations where you could have gotten hurt, for example when riding a bicycle, driving, operating a machine, or anything else? (KEY PHRASE: occurred in situations where you could have gotten hurt)
YES... CIRCLE "OCCURRED IN SITUATIONS WHERE YOU COULD HAVE GOTTEN HURT"... GO TO Q3b.
NO
DK
REF

Q3b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q4. Were you **ever** arrested or stopped by the police more than once because of driving under the influence of MARIJUANA or because of your behavior while you were under the influence of MARIJUANA? (KEY PHRASE: resulted in problems with the police)
YES... CIRCLE "RESULTED IN PROBLEMS WITH THE POLICE" ... GO TO Q4b.
NO

DK
REF

Q4b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

INTERFERED WITH YOUR WORK	CAUSED PROBLEMS WITH FAMILY OR FRIENDS	OCCURRED IN SITUATIONS WHERE YOU COULD HAVE GOTTEN HURT	RESULTED IN PROBLEMS WITH THE POLICE

Does this participant meet DSM Lifetime Cannabis Abuse
YES ____ NO_____

Does this participant NOT meet DSM Current Cannabis Abuse

YES ____ NO_____

Cannabis Dependence Questions

Q1a. Did you **ever** need larger amounts of MARIJUANA to get an effect, or did you ever find that you could no longer get high on the amount you used to use? (KEY PHRASE: you needed larger amounts of MARIJUANA to get an effect)
YES... CIRCLE "YOU NEEDED TO TAKE LARGER AMOUNTS TO GET AN EFFECT" ... GO TO Q1b.
NO
DK
REF

Q1b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q2a. Did you **ever** have times when you stopped, cut down or went without using MARIJUANA and then experienced withdrawal symptoms? (KEY PHRASE: you experienced withdrawal symptoms from MARIJUANA)

(NOTE: here are some examples of withdrawal symptoms to tell participants **only if they ask**: irritability, anger, aggression, nervousness, anxiety, sleep difficulty, decreased appetite or weight loss, restlessness, depressed mood, stomach pain, shakiness/tremors, sweating, fever, chills, headache)

YES... CIRCLE "YOU EXPERIENCED WITHDRAWAL SYMPTOMS" ... GO TO Q2b.
NO
DK
REF

Q2b. How recently did you have these problems with withdrawal – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q3a. Did you **ever** have times when you used MARIJUANA to keep from having withdrawal symptoms? (KEY PHRASE: you used MARIJUANA to keep from feeling withdrawal problems)
YES... CIRCLE "YOU EXPERIENCED WITHDRAWAL SYMPTOMS" ...GO TO Q3b.
NO
DK
REF

Q3b. How recently did you have these problems with withdrawal – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q4a. Did you **ever** have times when you used MARIJUANA even though you planned not to or when you used a lot more than you intended? (KEY PHRASE: you used when you planned not to, or you used more than you planned)
YES... CIRCLE "YOU NEEDED TO TAKE LARGER AMOUNTS OR USED OVER A LONGER PERIOD THAN WAS INTENDED" ... GO TO Q4b.
NO
DK
REF

Q4b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q5a. Were there **ever** times when you used MARIJUANA more frequently or for more days in a row than you intended? (KEY PHRASE: you used more frequently than you intended)
YES ... CIRCLE "YOU NEEDED TO TAKE LARGER AMOUNTS OR USED OVER A LONGER PERIOD THAN WAS INTENDED" ... GO TO Q5b.
NO
DK
REF

Q5b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q6a. Were there **ever** times when you tried to stop or cut down on your use of MARIJAUNA and found that you were not able to do so? (KEY PHRASE: you tried but weren't able to stop or cut down using)
YES... CIRCLE "YOU TRIED BUT WEREN'T ABLE TO STOP OR CUT DOWN USING"... GO TO Q6b.
NO
DK
REF

Q6b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q7a. Did you **ever** have several days or more when you spent so much time using or recovering from the effects of MARIJUANA that you had little time for anything else? (KEY PHRASE: you spent periods of several days doing little more than using or getting over the effects of using)

YES... CIRCLE "YOU SPENT PERIODS OF SEVERAL DAYS DOING LITTLE MORE THAN USING OR GETTING OVER THE EFFECTS OF USING" ... GO TO Q7b.

NO

DK

REF

Q7b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?

PAST 30 DAYS

2 TO 6 MONTHS AGO

7 TO 12 MONTHS AGO

>12 MONTHS AGO

DK

REF

Q8a. Did you **ever** have times when you gave up or greatly reduced important activities because of your MARIJUANA use – like sports, work, or seeing friends and family? [KEY PHRASE: you gave up or reduced important activities because of your use]

YES... CIRCLE "YOU GAVE UP OR REDUCED IMPORTANT ACTIVITIES BECAUSE OF YOUR USE"... GO TO Q8b.

NO

DK

REF

Q8b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?

PAST 30 DAYS

2 TO 6 MONTHS AGO

7 TO 12 MONTHS AGO

>12 MONTHS AGO

DK

REF

Q9a. Did you **ever** continue to use MARIJUANA when you knew you had a serious physical or emotional problem that might have been caused by or made worse by using MARIJUANA? (KEY PHRASE: you continued to use even though it caused or worsened physical or emotional problems)

YES... CIRCLE "YOU CONTINUED TO USE EVEN THOUGH IT CAUSED OR WORSENED PHYSICAL OR EMOTIONAL PROBLEMS "... GO TO Q9b.

NO

DK

REF

Q9b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?

PAST 30 DAYS

2 TO 6 MONTHS AGO

7 TO 12 MONTHS AGO

>12 MONTHS AGO

DK

REF

YOU NEEDED TO TAKE LARGER AMOUNTS TO GET AN EFFECT	YOU EXPERIENCED WITHDRAWAL SYMPTOMS	YOU NEEDED TO TAKE LARGER AMOUNTS OR USED OVER A LONGER PERIOD THAN WAS INTENDED	YOU TRIED BUT WEREN'T ABLE TO STOP OR CUT DOWN USING
YOU SPENT PERIODS OF SEVERAL DAYS DOING LITTLE MORE THAN USING OR GETTING OVER THE EFFECTS OF USING	YOU GAVE UP OR REDUCED IMPORTANT ACTIVITIES BECAUSE OF YOUR USE	YOU CONTINUED TO USE EVEN THOUGH IT CAUSED OR WORSENED PHYSICAL OR EMOTIONAL PROBLEMS	

Does this participant meet DSM Lifetime Cannabis Dependence
YES ____ NO_____

Does this participant NOT meet DSM Current Cannabis Dependence

YES ____ NO_____

To Determine Eligibility:

Participants are only eligible to participate in the study if each of the following are checked "YES":

1. Participant meets **EITHER** DSM Lifetime Cannabis Abuse **OR** DSM Life Cannabis Dependence

YES____ NO ____

2. Participant does not meet DSM Current Cannabis Abuse **AND** does not meet DSM Current Cannabis Dependence

YES____ NO ____

3. Ability to fluently read, write, and understand English.

YES____ NO ____

4. Participant agreed to refrain from using and drugs and alcohol (with the exception of nicotine and prescription medication at least 8 hours prior to participation in the study.

YES____ NO ____

5. Participant is at least 18-years old.

YES____ NO ____

6. Participant has the ability to come to our Laboratory to participate in the study.

YES____ NO ____

Script for Ineligible Participants

If participants are deemed ineligible for the study, then say the following:

"Unfortunately, based on your answers to our screening questions, you are not eligible to participate in our study. Nevertheless, we thank you very much for your time and commitment to our research. At this time, we ask everyone if they would like us to provide them with information regarding a variety of free-of-charge 24-hour help-lines, or possible treatment options that could be accessed through Access Mental Health--so would you like me to provide you with these resources?"

[IF PERSON RESPONDS "YES", THEN PROVIDE THE FOLLOWING:**AADAC: 1-866-322-2322 (Alberta Only); 1-866-33AADAC (Help Line); Distress Centre Calgary: 403-266-HELP (4357); Access Mental Health: 403-943-1500, mental.health@albertahealthservices.ca, www.albertahealthservices.ca).**]

[IF PERSON RESPONDS "NO", THEN SAY:

"Great, thank you again for your willingness to our participate in our study. Have a great day. Goodbye."

Appendix C: Informed Consent Form

UNIVERSITY OF CALGARY

Name of Researcher, Faculty, Department, Telephone & Email:

Jonathan N. Stea, M.Sc., Ph.D. Candidate (Clinical Psychology), Department of Psychology, University of Calgary
phone: (403)-210-9500
email to contact for study-related inquiries: Calgary-Marijuana-Study@ucalgary.ca
personal email: jnstea@ucalgary.ca

Syler Hayes, Department of Psychology, University of Calgary
phone: (403)-210-9500
email: swhayes@ucalgary.ca

Supervisor:

David C. Hodgins, Ph.D., Professor, Department of Psychology, University of Calgary
phone: (403)-220-3371
email: dhodgins@ucalgary.ca

Title of Project:

Recovery from Cannabis Use Disorders

***Sponsors*:**

Canadian Institutes of Health Research (CIHR)
Alberta Innovates Health Solutions (AIHS)

This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

Purpose of the Study:

The purpose of the study is to further understand the recovery process from cannabis use disorders.

What Will I Be Asked To Do?

Participation in this study is completely voluntary and confidential. You will be asked to complete several questionnaires and to respond to open-ended questions regarding various domains, including: demographic information, cannabis use, other drug and alcohol use, gambling, mental health, life events, reasons for overcoming cannabis problems, actions and maintenance strategies used to overcome cannabis problems, previous and current treatment regarding drug and mental problems, perceived barriers to change regarding cannabis problems, advice for cannabis abusers, and perceptions regarding the causes of cannabis problems. You are free to refuse to answer any questions that you do not wish to answer. It is possible to withdraw from the study at any time without penalty, and still receive compensation. Total time required for participation will be approximately **2 hours**. For your completion of the study, you will receive **$20**.

You will also be asked to provide the name and contact information of at least one family member or friend (i.e., a collateral) who is able to corroborate or validate (i.e., confirm) your cannabis use history over the telephone (the brief confidential telephone interview with your collateral will take approximately **5 minutes**). Your collateral will

not be compensated for their participation in the study. Your information from the study will **NOT** be shared with your collateral, since a blind researcher (i.e., a different researcher that knows nothing about you) will conduct the telephone interview with your collateral. Similarly, you will **NOT** have access to the information provided to our research team by your collateral.

Finally, you might be contacted by our research team in the future requesting your participation in a follow-up study. If you choose to participate in the future follow-up study, your participation will once again be completely voluntary and confidential, and you would be free to withdraw from the study at any time without penalty.

What Type of Personal Information Will Be Collected?

Your name and contact information (e.g., telephone, email, mailing address) will be the only pieces of identifying information to be collected in this study. This information will be used only for purposes of contacting and conducting the telephone interview with your collateral (i.e., we will need to identify you by your name when we speak with your collateral), and for contacting you in the future regarding possible future follow-up studies. With the exception of using your personal information to contact your collateral, **your personal information will NOT be released to the public. Similarly, your collateral's personal information will NOT be released to the public.**

Should you agree to participate in this study, you will be asked to provide demographic information, including your age, gender, marital status, area of residence (i.e., urban or rural), education level, occupation, ethnicity, and religion.

There are several options for you to consider if you decide to take part in this research. You can choose all, some or none of them. Please put a check mark on the corresponding line(s) that grants me your permission to:

I agree to provide my personal information: *Yes:* ___ *No:* ___

Name: _____

Email: _____

Telephone: _____

Mailing Address: _____

_____

I agree to provide the personal information of ***at least one*** *family member or friend (i.e., a collateral) who will be able to corroborate or validate (i.e., confirm) my cannabis use history in a* ***brief 5 minute telephone interview****:* *Yes:* ___ *No:* ___

Please provide the personal information of ***at least one*** *collateral that you think will be willing to speak with our research team over the phone for approximately 5 minutes regarding your cannabis use history:*

Name 1: _____

Email: _____

Telephone: _____

Mailing Address: _____

_____

Relation (are they your friend or family member?) _____

Name 2: _____

Email: _____

Telephone: _____

*Mailing Address:*_____

_____

Relation (are they your friend or family member?) _____

I grant permission to be contacted in the future regarding possible future studies: *Yes:* ___ *No:* ___

I grant permission to be contacted in 7-10 days so that a researcher can quickly ask me 23 brief questions (which will take ***1 – 2 minutes****) about my marijuana use over the phone to ensure the quality of our research:* *Yes:* ___ *No:* ___

Are there Risks or Benefits if I Participate?

Possible Risks: It is possible that participation in this study may cause you distress or trigger concerns regarding addictions or mental health problems. If you experience these risks, help is available from the following free-of-charge 24-hour help-lines: Problem gambling helpline: 1-800-665-9676, AADAC: 1-866-322-2322 (Alberta Only), 1-866-33AADAC (Help Line), and the Distress Centre Calgary: 403-266-HELP (4357). You may also choose to contact Access Mental Health for possible treatment options (403-943-1500, mental.health@albertahealthservices.ca, www.albertahealthservices.ca). If it is discovered during the course of the study that you are at high-risk for suicide, then we are obligated to arrange for your transportation to the nearest Emergency department, which might involve Police escort.

Benefits: Your participation in this study has the potential to inform researchers about the causes and various factors involved in the development and resolution of cannabis use disorders (CUDs), as well as new ways to develop and modify treatment approaches for CUDs. This knowledge could potentially help other people that are currently suffering from CUDs. In addition, you will be provided $20 and a debriefing form for your completion.

What Happens to the Information I Provide?

Participation is completely voluntary and confidential. You are free to discontinue participation at any time during the study. No one except the researchers and supervisor will be allowed to see or hear any of the answers to the questionnaires, open-ended responses, or the interview tape. With the exception of using your personal information to contact your collateral, **your personal information will NOT be released to the public. Similarly, your collateral's personal information will NOT be released to the public.** Only group information (i.e., no personal information) will be summarized for any presentation or publication of results. The findings from the study will be disseminated in the form of a doctoral dissertation project and an undergraduate honour's thesis, and will likely be presented at scientific research conferences and published in scientific journals. The questionnaires are kept in a locked cabinet only accessible by the researchers and supervisor. The data will be stored indefinitely for the purpose of possible future use on a computer disk. If you choose to withdraw from the study, your data will be retained up to the point of your withdrawal.

Verbal Consent

Your participation in this research project indicates that you 1) understand to your satisfaction the information provided to you about your participation in this research project, 2) have provided consent verbally following a comprehensive review of the form and explanation of the demands of participation, and 3) agree to participate as a research subject.

In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this

research project at any time. You should feel free to ask for clarification or new information throughout your participation.

Participant's Name: (printed by Researcher) _____Date: _____

Researcher's Name: (please print) _____Date: _____

Questions/Concerns

If you have any further questions or want clarification regarding this research and/or your participation, please contact:

Jonathan N. Stea, M.Sc., Ph.D Candidate
Department of Psychology/Faculty of Arts
phone: 403-210-9500, personal email: jnstea@ucalgary.ca
And
David C. Hodgins, Ph.D., Professor
Department of Psychology/Faculty of Arts, phone: 403-220-3371, email: dhodgins@ucalgary.ca

If you have any concerns about the way you've been treated as a participant, please contact the Senior Ethics Resource Officer, Research Services Office, University of Calgary at (403) 220-3782; email rburrows@ucalgary.ca.

A copy of this consent form has been given to you to keep for your records and reference. The investigator has kept a copy of the consent form.

Appendix D: Participant Interview

Note: Pages 31-32, and some of page 33, of the Participant Interview have been removed because these sections display items from the Inventory to Diagnose Depression (IDD; Zimmerman, 1994), which is a measure that is under copyright.

Stea 1- Participant ID _____

Participant Name:_____

Participant ID: _____

Date: _____

Jonathan N. Stea, Ph.D. Candidate
University of Calgary
Department of Psychology

Stea 2- Participant ID _____

INTERVIEW GUIDE

Preliminary Questions

(a) Have you used any drugs in the past 24 hours? _____

IF YES, which drugs and how many hours ago did you use them?

_____

_____

_____

(b) How did you hear about our study?

(d) What are the reasons that you requested a telephone interview as opposed to a face-to-face interview (if applicable)?

Stea 3- Participant ID _____

Demographics Questionnaire

DATE OF BIRTH: month: _____ day: _____ year: _____ **AGE:** _____
SEX: ___ male ___ female

MARITAL STATUS:
__ single
__ dating (1 partner)
__ dating (2 or more partners)
__ married (and not separated)
__ common law (living with your significant other)
__ separated/divorced
__ widowed

AREA OF RESIDENCE: ___urban ___ rural
Do you live more than a 1 hour drive from Calgary? No ___ Yes ___

EDUCATION: *(check off highest level only)*
__ No degree, certificate or diploma
If so, please indicate the last grade you completed: ____
__ Secondary (high) school graduation certificate or equivalent
__ Trades certificate or diploma
__ Other non-university certificate or diploma
__ University certificate or diploma below bachelor level
__ Bachelor's degree
__ University certificate or diploma above bachelor level
__ Degree in medicine, dentistry, veterinary medicine or optometry
__ Master's degree
__ Earned doctorate

OCCUPATION:
__ Employed full-time (30 or more hrs/week)
__ Employed part-time (less than 30hrs/week)
__ Unemployed (out of work but looking for work)
__ Student - employed part-time or full-time
__ Student - not employed
__ Retired
__ Homemaker
__ Other *(Specify)*: _____
Position/Job Title: _____

Approximate Net Yearly Income, To the Nearest $1,000: $ _____

ETHNICITY: *(check off all that apply; clarify if necessary)*
__ Aboriginal (Inuit, Métis, North American Indian, etc.)
__ Arab/West Asian (Armenian, Egyptian, Iranian, Lebanese, Moroccan…)
__ Black (African, Haitian, Jamaican, Somali, etc.)
__ Chinese

__ Filipino
__ Japanese
__ Korean
__ Latin American
__ South Asian
__ South East Asian
__ White (Caucasian)
__ Other *(specify)*: _____

RELIGION:

__ Not affiliated with a religious group
__ Affiliated with a religious group

If you are affiliated, please specify:
__ Aboriginal or First Nations spirituality
__ Catholic
__ Muslim
__ Protestant
__ Orthodox
__ Jewish
__ Eastern non-Christian
__ Other *(Specify)*: _____

How Important Is Religion In Your Life?
__ Very important
__ Somewhat important
__ Not very important
__ Not important at all

How Important Is Spirituality In Your Life?
__ Very important
__ Somewhat important
__ Not very important
__ Not important at all

Cannabis Use History and Related Problems Questions

Open-Ended Questioning to Determine Resolution Date (month/year):
On a scale of 1 to 5 (1 = never had a problem, 5 = had a severe problem), have you ever had a marijuana problem? _____On a scale of 1 to 5 (1 = no problem at all, 5 = severe problem), do you currently have a marijuana problem?_____

On approximately which date (i.e., month/year) did you first decide to quit or cut-down/control using marijuana? _____/_____If you cannot give an exact month, try to give a range of two months that capture the date that you started to overcome your marijuana problem, and we will use the midpoint of those two months as your resolution date.(range: _____/_____ to _____/_____; midpoint: _____/_____). How confident are you that this month represents the time in which you first began to resolve your marijuana problem (1 = not at all confident, 5 = extremely confident)? _____

**NOTE: Tell participants that all of the following questions might not apply to them but to please give their best answer.*

1. In the past 3 months, how frequently have you used some form of cannabis?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

2. In the past 12 months, how frequently have you used some form of cannabis (e.g., marijuana, hash)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

3. During the period in which your cannabis problem was the worst, how frequently did you use some form of cannabis?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

4. During the 12 months following your resolution date, how frequently did you use some form of cannabis?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

5. In the next 3 months, how often do you plan/intend to use some form of cannabis? _____
    a. Never
    b. Once or twice
    c. Monthly

d. Weekly
e. Daily or almost daily

6. In the next 12 months, how often do you plan/intend to use some form of cannabis?
   a. Never
   b. Once or twice
   c. Monthly
   d. Weekly
   e. Daily or almost daily

7. At what age did you first try cannabis? _____

8. At what age did you think you might have a problem with cannabis? _____

9. Do any of your current CLOSE friends use cannabis at least weekly? **(circle) YES or NO**

10. On a scale of 1 to 5 (1 = not at all supportive, 5 = extremely supportive) how supportive were your friends in general of your choice to quit/reduce/overcome your cannabis problem once you told them your choice? ____

11. On a scale of 1 to 5 (1 = not at all supportive, 5 = extremely supportive) how supportive were your family members in general of your choice to quit/reduce/overcome your cannabis problem once you told them your choice? ____

12. Do any of your parents use cannabis at least weekly? **(circle) YES or NO**

13. Do any of your siblings use cannabis at least weekly? **(circle) YES or NO**

14. On a scale of 1 to 5 (1 = not apathetic at all, 5 = extremely apathetic), when you had a cannabis problem, how apathetic (i.e., a general attitude of not caring about anything) were you? _____

15. On a scale of 1 to 5 (1 = not motivated at all, 5 = extremely motivated), when you had a cannabis problem, how motivated were you to accomplish your life goals? _____

16. On a scale of 1 to 5 (1 = extremely harmful, 3 = neither harmful/helpful, 5 = extremely helpful), how helpful or harmful would you say that cannabis is (in general) on your ability to achieve your life goals? _____

17. Have you ever been prescribed cannabis by a medical doctor? **(circle) YES or NO**. If yes, for what reason? _____ And if yes, are you currently using that medication? **(circle) YES or NO**

18. Have you ever used cannabis (illicit or legal) to help manage physical pain? **(circle) YES or NO**. Do you currently use cannabis (illicit or legal) to help manage physical pain? **(circle) YES or NO**

19. Have you ever been arrested by the police as a result of an event that was cannabis-related? **(circle) YES or NO.** If yes, how many times? _____

20. On a scale of 1 to 5 (1 = not motivated at all, 5 = extremely motivated), when you first started the process of overcoming your cannabis problem, how motivated were you to change your cannabis use habits (i.e., cut down or quit)? _____

21. On a scale of 1 to 5 (1 = not confident at all, 5 = extremely confident), when you first started the process of overcoming your cannabis problem, how confident were you that you would have the ability to change your cannabis use habits (i.e., cut down or quit)? _____

22. On a scale of 1 to 5 (1 = not at all confident, 5 = extremely confident), how confident are you in your ability to maintain your recovery from your cannabis problem (i.e., remain problem-free)? _____

23. On a scale of 1 to 5 (1 = not at all difficult, 5 = extremely difficult), how difficult do you think it is in general for people to overcome a cannabis problem? _____How difficult was/is it for you personally? _____

24. On a scale of 1 to 5 (1 = not at all harmful, 5 = extremely harmful), how harmful do you believe recreational cannabis use is to society on the whole? _____ How harmful is it to society for individuals to use cannabis for pain- or medically-related purposes? _____

25. On a scale of 1 to 5 (1 = not at all harmful, 5 = extremely harmful), how harmful do you believe cannabis use is for you personally (in general, on average)? ____How likely is it that harmful consequences in your life will occur if you use cannabis more than weekly (1= not at all likely, 5 = extremely likely)? _____

26. On a scale of 1 to 5 (1 = not at all helpful, 5 = extremely helpful), how helpful do you believe cannabis use is for you personally (in general, on average)? ____How likely is it that helpful/good things in your life will occur if you use cannabis more than weekly (1= not at all likely, 5 = extremely likely)? _____

27. On a scale of 1 to 5 (1 =extremely disagree, 5 = extremely agree), to what extent do you disagree or agree with the following statements: (a) If a person has a cannabis problem, the person can overcome the problem on his/her own without professional help____ (b) If a person has a cannabis problem, it is possible for the person to overcome the problem and still use cannabis once in awhile____

28. In general, how harmful is cannabis use relative to other drugs (1 = much less harmful, 2 = less harmful, 3 = same, 4 = more harmful, 5 = much more harmful)?_____To alcohol?____ To cigarettes?___ To gambling? ____ To heroin? ____ To crack/cocaine? _____ To prescription drugs (e.g., oxycodone)?____

29. On a scale of 1 to 5 (1= extremely disagree, 5 = extremely agree), how much do you agree that cannabis should be decriminalized for recreational purposes? ____for pain management ____? How much do you agree that cannabis should be fully legalized?____ How much do you agree that cannabis can be addictive for some people (overall)? _____How much do you agree that cannabis can be physically addictive for some people? _____How much do you agree that cannabis can be psychologically addictive for some people _____?

30. On a scale of 1 to 5 (1 = not at all acceptable, 5 = extremely acceptable), how socially acceptable do you believe that the public views cannabis use is in our society for recreational purposes? _____For pain- or medically-related purposes? _____

31. On a scale of 1 to 5 (1 = no social pressure at all, 5 = extreme social pressure), how much social pressure did you feel to overcome your cannabis problem from your family_____, friends_____, and society on the whole_____?

32. Have you ever experienced intense cravings or a strong desire or urge to use cannabis? **(circle) YES or NO**. How often did you experience intense cravings or a strong desire or urge to use cannabis when you cannabis problem was the WORST? (on a scale of 1 to 5; 1=never, 2=once or twice, 3=monthly, 4=weekly, 5=daily or almost daily)_____

33. How often do you currently experience intense cravings or a strong desire or urge to use cannabis? (on a scale of 1 to 5; 1=never, 2=once or twice, 3=monthly, 4=weekly, 5=daily or almost daily)_____

34. On a scale of 1 to 5, (1 = not at all important, 5 = extremely important), to what degree was cannabis an important part of who you were (i.e., your self-identity) when you had a cannabis problem? ___ To what degree is cannabis still an important part of who you are? ____ To what extent do you currently think of yourself as a cannabis user (1 = not at all, 5 = extremely much)? ____

Cannabis Item Questions Adapted from the CIDI

Cannabis Abuse Questions

Q1a. Was there **ever** a time in your life when your use of MARIJUANA frequently interfered with your work or responsibilities at school, on a job, or at home? (KEY PHRASE: interfered with your work)
YES .... CIRCLE "INTERFERED WITH YOUR WORK" ...GO TO Q1b.
NO
DK
REF

Q1b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q2a. Was there **ever** a time in your life when your use of MARIJUANA caused arguments or other serious or repeated problems with your family, friends, neighbors, or coworkers? (NO KEY PHRASE)
YES... GO TO Q2b and Q2c.
NO
DK
REF

Q2b. Did you continue to use MARIJUANA even though it caused problems with these people? (KEY PHRASE: caused problems with family or friends)
YES... CIRCLE "CAUSED PROBLEMS WITH FAMILY OR FRIENDS"
NO
DK
REF

Q2c. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q3. Were there **ever** times in your life when you were often under the influence of MARIJUANA in situations where you could have gotten hurt, for example when riding a bicycle, driving, operating a machine, or anything else? (KEY PHRASE: occurred in situations where you could have gotten hurt)
YES... CIRCLE "OCCURRED IN SITUATIONS WHERE YOU COULD HAVE GOTTEN HURT"... GO TO Q3b.
NO
DK
REF

Q3b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q4. Were you **ever** arrested or stopped by the police more than once because of driving under the influence of MARIJUANA or because of your behavior while you were under the influence of MARIJUANA? (KEY PHRASE: resulted in problems with the police)
YES... CIRCLE "RESULTED IN PROBLEMS WITH THE POLICE" ... GO TO Q4b.
NO

DK
REF

Q4b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

INTERFERED WITH YOUR WORK	CAUSED PROBLEMS WITH FAMILY OR FRIENDS	OCCURRED IN SITUATIONS WHERE YOU COULD HAVE GOTTEN HURT	RESULTED IN PROBLEMS WITH THE POLICE

Does this participant meet DSM Lifetime Cannabis Abuse
YES ____ NO_____

Does this participant NOT meet DSM Current Cannabis Abuse

YES ____ NO_____

Cannabis Dependence Questions

Q1a. Did you **ever** need larger amounts of MARIJUANA to get an effect, or did you ever find that you could no longer get high on the amount you used to use? (KEY PHRASE: you needed larger amounts of MARIJUANA to get an effect)
YES... CIRCLE "YOU NEEDED TO TAKE LARGER AMOUNTS TO GET AN EFFECT" ... GO TO Q1b.
NO
DK
REF

Q1b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q2a. Did you **ever** have time when you stopped, cut down or went without using MARIJUANA and then experienced withdrawal symptoms? (KEY PHRASE: you experienced withdrawal symptoms from MARIJUANA)

(NOTE: here are some examples of withdrawal symptoms to tell participants **only if they ask**: irritability, anger, aggression, nervousness, anxiety, sleep difficulty, decreased appetite or weight loss, restlessness, depressed mood, stomach pain, shakiness/tremors, sweating, fever, chills, headache)

YES... CIRCLE "YOU EXPERIENCED WITHDRAWAL SYMPTOMS" ... GO TO Q2b.
NO
DK
REF

Q2b. How recently did you have these problems with withdrawal – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q3a. Did you **ever** have times when you used MARIJUANA to keep from having withdrawal symptoms? (KEY PHRASE: you used MARIJUANA to keep from feeling withdrawal problems)
YES... CIRCLE "YOU EXPERIENCED WITHDRAWAL SYMPTOMS" ...GO TO Q3b.
NO
DK
REF

Q3b. How recently did you have these problems with withdrawal – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q4a. Did you **ever** have times when you used MARIJUANA even though you planned not to or when you used a lot more than you intended? (KEY PHRASE: you used when you planned not to, or you used more than you planned)
YES... CIRCLE "YOU NEEDED TO TAKE LARGER AMOUNTS OR USED OVER A LONGER PERIOD THAN WAS INTENDED" ... GO TO Q4b.
NO
DK
REF

Q4b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q5a. Were there **ever** times when you used MARIJUANA more frequently or for more days in a row than you intended? (KEY PHRASE: you used more frequently than you intended)
YES ... CIRCLE "YOU NEEDED TO TAKE LARGER AMOUNTS OR USED OVER A LONGER PERIOD THAN WAS INTENDED" ... GO TO Q5b.
NO
DK
REF

Q5b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q6a. Were there **ever** times when you tried to stop or cut down on your use of MARIJAUNA and found that you were not able to do so? (KEY PHRASE: you tried but weren't able to stop or cut down using)
YES... CIRCLE "YOU TRIED BUT WEREN'T ABLE TO STOP OR CUT DOWN USING"... GO TO Q6b.
NO
DK
REF

Q6b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?
PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q7a. Did you **ever** have several days or more when you spent so much time using or recovering from the effects of MARIJUANA use that you had little time for anything else? (KEY PHRASE: you spent periods of several days doing little more than using or getting over the effects of using)

YES... CIRCLE "YOU SPENT PERIODS OF SEVERAL DAYS DOING LITTLE MORE THAN USING OR GETTING OVER THE EFFECTS OF USING" ... GO TO Q7b.

NO
DK
REF

Q7b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?

PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q8a. Did you **ever** have time when you gave up or greatly reduced important activities because of your MARIJUANA use – like sports, work, or seeing friends and family? [KEY PHRASE: you gave up or reduced important activities because of your use]

YES... CIRCLE "YOU GAVE UP OR REDUCED IMPORTANT ACTIVITIES BECAUSE OF YOUR USE"... GO TO Q8b.

NO
DK
REF

Q8b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?

PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

Q9a. Did you **ever** continue to use MARIJUANA when you knew you had a serious physical or emotional problem that might have been caused by or made worse by using MARIJUANA? (KEY PHRASE: you continued to use even though it caused or worsened physical or emotional problems)

YES... CIRCLE "YOU CONTINUED TO USE EVEN THOUGH IT CAUSED OR WORSENED PHYSICAL OR EMOTIONAL PROBLEMS "... GO TO Q9b.

NO
DK
REF

Q9b. How recently did you have this problem – in the past 30 days, 2 to 6 months ago, 7 to 12 months ago, or more than 12 months ago?

PAST 30 DAYS
2 TO 6 MONTHS AGO
7 TO 12 MONTHS AGO
>12 MONTHS AGO
DK
REF

YOU NEEDED TO TAKE LARGER AMOUNTS TO GET AN EFFECT	YOU EXPERIENCED WITHDRAWAL SYMPTOMS	YOU NEEDED TO TAKE LARGER AMOUNTS OR USED OVER A LONGER PERIOD THAN WAS INTENDED	YOU TRIED BUT WEREN'T ABLE TO STOP OR CUT DOWN USING
YOU SPENT PERIODS OF SEVERAL DAYS DOING LITTLE MORE THAN USING OR GETTING OVER THE EFFECTS OF USING	YOU GAVE UP OR REDUCED IMPORTANT ACTIVITIES BECAUSE OF YOUR USE	YOU CONTINUED TO USE EVEN THOUGH IT CAUSED OR WORSENED PHYSICAL OR EMOTIONAL PROBLEMS	

Does this participant meet DSM Lifetime Cannabis Dependence
YES _____ NO_____
Does this participant NOT meet DSM Current Cannabis Dependence
YES _____ NO_____

Stea 12- Participant ID _____

Reasons for Resolution

Open-Ended Questioning: Please describe the reasons that led you to overcome your marijuana problem (either by quitting completely, or cutting-down/controlling your use of marijuana, or both).

"What were you thinking at the time when you decided to change?" (from Miller & Smith, 2010)

PROBE RESPONSES USING ALL OF THE FOLLOWING PROMPTS:

- "Can you please tell me more about that?"
- Did you intend/plan to quit completely, or did you intend/plan to reduce your use of marijuana? Why?

- On a scale of 1 to 5 (1 = I did not at all plan to quit, 5 = I 100% planned to quit), at the time you decided to change, how much did you PLAN TO QUIT/ABSTAIN COMPLETELY from marijuana in order to overcome your marijuana problem? _____ At the time you decided to change, how MOTIVATED WERE YOU TO QUIT/ABSTAIN COMPLETELY from marijuana in order to overcome your marijuana problem (1 = not motivated at all, 5 = extremely motivated)? _____
- Do you think you consciously made a decision to overcome your marijuana problem, or do you think it just sort of happened? Explain.

- On a scale of 1 to 5 (1 = completely out of awareness (unconscious), 5 = completely conscious), to what extent was your decision to overcome your marijuana problem a conscious choice? _____

- Did any particular life events play a role in your decision to overcome your marijuana problem?

Checklist:

Now I'm going to give you a checklist of reasons that might lead some people to overcome their marijuana problem. Some reasons might overlap. Using the following scale, please rate the extent to which each reason affected your decision to quit/cut-down/control your use of marijuana.

1 - - - - - - - - - - 2 - - - - - - - - - - - 3 - - - - - - - - - - - 4 - - - - - - - - - - 5

No effect at all **Somewhat affected** **Greatly affected**

Reasons

(from Cunningham et al., 1994, 1995; Hodgins & el-Guebaly, 2000; Sobell et al., 1993; Toneatto et al., 2008)

You were having financial problems _____
You wanted to feel better emotionally (e.g., feel less depressed/anxious) _____
Feeling like you hit rock bottom _____
You wanted to overcome your marijuana problem for your family _____
Confrontation about your marijuana problem (e.g., from a friend or family member) _____
You weighed the pros and cons of changing vs. not changing, and then made your decision _____
You experienced a humiliating event _____
You experienced a traumatic event _____
Your marijuana use caused problems between you and your significant other _____
You were having work-related problems _____
You were having physical health problems _____
Religious involvement _____
You were having legal problems _____
You wanted to, or were, decreasing your use of other drugs/addictive behaviours _____
You wanted to have a major life-style change _____
Incompatible with self-image (i.e., you didn't want to "see" yourself as a cannabis user) _____

(additional reasons from Ellingstad et al., 2006)

You began to view marijuana more negatively _____
You thought about how marijuana was affecting you negatively _____
You had social influence to quit from friends, family, significant other _____
You had a fear of having legal problems _____
Marijuana was too costly _____

(additional reasons from Hughes et al. 2008)

You wanted to become more motivated/have more energy _____
You were having health concerns _____

Stea 14- Participant ID _____

Actions Taken

Open-Ended Questioning: Did you consciously do anything to help you overcome your marijuana problem?

PROBE RESPONSES USING ALL OF THE FOLLOWING PROMPTS:
- "Can you please tell me more about that?"
- Did you quit cold turkey or did you gradually cut down your use of marijuana? Explain.

- Did you quit or reduce/control your use of marijuana at particular times? E.g., certain times of the day (e.g., "wake and bake" in the morning, or before bed) or during certain days (e.g., school or work days)?

- If you could make a list of the things that you did to help you overcome your marijuana problem, what things would be on your list?

- Did you PLAN to either increase or decrease (or quit) your use of other substances (e.g., alcohol, tobacco, caffeine, sleeping aids/pills, illicit drugs, salvia) or other addictive behaviours (e.g., gambling, shopping, sex) to help you overcome your marijuana problem? Explain...

Stea 15- Participant ID _____

Modified Version of Processes of Change Questionnaire

NOTE TO INTERVIEWER: PLEASE ALLOW PARTICIPANT TO FILL OUT THIS QUESTIONNAIRE ON THEIR OWN

Instructions: Using the following scale, please rate each item according to how much it helped you change your marijuana use.

1 - - - - - - - - - - 2 - - - - - - - - - - - 3 - - - - - - - - - - - 4 - - - - - - - - - - 5

Never Seldom Occasionally Frequently Repeatedly

1. I recalled information people had given to me on quitting/cutting-down marijuana. _____
2. Information from the media (magazines, newspaper, radio, TV) about marijuana seemed to catch my eye. _____
3. I thought about serious financial problems which may result from my marijuana use. _____
4. I got upset when I thought about my marijuana use. _____
5. I was ashamed of some of my behaviours while "high" on marijuana. _____
6. I struggled with the issue that I don't want to see myself as dependent on marijuana. _____
7. I was frightened by some of the situations I found myself in as a result of my marijuana use. _____
8. I felt frightened by the strength of my urges to use marijuana. _____
9. Dramatic portrayals of the dangers of marijuana use affected me emotionally. _____
10. I noticed advertisements and/or news stories on TV or the Internet about how society is trying to help people to not use marijuana. _____
11. I began to notice that public awareness of marijuana use was increasing. _____
12. I noticed that some people who quit/cut-down marijuana made known their desire to not be pressed into using marijuana. _____
13. I stopped to think about how my marijuana use hurt people around me. _____
14. I had strong feelings about how much my marijuana use hurt the people I care about. _____
15. I realized that my marijuana use caused problems for other people. _____
16. I had someone who listened when I needed to talk about my marijuana use. _____
17. I had someone to count on when I was having marijuana-related problems. _____
18. I had someone who tried to share their personal experiences of marijuana use with me. _____
19. I avoided people that I had used marijuana with. _____
20. I controlled my access to marijuana. _____
21. I stayed away from places generally associated with my marijuana use. _____
22. I kept myself busy to reduce my urge to use marijuana. _____
23. When I was tempted to use marijuana, I tried to distract myself by doing or thinking of something else. _____
24. I found it helpful to do something physically active to keep from using marijuana. _____
25. I spent time with people who rewarded me for not using marijuana. _____
26. Someone in my life tried to make me feel good when I didn't use marijuana. _____
27. I rewarded myself for not using marijuana. _____
28. I made a commitment with myself to not turn to marijuana at times when I felt the urge. _____
29. I told myself that if I tried hard enough, I could keep from using marijuana. _____
30. I told myself that I did not need to use marijuana to feel good about myself. _____

Stea 16- Participant ID _____

Maintenance Factors

Open-Ended Questioning: Describe what factors helped you to avoid a relapse or to avoid a return to having marijuana problems after you overcame your problem. In other words, describe what things helped you to remain problem-free from marijuana.

PROBE RESPONSES USING THE FOLLOWING PROMPTS:

- "Can you please tell me more about that?"
- Did your use of alcohol increase, decrease, or stay the same after you resolved your marijuana problem? _____ Cigarettes? _____ Caffeine? _____ Sleeping aids/pills? _____Gambling? _____ Salvia? _____ Psychoactive prescription pills? _____ Ecstasy? _____ Crack/Cocaine? _____ Mushrooms? _____ LSD? _____ Heroin? _____ Meth? _____Other drugs-which ones? _____

- How many times would you say that you returned to problematic marijuana use (i.e., relapsed) after you had already begun to overcome your problem? _____ Overall, how guilty did you feel when you returned to problematic use (1 = not at all guilty, 5 = extremely guilty)? ____ Overall, to what extent did you feel a sense of loss of control when you returned to problematic use (1 = no sense of loss of control, 5 = extreme sense of loss of control)? ____ What were the situations that caused you to return to problematic marijuana use? Explain.

- Have you ever been in a situation where you had initially cut-down/reduced your marijuana use and then you eventually quit marijuana completely? (circle) YES OR NO How many times? _____
Why did you decide to change from cutting-down to quitting? Explain.

- Has the opposite happened; have you ever been in a situation where you initially had quit marijuana completely and then started to use marijuana again occasionally (but still didn't have a problem with it)? (circle) YES OR NO. How many times? _____ Why did you decide to change from quitting to using occasionally? Explain.

Checklist:

Now I'm going to give you a checklist of things that some people might have found to help them in remaining problem-free from marijuana. Using the following scale, please rate the extent to which each factor helped/helps you to remain problem-free from marijuana:

1 - - - - - - - - 2 - - - - - - - - - 3 - - - - - - - - - 4 - - - - - - - - 5

No help **Helped somewhat** **Helped very much**

Factors

Past marijuana problems recalled (i.e., you think about your past marijuana problems) _____
Self-control/will power (i.e., you use your self-control/will power) _____
Financial status change (i.e., you have less money to spend on marijuana) _____
Respect gained from other people (i.e., you don't want to lose respect) _____
Goal commitment (i.e., commitment to staying problem-free) _____
Sense of accomplishment _____
Personal pride (i.e., you don't want to hurt your personal pride) _____
Recreational/leisure activities change _____
Social life activities change _____
Family support _____
Friends support _____
Significant other support _____
Change in friends _____
Marijuana Anonymous _____
Other self-help group (e.g., Alcoholics Anonymous) ____
Self-help materials (e.g., books, internet websites) ____
Concern about worsening physical health _____
Wanting to maintain better physical health _____
Major positive life-style change (i.e., you have had a major positive lifestyle change and want to maintain it) _____
Religious influence _____
You have decreased your nicotine use____
You have increased your nicotine use____
You have decreased your alcohol consumption____
You have increased your alcohol consumption ____
You have decreased other drug use____
You have increased other drug use ____
Residence change _____
Change in jobs _____
Change in diet _____
Employer's support _____

Perceived Barriers to Seeking Treatment

Have you EVER received at least one session of formal/professional treatment (e.g., talking to a physician, counsellor or therapist, calling a helpline, or receiving medication) for a marijuana problem? (circle) YES OR NO. IF "YES", ASK: "What kind of treatment(s)? _____ From whom?_____ How many sessions did you receive in total? _____ How many separate occasions did you receive treatment? _____When? _____ Was treatment(s) helpful (1=not at all, 5= extremely)? ____Why or why not?

Are you currently receiving formal/professional treatment for a marijuana problem? (circle) YES OR NO. IF "YES", ASK: "What kind of treatment(s)? _____ From whom?_____ How many sessions have you received in total? _____ How many sessions do you plan to receive? _____ Is treatment helpful (1=not at all, 5=extremely)?_____ Why or why not? _____

Have you EVER used self-help materials (e.g., self-help books, internet websites) to help overcome your marijuana problem? (circle) YES OR NO. IF "YES", what kinds? _____ How did you discover them (e.g., on your own, they were recommended by a professional)? _____. When? _____ Were they helpful (1=not at all, 5= extremely)? _____ Why or why not? _____ Are you CURRENTLY using marijuana-related self-help materials? (circle) YES OR NO. IF "YES", what kinds? _____ How did you discover them (e.g., on your own, they were recommended by a professional)? _____. Are they helpful (1=not at all, 5= extremely)?_____ Why or why not? _____

Have you ever received a session of formal/professional treatment for any other mental health or addiction problem? (circle) YES OR NO. IF YES, ask the same formal treatment questions above (i.e., which mental health or addiction problem, what kind of treatment(s), how many sessions, how many times treatment sought, when treatment was sought, helpfulness of past treatment rating, current treatment(s), and helpfulness rating of current treatment).

Have you ever used self-help materials (e.g., self-help books, internet websites) treatment for any other mental health or addiction problem? (circle) YES OR NO. IF YES, ask the same self-help questions above (i.e., which mental health or addiction problem, how were materials discovered, what kind(s), when it occurred, helpfulness rating, current use, and helpfulness rating of current use).

(for participants that responded YES to seeking formal treatment for a marijuana problem) Was there anything that delayed you, or 'got in the way' of your willingness to seek professional assistance sooner for your marijuana problem? What is the single biggest factor that delayed you/'got in your way' from seeking professional help sooner?

Stea 19- Participant ID _____

(for participants that responded NO to seeking formal treatment) What are some reasons that you decided not to seek professional treatment for your marijuana problem? Did anything prevent/stop you? What was the single biggest factor that prevented you from seeking help?

Here are some potential reasons that people might not seek formal/professional treatment for their marijuana problem. Using the following scale, IN GENERAL, please rate how much each reason PREVENTED YOU from seeking help, or 'GOT IN YOUR WAY'/DELAYED YOU from seeking help:

1 - - - - - - - - 2 - - - - - - - - - 3 - - - - - - - - - 4 - - - - - - - - 5

NOT AT ALL prevented you/" got in your way' **VERY MUCH prevented you/"got in your way'**

Reasons (informed by Pulford et al., 2009, and Suurvali et al., 2009)

- Believing there wasn't a problem _____
- Unwillingness to admit a problem _____
- Believing that help was not needed _____
- Wanting to resolve problem alone _____
- Being too proud to seek help _____
- Planning to get help but not getting around to it _____
- Feeling ashamed or embarrassed for yourself or family _____
- Not being aware that treatment was available _____
- Not being able to get the service at the time or place wanted _____
- Language concerns _____
- Thinking the service would not relate to your culture _____
- Not wanting to use a telephone service _____
- Not wanting to use a face to face service _____
- Difficulty being able to attend a face to face service _____
- Not wanting to use an online service _____
- Thinking that services would treat you like an addict/mentally ill _____
- Concerns about your confidentiality _____
- Having too many commitments to seek help _____
- Being too overwhelmed by other problems to seek help _____
- Being too busy trying to address other problems _____
- Not having enough encouragement from friends, family, or community to seek help _____
- Feeling pressured by friends, family or community to continue using marijuana _____
- Having had bad experiences of seeking help for marijuana problems in the past _____
- Having had bad experiences of seeking help for other problems in the past _____

Stea 20- Participant ID _____

Alcohol, Smoking, and Substance Involvement Screening Test, Cannabis Section (ASSIST)

NOTE TO INTERVIEWER: ORALLY ADMINISTER THIS QUESTIONNAIRE

1. In the past three months, how often have you used cannabis (marijuana, pot, grass, hash, etc.)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily
2. During the past three months, how often have you had a strong desire or urge to use cannabis (marijuana, pot, grass, hash, etc.)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily
3. During the past three months, how often has your use of cannabis (marijuana, pot, grass, hash, etc.) led to health, social, legal or financial problems?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily
4. During the past three months, how often have you failed to do what was normally expected of you because of your use of cannabis (marijuana, pot, grass, hash, etc.)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily
5. Has a friend or relative or anyone else <u>ever</u> expressed concern about your use of cannabis (marijuana, pot, grass, hash, etc.)?
    a. No, Never
    b. Yes, in the past 3 months
    c. Yes, but not in the past 3 months
6. Have you <u>ever</u> tried and failed to control, cut down, or stop using cannabis (marijuana, pot, grass, hash, etc.)?
    a. No, Never
    b. Yes, in the past 3 months
    c. Yes, but not in the past 3 months

Stea 21- Participant ID _____

The Severity of Dependence Scale (cannabis)

PAST 12 MONTH and PAST 3 MONTH VERSION

NOTE TO INTERVIEWER: ORALLY ADMINISTER THIS QUESTIONNAIRE

	During the past 12 months...	*During the past 3 months...*
1. Did you think your use of marijuana was out of control?	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)
2. Did the prospect of missing a "high" or a smoke (or "session") make you anxious or worried?	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)
3. Did you worry about your use of marijuana?	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)
4. Did you wish you could stop?	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)
5. How difficult did you find it to stop or go without marijuana?	Not difficult (0) Quite difficult (1) Very difficult (2) Impossible (3)	Not difficult (0) Quite difficult (1) Very difficult (2) Impossible (3)

Stea 22- Participant ID _____

Marijuana Problems Scale (Stephens et al.): MODIFIED VERSION (lifetime) and REAL VERSION (past 3 months)

NOTE TO INTERVIEWER: ORALLY ADMINISTER THIS QUESTIONNAIRE

The following are different types of problems you may have experienced as a result of smoking **marijuana**. Please let me know whether this has **ever been a problem for you during your lifetime AND whether this has been a problem for you in the past 90 days.**

	Ever been a problem for you during your LIFETIME?			**Been a problem for you in the past 90 days (3 months)?**		
Has Marijuana use caused you:	**No Problem**	**Minor Problem**	**Serious Problem**	**No Problem**	**Minor Problem**	**Serious Problem**
1. Problems between you and your partner	0	1	2	0	1	2
2. Problems in your family	0	1	2	0	1	2
3. To neglect your family	0	1	2	0	1	2
4. Problems between you and your friends	0	1	2	0	1	2
5. To miss days at work or miss classes	0	1	2	0	1	2
6. To lose a job	0	1	2	0	1	2
7. To have lower productivity	0	1	2	0	1	2
8. Medical problems	0	1	2	0	1	2
9. Withdrawal symptoms	0	1	2	0	1	2
10. Blackouts or flashbacks	0	1	2	0	1	2
11. Memory loss	0	1	2	0	1	2
12. Difficulty sleeping	0	1	2	0	1	2
13. Financial difficulties	0	1	2	0	1	2
14. Legal problems	0	1	2	0	1	2
15. To have lower energy level	0	1	2	0	1	2
16. To feel bad about your use	0	1	2	0	1	2
17. Lowered self-esteem	0	1	2	0	1	2
18. To procrastinate	0	1	2	0	1	2
19. To lack self-confidence	0	1	2	0	1	2

Stea 23- Participant ID _____

Marijuana Motives Measure

NOTE TO INTERVIEWER: PLEASE ALLOW PARTICIPANT TO FILL OUT THIS QUESTIONNAIRE ON THEIR OWN

Please consider all the times that you have used cannabis and indicate how often you have used cannabis for each of the following reasons. Please provide an answer using the following scale:

1 - - - - - - - - 2 - - - - - - - - - 3 - - - - - - - - - 4 - - - - - - - - 5

Almost never/never Sometimes Almost always/always

1. To forget my worries ____
2. Because my friends pressure me to use marijuana ____
3. Because it helps me to enjoy a party ____
4. Because it helps me when I feel depressed or nervous ____
5. To be sociable ____
6. To cheer me up when I am in a bad mood ____
7. Because I like the feeling ____
8. So that others won't kid me about not using marijuana ____
9. Because it's exciting ____
10. To get high ____
11. Because it makes social gatherings more fun ____
12. To fit in with the group I like ____
13. Because it gives me a pleasant feeling ____
14. Because it improves parties and celebrations ____
15. Because I feel more self-confident and sure of myself ____
16. To celebrate a special occasion with friends ____
17. To forget about my problems ____
18. Because it's fun ____
19. To be liked ____
20. So I won't feel left out ____
21. To know myself better ____
22. Because it helps me be more creative and original ____
23. To understand things differently ____
24. To expand my awareness ____
25. To be more open to experiences ____

Stea 24- Participant ID _____

The SPQ-B

NOTE TO INTERVIEWER: PLEASE ALLOW PARTICIPANT TO FILL OUT THIS QUESTIONNAIRE ON THEIR OWN

Please answer each item by indicating Y (Yes) or N (No). Answer all items even if unsure of your answer.

1. _____ People sometimes find me aloof and distant.
2. _____ Have you ever had the sense that some person or force is around you, even though you cannot see anyone?

3. _____ People sometimes comment on my unusual mannerisms and habits.
4. _____ Are you sometimes sure that other people can tell what you are thinking?
5. _____ Have you ever noticed a common event or object that seemed to be a special sign for you?

6. _____ Some people think that I am a very bizarre person.
7. _____ I feel I have to be on my guard even with friends.
8. _____ Some people find me a bit vague and elusive during a conversation.
9. _____ Do you often pick up hidden threats or put-downs from what people say or do?

10. _____ When shopping do you get the feeling that other people are taking notice of you?

11. _____ I feel very uncomfortable in social situations involving unfamiliar people.
12. _____ Have you had experiences with astrology, seeing the future, UFOs, ESP or a sixth sense?

13. _____ I sometimes use words in unusual ways.
14. _____ Have you found that it is best not to let other people know too much about you?

15. _____ I tend to keep in the background on social occasions.
16. _____ Do you ever suddenly feel distracted by distant sounds that you are not normally aware of?

17. _____ Do you often have to keep an eye out to stop people from taking advantage of you?

18. _____ Do you feel that you are unable to get "close" to people?
19. _____ I am an odd, unusual person.
20. _____ I find it hard to communicate clearly what I want to say to people.
21. _____ I feel very uneasy talking to people I do not know well.
22. _____ I tend to keep my feelings to myself.

Substance Use Disorder (other than marijuana) Questions Adapted from the CIDI

NOTE TO INTERVIEWER: Alcohol counts as a drug, but NOT nicotine for these questions! Tell this to the participant...

Substance Abuse Questions

Q1. Was there **ever** a time in your life when your use of DRUGS OTHER THAN MARIJUANA frequently interfered with your work or responsibilities at school, on a job, or at home? (KEY PHRASE: interfered with your work)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q2a. Was there **ever** a time in your life when your use of DRUGS OTHER THAN MARIJUANA caused arguments or other serious or repeated problems with your family, friends, neighbors, or coworkers? (NO KEY PHRASE)
YES... GO TO Q2b
NO
DK
REF

Q2b. Did you continue to use THESE/THIS DRUG even though it caused problems with these people? (KEY PHRASE: caused problems with family or friends)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q3. Were there **ever** times in your life when you were often under the influence of DRUGS OTHER THAN MARIJUANA in situations where you could have gotten hurt, for example when riding a bicycle, driving, operating a machine, or anything else? (KEY PHRASE: occurred in situations where you could have gotten hurt)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q4. Were you **ever** arrested or stopped by the police more than once because of driving under the influence of DRUGS OTHER THAN MARIJUANA or because of your behavior while you were under the influence of DRUGS OTHER THAN MARIJUANA? (KEY PHRASE: resulted in problems with the police)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Substance Dependence Questions

Q1. Did you **ever** need larger amounts of DRUGS OTHER THAN MARIJUANA to get an effect, or did you ever find that you could no longer get high on the amount you used to use? (KEY PHRASE: you needed larger amounts of DRUGS OTHER THAN MARIJUANA to get an effect)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q2. Did you **ever** have times when you stopped, cut down or went without using DRUGS OTHER THAN MARIJUANA and then experienced withdrawal symptoms? (KEY PHRASE: you experienced withdrawal symptoms from DRUGS OTHER THAN MARIJUANA)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q3. Did you **ever** have times when you used DRUGS OTHER THAN MARIJUANA to keep from having withdrawal symptoms? (KEY PHRASE: you used MARIJUANA to keep from feeling withdrawal problems)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q4. Did you **ever** have times when you used DRUGS OTHER THAN MARIJUANA even though you planned not to or when you used a lot more than you intended? (KEY PHRASE: you used when you planned not to, or you used more than you planned)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q5. Were there **ever** times when you used DRUGS OTHER THAN MARIJUANA more frequently or for more days in a row than you intended? (KEY PHRASE: you used more frequently than you intended)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q6. Were there **ever** times when you tried to stop or cut down on your use of DRUGS OTHER THAN MARIJAUNA and found that you were not able to do so? (KEY PHRASE: you tried but weren't able to stop or cut down using)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q7. Did you **ever** have several days or more when you spent so much time using or recovering from the effects of DRUGS OTHER THAN MARIJUANA that you had little time for anything else? (KEY PHRASE: you spent periods of several days doing little more than using or getting over the effects of using)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q8. Did you **ever** have times when you gave up or greatly reduced important activities because of DRUGS OTHER THAN MARIJUANA – like sports, work, or seeing friends and family? [KEY PHRASE: you gave up or reduced important activities because of your use]
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Q9. Did you **ever** continue to use DRUGS OTHER THAN MARIJUANA when you knew you had a serious physical or emotional problem that might have been caused by or made worse by using THESE/THIS DRUG? (KEY PHRASE: you continued to use even though it caused or worsened physical or emotional problems)
CIRCLE: YES NO DK REF

If yes, which drugs?_____

Cigarette Smoking Questions

1. In the past 3 months, how frequently have you smoked cigarettes? _____
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

2. Have you ever tried to stop, cut down, or control your cigarette smoking? Circle YES or NO

Gambling Questions

NODS CLiP Questions:

A. Have you ever tried to stop, cut down, or control your gambling? Circle YES or NO
B. Have you ever lied to family members, friends, or others about how much you gamble or how much money you lost on gambling? Circle YES or NO
C. Have there ever been periods lasting 2 weeks or longer when you spent a lot of time thinking about your gambling experiences or planning out future gambling ventures or bets? Circle YES or NO

Problem Gambling Severity Index (PGSI) from the Canadian Problem Gambling Index

NOTE TO INTERVIEWER: PLEASE ALLOW PARTICIPANT TO FILL OUT THIS QUESTIONNAIRE ON THEIR OWN

Some of the following questions about gambling may not apply to you but please attempt to be as accurate as possible. Please circle the answer that best describes your experiences over the past 12 months.

1. How often have you bet more than you could really afford to lose?
    a. Never
    b. Sometimes
    c. Most of the time
    d. Almost always
    e. Don't know

2. How often have you needed to gamble with larger amounts of money to get the same feeling of excitement?
    a. Never
    b. Sometimes
    c. Most of the time
    d. Almost always
    e. Don't know

3. When you gambled, how often did you go back another day to try to win back the money you lost?
    a. Never
    b. Sometimes
    c. Most of the time
    d. Almost always
    e. Don't know

4. How often have you borrowed money or sold anything to get money to gamble?
    a. Never
    b. Sometimes
    c. Most of the time
    d. Almost always
    e. Don't know

5. How often have you felt that you might have a problem with gambling?
    a. Never
    b. Sometimes
    c. Most of the time
    d. Almost always
    e. Don't know

6. How often has your gambling caused you any health problems, including stress or anxiety?
    a. Never
    b. Sometimes
    c. Most of the time
    d. Almost always
    e. Don't know

7. How often have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?
    a. Never
    b. Sometimes
    c. Most of the time
    d. Almost always
    e. Don't know

8. How often has your gambling caused any financial problems for you or your household?
    a. Never
    b. Sometimes
    c. Most of the time
    d. Almost always
    e. Don't know

9. How often have you felt guilty about the way you gamble or what happens when you gamble?
    a. Never
    b. Sometimes
    c. Most of the time
    d. Almost always
    e. Don't know

Stea 29- Participant ID _____

Alcohol Questions

1. Have you ever tried to stop, cut down, or control your alcohol use? **Circle YES or NO**

The Alcohol Use Disorders Identification Test (AUDIT)

NOTE TO INTERVIEWER: PLEASE ALLOW PARTICIPANT TO FILL OUT THIS QUESTIONNAIRE ON THEIR OWN

Some of the following questions about alcohol use may not apply to you but please attempt to be as accurate as possible. Please circle the answer that best describes your experiences.

1. How often do you have a drink containing alcohol?
    a. Never
    b. Monthly or less
    c. 2-4 times a month
    d. 2-3 times a week
    e. 4 or more times a week
2. How many drinks containing alcohol do you have on a typical day when you are drinking?
    a. 1 or 2
    b. 3 or 4
    c. 5 or 6
    d. 7 to 9
    e. 10 or more
3. How often do you have six or more drinks on one occasion?
    a. Never
    b. Less than monthly
    c. Monthly
    d. Weekly
    e. Daily or almost daily
4. How often during the last year have you found that you were not able to stop drinking once you had started?
    a. Never
    b. Less than monthly
    c. Monthly
    d. Weekly
    e. Daily or almost daily
5. How often during the last year have you failed to do what was normally expected of you because of drinking?
    a. Never
    b. Less than monthly
    c. Monthly
    d. Weekly
    e. Daily or almost daily
6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?
    a. Never
    b. Less than monthly
    c. Monthly

   d. Weekly
   e. Daily or almost daily
7. How often during the last year have you had a feeling of guilt or remorse after drinking?
   a. Never
   b. Less than monthly
   c. Monthly
   d. Weekly
   e. Daily or almost daily
8. How often during the last year have you been unable to remember what happened the night before because of your drinking?
   a. Never
   b. Less than monthly
   c. Monthly
   d. Weekly
   e. Daily or almost daily
9. Have you or someone else been injured because of your drinking?
   a. No
   b. Yes, but not in the last year
   c. Yes, during the last year
10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?
   a. No
   b. Yes, but not in the last year
   c. Yes, during the last year

Stea 33- Participant ID _____

The following questions are about the period of depression you just described (the way you felt during the WEEK IN YOUR LIFE YOU FELT THE MOST DEPRESSED).

1) Did you use marijuana at least once during that week of depression? Please circle: **(Yes) or (No)**

2) Do you think your use of marijuana made your depression worse? Please circle: **(Yes) or (No)**

3) Do you think your use of marijuana made your depression better? Please circle: **(Yes) or (No)**

4) Do you think your use of marijuana caused your depression? Please circle: **(Yes) or (No)**

Stea 34- Participant ID _____

Advice for Other Cannabis Abusers and Perception of Etiology

Advice Questions: What advice would you give to help another person with a marijuana problem?

Would you recommend another person with a marijuana problem to reduce/cut back marijuana, or would you recommend that he/she quit marijuana completely? Please explain.

Would you recommend professional treatment or self-help materials to another person with a marijuana problem? Why or why not?
PROFESSIONAL TREATMENT: (circle) YES OR NO.

SELF-HELP MATERIALS: (circle) YES OR NO.

Would you recommend to another person with a marijuana problem that he/she try to overcome the problem on their own without professional assistance? (circle) YES OR NO. Why or why not?

Etiology Questions: Many people who try marijuana develop a problem, and many people who try marijuana do not develop a problem. What is your understanding of why you in particular developed a marijuana problem?

Some people take longer than others to overcome their marijuana problem, while some people may never overcome their problem. What is your understanding of why you in particular were able to overcome your marijuana problem?

Appendix E: Debriefing Form

UNIVERSITY OF CALGARY

Debriefing Form

Research Project Title: Recovery from Cannabis Use Disorders

Primary Investigator: Jonathan N. Stea, M.Sc., Ph.D. Candidate (Clinical Psychology), Department of Psychology, University of Calgary, phone: (403)-210-9500, email to contact for study-related inquiries: Calgary-Marijuana-Study@ucalgary.ca, personal email: jnstea@ucalgary.ca

Co-Investigator: Syler Hayes, Department of Psychology, University of Calgary, phone: (403)-210-9500, email: swhayes@ucalgary.ca

Supervisor: David C. Hodgins, Ph.D., Professor, Department of Psychology, University of Calgary, phone: (403)-220-3371, email: dhodgins@ucalgary.ca

Background and Study Purpose: Cannabis is the most widely used illicit drug in the world. There remains considerable debate both in the media and the scientific community regarding the harms associated with cannabis use and its addictive properties. While cannabis use might be considered less harmful relative to other substances, there is little doubt that cannabis use can cause problems for a subgroup of users. Indeed, it has been estimated that approximately one in ten people who use cannabis at least once will meet diagnostic criteria for a cannabis dependence disorder at some time in their lives. Moreover, the risk for developing cannabis dependence increases with frequency of use, such that among daily or near daily users, the risk is thought to increase to approximately one in two. Furthermore, approximately one in four clients in Canada and in Alberta who enter publicly funded addiction treatment programs have reported cannabis problems. The treatment of cannabis use disorders appears promising, but there is still much to be learned about the causes and recovery process of cannabis use disorders. Thus, this project sought to build an understanding of the recovery process from cannabis use disorders, especially regarding differences between natural recovery and treatment-assisted recovery, and factors influencing abstinence and moderated cannabis use.

Study Implications: This study could serve as a significant contribution to the scientific literature by providing the first in-depth exploratory portrait of the recovery process from cannabis use disorders. Indeed, the recovery process from cannabis use disorders likely consists of both similarities and differences to that of other addictions. The results of this project could hold a number of implications for researchers, clinicians, and policy makers, which ultimately, could inform intervention policy and programs specific to cannabis use disorders by helping to promote factors that are associated with positive change and helping to minimize barriers to recovery.

Purpose of the Collateral Interview: The purpose of the collateral interview was to compare the responses from collaterals with the responses from participants. Using this data, researchers can obtain a measure of agreement between the responses, which can provide information regarding the validity of participant responses and meaningful information regarding the social context of cannabis use disorders.

Your Participation: Thank you for taking part in this study about the recovery process from cannabis use disorders. This research constitutes the Ph.D. dissertation research of Mr. Jonathan N. Stea and the undergraduate honour's thesis of Mr. Syler Hayes. Your contribution to this research is greatly appreciated.

If you have any questions or issues concerning this project that are not related to the specific aspects of the research, or if you have any concerns about the way you have been treated as a participant, you may contact Russell Burrows, Senior Ethics Resource Officer, Research Services Office, University of Calgary at (403) 220-3782; email: rburrows@ucalgary.

Help available is available for addressing mental health or addictions problems. Please call the following free-of-charge 24-hour help-lines: Problem gambling helpline: 1-800-665-9676, AADAC: 1-866-322-2322 (Alberta Only), 1-866-33AADAC (Help Line), and the Distress Centre Calgary: 403-266-HELP (4357). Access Mental Health is also available for possible treatment options (403-943-1500, mental.health@albertahealthservices.ca, www.albertahealthservices.ca)

Appendix F: Suicide Risk Assessment

Suicide Protocol

During the diagnostic interview, if the participant indicates that he/she is feeling suicidal/having suicidal thoughts, or you believe, based on their answers to the questions, that they may be having suicidal thoughts, then the following needs to be done:

- The interview will be completed
- Concern about the suicidal thoughts will be expressed
- The Scale for Suicidal Ideation (SSI) will be administered and scored
- Available resources will be assessed (therapist, family friends, family doctor, other counsellor)
- Please do not hesitate to contact Dr. David Hodgins (403-220-3371) or Mr. Jonathan Stea (403-210-9500) if you have any questions regarding how to handle the situation or the resources to provide

If the SSI score is 17 or less, the participant is at mild risk:
- Tell the participant that it would be a good idea to talk to his/her resource (therapist, family physician or other counsellor) about the suicidal thoughts during the next session or if they worsen to contact the resource immediately. Provide the local crisis number as well.
- Check to see if the participant feels confident that he/she can take these steps
- If you do not think that he/she is capable of taking these steps, seek permission to contact the resource as soon as possible to apprise of the situation. If there is no resource then discuss with Dr. David Hodgins or Mr. Jonathan Stea possible options for the participant to receive services.

If the SSI score is 18-25, the participant is at moderate risk:
- Tell the participant that you would like him/her to call the resource (therapist, family physician, or other counsellor) today (or the next day if it is the evening) to let the resource know how he/she is feeling. Provide the local crisis number as well.
- Check with him/her that he/she feels confident in his/her ability to take these steps.
- If you do not think he/she is capable to take these steps, let him/her know you are obligated to take action. – call a friend, family member or police to provide transportation to the nearest emergency room. Discuss with the participant which is the best option.

If the SSI score is 26 or above, the participant is at high risk:
- Tell the participant that he/she should go to the nearest Emergency department for assistance.
- If you do not think he/she is capable of going on his/her own, contact an appropriate resource person (family, friend, police) and request that the resource take action.

All situations that require the administration of the SSI, require that that your rationale and actions be recorded on the SSI form. All situations will be reviewed with Dr. David Hodgins and Mr. Jonathan Stea as soon as possible.

Scale for Suicidal Ideation

Participant's name: _____Date of interview: _____

Instructions: For each item, circle the number that applies **right now:**

I. Characteristics of Attitude Towards Living/Dying

1. Wish to live
   0. Moderate to Strong 1. Weak 2. None

How would you describe your desire to live?

2. Wish to die
   0. None 1. Weak 2. Moderate to Strong

What about your wish to die?

3. Reasons for living/dying
   0. Living outweighs dying 1. About equal 2. Dying outweighs living

What are your reasons for living?

4. Desire to make active suicide attempt
   0. None 1. Weak 2. Moderate to Strong

How close are you to acting on these feelings?

5. Passive suicidal desire

Sometimes people stop taking care of themselves as a way of dying. Does that apply?

   0. Would take precautions to save life
   1. Would leave life or death to chance (e.g. carelessly crossing a busy street)
   2. Would avoid steps to save or maintain life (e.g. diabetic not taking insulin)

_____**Total of Section I.**

<u>Note:</u> If both items 4 and 5 are scored a "0" skip to section V.

II. Characteristics of Suicide Ideation/Wish

How long do these feelings last?

6. Time Dimension: Duration
   0. Brief, fleeting periods 1. Longer periods 2. Continuous (Chronic),or almost so

Do they come and go?

7. Time Dimension: Frequency
   0. Rare, occasional 1. Intermittent 2. Persistent or continuous

8. Attitude toward Ideation/Wish
   0. Rejecting 1. Ambivalent; indifferent 2. Accepting

Can you ignore the feelings? Or change them?

9. Control over Suicidal Action/ Acting-out Wish
   0. Has sense of Control 1. Unsure of control 2. Has no sense of control

Would you ever act on the feelings?

10. Deterrents to Active Attempt
    0. Would not commit suicide due to deterrents
    Indicate deterrents (e.g. family, religion, serious injury if unsuccessful, irreversible, fear of pain _____
    _____
    1. Some concern about deterrents
    2. Minimal or no concern about deterrents

What would change if you died?

11. Reasons for Contemplated Attempt
    0. To manipulate environment; get attention; revenge
    1. Combination of 0. And 2.
    2. Escape, end of pain or intolerable situation, solve problems

_____ **Total of Section II.**

Section III. Characteristics of Contemplated Attempt

Do you have a plan for how you would do this?

12. Specificity/Planning of Method
    0. Not considered
    1. Considered, but details not worked out
    3. Details worked out/ well formulated

13. Availability/Opportunity of Method
    0. Method not available/ no opportunity
    1. Method would take time and/ or effort; opportunity not readily available
    2. Method and opportunity available; or anticipated in the near future

Would you be able to follow through?

14. Sense of "Capability" to carry out Method
    0. No courage, too weak, afraid, or incompetent
    1. Unsure of competence, courage
    2. Sure of competence, courage

15. Interviewee's Expectancy/Anticipation of Actual Attempt
    0. No 1. Uncertain/Not sure 2. Yes

_____**Total of Section III.**

Section IV. Actualization of Contemplated Attempt

Have you ....?

16. Actual Preparation
    0. None 1. Partial (e.g. starting to collect pills) 2. Complete

Have you prepared a suicide note?

17. Suicidal Note
    0. None 1. Started but not completed; thought about 2. Complete

Have you made other arrangements? Plans?

18. Final acts in anticipation of Death
    0. None
    1. Thought about or made some arrangements
    3. Made definite plans or completed arrangements (e.g. insurance, made will, gave away gifts, returned borrowed objects):
    Specify: _____

19. Deception, Concealment of Contemplated Attempt

0 Revealed ideas openly 1. Held back on revealing 2. Attempted to deceive, conceal, lie

_____ **Total of Section IV.**

Section V. Background Factors

Have you ever made a suicide attempts? How many? Can you describe the last time?

20. Previous Suicide Attempts

0. None 1. One 2. Two or more

21. Intent to Die Associated with Last Attempt

Was your intention to die?

0. Low 1. Moderate; ambivalent, unsure 2. High

_____**Total of Section V.**

Interviewer's Decisions:

SSI Total: I: _____ II: ____ III: ____ IV: ____ V: _____ Total: _____

Decision: □ ≤ 17 Low Risk ☐ 18 – 25 Moderate Risk ☐ ≥ 26 High Risk

Action(s) Taken:

_____

_____

_____

Date: _____

Interviewer's Signature: _____

Appendix G: Collateral Validation Interview

Stea 1 – Collateral ID _____

Collateral Interview Protocol

Participant Name:_____ Participant ID: _____

Collateral Name: _____ Collateral ID: _____

Date: _____

Collateral Interview Consent Script

My name is [INTERVIEWER NAME] and I am calling on behalf of Mr. Jonathan N. Stea, Mr. Syler Hayes, and Dr. David C. Hodgins, who are clinical psychology researchers at the University of Calgary. [PARTICIPANT NAME] has recently participated in a scientific research study conducted by Mr. Stea and Dr. Hodgins, and [PARTICIPANT NAME] has provided us with your contact information so that you could participate in a brief 5 minute telephone interview regarding [PARTICIPANT NAME]'s marijuana use history.

Did [PARTICIPANT NAME] let you know that we would be calling? **CHECK: YES _____ NO _____**

Okay. The study is being conducted by Mr. Jonathan N. Stea, Mr. Syler Hayes, and Dr. David C. Hodgins at the Addictive Behaviours Laboratory at the University of Calgary. The title of the project is Recovery from Cannabis Use Disorders, and the study is sponsored by both the Canadian Institutes of Health Research and Alberta Innovates Health Solutions. The purpose of the study is to further understand the recovery process from cannabis use disorders. The study has been approved by the Conjoint Faculties Research Ethics Board. [PARTICIPANT NAME] was interviewed in our study regarding his/her marijuana use history, and we would really appreciate if you could also just spend 5 minutes answering some questions about his/her marijuana use history so that we can confirm his/her history and therefore strengthen the scientific basis of our study. Your participation in [PARTICIPANT NAME]'s interview process and our study has the potential to inform researchers about the causes and various factors involved in the development and resolution of cannabis use disorders (CUDs), as well as new ways to develop and modify treatment approaches for CUDs. It's important to know that this knowledge could potentially help other people that are currently suffering from CUDs. You will not be provided with monetary compensation for partaking in this brief 5 minute interview.

Your personal information which [PARTICIPANT NAME] has provided us will not be released to the public and is strictly confidential. Your participation in this brief 5 minute interview is completely voluntary and confidential, and you are free to discontinue participation at any time during the questioning period. No one except the researchers and supervisor will be allowed to see or hear any of your answers to our questions. Only group information (i.e., not your personal information) will be summarized for any presentation or publication of results. The findings from the study will be disseminated in the form of a doctoral dissertation project and an undergraduate honour's thesis, and will likely be presented at scientific research conferences and published in scientific journals. Your answers will be kept in a locked cabinet only accessible by the researchers and supervisor. The data will be stored indefinitely for the purpose of possible future use on a computer disk. If you choose to withdraw from the screening process, your data will be retained up to the point of your withdrawal. Your answers from this brief 5 minute interview will **NOT** be shared with [PARTICIPANT NAME]. In case you wish to make a comment or complaint regarding your treatment in this study, you are free to contact the Ethics Resource Officer at the University of Calgary—his name is Mr. Russell Burrows and he can be reached via telephone (403-220-3782) or email (rburrows@ucalgary.ca)

Do you understand to your satisfaction the information provided to you about your participation in this research project?
RESEARCHER CHECKS: YES _____ or NO _____

Do you agree to participate in this brief 5 minute interview?
RESEARCHER CHECKS: YES _____ or NO _____

Researcher Name (please print): _____ Date: _____

Collateral Interview:

NOTE TO RESEARCHER: A researcher, blind to the participant's interview, will telephone one collateral person for each participant and conduct a brief 5 minute interview.

SAY TO THE COLLATERAL: "There will be lots of repetition in the following questions, but please just bare with us and answer honestly and to the best of your ability."

QUESTION 1. Open-Ended Questioning to Determine Resolution Date (month/year)

On a scale of 1 to 5 (1 = never had a problem, 5 = had a severe problem), do you think [PARTICIPANT NAME] has ever had a marijuana problem? _____ On a scale of 1 to 5 (1 = no problem at all, 5 = severe problem), do you think [PARTICIPANT NAME] currently has a marijuana problem? _____ Please rate how certain you are of your answers using the following scale: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain. _____

On approximately which date (i.e., month/year) do you think [PARTICIPANT NAME] first decided to quit or cut-down/control using marijuana? _____/_____ If you cannot give an exact month, try to give a range of two months that capture the date that he/she started to overcome his/her marijuana problem, and we will use the midpoint of those two months as their resolution date.(range: _____/_____ to _____/_____; midpoint: _____/_____). How confident are you that this month represents the time in which he/she first began to resolve his/her marijuana problem (1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain)? _____

1. In the past 12 months, how frequently has [PARTICIPANT NAME] used some form of cannabis (e.g., marijuana, hash)?
   (circle) A) Never B) Once or twice C) Monthly D) Weekly E) Daily or almost daily

How certain are you?: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

2. In the past 3 months, how frequently has [PARTICIPANT NAME] used some form of cannabis?
   (circle) A) Never B) Once or twice C) Monthly D) Weekly E) Daily or almost daily

How certain are you?: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

3. During the period in which [PARTICIPANT NAME] 's cannabis problem was the worst, how frequently did he/she use some form of cannabis?
   (circle) A) Never B) Once or twice C) Monthly D) Weekly E) Daily or almost daily

How certain are you?: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

4. During the 12 months following [PARTICIPANT NAME]'s resolution date, how frequently did he/she use some form of cannabis?
   (circle) A) Never B) Once or twice C) Monthly D) Weekly E) Daily or almost daily

How certain are you?: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

5. In the next 12 months, how often do you think [PARTICIPANT NAME] plans/intends to use some form of cannabis?
   (circle) A) Never B) Once or twice C) Monthly D) Weekly E) Daily or almost daily

How certain are you?: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

QUESTION 2. The Severity of Dependence Scale (cannabis) (modified for collaterals; past 12 month and past 3 month version)

	During the past 12 months...	*During the past 3 months...*
1. Did you ever think [PARTICIPANT NAME] 's use of marijuana was out of control?	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)
2. Do you think the prospect of missing a "high" or a smoke (or "session") ever made [PARTICIPANT NAME] very anxious or worried?	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)
3. Do you think [PARTICIPANT NAME] ever worried about his/her use of marijuana?	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)
4.Do you think [PARTICIPANT NAME] ever wished he/she could stop?	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)	Never/almost never (0) Sometimes (1) Often (2) Always/nearly always (3)
5. How difficult do you think [PARTICIPANT NAME] ever found it to stop or go without marijuana?	Not difficult (0) Quite difficult (1) Very difficult (2) Impossible (3)	Not difficult (0) Quite difficult (1) Very difficult (2) Impossible (3)

Please rate how certain you are of your answers using the following scale: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

QUESTION 3: Marijuana Problems Scale (modified for collaterals, modified lifetime version and real past 3 month version)

The following are different types of problems [PARTICIPANT NAME] may have experienced as a result of smoking marijuana. Please let me know whether this has ever been a problem for **[PARTICIPANT NAME]** during his/her lifetime **AND** whether this has been a problem for **[PARTICIPANT NAME]** in the past 90 days.

	Ever been a problem for you during your LIFETIME?			Been a problem for you in the past 90 days (3 months)?		
Has Marijuana use caused you:	**No Problem**	**Minor Problem**	**Serious Problem**	**No Problem**	**Minor Problem**	**Serious Problem**
1. Problems between [PARTICIPANT NAME] and his/her partner	0	1	2	0	1	2
2. Problems in his/her family	0	1	2	0	1	2
3. To neglect his/her family	0	1	2	0	1	2
4. Problems between [PARTICIPANT NAME] and his/her friends	0	1	2	0	1	2
5. To miss days at work or miss classes	0	1	2	0	1	2
6. To lose a job	0	1	2	0	1	2
7. To have lower productivity	0	1	2	0	1	2
8. Medical problems	0	1	2	0	1	2
9. Withdrawal symptoms	0	1	2	0	1	2
10. Blackouts or flashbacks	0	1	2	0	1	2
11. Memory loss	0	1	2	0	1	2
12. Difficulty sleeping	0	1	2	0	1	2
13. Financial difficulties	0	1	2	0	1	2
14. Legal problems	0	1	2	0	1	2
15. To have lower energy level	0	1	2	0	1	2
16. To feel bad about his/her use	0	1	2	0	1	2
17. Lowered self-esteem	0	1	2	0	1	2
18. To procrastinate	0	1	2	0	1	2
19. To lack self-confidence	0	1	2	0	1	2

Please rate how certain you are of your answers using the following scale: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

QUESTION 4. ASSIST (modified for collaterals, real past 3 month version)

1. In the past three months, how often has [PARTICIPANT NAME] used cannabis (marijuana, pot, grass, hash, etc.)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

2. During the past three months, how often has [PARTICIPANT NAME] had a strong desire or urge to use cannabis (marijuana, pot, grass, hash, etc.)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

3. During the past three months, how often has [PARTICIPANT NAME] 's use of cannabis (marijuana, pot, grass, hash, etc.) led to health, social, legal or financial problems?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

4. During the past three months, how often has [PARTICIPANT NAME] failed to do what was normally expected of him/her because of his/her use of cannabis (marijuana, pot, grass, hash, etc.)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

5. Has a friend or relative or anyone else ever expressed concern about [PARTICIPANT NAME]'s use of cannabis (marijuana, pot, grass, hash, etc.)?
    a. No, Never
    b. Yes, in the past 3 months
    c. Yes, but not in the past 3 months

6. Has [PARTICIPANT NAME] ever tried and failed to control, cut down, or stop using cannabis (marijuana, pot, grass, hash, etc.)?
    a. No, Never
    b. Yes, in the past 3 months
    c. Yes, but not in the past 3 months

Please rate how certain you are of your answers using the following scale: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

QUESTION 5. Marijuana Motives Measure (modified for collaterals)

Please consider all the times that [PARTICIPANT NAME] has used cannabis and indicate how often you think he/she has used cannabis for each of the following reasons. Please provide an answer using the following scale:

1 - - - - - - - - 2 - - - - - - - - - 3 - - - - - - - - - 4 - - - - - - - - 5

Almost never/never Sometimes Almost always/always

1) To forget his/her worries ___
2) Because his/her friends pressure him/her to use marijuana ___
3) Because it helps him/her to enjoy a party ___
4) Because it helps him/her when he/she feels depressed or nervous ___
5) To be sociable ___
6) To cheer him/her up when he/she is in a bad mood ___
7) Because he/she likes the feeling ___
8) So that others won't kid him/her about not using marijuana ___
9) Because it's exciting ___
10) To get high ___
11) Because it makes social gatherings more fun ___
12) To fit in with the group he/she likes ___
13) Because it gives him/her a pleasant feeling ___
14) Because it improves parties and celebrations ___
15) Because he/she feels more self-confident and sure of him/herself ___
16) To celebrate a special occasion with friends ___
17) To forget about his/her problems ___
18) Because it's fun ___
19) To be liked ___
20) So he/she won't feel left out ___
21) To know him/herself better ___
22) Because it helps him/her be more creative and original ___
23) To understand things differently ___
24) To expand his/her awareness ___
25) To be more open to experiences ___

Please rate how certain you are of your answers using the following scale: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

QUESTION 6. History of cannabis treatment involvement.

Has [PARTICIPANT NAME] ever received at least one session of formal/professional treatment (e.g., talking to a physician, counsellor or therapist, calling a helpline, or receiving medication) for a marijuana problem? (circle) YES OR NO. IF "YES", ASK: "What kind of treatment(s)? _____ From whom?_____ How many sessions did [PARTICIPANT NAME] receive in total? _____ How many separate occasions did [PARTICIPANT NAME] receive treatment? _____ When? _____Do you think treatment(s) was helpful (1=not at all, 5= extremely)? ____
Please rate how certain you are of your answers using the following scale: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

Is [PARTICIPANT NAME] currently receiving formal/professional treatment for a marijuana problem? (circle) YES OR NO. IF "YES", ASK: "What kind of treatment(s)? _____ From whom?_____ How many sessions has [PARTICIPANT NAME] received in total? _____ Do you think treatment is helpful (1=not at all, 5=extremely)?_____
Please rate how certain you are of your answers using the following scale: 1 = very uncertain, 2 = uncertain, 3 = certain, 4 = very certain.

Debriefing

SAY TO THE COLLATERAL:

"Thank you very much for your participation in this study. Would you like us to send you the Debriefing Form for the study, which briefly outlines the background, purpose, and implications of the study?" **RESEARCHER CHECKS: Yes: _____ No: _____**

IF YES, "would you prefer mail or email?" **RESEARCHER CHECKS: Mail: ___ Email: ___**

Mailing Information (if different than provided by participant):
Address:
_____
_____
Email:_____

Appendix H: Test-Retest Reliability Interview

Stea 1 – Participant ID _____

Test-Retest Interview Protocol

Participant Name:_____ Participant ID: _____

Interviewer Name (make sure this is coded in SPSS): _____

Date: _____

Test-Retest Interview Script

My name is [INTERVIEWER NAME] and I am calling on behalf of Mr. Jonathan N. Stea, Mr. Syler Hayes, and Dr. David C. Hodgins, who are clinical psychology researchers at the University of Calgary. You recently participated in our scientific research study investigating recovery from cannabis use disorders and you agreed to allow to us to quickly ask you 23 brief cannabis-related questions over the phone 7-10 days later. Is now a good time to ask you those questions?
Great.

1. In the past 3 months, how frequently have you used some form of cannabis?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

2. In the past 12 months, how frequently have you used some form of cannabis (e.g., marijuana, hash)?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

3. During the period in which your cannabis problem was the worst, how frequently did you use some form of cannabis?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

4. In the next 12 months, how often do you plan/intend to use some form of cannabis?
    a. Never
    b. Once or twice
    c. Monthly
    d. Weekly
    e. Daily or almost daily

Stea 2 – Participant ID _____

Marijuana Problems Scale (Stephens et al.): MODIFIED VERSION (lifetime) and REAL VERSION (past 3 months)

The following are different types of problems you may have experienced as a result of smoking **marijuana**. Please let me know whether this has **ever been a problem for you during your lifetime AND whether this has been a problem for you in the past 90 days.**

	Ever been a problem for you during your LIFETIME?			**Been a problem for you in the past 90 days (3 months)?**		
Has Marijuana use caused you:	**No Problem**	**Minor Problem**	**Serious Problem**	**No Problem**	**Minor Problem**	**Serious Problem**
1. Problems between you and your partner	0	1	2	0	1	2
2. Problems in your family	0	1	2	0	1	2
3. To neglect your family	0	1	2	0	1	2
4. Problems between you and your friends	0	1	2	0	1	2
5. To miss days at work or miss classes	0	1	2	0	1	2
6. To lose a job	0	1	2	0	1	2
7. To have lower productivity	0	1	2	0	1	2
8. Medical problems	0	1	2	0	1	2
9. Withdrawal symptoms	0	1	2	0	1	2
10. Blackouts or flashbacks	0	1	2	0	1	2
11. Memory loss	0	1	2	0	1	2
12. Difficulty sleeping	0	1	2	0	1	2
13. Financial difficulties	0	1	2	0	1	2
14. Legal problems	0	1	2	0	1	2
15. To have lower energy level	0	1	2	0	1	2
16. To feel bad about your use	0	1	2	0	1	2
17. Lowered self-esteem	0	1	2	0	1	2
18. To procrastinate	0	1	2	0	1	2
19. To lack self-confidence	0	1	2	0	1	2

Thank you very much for your time and your participation in our research. Have a great day.

Appendix I: Participant Responses that Comprised the CIDI Substance Use Disorder Categories

As can be seen in the table, the Other Substance Use Disorders category contained miscellaneous substances—mostly antidepressant and antipsychotic medication—that were not considered to fall into the other categories; and interestingly, it is noteworthy that only one participant reported lifetime use of synthetic cannabinoids.

Table I1

Participant Responses that Comprised the CIDI Substance Use Disorder Categories

CIDI Substance Use Disorder Category	Range of Participant Responses
Opioid use disorders	heroin, demerol, oxycontin, percocets, dilaudid, codeine, morphine
Stimulant use disorders	crack, cocaine, coke, speed, methamphetamine, crystal meth, Ritalin
Sedative-Hypnotic-Anxiolytic Use Disorders	barbituates, ativan, valium, GHB, bennies, sleeping pills
Hallucinogen Use Disorders	PCP, ketamine, mescaline, peyote, mushrooms, LSD, ecstasy, ex, MDMA, MDA, salvia
Other Substance Use Disorders	diet pills, antidepressants, antipsychotic medication, Advil, synthetic cannabinoids

Appendix J: DSM-5 Variables

The recently released DSM-5 has refined its general criteria for substance use disorder, whereby DSM-IV substance abuse and dependence criteria have been combined into one disorder; the "legal problems" criterion from the former substance abuse category has been eliminated; and a new diagnostic criterion representing craving has been added (American Psychiatric Association, 2013). In general, research has supported this refinement of the criteria for cannabis use disorder (Hasin, Fenton, Beseler, Par, & Wall, 2012; Gillespie, Neale, Legrand, Iacono, & McGue, 2012; Kopak, Proctor, & Hoffmann, 2012). Additionally, severity specifiers now accompany DSM-5 diagnoses of substance use disorder, such that two or three criteria are indicative of mild severity, four or five criteria are indicative of moderate severity, and six or more criteria are indicative of severe severity. Thus, to receive a diagnosis of cannabis use disorder in the DSM-5, an individual needs to meet two or more out of eleven criteria.

In the present study, DSM-5 cannabis use disorder categories were created by combining the CIDI cannabis abuse and dependence criteria, omitting the "legal problems" criterion, and adding a craving criterion. The lifetime craving criterion was assessed by the question, "have you ever experienced intense cravings or a strong desire or urge to use cannabis?", and the current craving criterion was assessed by the question, "how often do you currently experience intense cravings or a strong desire or urge to use cannabis?" While the lifetime craving question required a dichotomous response of "yes" or "no", the current craving question was rated on the following five point scale: 1 = never, 2 = once or twice, 3 = monthly, 4 = weekly, 5 = daily or almost daily. Thus, the current craving criterion was considered to be categorically met when participants rated their current cravings as 2 or more.

Table J1 displays the percentage of participants within DSM-IV and DSM-5 cannabis use disorder categories. As can be seen from table, all participants with lifetime DSM-IV cannabis abuse, dependence, and any cannabis use disorder diagnoses met lifetime DSM-5 diagnostic criteria. More specifically, of those participants who met lifetime DSM-IV cannabis abuse, 6.8%, 8.5%, and 84.6% fell into the DSM-5 categories of mild, moderate, and severe, respectively. Of those participants who met lifetime

DSM-IV cannabis dependence, 1.0%, 2.9%, and 96.1% fell into the DSM-5 categories of mild, moderate, and severe, respectively. Of those participants who met any lifetime DSM-IV cannabis use disorder, 7.6%, 9.2%, and 83.2% fell into the DSM-5 categories of mild, moderate, and severe, respectively. As can also be seen from the table, only 2 (1.7%) participants with no current DSM-IV cannabis abuse, dependence, or any cannabis use disorder diagnoses met current DSM-5 diagnostic criteria. Specifically, these 2 participants fell into the current DSM-5 category of mild severity.

Overall, these results suggest good agreement between the lifetime and current DSM-IV and DSM-5 categories. The results also indicate that the majority of participants in the present study could be classified into the lifetime DSM-5 severe category.

Table J1

Percentage of Participants Within DSM-IV and DSM-5 Cannabis Use Disorder Categories (N = 119)

		DSM-5 Categories (% of Total Sample)			
DSM-IV Categories	Total Sample	No Diagnosis	Mild	Moderate	Severe
Lifetime					
Abuse	98.3	0.0	6.8	8.5	84.6
Dependence	86.6	0.0	1.0	2.9	96.1
Any CUD	100.0	0.0	7.6	9.2	83.2
Current					
Abuse	0.0	98.3	1.7	0.0	0.0
Dependence	0.0	98.3	1.7	0.0	0.0
Any CUD	0.0	98.3	1.7	0.0	0.0

Note. CUD = cannabis use disorder; DSM = Diagnostic and Statistical Manual of Mental Disorders.

Appendix K: Test of Theory of Planned Behaviour

To test whether the Theory of Planned Behaviour (TPB) could predict 12 month post-resolution and past 12 month frequency of cannabis use in a sample of individuals who have recovered from a cannabis use disorder, a series of hierarchical simultaneous (i.e., forced entry) multiple regression analyses were conducted. While the use of structural equation modeling would have been the ideal data analytic approach, this method was not employed due to insufficient sample size. Whereas the total sample in the present study was N = 119, the typical sample size is about 200 cases in studies where structural equation modeling is used (Kline, 2011). Further, as described by Kline (2011), a useful rule of thumb concerning the relation between sample size and model complexity that has some empirical support is the N:q rule, whereby an ideal sample size-to-parameters ratio would be 20:1. Even based on a parsimonious use of 18 parameters to be estimated in order to appropriately test the TPB model in the present study, the N:q ratio would be 119:18, which falls much short of the ideal ratio. Therefore, regression analyses were employed in lieu of structural equation modeling.

The TBP variables were derived as follows: a) Attitudes were assessed by summing the values of two items (alpha = .61, n = 118), namely, *perceived likelihood of negative consequences for weekly cannabis use* and *perceived likelihood of positive consequences for weekly cannabis use* (reverse scored); Subjective Norms were assessed by summing the values of three items (alpha = .62, n = 119), namely, *perceived family social pressure to overcome cannabis problem*, *perceived friends social pressure to overcome cannabis problem*, and *perceived societal social pressure to overcome cannabis problem*; Behavioural Intentions were assessed by summing the values of two items (alpha = .69, n = 119), namely, *motivated to change post-resolution*, and *plan for abstinence post-resolution* (the latter item of which was obtained from the Reasons for Resolution section of the Participant Interview); Perceived Behavioural Control was assessed independently by two items, namely, *self-efficacy/confidence in ability to change post-resolution* and *self-efficacy/confidence to maintain recovery*; Self-Identity was assessed independently by two items, namely, *importance of cannabis to self-identity during cannabis problem* and *importance of cannabis to self-identity currently*; and

Behaviour was assessed independently by two items, namely, *12 month post-resolution cannabis use frequency* and *past 12 month cannabis use frequency*.

Sufficient sample size to test the regression models was determined by a power analysis using G*Power software (Faul et al., 2009) for a multiple regression with a maximum of 3 predictors, two-tailed, alpha level of .05, power level of .8, whereby to detect a medium effect (f^2 = .15), a sample size of N = 55 would be needed, and to detect a small effect (f^2 = .02), a sample size of N = 395 would be needed. Thus, a sample size of N = 119, was deemed sufficient to detect an effect in size between small and medium.

The first regression model tested the first sequence in the TPB (Madden et al., 1992), whereby Attitudes, Subjective Norms, and Perceived Behavioural Control (as assessed by the item, *self-efficacy/confidence in ability to change post-resolution*) were hypothesized to predict Behavioural Intentions. In addition, Self-Identity (as assessed by the item, *importance of cannabis to self-identity during cannabis problem*) was tested in Step 2 of the model. Assumptions of normality, linearity, and homoscedasticity were tested by examining the residual scatterplot between predicted dependent variable scores and errors of prediction (Tabachnick & Fidell, 2007). The scatterplot was rectangular in shape, suggesting linearity and homoscedasticity, albeit with a skewed distribution of residuals, suggesting a failure of normality; which might limit the generalizability of the regression model beyond the sample (Field, 2009). Transformations of the raw data were not conducted because the transformations would not necessarily affect the residuals (Field, 2009). No outliers were identified in the data as indicated by the maximum value for Malahanobis distance = 16.1, which was below the critical value of 16.266, using a $p < .001$ for 3 degrees of freedom, as suggested by Tabachnick and Fidell (2007). In Step 1 of the regression model, Attitudes, Subjective Norms, and Perceived Behavioural Control were simultaneously entered as predictors of Behavioural Intentions. The overall regression model significantly accounted for 37.4% of the variance in Behavioural Intentions, R = .37 , R^2 = .14, F (3, 114) = , $p < .001$. Both Attitudes (B = .29, SE (B) = .10, β = .27, $p < .01$) and Perceived Behavioural Control (B = .45, SE (B) = .16, β = .25, $p < .01$), but not Subjective Norms (B = -.11, SE (B) = .07, β = -.14, *ns*), significantly accounted for unique variance in Behavioural Intentions. Specifically, Attitudes and

Perceived Behavioural Control accounted for 7.2% (semi-partial correlation = .27) and 6.1% (semi-partial correlation = .25) of unique variance in Behavioural Intentions, respectively. In Step 2 of the regression model, while the overall model significantly accounted for 37.7% of the variance in Behaviour, R = .38 , R^2 = .11, F (4, 113) = , p < .01, the addition of Self-Identity did not result in a significantly improved model, R^2 Change = .00, F Change (1, 113) = 0.3, *ns*, and indeed, Self-Identity did not significantly account for unique variance in the prediction of Behaviour (B = -.09, SE (B) = .17, β = -.05, *ns*).

The second regression model tested the second sequence in the TPB (Madden et al., 1992), whereby Behavioural Intentions and Perceived Behavioural Control (as assessed by the item, *self-efficacy/confidence in ability to change post-resolution*) were hypothesized to predict Behaviour. In this model, 12 month post-resolution cannabis use frequency was used as the indicator of Behaviour and was entered as the dependent variable. Again, Self-Identity (as assessed by the item, *importance of cannabis to self-identity during cannabis problem*) was tested in Step 2 of the model. Assumptions of normality, linearity, and homoscedasticity were tested by examining the residual scatterplot between predicted dependent variable scores and errors of prediction. The scatterplot was rectangular in shape, suggesting linearity and homoscedasticity, albeit with a skewed distribution of residuals, suggesting a failure of normality; which might limit the generalizability of the regression model beyond the sample (Field, 2009). Transformations of the raw data were not conducted because the transformations would not necessarily affect the residuals. No outliers were identified in the data as indicated by the maximum value for Malahanobis distance = 10.7, which was below the critical value of 13.816, using a p < .001 for 2 degrees of freedom, as suggested by Tabachnick and Fidell (2007). In Step 1 of the regression model, Behavioural Intentions and Perceived Behavioural Control were simultaneously entered as predictors of Behaviour. The overall regression model significantly accounted for 41.2% of the variance in Behaviour, R = .42 , R^2 = .18, F (2, 116) = , p < .001. Only Behavioural Intentions (B = -.23, SE (B) = .05, β = -.39, p < .001), and not Perceived Behavioural Control (B = -.07, SE (B) = .09, β = -.07, *ns*), significantly accounted for unique variance in Behaviour. Specifically,

Behavioural Intentions accounted for 14.7% (semi-partial correlation = -.38) of unique variance in Behaviour. In Step 2 of the regression model, while the overall model significantly accounted for 42.4% of the variance in Behaviour, $R = .42$, $R^2 = .18$, F (3, 115) = , $p < .001$, the addition of Self-Identity did not result in a significantly improved model, R^2 Change = .01, F Change (1, 115) = 1.4, *ns*, and indeed, Self-Identity did not significantly account for unique variance in the prediction of Behaviour ($B = -.11$, SE (B) = .09, $\beta = -.10$, *ns*).

The third regression model again tested the second sequence in the TPB, whereby Behavioural Intentions and Perceived Behavioural Control were hypothesized to predict Behaviour. However, in this model, past 12 month cannabis use frequency was used as the indicator of Behaviour and was entered as the dependent variable; Perceived Behavioural Control was assessed by the item *self-efficacy/confidence to maintain recovery*; and Self-Identity was tested in Step 2 of the model and was assessed by the item, *importance of cannabis to self-identity currently*. Assumptions of normality, linearity, and homoscedasticity were tested by examining the residual scatterplot between predicted dependent variable scores and errors of prediction. The scatterplot was rectangular in shape, suggesting linearity and homoscedasticity, albeit with a skewed distribution of residuals, suggesting a failure of normality; which might limit the generalizability of the regression model beyond the sample. Transformations of the raw data were not conducted because the transformations would not necessarily affect the residuals. Five outliers were identified in the data as indicated by five values of Malahanobis distance that were above the critical value of 13.816, using a $p < .001$ for 2 degrees of freedom, as suggested by Tabachnick and Fidell (2007). However, an examination of the cases that were identified as outliers revealed that the data were accurately entered into the data file and likely are a legitimate part of the sample. Since the following results mirror those of the previous analyses, no steps were taken to attempt to reduce the impact of the outliers on the solution. In Step 1 of the regression model, Behavioural Intentions and Perceived Behavioural Control were simultaneously entered as predictors of Behaviour. The overall regression model significantly accounted for 26.6% of the variance in Behaviour, $R = .27$, $R^2 = .07$, F (2, 116) = , $p < .05$. Only

Behavioural Intentions (B = -.11, SE (B) = .04, β = -.22, p < .05), and not Perceived Behavioural Control (B = -.31, SE (B) = .21, β = -.14, *ns*), significantly accounted for unique variance in Behaviour. Specifically, Behavioural Intentions accounted for 5.0% (semi-partial correlation = -.22) of unique variance in Behaviour. In Step 2 of the regression model, while the overall model significantly accounted for 31.4% of the variance in Behaviour, R = .31 , R^2 = .10, F (3, 115) = , p < .01, the addition of Self-Identity did not result in a significantly improved model, R^2 Change = .03, F Change (1, 115) = 3.6, *ns*, and indeed, Self-Identity did not significantly account for unique variance in the prediction of Behaviour (B = .21, SE (B) = .11, β = .18, *ns*).

In sum, these results largely support the TPB in the prediction of 12 month post-resolution and past 12 month frequency of cannabis use in a sample of individuals who have recovered from a cannabis use disorder. The results also suggest that in this particular sample, Self-Identity did not significantly contribute additional variance in the prediction of Behaviour. With respect to the first sequence of the TPB, these results suggest that Attitudes and Perceived Behavioural Control were stronger predictors of Behavioural Intentions than Subjective Norms in this particular sample—indeed, Attitudes has been found to be a stronger predictor of Behavioural Intentions than Subjective Norms in previous studies that have tested the TRA in the prediction of cannabis use (Conner & McMillan, 1999). With respect to the second sequence of the TPB, these results suggest that Behavioural Intentions was a stronger predictor of Behaviour than Perceived Behavioural Control. Interestingly, as indicated by the overall proportion of variance accounted for in Behaviour, these results also suggest that TPB variables were better able to predict 12 month post-resolution cannabis use frequency compared to past 12 month cannabis use frequency in this particular sample, which may in part reflect the fact that the TPB variables were more tailored to assess post-resolution frequency of cannabis use.

Appendix L: Representative Content from the Content Analysis

Table L1

Representative Content from the Reasons for Resolution Categories

Category	Representative Content
Self incompatibility	- "I wanted to grow up from my teenaged lifestyle, even though I was 40 years old." - "The fun is over, it's time to get your life straight. The weed is not working for you, it's just not doing it." - "This was not my identity, I need to get back to who I am as a person." - "I wanted to increase my energy level, I wanted to feel more motivated to move ahead in life." - "I was lost. I was thinking about my life goals compared to where I was."
Social incompatibility	- "I was a good mom, but not a present mom...I wanted to quit for my children." - "My dad said he was at a dinner and people were talking about their children, and he couldn't say anything good about me, dad was a sensitive guy, that hurt him and me." - "I didn't like getting high around my wife because she didn't smoke and it was awkward." - "Social element. I thought it would be better to stop using marijuana because I saw how it affected past friendships. It started with people not wanting to be around me because I was high all the time. I chose weed over them." - "I wanted to fit in with society like I used to."
Mental health concerns	- "It made me extremely stupid." - "Anxiety...when I get high, I was like a turtle in a shell, it was hard for me to talk to people I don't know, and I used despite anxiety." - "I was getting panic attacks while high, possibly due to high potency. This lead me to want to stop using." - "My depression contributed to me wanting to quit, because I wanted to get better. I knew I was self-medicating." - "Pot was starting to make me paranoid."

Category	Representative Content
Too integral to reality/lost enjoyment	- "I couldn't get high anymore. I was just using to feel normal." - "I always knew daily use was exhausting. I was a functioning addict but it was exhausting...6 joints rolled in the morning, had to smoke to go to interviews, daily activities, etc...I had a 4.0 GPA, I passed 100% on my driving license while high (and smoked with my dad)." - "It was an eye-opener. I've spent my whole life chained to a drug. 1967 was supposed to be about freedom, ironically I was not free." - "It was taking up more space than it should've in my life." -"I wasn't getting the same effects, I was smoking a lot, I can cut down and it doesn't make a big difference. Even now I smoke once a week and it doesn't really improve my day that much. It is still enjoyable, but not as much as it used to be."
Financial concerns	- "I felt I was burning money away." - "Half of pay cheques going to this..." - "It's an expensive habit. I couldn't afford cigarettes, so quitting helped." - "At my worst, I was spending $60/week. My boyfriend said I was spending more on weed than rent." - "Large expense, up to $1000/week."
Work/school concerns	- "I decided to quit soon after getting fired from my job." - "Around that time, the provincial grade 12 exams were happening, so I wanted to cut down only during the day so I could focus and learn." - "I was accepted to teacher's college in April, 2011, so I made a pact with myself that I wouldn't smoke anymore because I would be in elementary schools." - "I was unable to work as hard or long as I used to." - "I wanted to hold a job."
Realization of harm	- "I was smoking for 30 years, I decided I need to change, reflecting on past negative consequences." - "I was using it as an escape from the things that were important in my life." - "Marijuana interfered with personal fulfillments and personal and professional goals."

Category	Representative Content
	- "I could no longer function on a daily basis." - "It wasn't helping my life, I wasn't productive."
Physical health concerns	- "Started in March 2011, I had a conversation with a doctor, I was experiencing decreased libido and sexual problems. I told the doctor I was using cannabis daily and he advised me to quit." - "Health is the biggest reason...because I have kids, I wanted to live long...continued use would restrict my lifespan." - "I knew how damaging it was to my body and my lungs." - "I wanted to quit for health and fitness. I was almost a professional skate boarder, marijuana got in the way of that." - "I would dry heave because of smoking and still continue to use."
Legal/driving concerns	- "It's illegal and I didn't want to get in trouble." - "Got arrested and charged for assault, and smoking was a breach of probation." - "Me and my mom were going to take custody of my niece, which require me to take drug tests." - "I had a legal issue, which required me not to use." - "It's unsafe to drive."
Negative social environment	- "I didn't like the sketchy people around me." - "The gangs and violence was a big concern for me, I wouldn't want to put myself in harms way." - "I would never re-attach myself to another circle who's lives depended on sharing dope." - "I realized the types of people I was friends with." - "I saw friends acting stupid and I didn't want to be like that."
Lack of control	- "It was completely controlling my life, I was powerless to stop." - "It's a scary feeling of not being able to quit." - "I had lack of control over my use, I couldn't choose to not use. I lacked control over my behaviour when I was intoxicated, coming home at 6:00 am. I couldn't follow through on my intentions. I experienced

Category	Representative Content
	blackouts from alcohol and marijuana. I couldn't control what was happening to me." - "I was feeling helpless, out of control, I had lost control over my cannabis use." - "It controls me, I don't control it."
Religious/ spiritual/ moral concerns	- "The Lord convicted me...heard a voice asking "why are you doing that?" when lighting my pipe. I threw away my pipe after that. I felt a release after that. I didn't have to depend on it." - "It was moral and ethical reasons." - "It conflicted with Christianity." - "Addiction caused me to reflect on my spiritual path." - "I didn't feel like I was a good person."
Experienced a major event	- "The reason I quit cold turkey is because I had a fight with my brother which caused him to become hospitalized for 4 days." - "My daughter realized my wife and I were on our last legs because of drugs...she enrolled us in a 5-day self-help seminar called Choices...I stood up and acknowledged I had a problem with drugs and alcohol...It was the first time I realized I had a marijuana problem." - "I was a victim of date rape, I was in the situation because I was seeking to buy marijuana." - "I got a bag laced with PCP, had a really bad trip, lead to severe paranoia, and it was difficult to get over that, even to this day." - "A group of friends sat me down and discussed the need for me to change."
Fear of escalation	- "It's straightforward, I have to quit, it might get worse." - "I realized if I continue to smoke weed, it would lead me back to crack." - "I knew it was a difficult addiction, and if I kept using I would never quit marijuana or alcohol." - "I wasn't willing to risk using other drugs." - "It caused me to want to use other drugs."

Table L2

Representative Content from the Life Event-Related Reasons for Resolution Categories

Category	Representative Content
Interpersonal event	- "I broke up with my boyfriend." - "I had relationship problems with my wife. I owed it to her to stop." - "I met the man of my dreams." - "Infidelity, I was cheating on my ex-husband with a pot-user. And I didn't want to, only when intoxicated. Truly bizarre. My tie to the person was marijuana based." - "An important person came into my life. We're still very close....he didn't use and was an influence on my choice to quit."
Work/ school-related event	- "Getting fired definitely contributed." - "Graduating...'I'm out of high school, I need to get a life now'." - "One of my supervisors thought I was high at work, something clicked there." - "Going back to school." - "Multiple failures at work."
None	
Experienced a mental health problem	- "I had a panic attack while using." - "It was really the memory loss that triggered it." - "I experienced severe depression and was suicidal." - "I had drug induced psychosis, admitted myself into the psych ward." - "I had bad experiences due to anxiety."
Traumatic/ humiliating event	- "I had a car accident." - "My decision to have an abortion, I realized I was getting high to cope." - "At a party, I was smoking up, I heard someone saying "who invited him, he's a loser"...I couldn't stop thinking

Category	Representative Content
	about that. It was a girl who wasn't fond of me, I think." - "The year prior, in October 2006, I was taken advantage of, I had to give my children up. I would have never laid with that man had substances not been a problem." - "Smoked really good weed and drank and collapsed and had to call an ambulance and was taken to hospital...didn't make me change completely but influenced the change."
Confrontation/ intervention	- "Daughter confronted me, sent me to the seminar." - "Being referred to the Addiction Centre." - "I was seeing a counselor and realized with him the severity of the problem." - "Intervention by friends, discussed my current problems and the need to change." - "Confrontation between wife and I, wife quit since she got pregnant."
Legal event	- "Fight and subsequent incarceration." - "Embezzlement of money." - "Got arrested." - "Getting federal sentence." - "Custody with niece and drug test."
Financial event	- "I'm broke financially...in our family, we already have savings allocated and it's supposed to last for 6 years...I spent a lot of it on marijuana...I went from rich to poor." - "Loss of money." - "Became homeless." - "Financial turbulence." - "Needed money for research."
Experienced a physical health problem	- "Got sick with pneumonia, and I said, "I'm done blazing"." - "I experienced sexual difficulties." - "Asthma and sinus infections."

Category	Representative Content
	- "Hacking up phlegm, realizing I'm not physically healthy." - "Lung problems."
Residence change	- "Moving to a different province." - "I moved away from my roommate/ex-girlfriend." - "I moved, and was receiving excellent education...caused me to start thinking." - "Moved to Mexico." - "Moved to Houston, left my family and friends."
Religious/ spiritual event	- "I was baptized three days earlier, surrendering my life to God." - "More involved with church." - "Loss of spirituality." - "Quitting drinking made me more religious and that helped me to quit smoking weed." - "Conversion to Christianity, the same exact moment I had a belief in God and belief that I need to quit...they were the same change."
Birthday	- "Just turned 40." - "Turning 30."

Table L3

Representative Content from the Actions Taken Categories

Category	Representative Content
Cognitive strategies	- "I told myself if I use I would feel bad...it's like weighing the positives versus negatives, I guess." - "Mainly, I became more self-aware that is was affecting me negatively and if I kept using it I wouldn't get better and I could really hurt myself and my brain." - "I had to realize/recognize my cognitive distortions and then reframe my thoughts." - "Thinking about my goals, to get back to a healthy state." - "Focusing on what I can become rather than what I have been. Establishing a better relationship with myself."
Decreased time spent with users/ increased time spent with non-users	- "I started to limit my exposure to people who smoked." - "I lost the group of friends I had because they just got high in the basement and it wasn't something I wanted to do anymore so I separated myself from them." - "I didn't leave my environment, but stopped hanging out with my friends." - "I less frequently hung out with old friends and started to hang out more with other group of friends who didn't use." - "I wasn't spending as much time with my using friends. I was hanging out more with my wife. New non-users entered my life, that caused me to smoke less."
Stimulus control/ avoidance	- "I didn't want to be around it...I just didn't go after it at a party, the smell would make my heart beat faster...I would remove myself." - "Avoiding alcohol because once I got a buzz, I had an urge to use." - "Not putting myself in situations where I 'm always surrounded by weed and drugs." - "I don't go to rock concerts anymore...I was shaking and crying at a concert and had to leave because I smelled marijuana." - "I also got of the dealers' numbers from phone. I made it so I had no way of getting any. I stopped doing art because I would like to get high and do it...so this was a trigger for me."

Category	Representative Content
Treatment	- "I went to group and individual counselling, daily for three months...it was cognitive-behavioural therapy." - "I committed to 12-step Alcoholics Anonymous. I had been in the past for alcohol, but this time I went to AA for marijuana. I used the principles, just switched the word." - "I went to outpatient treatment (Addiction Centre) and residential (Claresholm concurrent disorder). I attended and continue to attend Narcotics Anonymous." - "I went to Detox in Kenora for 10 days for marijuana. Immediately after I went to Crossroads recovery home." - "I hired a hypnotist. I had previously used a hypnotist to quit cigarettes and that worked, I didn't experience withdrawals. I hired a hypnotist for marijuana in April 2004."
Hobbies/ distracting activities	- "Got busy. Sought out activities that would be impossible to use at." - "Cooking, reading, replaced old habits. Tried to stay busy." - "Seeking other entertainment." - "Spend more money doing something else." - "Retail therapy (shopping). Just getting out of the house, being indoors is hard for me, being outside is a great distracter."
Exercise/ diet	- "Changed eating habits, got healthy, worked out." - "Exercised almost daily." - "Substituted my pot use with some exercise." - "Started to eat better." - "Ate 'detox' food and drank a lot of lemon water."
Social/ family support	- "My parents helped me out emotionally and financially, wanted to pay them back somehow." - "I often talk to my sister if I'm having issues, cravings, or identity issues. For example, leaving a barbeque because someone smoked a joint...she's a good crutch." - "I asked my friends for support and they were encouraging." - "My girlfriend helped me a lot to set goals (be active at school, church, socialize, etc.)." - "Communicated with important people in my life to re-evaluate and motivate the change."

Category	Representative Content
Work/ school involvement	- "In the summer, I had to study for more exams, so I was using less." - "I started taking school more seriously. I figured I have all this time, I might as well put it to use." - "I applied to a part time job in fast food, which became full time and kept me busy. I started preparing to study for school next year." - "I focused on my career." - "I went back to school, get my life back on track."
Religious/ spiritual involvement	- "I prayed often (daily) to the creator." - "New age stuff, spirituality, rocks." - "I used to read a few sentences in the Bible everyday and joined a Bible study group." - "I looked towards spirituality, shamanism. More spirituality in relation to environments, forests, natural surroundings, and feeling a part of it. It gave me a calming sense, helped with the stress of it." - "I got more engaged in religion, more devout Catholicism, prayed, went to church weekly with family and a friend."
Discarded cannabis/ paraphernalia	- "I had a ceremony. I threw my one-hitter off a bridge, took a photo, and it's now on my nightstand." - "I smashed my pipe and threw out paraphernalia. This was meaningful, it meant commitment." - "I threw out a bag of weed and all paraphernalia." - "I flushed away my stash, for guilt, after buying it to use." - "I didn't have it in the house anymore, I gave it to a friend."
Increased or substituted other substance or addictive behaviour	- "I drank alcohol more (1 or 2 drinks more than usual), perhaps to get a little more intoxicated." - "There was a time where I was smoking cigarettes instead, helped maybe at the time." - "To cope with my cravings, I smoked tobacco." - "I started smoking cigarettes, increased my alcohol, these helped me to relax." - "Smoked cigars if cravings were particularly bad."
Refusal skills	- "Once I told my friends that I quit, they just bypassed me when having a toke."

Category	Representative Content
	- "I would say 'no' more when a joint was passed around. Not as difficult as one would think, maybe a little awkward, people look at you different." - "I told everyone I don't use anymore. Some people were mad, some happy." - "Told dealers not to see me." - "Told friends I was quitting and did not want them smoking around me."
Self-help/ self-education	- "I researched ways to quit marijuana 16 years ago...some times more intense than others...found nothing on marijuana...intensified my research to addictions in general because nothing on marijuana...also studied on smoking cigarettes because I was smoking marijuana." - "I found a self-help book from the public library. It was serendipity. I was actually looking for marijuana books on how to cook marijuana brownies, and I just saw it. I read the whole thing and used it...it wasn't so much an instructional book, it was accounts/stories of how people got over marijuana addiction." - "I started to read psychology books which made me become more aware of what was happening to me." - "Read books on self-esteem...investigated effects of drugs and alcohol, became more self-aware." - "Learned about addiction to understand it."
Maintained old social network with users	- "I still kept the same friends, it didn't matter that it was around." - "I still continued with the social aspect, watched them pass around the joint, not really anymore though." - "I still hung out with my friend who smoked weed...I held firm to my convictions to quit." - "Didn't stop hanging around people that had it on them and continued to smoke their supply." - "I still keep in touch with my friends, they honour me, they don't smoke in front of me."
Residence change	- "I moved away from everyone in Ontario who smoked." - "Moved out from living with friends to living with girlfriend. Before it was a house (easy to smoke there), and now I'm in an apartment (more difficult to smoke there)." - "I moved provinces so it wasn't available to me anymore." - "I moved away for 3 months, got away from Calgary environment." - "I moved households, one was more stable."

Category	Representative Content
Miscellaneous	- "Nothing. There was no list, not even a mental note. I didn't say, 'just quit'. Like someone playing hockey growing up, the lifestyle just changes. It becomes less and less frequent, until someone doesn't even have a stick anymore. You tell yourself, 'I used to do that, I don't even know how anymore." - "Pets, I was really mean to pets when I was stoned. I bought a mule. I didn't want to be stoned with the mule." - "I bought a house, had to make house payments, which I knew would take away from pot." - "I always had it in the house, it helped me." - "I purposely stayed single for a year."

Table L4

Representative Content from the Maintenance Factors Categories

Category	Representative Content
Cognitive strategies	- "Anytime I thought about weed, I got scared shitless because I remembered what it was like, just remembering what it was like scared me away." - "The realization of how much my life had improved since quitting." - "I feel good when people go for a toke and I know I don't need it." - "Keeping focused on a goal, whether they be small or big." - "A positive mindset, I told myself that I would never ever use again (alcohol and cannabis)."
Hobbies/ distracting activities	- "I stayed busy, no idle times." - "I try to keep myself full of responsibilities, work related stuff, home stuff, to keep busy and take up time." - "I am engaged with my life. I am active, involved with the things that I enjoy." - "Just keeping myself distracted, TV, Internet." - "A lot of activity, busy from morning to night."
Decreased time spent with users/increased time spent with non-users	- "Not being with people that smoke often, limiting my time with them. I used to see these people every day, but now just once in awhile." - "I associate with positive and sober people, normal people." - "I made completely new friends, initially in Narcotics Anonymous, but now-a-days my friends are in the 'real world'." - "I purposely date non-drug users." - "I cut out everyone I used to use marijuana with."
Social support/ accountability	- "My boyfriend doesn't want me smoking dope." - "I have supportive friends and family and professionals." - "If I'm having an urge, I call close friends or family, talk about concerns, worries, feelings." - "It was kind of motivating that my common law was proud."

Category	Representative Content
	- "I stay connected with my family and other people in recovery."
Work/school involvement	- "Work, I didn't smoke at work anymore, it kept me busy 6 days/week, often 12 hours/day." - "I went back to school and finished my degree, you can't be high and go to school." - "Work was more important." - "I had too much to lose with my research project." - "I work two jobs."
Exercise/diet	- "Working out is a huge factor. I workout 3 times/week, it's a health related positive thing. This has been great 'replacement therapy'. I've reached my potential in the gym that I could not have achieved when using. I used to smoke and life weights." - "Exercise is part of my life, and marijuana doesn't go well with that, otherwise you don't exercise and you get junk food in your system." - "Physical activity, gym, bike, roller blade. I try to go as often as I can. Right now about 3-4 times/week. I try to ride my bike everywhere I go, which is easier now that I don't smoke." - "Becoming physically active." - "I changed my diet."
Stimulus control/ avoidance	- "For the first little bit, laying low, not going to the places I usually go...deleted dealers, although I could have got it." - "Number one way is to limit exposure to it." - "I didn't go out to smoke when other people did, but kept the same friends." - "Not having materials around me, still have papers, but don't have bongs or pipes or anymore." - "I didn't put myself in situations where I could use."
Treatment/ self-help	- "Being actively involved in Narcotics Anonymous." - "I go to after the care program at Aventa. We just talk recovery." - "I went back to outpatient treatment and saw my case manager on a regular basis after residential treatment."

Category	Representative Content
	- "Working the steps and 12-step readings along with external sources." - "I read meditations."
Religious/ spiritual involvement	- "I became very spiritual, not religious. The people there at Narcotics Anonymous were my high power." - "Religion, whenever I read any part of the Bible it confirms I'm doing the right thing, even the first sentence I read." - "I went to church regularly 2-3 years after I quit." - "Bible reading, food for thought." - "Ongoing exploration of the discovery of development of spirituality, including existence and use of a higher power."
Financial concerns	- "Financial costs, I couldn't afford it, living pay cheque to pay cheque." - "Money is a small motivation." - "A financial aspect to it, my parents took away my money, they don't give me a lot of money." - "I need money for rent so I can't buy weed." - "Financial side, to get back to using regularly would be a financial burden."
Helping others	- "I run and participate in addiction groups and one-on-ones at my job, so I don't want to be a hypocrite. Plus it's a successful life story that I can share with them, it is possible to not smoke weed for the rest of your life." - "Once every 5-6 weeks, I help out at "Choices Recovery", I give an intro 12-step lecture about all addictions." - "Even doing this interview is giving back and volunteering. I also sponsor other people in the 12-steps program." - "I got involved with service work with Narcotics Anonymous, which is a reminder for sobriety." - "Helping others that suffer with addiction and in general."
Miscellaneous	- "I use a silly putty stressball." - "My legal situation helped, I want to comply." - "Interestingly, I have some weed at home. It makes me feel in control. If I don't have it, I think about it more." - "When I was growing up, I used, now I don't. It just phased out. You grow out of it. I couldn't really see myself

Category	Representative Content
	using anymore. It's incomprehensible, almost as much as jumping off a bridge while following lemmings." - "No, nothing helped, it felt natural, the underlying influences were no longer present."
Increased or substituted other substance or addictive behaviour	- "Rediscovering alcohol, socially." - "Smoking more cigarettes, even to this day." - "Increased drinking helped a little." - "More drinking." - "Drinking occasionally as my guilty pleasure."
Residence change	- "I changed my residence because people were smoking above my apartment daily, so I have my landlord my notice." - "I no longer live in Okotoks (a rural small town), there is nothing to do there except drugs." - "I moved in February, 2001, it took me away to Calgary... and so I didn't know anyone who did it, I started from scratch almost." - "I changed my location, I left for Mexico for 3 years." - "Change of city, I moved from Vancouver to Calgary."

Table L5

Representative Content from the 'Relapse Causes' Categories

Category	Representative Content
Exposure to triggers/ peer pressure	- "One night with a friend, just had one joint, back to daily use." - "Having an excess volume of weed." - "Just being around it, my brother bugged me to sell it again, he said "keep the profit, don't smoke it"...other people bugged me for weed." - "Going to social gatherings/parties when people would use." - "My girlfriend wanted to smoke so we did and then the next few days I would smoke a bit in the morning until I realized I could return to problematic use."
Cope with stress/pain	- "I would justify to myself that I needed it...I was a single parent, 2 kids, full-time job...I had a lot to do, cannabis helped me to cope with all the responsibilities/stress." - "I broke up with my girlfriend. I was living in isolation with no friends and shabby living conditions. I felt like I had nothing. I used daily for about 2 weeks." - "Wanted to get out of a normal state of mind, and wanting escape reality." - "Tension from work day, anger from work." - "Pain, side effects of medications...lesser of the evils...easier, softer drug."
Beliefs that relapse will not happen	- "I quit for 2 years, I didn't think I would get hooked." - "You adopt the attitude, "it's not so bad", and think in the back of your mind, "I'll just do it recreationally", and then within a month, I'm back to using daily." - "I would think to myself that I could control it this time." - "Thought I could do it and not return to use...bought some a week later, wanted to keep it for weekends, slowly turned into daily use." - "I'd get thinking about it, and the more I thought about it, the less of a problem it seemed. By the end of the day, I'd be trying to get some."

Category	Representative Content
Boredom/ Habit/ Enjoyment	- "A lot of time and nothing else to do." - "Just enjoyed and missed it." - "Fell into old habits." - "Fidgety, boredom, and isolation." - "I had a bunch of school work to do, I just decided to smoke weed instead and neglect it. Not due to stress, just laziness."
Other	- "I was told, "don't expect to quit all at once" at Lander's in Claresholm...expect that I should relapse, so I didn't fight it." - "Atheism, no God, realized that God saved me, can't see without His help...only interested in the light now...now a lot easier to say "no"."

Table L6

Representative Content from the 'Switched from Moderation to Abstinence Reasons' Categories

Category	Representative Content
Ultimately wanted abstinence	- "I wanted to quit, cutting down just happened." - "I just really wanted to quit." - "I've always tried to quit, I never said I wanted to cut down, every time I returned to use it was a mistake." - "Was gradually quitting, plan was to reduce to a point of quitting over time." - "Main goal was to quit completely but had to gradually cut down."
External/social pressure	- "Because I want to gain employment at CSIS, which required me to be clean from cannabis and other illicit drugs for at least one year." - "People expected me to be quit, everything as on the sly and hidden." - "It was not available or affordable." - "For work." - "Ordered by court to quit in October 2010."
Realization of harm	- "Because using at all was negatively affecting my life...because if I continued to use, it was an open door to other drug use." - "I just wanted to go back to work, live a healthy lifestyle, get my shit together. I came back from Toronto broken and I knew weed was a big part of that." - "Smoking is such an addictive habit, couldn't breathe anymore, no middle ground, smoke it till' it was all gone." - "You get tired of the game you play, tired of not being in control." - "Don't want to have any problems with my immune system. I want to live to 125-130 years. I need to do everything right."

Category	Representative Content
Moderation did not work	- "Cutting down wasn't working! Over 4 years ago, I tried reducing the number of times, per day, per week, but then I just returned to daily and hourly use." - "Because I discovered it was a bigger issue that I originally thought and cutting down wasn't good enough, it didn't solve the problem, I eventually ended up using more." - "Because cutting down wasn't successful, I couldn't be the occasional user." - "Because cutting down wasn't doing it. Issues needed to be dealt with, pot was not allowing that." - "Couldn't use it moderately. I had a hard time going to sleep and experienced night sweats...I needed marijuana to help sleep."
Lost desire to use	-"It just happened, the less I used, the less I wanted to use. The point came where I no longer wanted to get high, the point came when I was happy in my sober state." - "It was becoming a hassle, inconvenience, I had better things to do. The high didn't work for me anymore." - "Just don't want to use anymore." - "It no longer fit my lifestyle. Spirituality took precedence over marijuana." - "After one return to problem use, it verified that I didn't feel like it and wanted to quit completely, I had no desire, no curiosity."

Table L7

Representative Content from the 'Switched from Abstinence to Moderation Reasons' Categories

Category	Representative Content
Social reasons	- "Now it's just social." -"Socially with friends, my common law said to increase my use." - "Friends would influence me." - "Friends, staying in social scene, everyone was doing it, didn't notice that much of a difference." - "Using in the moment with friends that I trusted."
Beliefs that relapse will not happen	- "I feel a lot more comfortable with it than I once did. And now when I use, I use a lot less. I used to use 3 grams in one session, and now will only have a puff. I never plan it, if it happens, it happens." - "I'm not worried, there are more important things in life now, like my health and child." - "A lot of people are all or nothing. I'm not like that. I can use in moderation. I'm lucky because people struggle with that." - "Because I felt more mature, older, more in control and that I could handle it. It still makes me tense and paranoid sometimes when I use." - "I feel that I have control, with only limited use, and that it's better than getting drunk."
Boredom/Enjoyment	- "Once in awhile I just feel like having one." - "There are some enjoyable things about it, I would ideally like to smoke it every day without problems. I recognize it's an ongoing battle. I don't want to be an occasional user forever." - "I would remember the good times, the fun times. I would think, "it would be fun to do it again."" - "Boredom, I don't know why." - "I liked getting high, as long as I could be a good mom."
Cope with stress	- "A need to escape." - "Extreme stress." - "Emotional turmoil, wanted to feel better."

Category	Representative Content
	- "I was suicidal because of drinking, so I quit drinking and substituted with weed." - "Loneliness."
Other	- "I initially quit to see if there would be any benefits in term of friendships and motivation for life goals. I didn't see any benefits, it actually got worse, and so I started to use again, between weekly and monthly, and consider myself a moderation user now." - "My attitude about it changed, smoke for a different reason, not because I have to forget problems." - "Religion made me think I needed to quit completely but I went back." - "I talked myself out of it, I convinced myself that quitting wasn't necessary, I currently have mixed feelings, I didn't accomplish what I wanted to by quitting...which was a shift in well-being." - "Medical necessity, always had pain and joint would take it away."

Table L8

Representative Content from the Barriers to Treatment Seeking Categories

Category	Representative Content
Not believing there is a problem	- "I just don't think I need it." - "I didn't think there was a problem. I was convinced that marijuana use made it better." - "I didn't think I needed it, it didn't have a grip on me like that." - "I didn't always think something was wrong." - "I didn't need formal treatment for marijuana."
Wanted to do it on my own	- "I felt like I could do it on my own, which I did." - "I felt I could quit for myself, but it was a fantasy." - "I figured I could quit on my own if it's too much." - "I also wanted to do it on my own, conquer the beast, this was the single bigger factor because if I got help, I thought I would have to rely on it later." - "I knew I had the capability of quitting on my own."
Stigma/pride	- "Stigma of going "just for weed"" - "Being associated with rehab centres, social stigma." - "Trying not involve other people...too proud...not going to ask someone to help me up." - "Embarrassment of admitting my problem to a stranger." - "Looking back, I was a little scared...being labelled as a marijuana user."
Not wanting to admit a problem/ denial/ self-deception	- "I was too afraid to admit to myself that I was a drug addict. I think I knew internally that marijuana was a real problem, but it wasn't legitimized. I thought depression was my problem, not marijuana. I had been told that marijuana is not physically addictive. I've seen people high their whole life. I would rationalize that marijuana was okay. I always knew it was a danger to children, but never went so far to admit it to myself." - "I didn't want to admit that it was out of my control."

Category	Representative Content
	- "I didn't want to be in a position to even quit. I wanted to keep maintaining excuses instead of putting effort in." - "Denial...minimizing the whole concept of marijuana being a problem." - "Looking back I was a little scared to admit out loud that I was a marijuana addict."
Enjoyable/ did not want to stop or cut down	- "I didn't want to!" - "Just not wanting to...I enjoyed it very much." - "Because I was a making a lot of money...because smoking helped me bond with my brother and dad once they found out I was selling weed." - "I liked using marijuana." - "Chronic pain and mental illnesses (depression/anxiety) stopped me because I thought marijuana was helping these problems...my non-desire to actually have to feel. I enjoyed being numb."
Difficulty accessing treatment	- "Wasn't easy to get, wasn't advertised like Alcoholics Anonymous." - "Can't afford treatment." - "Living outside of Calgary, access was difficult." - "Expense was the biggest factor (lived in the USA)." - "I also lived in the boonies so help wasn't accessible."
Mistrust of treatment providers	- "Would only make things worse...general mistrust of society and institutions." - "I didn't think guidance counsellors could help. I tried calling a helpline once at CAMH, but they didn't call back, so I never received it, I didn't think they could help anyway." - "Wouldn't be a benefit...I know how the system views marijuana, they provide misleading info, and I don't agree with their approach...they have a lack of ability and knowledge to help me personally." - "I came into university mistrusting institutions, difficult trusting people." - "Professional treatment is wrong. Everyone is different, you cannot solve with books."

Category	Representative Content
Never thought about it	- "Didn't even think about it, wasn't a thought." - "It never crossed my mind to seek help, that's the biggest factor." - "Never thought about it." - "Never occurred to me." - "Never really crossed my mind, never really brought up."
Too busy with life/ dealing with other problems	- "Got my 16 year-old girlfriend pregnant, quit school and couldn't see her anymore, too much in life to worry about quitting." - "It's hard to reflect, I was in a zombie state, difficult to recall, I was intoxicated every day for 20 years...life was work and abuse." - "Where you're at in life, choices got in the way (partying)." - "Time consuming." - "Marijuana was not the primary problem."
Unaware of treatment availability	- "Didn't know there was support for marijuana addiction." - "Unaware of treatment for marijuana." - "Didn't know it existed." - "Didn't know that they were out there." - "I didn't think you could go to treatment for a marijuana problem, I thought it was extreme alcohol and drug abuse. I didn't know resources were out there."
Not wanting to face issues/ fear of facing issues	- "Fear of facing my emotions and past hurts...not wanting to deal with it...I didn't think I was a worthy or good enough person." - "Fear of change. Fear of the unknown." - "I've done it for so long, it was attached to my identity, I was a pothead...fear of not knowing who I would be." - "Didn't want to be vulnerable." - "Not willing to enter a program...fear of "how am I going to cope?"."

Category	Representative Content
Was not directed/ coerced/ compelled to treatment	- "If I wasn't arrested, I would still be addicted today." - "Wasn't being pointed in the proper direction for help (by original psychiatrist)." - "Not hitting rock bottom." - "Until hitting bottom, I thought I could keep using." - "I did not want to go to treatment, I was forced to go to AADAC."
Cannabis was socially acceptable	- "It was socially acceptable there in BC, all the people I knew used." - "My family accepted my marijuana use when I was younger." - "Friends, peer pressure." - "It was acceptable to me and others and society."

Table L9

Representative Content from the Advice Categories

Category	Representative Content
Seek help/ social support	- "Find some people that know about addictions, especially marijuana." - "Seek outside help, specifically Narcotics Anonymous." - "Open up, talk to someone." - "Don't be afraid to seek help if you need it." - "Nothing wrong with seeking professional help."
Reflect on reasons for change	- "Encourage them to find a reason to reduce their use (e.g., family, religion, etc.)." - "Weigh out your pros and cons." - "Weed is not helping your life, it's temporary entertainment that is really costly and bad for your health, and after a certain point, it will make you feel worse." - "Life is actually better without marijuana." - "Re-evaluate whether they can achieve their life goals at their usage."
Engage in hobbies/ distracting activities	- "Find a project or goal that they are inspired by or motivated by." - "Get busy, find activities, something to do." - "Set goals, short term and long term, make them realistic." - "Get new hobbies, change of life style." - "Change your lifestyle...exercising, school, job, better yourself."
Stimulus control/ avoidance/ change social environment	- "I would suggest to avoid situations and people they use with." - "Get rid of your paraphernalia." - "I would recommend moving to a different environment, different areas." - "Change your friends, develop a good support network." - "Don't hang out with people who use."

Category	Representative Content
Think positively	- "If you stick to it, it can be overcome, be positive with it...it's like cigarette smoking, if you can quit smoking, you can quit smoking marijuana." - "Use your will power, retrain your brain." - "Think highly of yourself, you can do anything you want to do." - "To do everything, you've got to believe in yourself that you have the right attitude...you need it, it's always a mind game." - "Persistence conquers all things."
Face denial/self-deception	- "If someone recognizes the problem, that's half the battle" - "Being honest about why you're using." - "Be honest with themselves, no denial." - "Admit you have a problem and want/need to change." - "Don't lie to yourself, identify the level of addiction."
Change is a personal decision	- "Need to make a choice for yourself. It's your decision, just do it." - "You have to want to quit." - "People can't change unless they want to." - "If you want to stop it's up to you, no one but you can make you stop." - "You control your life, grow up and quit. It's all on you, quit if you want to quit."
Find underlying issue/motive for use	- "Marijuana use is not the underlying problem. What is the drug doing for you? Marijuana is a medication. The real question is what are you medicating for?" - "First ask yourself, why do you like it? Are you hiding from something? Then, if you can come up with an answer, and it's because you're hiding, figure out what you're hiding from and why you feel that way." - "Ask yourself why you are using it, you won't be able to fix it unless you know why you have the problem." - "Person needs to find out why they use." - "There is probably some deep seeded reason why...try to get to the bottom of it. Ask the question, why do you want to be high?"

Category	Representative Content
Quit	- "You should quit." - "It's all or none, can't occasionally use." - "Don't do it once, you will be back to problem using." - "Need to quit completely." - "If you can quit, just quit."
Research cannabis/addiction	- "Educate yourself about marijuana." - "Read books on addiction and cannabis; for example, From Chocolate to Morphine." - "Education, and support and encourage them to educate themselves." - "If they have a problem, I'd say read something...it's obviously a problem with themselves." - "Do some research."
Seek spiritual/ religious guidance	- "There is a need for a spiritual life." - "Pray to whatever." - "Seek God." - "Pick up a Bible." - "Look to religion, spirituality."
Moderate use	- "How do you convince someone to quit when it's becoming legal? Do what works for you, don't distress yourself, cut back on weekends if you have to." - "Don't smoke it, eat it if you have to." - "Consider it a process and gradually decrease the usage while keeping in mind that it's a process and be willing to accept the sliding scales of the process."

Table L10

Representative Content from the Perceived Etiology Categories

Category	Representative Content
Used cannabis to cope	- "I used it to medicate my emotions, to escape, not just to have a good time. I became dependent on it. I used it to self-medicate, avoid other problems...over 10 years, it manifests itself into an addiction." - "Help deal with and mask low self-esteem, self-confidence." - "I was filling a void that I couldn't get elsewhere." - "I tried to escape and not deal with my emotions." - "The stress relief, even though it was causing the stress. It's a catch 22."
Environment/ social influence	- "A lot of my peers were doing it, peer pressure. I was a teenager, peer pressure." - "Where I grew up, it was a way of life, it was as normal as having a cigarette during break time at school." - "Being around friends who use it." - "Peer pressure...falls into not being comfortable in my own skin. I wanted to be accepted. I would do anything, get high to be cool." - "Your environment, I was around it."
Enjoyment/ boredom/ positive perceptions of cannabis	- "I just really liked the feeling...that's about it. I really liked it but then it turned its back on me." - "The perception that it is mind enhancing/expanding." - "Enjoyed being high, excuse to be philosophical or silly." - "Didn't have anything better to do." - "I liked the feeling of being high, more so than the effects of alcohol."
Addictive personality	- "I think there is something to be said about addictive personality." - "I used to have a really addictive personality, still kind of do." - "I think I generally tend to have addictive personality. - "Addictive personality, I was told at Fresh Start." - "Highly addictive personality, anything I've done, I've done a lot."

Category	Representative Content
Genetics/ predisposition	- "Might be genetic, hardwired. Some families have no addictions. It skips a generation in my family...maybe because each generation sees what it does." - "It's a predisposition to addiction and mental illness. I'm just wired differently, it did something for me that I liked." - "I think coming from parents that have addiction issues." - "Vulnerable, genetically predisposed, family problems, susceptible. If not pot, it would have been something else." - "Addiction is genetic, I had a predisposition to addiction."
Habit/ dependence/ addiction	- "Became a habit." - "Regular use...body got used to...goes by in a blink, you never say, "I'll smoke every day of my life"." - "Became a habit/addiction." - "Years of use, years of relying on it." - "Habit part of it...I was used to being stoned."
Loss of control	- "Feeling of not being able to stop." - "Got out of control." - "I constantly wanted to get back the same high." - "I was obsessed with it." - "It snowballed."
Cannabis per se causes the addiction	- "Marijuana has control of the biological/chemical imbalance." - "It's addictive." - "The amount used...change in potency, old versus new marijuana." - "Maybe some bad dope, it could have been laced." - "It will affect your mind, your decision making, then problems come out like a mushroom."

Category	Representative Content
No problem actually existed	- "I never perceived it as a problem...meaning interfering with life, socially and professionally...I still don't have a problem." - "I don't believe I had a problem, always felt in control of use, even at high levels of usage." - "It never seemed like a problem. It was just a habit. It only became an issue when my girlfriend wanted to go into law enforcement." - "I knew I could always manage what I was doing. I knew I was in change, and when I was going to stop, I would stop. I was quite conscious that I could have fun and then stop whenever I wanted." - "I never considered it to be a problem. Others thought it was and tried to extend their feelings to change the way I see marijuana. They made me think it was a problem."
Denial/ self-deception/ ignorance/ choice	- "At the time, lack of feeling it was a problem, denial of any perceived problem." - "Young and ignorant." - "I chose it, decisions, that's all it comes down to." - "I think that everyone has a problem with marijuana...everyone else is lying."

Table L11

Representative Content from the Perceived Causes of Recovery Success Categories

Category	Representative Content
Focused on reasons for change	- "Kept focused on the reasons I wanted to quit." - "Having the confidence, maturity, and knowledge that it isn't doing me any good...and thinking about how it's not helping me achieve my goals, it's useless and pointless." - "I had a reason, a goal in mind and I need to quit to accomplish that goal." - "Determined to become successful in life, wealthy and prestigious. Wanting a more fulfilling life...using decreased self-esteem and mental/physical health." - "Biggest reason is because I set goals and was determined to achieve them, slowing marijuana use was necessary to achieve them."
Goal commitment to change	- "Stuck to my guns, made sure I stuck to it and followed through." - "Sheer motivation, I was that determined. Other people might not want to. They would self sabotage without even knowing it, this applies to all addictions." - "Because I said I wanted to. I took the initiative and did it." - "My decision and commitment to complete abstinence. Commitment/wanting to be clean, has to come 100% from you, not anyone else." - "Very determined to overcome the problem."
Conquered denial/ self-deception	- "I had the ability to recognize I had a problem. I know lots of people who say they don't have a problem, but they do." - "Once I saw what I had become, and didn't try to minimize the fact that it was just marijuana, I didn't want to be that anymore. It was a bigger problem than what it was worth physically and emotionally. I didn't like what I saw in the mirror, I had to change the picture." - "The crux is the willingness to do things that are really uncomfortable, to be honest with myself and others." - "I saw it as a lie, and as a coping mechanism that people use, like drinking." - "I had self-awareness that marijuana was impeding the process of progressing as a human, the human I wanted to

Category	Representative Content
	be."
Treatment/ self-help	- "I've been involved for 25 years in Narcotics Anonymous. Hearing people talk about it, I can't pin it down. I don't know. The only thing I can say is that the program of NA worked for me perfectly, I consider myself textbook. I even used to lie about marijuana in recovery because people didn't think of it as bad. But now, I'm fully on the other side, I always say it is my primary drug." - "I had rehab tools, basically the whole package of rehab." - "I attribute a lot of it to my treatment. I don't think Alcoholics and Narcotics Anonymous was enough, I think residential treatment was necessary to help me resolve my past pains and generate self-love. I like who I am today." - "Education, access to a lot of materials...better able to make an informed decision." - "Research, educating myself, reading materials, sharing."
Religious/ spiritual guidance	- "I think there is something bigger than us, a creator. I've always had a connection with it. I'm not religious, but I'm spiritual, and I believe in something else that is in control, and being able to access that has helped me to get passed this." - "God had a purpose for me, marijuana was a distraction from God's plan." - "I had Jesus." - "Not very religious but felt profound chosen sense of need to quit. God spoke my name." - "Religion played a part."
Will power	- "I'm strong willed." - "Will power." - "My drive and will power." - "Strong willed." - "Strong will power."
Lost enjoyment/ lifestyle change	- "I no longer like the high, it sucks. People who smoke like the high." - "Change of circumstances, life became fulfilling without using...environmental changes, different friends, work

Category	Representative Content
	environment." - "It was a gradual to abrupt lifestyle change. When I quit, I quit." - "Just didn't like it anymore." - "Grew out of it, tired of the smell."
Social support	- "I had support of others." - "Financially and emotionally supportive parents and family." - "Positive people came into my life." - "Very good personal supports." - "Related to other people, realized that I wasn't alone, it was possible by seeing other people in the same situation."
Stimulus control/ avoidance/ changed social environment	- "I don't hang out with people at all anymore who use." - "Avoiding people, situations." - "Depends on the environment, took myself out of toxic environment." - "Changed external environment." - "Removing myself from the environment, not spending much time with friends."
Conquered underlying issues	- "I found the underlying issues that caused me to feel badly about myself, and I have healed from that. Therein, I filled that void of self-worth that was missing." - "Because I found out why I was doing it and I sought treatment for that issue. And since I was seeking treatment for that issue, I could look at my marijuana use more objectively and see it wasn't helpful for anyone using it to cope with their issues." - "Learned about underlying issues. Learned to cope with issues." - "Dealt with core issues." - "Was able to develop more mature emotional responses to my particular problems, instead of medicating with marijuana."

Category	Representative Content
Luck/ lack of cravings or withdrawal	- "I'm one of the lucky ones. I would like to know why I overcame it as well." - "Fortunately, withdrawal symptoms were minimal." - "I just never had strong cravings or urges when trying to quit." - "Different physiology, did not have addicted personality like others do."
Helping others	- "Counselling of other people with the same problem." - "Being a positive influence for others, being a good example."

Appendix M: PCA of the Reasons for Resolution Checklist

In order to explore the internal structure of the reasons for resolution checklist, a principal components analysis (PCA) was conducted using a varimax rotation. The results indicated that seven components were extracted using an eigenvalue cut-off of greater than 1.0. Overall, the solution accounted for 69.34% of the variance in the original set of items. The initial or unrotated results were as follows: Components 1 through 7 accounted for 28.76%, 9.87%, 8.32%, 7.21%, 5.91%, 4.77%, and 4.51% of the variance in the original set of items, respectively, with eigenvalues of 6.61, 2.27, 1.91, 1.66, 1.34, 1.10, and 1.04, respectively. The rotated results were as follows: Components 1 through 7 accounted for 15.41%, 12.38%, 10.98%, 9.71%, 8.56%, 6.99%, and 5.32% of the variance in the original set of items, respectively, with eigenvalues of 3.54, 2.48, 2.52, 2.23, 1.97, 1.61, and 1.23, respectively.

Using a conservative cut-off of +/- 0.50 to indicate a substantive loading, the rotated component matrix indicated that Component 1 was composed of the following 5 items: *you wanted to have a major life-style change* (.61), *incompatible with self-image (i.e., you didn't want to "see" yourself as a cannabis user)* (.80), *you began to view marijuana more negatively* (.75), *you thought about how marijuana was affecting you negatively* (.67), and *you wanted to become more motivated/have more energy* (.76). Based on the content of these items, it might be reasonable to name Component 1 as the Internal Reasons component. Component 2 was composed of the following 4 items: *you wanted to overcome your marijuana problem for your family* (.64), *confrontation about your marijuana problem (e.g., from a friend or family member)* (.83), *your marijuana use caused problems between you and your significant other* (.73), and you *had social influence to quit from friends, family, significant other* (.85). Based on the content of these items, it might be reasonable to name Component 2 as the Interpersonal Reasons component. Component 3 was composed of the following 4 items: *feeling like you hit rock bottom* (.67), *you experienced a humiliating event* (.68), *you experienced a traumatic event* (.56), and *you wanted to, or were, decreasing your use of other drugs/addictive behaviours* (.64). Based on the content of these items, it might be reasonable to name Component 3 as the Trauma-related Reasons component. Component

4 was composed of the following 2 items: *you were having physical health problems* (.79) and *you were having health concerns* (.82). Based on the content of these items, it might be reasonable to name Component 4 as the Physical Health Reasons component. Component 5 was composed of the following 2 items: *you were having financial problems* (.80), and *marijuana was too costly* (.86). Based on the content of these items, it might be reasonable to name Component 5 as the Financial Reasons component. Component 6 was composed of the following 2 items: *you were having legal problems* (.84), and *you had a fear of having legal problems* (.82). Based on the content of these items, it might be reasonable to name Component 6 as the Legal Reasons component. Finally, component 7 was composed of the following 2 items: *you weighed the pros and cons of changing vs. not changing, and then made your decision* (-.66), and *religious involvement* (.65). Based on the content of these items, it might be reasonable to name Component 7 as the Other Reasons component. Thus, the PCA suggests that 7 broad categories of reasons for resolution can be derived from the checklist: Internal Reasons, Interpersonal Reasons, Trauma-related Reasons, Physical Health Reasons, Financial Reasons, Legal Reasons, and Other Reasons.

While the item *you were having work-related problems* did not achieve a conservative loading of +/- 0.50 on any of the components, its highest loading (.44) was on Component 5 (Financial Reasons), which appears to be conceptually consistent with the other items on Component 5. Moreover, using a cut-off rule of thumb of greater than .50 to indicate a substantive amount of variance of an item accounted for by the solution, an examination of the communalities of the items indicated that all 23 items substantively contributed variance to the solution. These substantive communalities suggest that all 23 items ought to be retained in the checklist as they each contributed substantive variance to the 7-component solution. Therefore, the item *you were having work-related problems* was added to Component 5.

Finally, mean component scores for each participant were calculated by first summing the values of the constituent items of each component and then dividing by the number of constituent items of each component. Table M1 displays the means and standard deviations of the reasons for resolution checklist components for the total

sample and group comparisons. As can be seen from the table, the top three component-based reasons reported were Internal Reasons, Trauma-Related Reasons, and Interpersonal Reasons. While there were no differences between the abstinence- and moderation-oriented groups, three differences were found between the treatment-assisted and natural recovery groups. Specifically, the treatment-assisted group reported significantly higher scores on the Trauma-Related Reasons, Physical Health Reasons, and Legal Reasons components—however, the difference on the Legal Reasons component no longer remained significant after adjusting for the significant Levene's test. Moreover, there was a significant interaction on the Interpersonal Reasons component, F (1, 115) = 6.5, $p < .05$, whereby abstinence-oriented participants reported higher scores compared to moderation-oriented participants only among those who naturally recovered (M = 2.8 vs. 1.9, F (1, 115) = 9.1, $p < .01$), not those who sought treatment (M = 2.5 vs. 2.8, F (1, 115) = 0.6, *ns*). If, however, one were to use a Bonferroni correction alpha level of .007 to correct for 7 comparisons, only the main effect between the groups on the Trauma-Related Reasons component would remain statistically significant.

Table M1

Means and Standard Deviations of the Reasons for Resolution Checklist PCA Components for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Components, *M* (*SD*)	Total Sample (*N* = 119)	AB (*n* = 68)	MOD (*n* = 51)	*F*-test	TAR (*n* = 53)	NR (*n* = 66)	*F*-test
1. Internal reasons	3.4 (1.2)	3.6 (1.1)	3.2 (1.3)	2.3	3.4 (1.1)	3.5 (1.2)	0.1
2. Interpersonal reasons	2.5 (1.2)	2.6 (1.3)	2.3 (1.2)	1.8	2.6 (1.1)	2.4 (1.3)	1.4
3. Trauma-related reasons	2.6 (1.2)	2.8 (1.2)	2.3 (1.2)	1.1	3.1 (1.1)	2.2 (1.2)	16.0^{***}
4. Physical health reasons	2.4 (1.5)	2.5 (1.6)	2.3 (1.4)	0.1	2.8 (1.5)	2.1 (1.4)	6.0^{*}
5. Financial reasons	2.4 (1.2)	2.5 (1.2)	2.2 (1.2)	0.6^{i}	2.6 (1.3)	2.1 (1.1)	3.9^{i}
6. Legal reasons	1.8 (1.2)	1.8 (1.2)	1.8 (1.2)	0.2^{i}	2.0 (1.4)	1.6 (1.0)	4.7^{*i}
7. Other reasons	2.4 (1.0)	2.5 (1.1)	2.4 (0.9)	0.1	2.3 (0.9)	2.5 (1.0)	1.2

Note. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Levene's test of equality of error variances was significant.
[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

Appendix N: PCA of the Maintenance Factors Checklist

In order to explore the internal structure of the maintenance factors checklist, a principal components analysis (PCA) was conducted using a varimax rotation. The results indicated that eight components were extracted using an eigenvalue cut-off of greater than 1.0. Overall, the solution accounted for 64.06% of the variance in the original set of items. The initial or unrotated results were as follows: Components 1 through 8 accounted for 25.42%, 8.15%, 6.69%, 6.40%, 4.98%, 4.79%, 4.03%, and 3.60% of the variance in the original set of items, respectively, with eigenvalues of 7.63, 2.45, 2.01, 1.92, 1.50, 1.44, 1.21, and 1.10, respectively. The rotated results were as follows: Components 1 through 8 accounted for 11.37%, 9.85%, 9.65%, 8.58%, 7.12%, 6.46%, 5.55%, and 4.89% of the variance in the original set of items, respectively, with eigenvalues of 3.41, 2.96, 2.89, 2.58, 2.32, 1.94, 1.66, and 1.47, respectively.

Using a conservative cut-off of +/- 0.50 to indicate a substantive loading, the rotated component matrix indicated that Component 1 was composed of the following 7 items: *past marijuana problems recalled (i.e., you think about your past marijuana problems)* (.51), *self-control/will power (i.e., you use your self-control/will power)* (.54), *respect gained from other people (i.e., you don't want to lose respect)* (.53), *goal commitment (i.e., commitment to staying problem-free)* (.80), *sense of accomplishment* (.79), *personal pride (i.e., you don't want to hurt your personal pride)* (.76), and *major positive life-style change (i.e., you have had a major positive lifestyle change and want to maintain it)* (.52). Based on the content of these items, it might be reasonable to name Component 1 as the Cognitive Strategies component. Component 2 was composed of the following 4 items: *family support* (.79), *friends support* (.79), *significant other support* (.75), and *employer's support* (.50). Based on the content of these items, it might be reasonable to name Component 2 as the Social Support component. Component 3 was composed of the following 4 items: *recreational/leisure activities change* (.53), *concern about worsening physical health* (.80), *wanting to maintain better physical health* (.81), and *change in diet* (.55). Based on the content of these items, it might be reasonable to name Component 3 as the Physical Health component. Component 4 was composed of the following 4 items: *other self-help group (e.g., Alcoholics Anonymous)* (.80), *self-help*

materials (e.g., books, internet websites) (.62), *you have decreased your alcohol consumption* (.55), and *you have decreased other drug use* (.54). Based on the content of these items, it might be reasonable to name Component 4 as the Self-Help Group/Decrease Other Substances component. Component 5 was composed of the following 2 items: *social life activities change* (.71), and *change in friends* (.75). Based on the content of these items, it might be reasonable to name Component 5 as the Social Life Change component. Component 6 was composed of the following 3 items: *you have increased your nicotine use* (.75), *you have increased your alcohol consumption* (.72), and *you have increased your other drug use* (.65). Based on the content of these items, it might be reasonable to name Component 6 as the Increase other Substances component. Component 7 was composed of the following 3 items: *Marijuana Anonymous* (.50), *residence change* (.63), and *change in jobs* (.69). Although *Marijuana Anonymous* does not appear to be consistent with the content of these items, it might be reasonable to name Component 7 as the Change in Life Circumstances component. Finally, component 8 was composed of the following 2 items: *financial status change (i.e., you have less money to spend on marijuana)* (.66), and *religious influence* (.73). Based on the content of these items, it might be reasonable to name Component 8 as the Other Factors component. Thus, the PCA suggests that 8 broad categories of maintenance factors can be derived from the checklist: Cognitive Strategies, Social Support, Physical Health, Self-Help Group/Decrease Other Substances, Social Life Change, Increase Other Substances, Change in Life Circumstances, and Other Factors.

The item *you have decreased your nicotine use* did not achieve a conservative loading of +/- 0.50 on any of the components, and indeed, using a cut-off rule of thumb of greater than .50 to indicate a substantive amount of variance of an item accounted for by the solution, an examination of the communalities of the items indicated that this item (communality = .36) was the only one of all 30 items that did not substantively contribute variance to the solution. These substantive communalities suggest that all items, except for the item, *you have decreased your nicotine use*, ought to be retained in the checklist as they each contributed substantive variance to the 8-component solution. Although the item, *Marijuana Anonymous* was statistically retained in the 8-component solution, its

low base rate of endorsement among the total sample and its loading on to a seemingly unrelated component (Change in Life Circumstances) suggests that it should either be dropped or moved to the Self-Help Group/Decrease Other Substances component.

Finally, mean component scores for each participant were calculated by first summing the values of the constituent items of each component and then dividing by the number of constituent items of each component. The decision was made to drop both the *you have decreased your nicotine use* and the *Marijuana Anonymous* items for the reasons listed above. Table N1 displays the means and standard deviations of the components. The top three component-based factors reported were Cognitive Strategies, Social Life Change, and Physical Health Factors. Moreover, five significant differences among the components were found between the abstinence- and moderation-oriented groups, and two statistically significant differences were found between the treatment-assisted and natural recovery groups. Specifically, the abstinence-oriented group reported significantly higher scores on the Cognitive Strategies, Social Support, Self-Help Group/Decrease Other Substances, and Social Life Change components, whereas the moderation-oriented group reported significantly higher scores on the Increase Other Substances component—these differences remained significant after adjusting for the significant Levene's tests. If, however, one were to use a Bonferroni correction alpha level to correct for 8 comparisons, rendering a new alpha level of .006, then only the difference on the Increase Other Substances component would remain statistically significant. The treatment-assisted group reported significantly higher scores on the Self-Help Group/Decrease Other Substances and Increase Other Substances components—however, only the difference on the former component remained significant after adjusting for the significant Levene's test and the Bonferroni correction. Moreover, there was a significant interaction on the Increase Other Substances component, F (1, 115) = 9.9, $p < .01$ whereby abstinence-oriented participants reported lower scores compared to moderation-oriented participants only among those who sought treatment (M = 1.2 vs. 1.8, F (1, 115) = 9.1, $p < .01$), not those who naturally recovered (M = 1.2 vs. 1.3, F (1, 115) = 0.4, *ns*)—however, this interaction did not remain significant after adjusting for either the significant Levene's test or the Bonferroni correction.

Table N1

Means and Standard Deviations of the Maintenance Factors Checklist PCA Components for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Components, *M* (*SD*)	Total Sample (*N* = 119)	AB (*n* = 68)	MOD (*n* = 51)	*F*-test	TAR (*n* = 53)	NR (*n* = 66)	*F*-test
1. Cognitive strategies	3.8 (1.0)[a]	4.0 (0.9)[b]	3.5 (1.0)	6.1[*]	4.0 (0.9)	3.7 (1.0)[c]	2.6
2. Social support	2.4 (1.2)[a]	2.6 (1.2)	2.0 (1.1)[d]	5.6[*]	2.6 (1.3)	2.2 (1.1)[c]	1.1
3. Physical health	2.7 (1.2)	2.8 (1.3)	2.6 (1.1)	0.3	3.0 (1.2)	2.6 (1.1)	2.6
4. Self-help group/decrease other substances	2.1 (1.2)[a]	2.3 (1.4)[b]	1.7 (0.9)	4.5[*i]	2.7 (1.3)[e]	1.6 (0.8)	27.8[***i]
5. Social life change	3.4 (1.4)	3.6 (1.4)	3.1 (1.3)	4.1[*]	3.5 (1.3)	3.2 (1.4)	0.4
6. Increase other substances	1.3 (0.6)	1.2 (0.5)	1.5 (0.8)	8.1[**i]	1.4 (0.8)	1.3 (0.5)	4.0[*i]
7. Change in life circumstances	2.3 (1.4)	2.4 (1.4)	2.2 (1.3)	0.4	2.4 (1.4)	2.3 (1.4)	0.2
8. Other factors	2.2 (1.2)	2.2 (1.3)	2.2 (1.1)	0.0	2.2 (1.2)	2.2 (1.2)	0.0

Note. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Levene's test of equality of error variances was significant.
[a] *n* = 118. [b] *n* = 67. [c] *n* = 65. [d] *n* = 50. [e] *n* = 52.
[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

Appendix O: PCA of the Barriers to Treatment Seeking Checklist

In order to explore the internal structure of the barriers to treatment seeking checklist, a principal components analysis (PCA) was conducted using a varimax rotation. The results indicated that seven components were extracted using an eigenvalue cut-off of greater than 1.0. Overall, the solution accounted for 68.0% of the variance in the original set of items. The initial or unrotated results were as follows: Components 1 through 7 accounted for 28.84%, 9.60%, 7.29%, 6.55%, 5.77%, 5.60%, and 4.41% of the variance in the original set of items, respectively, with eigenvalues of 6.92, 2.31, 1.75, 1.57, 1.38, 1.34, and 1.06, respectively. The rotated results were as follows: Components 1 through 7 accounted for 12.37%, 11.10%, 10.84%, 10.56%, 9.94%, 6.99%, and 6.24% of the variance in the original set of items, respectively, with eigenvalues of 2.97, 2.66, 2.60, 2.53, 2.39, 1.68, and 1.50, respectively. Compared to the other PCAs conducted in the present study, however, this particular PCA is the least useful with respect to the manner and meaningfulness in which the content of items loaded on to their respective components.

Using a conservative cut-off of +/- 0.50 to indicate a substantive loading, the rotated component matrix indicated that Component 1 was composed of the following 5 items: *planning to get help but not getting around to it* (.65), *feeling ashamed or embarrassed for yourself or family* (.74), *not being aware that treatment was available* (.54), *not being able to get the service at the time or place wanted* (.60), *concerns about your confidentiality* (.55), and *not having enough encouragement from friends, family, or community to seek help* (.50). Based on the content of these items, it might be reasonable to name Component 1 as the Treatment Intention component. Component 2 was composed of the following 3 items: *believing there wasn't a problem* (.86), *unwillingness to admit a problem* (.79), and *believing that help was not needed* (.84). Based on the content of these items, it might be reasonable to name Component 2 as the Denial/Self-Deception component. Component 3 was composed of the following 3 items: *having too many commitments to seek help* (.70), *being too overwhelmed by other problems to seek help* (.85), and *being too busy trying to address other problems* (.82). Based on the content of these items, it might be reasonable to name Component 3 as the Too Busy

component. Component 4 was composed of the following 4 items: *not wanting to use a telephone service* (.71), *not wanting to use a face to face service* (.83), *thinking that services would treat you like an addict/mentally ill* (.70), and *concerns about your confidentiality* (.53). Based on the content of these items, it might be reasonable to name Component 4 as the Mistrust component. Component 5 was composed of the following 3 items: *language concerns* (.83), *thinking the service would not relate to your culture* (.75), and *having had bad experiences of seeking help for marijuana problems in the past* (.74). Based on the content of these items, it might be reasonable to name Component 5 as the Diversity component. Component 6 was composed of the following 2 items: *not having enough encouragement from friends, family, or community to seek help* (.53), and *having had bad experiences of seeking help for other problems in the past* (.78). Based on the content of these items, it might be reasonable to name Component 6 as the Other component. Finally, component 7 was composed of the following 3 items: *wanting to resolve problem alone* (.71), *being too proud to seek help* (.55), and *feeling pressured by friends, family, or community to continue using marijuana* (-.52). Based on the content of these items, it might be reasonable to name Component 7 as the Treatment Resistant component. Thus, the PCA suggests that 7 broad categories of barriers can be derived from the checklist: Treatment Intention, Denial/Self-Deception, Too Busy, Mistrust, Diversity, Other, and Treatment Resistant.

The item *difficulty being able to attend a face to face service* did not achieve a conservative loading of +/- 0.50 on any of the components, and indeed, using a cut-off rule of thumb of greater than .50 to indicate a substantive amount of variance of an item accounted for by the solution, an examination of the communalities of the items indicated that this item (communality = .45) was the only one of all 24 items that did not substantively contribute variance to the solution. These substantive communalities suggest that all items, except for the item, *difficulty being able to attend a face to face service*, ought to be retained in the checklist as they each contributed substantive variance to the 7-component solution. However, two items were found to substantively load on two different components. Specifically, the item *concerns about your confidentiality* substantively loaded on both Component 1/Treatment Intention (.55) and Component

4/Mistrust (.53); and the item *not having enough encouragement from friends, family, or community to seek help* substantively loaded on Component 1/Treatment Intention (.50) and Component 6/Other (.53). Based on the content of the items, the decision was made to remove both of these items from Component 1/Treatment Intention.

Finally, mean component scores for each participant were calculated by first summing the values of the constituent items of each component and then dividing by the number of constituent items of each component. Table O1 displays the means and standard deviations of the barriers to treatment seeking checklist components for the total sample and group comparisons. As can be seen from the table, the top three component-based barriers reported were Denial/Self-deception, Treatment Resistant, and Treatment Intention barriers. While there were no statistically significant differences found among the components between the abstinence- and moderation-oriented groups, there were six statistically significant differences found between the treatment-assisted and natural recovery groups. Specifically, the treatment-assisted group reported significantly higher scores on the Treatment Intention, Denial/Self-Deception, Too Busy, Mistrust, Diversity, and Other components; only the Diversity component of which did not remain significant after adjustment for the significant Levene's tests. If, the Bonferroni correction were employed for 7 comparisons, rendering a new alpha level of .007, then only the differences on the Treatment Intention, Denial/Self-Deception, Too Busy, and Other components would remain statistically significant.

Table O1

Means and Standard Deviations of the Barriers to Treatment Seeking Checklist PCA Components for the Total Sample and Group Comparisons

		Recovery Orientation			Recovery Type		
Components, *M* (*SD*)	Total Sample (*N* = 119)	AB (*n* = 68)	MOD (*n* = 51)	*F*-test	TAR (*n* = 53)	NR (*n* = 66)	*F*-test
1. Treatment intention	2.2 (1.2)	2.3 (1.3)	2.0 (1.1)	0.4	2.6 (1.3)	1.9 (1.0)	8.4**
2. Denial/self-deception	3.4 (1.4)	3.4 (1.5)	3.4 (1.4)	0.5	4.0 (1.2)	2.9 (1.4)	16.2***
3. Too busy	1.9 (1.1)	2.0 (1.2)	1.8 (1.1)	0.0[i]	2.4 (1.3)	1.5 (0.8)	22.1***[i]
4. Mistrust	1.7 (0.9)	1.8 (1.1)	1.7 (0.8)	0.0[i]	2.0 (1.1)	1.5 (0.7)	7.2**[i]
5. Diversity	1.2 (0.6)	1.2 (0.6)	1.2 (0.6)	0.0[i]	1.4 (0.8)	1.1 (0.4)	6.1*[i]
6. Other	1.8 (1.0)	1.8 (1.1)	1.9 (1.0)	0.7[i]	2.2 (1.1)	1.5 (0.8)	11.5***[i]
7. Treatment resistant	2.9 (1.0)	2.8 (1.0)	3.0 (1.0)	1.5	3.0 (1.1)	2.7 (0.9)	2.5

Note. AB = abstinence; MOD = moderation; NR = natural recovery; TAR = treatment-assisted recovery.
[i] Levene's test of equality of error variances was significant.
* $p < .05$. ** $p < .01$. *** $p < .001$