

AN EXAMINATION OF FRAME OF REFERENCE AND SELF-CONTROL IN
ALCOHOL AND DRUG ADDICTS

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DEDICATION

I would like to dedicate this project to my grandfather, Floyd Wayne Scott, who was the best person and most gifted teacher I have ever known. Without his unconditional love and support I would not be who I am or where I am today.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS.....	vi
LIST OF TABLES.....	ix
LIST OF FIGURES.....	x
ABSTRACT.....	xi
CHAPTER	
I. INTRODUCTION.....	1
II. LITERATURE REVIEW.....	5
Defining Addiction: Loss of Control.....	8
Choice Theories of Addiction.....	20
Explaining Self-Control.....	29
Research Questions and Hypotheses.....	32
III. METHODOLOGY.....	34
Sampling Method.....	34
Data and Instrumentation.....	43
IV. FINDINGS.....	51
Local Preferences.....	51
Long-Term Preferences.....	53
Patterns Over Time.....	54
Modes of Reinforcement.....	55
Self-Control.....	62
V. CONCLUSIONS.....	72
Limitations.....	74
Future Research.....	75

APPENDIX A: DIAGNOSTIC CRITERIA FOR SUBSTANCE ABUSE AND DEPENDENCE.....	89
APPENDIX B: QUESTIONNAIRE.....	93
APPENDIX C: QUESTIONNAIRE DEVELOPMENT	115
REFERENCES	120

LIST OF TABLES

Table	Page
1. Sample characteristics.....	77
2. Self-reported drug of choice.	78
3. Percent reporting lifetime, current (past three months), and intravenous drug use	79
4. Perceived access to various substances.....	80
5. Paired samples t-tests of differences in perceived level of enjoyment for using or abstaining at different points in time	81
6. Paired samples t-test of perceived level of enjoyment for abstinence or daily/almost daily use over one year	82
7. Paired samples t-test of perceived level of enjoyment for moderate use or daily/almost daily use over one year	83
8. Paired samples t-test of perceived level of enjoyment for moderate use or abstinence over one year.....	84
9. Percent reporting positive reinforcement, negative reinforcement, or punishment after using at various points in time	85
10. Regression of substance involvement scores on self-control and opportunity	86

LIST OF FIGURES

Figure	Page
1. Utility of using over time	87
2. Utility of abstaining over time	88

ABSTRACT

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Although the criminal justice system is often responsible for diagnosing and treating substance-use disorders, we have a poor understanding of the complicated processes underlying these issues. The present study was conducted in an attempt to determine what (1) local preferences (2) global preferences and (3) self-control can contribute to explanations of substance use-disorders. Sixty-four participants completed a questionnaire about their drug and alcohol histories, their short and long-term preferences for using these substances, and their levels of self-control. The results

indicate that individuals with substance-use disorders generally prefer to use drugs or alcohol at discrete points in time but prefer abstinence over longer periods of time. Self-control also appears to be related to greater levels of substance involvement.

CHAPTER I

INTRODUCTION

Many of those under the purview of the criminal justice system have histories of substance-use disorders. The criminal justice system has become increasingly responsible for treating and rehabilitating offenders who suffer from these disorders. While researchers have devoted substantial effort to determining what programs are effective for treating substance-use disorders in correctional settings, the field has devoted less attention to understanding the processes underlying addiction. A more thorough understanding of the behavioral processes that comprise substance-use disorders can only strengthen our ability to diagnose and treat offenders suffering with them.

The research presented here was conducted in an attempt to study the decision making patterns of people with substance-use disorders. Substance-use disorders encompass both substance abuse and substance dependence. The DSM-IV (APA, 1994) defines “substance abuse” as substance use that results in failure to fulfill major role obligations, physically hazardous situations, or recurrent social, legal, or interpersonal problems. “Substance dependence,” the more serious of the disorders, may include

tolerance; withdrawal; taking the substance in larger amounts or over longer periods than intended; spending a great deal of time procuring, using, or recovering from substance use; giving up other activities; or continued use despite recurrent physical or psychological problems related to use. (For full diagnostic criteria, see Appendix A.)

In this study, the terms “substance-use disorder” and “addiction” are used interchangeably in reference to substance abuse and/or dependence. This is consistent with the new definitions set forth in the DSM-V, slated for release in May of 2013 (see O’Brien, 2010). The term “addiction” was omitted from earlier versions of the DSM because some felt that “dependence” was a more neutral term. The DSM-V will include a section called “Addiction and Related Disorders.” Further, the newest edition of the DSM will not distinguish between substance abuse and dependence, but will only refer to varying degrees of substance-use disorders, although the diagnostic criteria will remain largely unchanged. Thus, the use of both “substance-use disorders” and “addiction” is consistent with the anticipated diagnostic criteria, as well as the operational definition used in this study.

Chapter II begins with a brief overview of what is known about the relationship between substance use, addiction, and crime. The discussion then turns to how addiction has been conceptualized in the United States. Addicts are typically viewed as being “out of control” and, thus, limited in their decision making capacity, so it is necessary to discuss how this idea developed. It is argued here that the decision to include loss of control in definitions of addiction is not based on the available data. Several studies that demonstrate how, and under what circumstances, addicts can choose to moderate or control their consumption are discussed.

Two theories, both of which are compatible with the empirical picture of addiction, are discussed. The first, relative addiction theory (Rachlin, 2000), is grounded in behavioral psychology and behavioral economics. Rather than assuming that addicts are out of control, Rachlin purports to explain how addiction can result from a series of rational decisions. This perspective suggests that addiction is the result of many small choices distributed over time. Individuals who become addicted have a tendency to rely on a local, as opposed to global, frame of reference when making choices.

The second, self-control theory (Gottfredson & Hirschi, 1990), also suggests that addiction results from short-sightedness on the part of the addict but differs in regard to the stability of this characteristic. While relative addiction theory, at least implicitly, suggests that individuals can alternate between local and global frames of reference, self-control theorists maintain that one's level of self-control (or one's ability to delay gratification) is fixed in early childhood and is an enduring characteristic that can be observed across diverse behaviors.

At their core, both theories suggest a similar underlying cause of addiction—a tendency to weight short term rewards more heavily than long term rewards. Each theory contributes to an explanation of how addiction emerges. Self-control theory describes how self-control is formed (in early childhood, largely due to child rearing practices). Relative addiction theory explicates the precise role that self-control plays in forming addictive patterns of behavior. While self-control theory is most often used to explain crime (Gottfredson & Hirschi, 1990), it is also useful for explaining a wide variety of other behaviors including those associated with addiction. Relative addiction theory,

proposed to explain addiction in particular, also provides a description of the choices that lead to many non-addictive behaviors, including some types of crimes.

This study was an attempt to (1) investigate several of the henceforth unexplored hypotheses suggested by relative addiction theory as well as (2) determine whether and how self-control is related to addiction. The research hypotheses, sampling methods, and survey instrumentation are discussed in Chapter III. A copy of the survey instrument is provided in Appendix B. The research findings are presented in Chapter IV. A discussion of the study's implications and directions for future research follow in Chapter V.

CHAPTER II

LITERATURE REVIEW

The relationship between drug use and crime is well established. Research conducted by the Office of National Drug Control Policy (2010, p. 22) found that between 56 and 82 percent of male arrestees tested positive for an illicit drug at the time of arrest. A national survey conducted by the Bureau of Justice Statistics [BJS] (2006, p. 4) revealed that drug offenders make up 21 percent of state prison populations and 55 percent of federal prison populations. Drug offenders also account for 35 percent of parolees and 28 percent of probationers being supervised in the community (BJS, 2011, p. 6-10). Many other crimes are also motivated by drug use. One in three property offenders in state prison report that their crimes were committed in order to get money for drugs (BJS, 2006, p. 6), and nearly one-third of state inmates and 26 percent of federal inmates were under the influence of drugs at the time of their offense (p. 1).

Although the evidence shows an indisputable relationship between drug use and crime, this alone does not imply that most drug offenses, or even drug-related offenses, are committed by addicts. Many offenders can, however, be classified as addicts by our current diagnostic criteria. According to the BJS (2006, p. 6) 53 percent of state

prisoners and 45 percent of federal prisoners meet the DSM-IV criteria for drug abuse or dependence. One study found that between 10 and 36 percent of arrestees received outpatient drug or alcohol treatment prior to incarceration, and an approximately equal percent received inpatient treatment for alcohol or drug-use disorders (Office of National Drug Control Policy, 2010, p. 16). Additionally, 34 percent of state prisoners and 45 percent of federal prisoners classified as recent drug users (who used in the month before being arrested) receive drug treatment while incarcerated (BJS, 2006, p. 8), illustrating how the criminal justice system is heavily invested in the treatment of substance use disorders.

The relationship between addiction and crime has also been substantiated by studies of individuals seeking treatment. In one large-scale study, approximately one-quarter of outpatient methadone clients, two-thirds of long-term residential clients, and one-half of outpatient treatment clients reported a criminal justice status (e.g., probation, parole) upon entering treatment (Craddock, Rounds-Bryant, Flynn, & Hubbard 1997). Based on the available data, it is difficult to know precisely how many offenders are in need of substance abuse treatment. What is clear is that there is substantial overlap between these populations. Simply put, many criminal offenders have a history of substance abuse and/or dependence, and many people seeking treatment have a criminal history.

An awareness of the relationship between substance-use disorders and crime is important both because substance abuse is predictive of (and sometimes is) criminal behavior and because addressing issues related to substance abuse can diminish the likelihood of recidivism. Several meta-analyses have confirmed that substance abuse is

an important factor in predicting criminal recidivism. In their meta-analysis of 45 studies, Dowden and Brown (2002) found that alcohol and/or drug problems were related to general recidivism. In an even larger study of the factors related to recidivism, researchers found that dynamic factors, including substance abuse, were able to predict recidivism as well as the criminal history variables most commonly used in assessing offender risk (e.g., prior offenses, age at first arrest) (Gendreau, Little, & Goggin, 1996). This is particularly important, as dynamic factors can measure change over time and, thus, shifts in the likelihood of recidivism (Andrews, 1989).

Numerous studies have shown that treatment of substance-use disorders reduces the likelihood of further criminal activity. In general, participation in treatment reduces both subsequent drug use and future criminal behavior (Predergast, Podus, Chang, & Urada, 2002). More specifically, studies have shown that treatment of substance-use disorders by the criminal justice system is effective in reducing recidivism, and compulsory treatment is no less effective than voluntary treatment (Wild, Roberts, & Cooper, 2002). Programs for treating substance-use disorders that have been shown to be effective include drug courts (Wilson, Mitchell, & Mackenzie, 2006), therapeutic communities in prisons (Pearson & Lipton, 1999), and aftercare upon release (Hiller, Knight, & Simpson, 1999; Zanis et al., 2003). Drug treatment is a cost-effective way to improve offender outcomes and reduce recidivism in both community (Marlowe, 2003) and institutional (Belenko & Peugh, 1998) correctional settings.

Defining Addiction: Loss of Control

The conventional wisdom on addiction is that addicted individuals have lost control over their consumption. Originally, loss of control referred to the perceived inability of alcoholics to stop after one drink (see Jellinek, 1960), but, in the literature, addicts are often said to have lost control over their consumption more generally (see Peele, 1989 for a discussion). Nearly all official definitions of substance abuse and addiction include some reference to loss of control on the part of the addict. The World Health Organization's definition of dependence includes "the desire (often strong, sometimes overpowering) to take psychoactive drugs . . . alcohol, or tobacco" (WHO, 1992, p. 5). While "desire" refers to craving or motivation, the notion that it is "overpowering" indicates that the addict is out of control. The Diagnostic and Statistical Manual [DSM- IV] of the American Psychiatric Association specifies substance dependence as "a pattern of repeated self-administration that usually results in tolerance, withdrawal, and compulsive drug-taking behavior" (APA, 1994, p. 176). The notion of loss of control is also embodied in the first step of Alcoholics Anonymous: "We admitted that we were powerless over alcohol-that our lives had become unmanageable" (*Alcoholics Anonymous*, 2001, p. 59).

The loss of control hypothesis can be traced to Jellinek's (1960) early work on alcoholism. Jellinek openly acknowledged the limited nature of his studies, and this is made quite clear in the first sentence of his book: "The subject of this study represents not more than a small section of the problems of alcohol-a very small section indeed" (Jellinek, 1960, p. ix). Although Jellinek was hesitant to generalize his findings (based

entirely upon male members of Alcoholics Anonymous), his work was hugely influential in shaping the American view of addiction, in general, and alcoholism, in particular. The passages most often quoted from his studies, however, were not his own findings, but merely his reports on the claims made by Alcoholics Anonymous (Fingarette, 1988). Specifically, the public responded to the key symptom of alcoholism, the loss of control which meant that no alcoholic could stop after one drink.

Jellinek (1960) ultimately concluded that there were several types of alcoholics, and that loss of control was only a significant identifying factor in one type, the Gamma alcoholic. Jellinek (1960) determined that this was the predominant type of alcoholic in the United States, which is not surprising since the subjects of his study consisted wholly of members of Alcoholics Anonymous, and this was the only type of alcoholic recognized by the group. Over time, Jellinek's other types of alcoholics have been ignored, and the Gamma alcoholic, although no longer referred to as such, is what remains as the conventional image of the alcoholic in America.

The competing viewpoint, that addicts exercise some control over their behavior, is also represented in the literature. The idea that addiction entails choice or voluntariness on the part of the addict is not a popular one, but it is not without empirical support. Jellinek himself found that 13 percent of his subjects had never experienced loss of control (Jellinek, 1960, p. 38). Most addiction experts assert that addiction is a lifelong disorder characterized by a loss of control over drugs or alcohol. This notion contradicts 60 years worth of literature suggesting that most people who use alcohol and illicit drugs do not become addicted, those who do often recover without treatment, and even severely dependent addicts can often moderate or abstain when sufficiently

motivated (Biernacke, 1990; Cahalan & Room, 1974; Cohen, Liebson, Faillace, & Spears, 1971; Fillmore, 1987; Fingarette, 1988; Frisher & Beckett, 2006; Marlatt, 1987; NIAAA, 2009; Robins, 1990; Robins & Murphy, 1967; Tuchfeld, 1981; Waldorf, Reinarnman, & Murphy, 1991; Winick, 1962).

Chemical and Biological Correlates of Addiction

In large part, the notion that addicts cannot control their desire for alcohol or drugs comes from the vast literature concerning the role of genetic and biological processes associated with addiction. Early research on the genetics of addiction tended to focus on the heritability of alcoholism and other addictive disorders. With advances in scientific technology, more effort was devoted to isolating the specific genes that might be responsible for addiction. Most recently, though, biologists have conceptualized addiction as resulting from a complex network of biological, psychological, and environmental factors.

Heritability of addiction. The idea that addiction is a heritable trait began with evidence that the sons of alcoholics were more likely to become alcoholics themselves (for a dated but thorough review of the literature see Pihl & Peterson, 1990). The problem, of course, is that it is difficult to determine whether this is due to biological or environmental factors. A large scale study of Danish adoptees (Goodwin, Schulsinger, Hermansen, Guze, & Winokur, 1973) remedied this by studying the effects of biological and adoptive parents on alcoholism in those who were adopted. When the biological

parents were alcoholic, men were approximately four times more likely to become alcoholic than when their adoptive parents were alcoholic, although the rates of alcoholism were low across both groups.

Additional studies have examined concordance rates of addiction in siblings. Goodwin (1971) found that identical twins pairs were more likely to both be addicts than were fraternal twins, who share less genetic similarity. Murray, Clifford and Gurling (1983) corroborated these findings when they reviewed the available literature using twin and adoption studies. In general, relatives of addicts may be eight times more likely to develop substance use disorders of their own (Merikangas et al., 1998). Relying on a variety of studies, including those of biological and adoptive parents, siblings, and twins, some researchers have estimated that genetic factors explain between 40 and 60 percent of the variation in addiction (Schuckit, 2000). A meta-analysis of strictly the alcoholism literature, however, indicated that only 24 percent of the variation was due to inherited traits (Walters, 2002).

Although methodological differences have resulted in disparate effect sizes across studies, there is still good indication that predisposition to addiction is, to some degree, a heritable trait. In a series of studies, Schuckit (1980, 1985, 2000) attempted to determine why the children of alcoholics appeared to be predisposed to their own alcohol abuse. In a controlled setting, Schuckit (1980) gave alcohol to two groups of men: those deemed to be at higher risk for alcoholism due to their parentage and those deemed to be at lower risk. When both groups had comparable blood alcohol concentrations, the control group (with non-alcoholic parents) reported feeling more intoxicated. This was corroborated by further research (Schuckit, 1985, 2000), indicating that children of alcoholics may have a

higher tolerance for alcohol, which leads to higher consumption and, subsequently, a greater risk for developing dependence. Recently, researchers have attempted to explicate more precisely the role that genetics play in addiction.

The genetics of addiction. There is no single “addiction gene.” Rather, various genetic factors appear to play a role at different points in the addictive process, including the onset of drug use, regular use, dependence, and relapse (Kreek, Nielsen, Butelman, & Laforge, 2005). Some of these genes affect personality traits, which may predispose individuals to using drugs in the first place, and others more directly affect how they respond to drugs and their intoxicating effects.

Personality traits, such as impulsivity, risk-taking, and sensation seeking are genetically influenced. Impulsivity is “characterized by behavioral disinhibition, defined as acting suddenly in an unplanned manner to satisfy a desire” (Kreek, Nielsen, Butelman, & LaForge, 2005, p. 1452). Risk-taking consists of “those behaviors performed under uncertainty, with or without inherent negative consequences, with or without possible or probable harm to oneself or others, and without robust contingency planning” (Kreek, Nielsen, Butelman, & LaForge, 2005, p. 1453). Sensation-seeking is related to risk-taking and is defined as “a need to seek intense sensations along with the willingness to take risks for the sake of having such experiences (Erche, Turton, Pradhan, Bullmore, & Robbins, 2010, p. 770). Note that each of these traits correspond to those put forth in Gottfredson and Hirschi’s (1990) general theory of crime, but they specify that environmental factors (i.e., poor parenting), not genetics, are responsible for their development.

Higher levels of impulsivity have been reported for both drug addicts and their non-addicted siblings, indicating that impulsivity is influenced by genetics but does not necessarily result in addiction (Ersche, Turton, Pradhan, Bullmore, & Robbins, 2010). Impulsivity is likely to affect an individual's propensity to take drugs in the first place (Buckland, 2008; Moeller, Gerard, & Dougherty, 2002), but, of course, the onset of drug use is influenced by environmental factors as well. The role of impulsivity is a complicated one, as it appears that impulsivity is both a cause and effect of substance abuse (de Wit, 2009; Moeller, Gerard, & Dougherty, 2002).

The roles of risk-taking and sensation-seeking are also convoluted. Some research (Franques, Auriacombe, & Tignol, 2000) suggests that sensation-seeking is a risk factor or precursor to substance abuse, but other studies indicate that sensation-seeking is more likely to result from using drugs in the first place (Ersche, Turton, Pradhan, Bullmore, & Robbins, 2010). As with impulsivity, risk-taking and sensation-seeking clearly play some role in addiction, but what that relationship may be is not entirely clear.

Physiological responses to drugs are also influenced by genetics. Several genes have been identified that are repeatedly linked with alcohol dependence. At least two of these, GABRA2 and GABRG3, affect how an individual's receptors respond to alcohol, while others, including CHRM2 and ADH4, play a role in metabolizing alcohol (Buckland, 2008). Some ethnic groups display "flushing" or reddening of their skin when they drink. This is due to higher acetaldehyde levels while alcohol is being metabolized. At one point, this was thought to be an important physiological indicator of a predisposition toward alcoholism. Interestingly, flushing is experienced by the ethnic

groups with both the highest *and* the lowest rates of alcoholism in the United States, suggesting that cultural factors affect the development of alcoholism (Johnson, Nagoshi, Ahern, Wilson, & Yuen, 1987).

Other researchers have focused on how drug use affects the neurotransmitter dopamine, which is used by the brain's reward pathway and, among other things, has an effect on motivation and pleasure. Drug use decreases the levels of dopamine receptors in the brain (Leshner, 1997; Nader, Morgan, Gage, Nader, Calhoun, Buchheimer, Ehrenkauf, & Mach, 2006), which is thought to cause the "cravings" experienced by addicts (Clay, Allen, & Parran, 2008; Nader, Morgan, Gage, Nader, Calhoun, Buchheimer, Ehrenkauf, & Mach, 2006; Volkow, Fowler, & Wang, 2002). Note that this is the biological argument for the "loss of control" that addicts are thought to experience. However, some have pointed out that dopamine is also related to impulsivity, which is thought to play more of a role in the initiation of use rather than the progression from regular use to addiction (Buckland, 2008; Dalley, Fryer, Brichard, Robinson, Theobald, Laane, Pena, Murphy, Shah, Probst, Abakumova, Aigbirhio, Richards, Hong, Baron, Everitt, & Robbins, 2007).

The available evidence suggests that there is a complex relationship between genetics, personality, and addiction. The exact nature of that relationship, though, is ambiguous. Most researchers at the intersection of these issues have concluded that biopsychosocial models, which consider genetic, psychological, and environmental variables, are necessary in order to fully explain the risk factors for addiction (Buckland, 2008; Franques, Auriacombe, & Tignol, 2000; Harding, Zinberg, Stelmack, & Barry, 1980; Kreek, Nielsen, Butelman, & LaForge, 2005; Wallace, 1993). For this reason, it is

generally recommended that behavioral interventions be included in addiction prevention and treatment protocols (Clay, Allen, & Parran, 2008; Leshner, 1997; Moeller, Gerard, & Dougherty, 2002). Most importantly, the fact that biology plays a role in the initiation of drug use and the development of addiction, does not prove that the behavior exhibited by addicts is somehow beyond their control. As evidenced by the call for mixed-model approaches, genetic predispositions and substance-induced alterations in brain functioning do not preclude the need for behavioral approaches to understanding and treating addiction (see Heyman, 2004 for an excellent discussion of this point).

Spontaneous Remission

Perhaps the most convincing evidence contradicting the loss of control hypothesis is the literature on spontaneous remission (Cahalan & Room, 1974; Fillmore, 1975; Fingarette, 1988; Frisher & Beckett, 2006; NIAAA, 2009; Robins, 1990; Tuchfeld, 1981; Waldorf et al., 1991; Warner, Kessler, Hughes, Anthony, & Nelson, 1995; Winick, 1962). Spontaneous remission, as it pertains to substance-use disorders, refers to people who have problematic patterns of substance use but recover without receiving treatment. Spontaneous remission among addicts is compatible with the well known age/crime curve, whereby crime peaks during adolescence and then plummets past a certain age.

Traditional criminological theories have offered various explanations for this phenomenon. Moffitt (1993, 1997) acknowledges two types of offenders: those that become delinquent very early in life and typically do not age out of their criminality (life-course persistent or LCP offenders) and the much larger group of offenders who are

delinquent during adolescence but return to pro-social behavior during adulthood (adolescent limited or AL youth). She argues that the patterns exhibited by the former are due to a combination of neurological or psychological problems and ineffective parenting. She employs a separate explanatory framework for the majority of youth who ultimately age out of their delinquent behavior. They merely mimic the behavior of the LPC youth during the teen years but desist upon forming bonds during adulthood. The LPC youth, ostensibly, lack the necessary cognitive and social functioning to form these bonds. This, coupled with underlying biological predispositions, causes them to remain criminally involved.

Conversely, Sampson and Laub (1993, 2005) have maintained that only one causal framework is necessary for explaining crime and desistance. Their data demonstrate that social bonds in adulthood (e.g., to work and to family) are responsible for desistance from crime regardless of early childhood differences. Importantly, they also note that even those with persistent criminal histories commit fewer crimes as they age. Essentially, they maintain that everyone ages out of crime to varying extents. Traditionally, addiction has been viewed as a disease and, thus, unsusceptible to this aging out process. Spontaneous remission, however, has been a documented occurrence among many types of addicts for at least half a century.

The first well-known official report of this phenomenon was in 1962. Upon discovering that a large percentage of narcotics addicts known to the Federal Bureau of Narcotics had become inactive in their thirties, Winick (1962) speculated that this was due to maturing out of narcotic addiction once past the trials and tribulations of adolescence and young adulthood. He defined maturing out as “the process by which the

addict stops taking drugs, as the problems for which he originally began taking drugs become less salient and less urgent” (Winick, 1962, p. 4). Winick (1962) also argued that, for some, substance abuse might be self-limiting and, therefore, the duration of addiction may be tied to the *how long* the addict has been using rather than the *age* at which they began using.

Evidence of spontaneous remission continued to mount throughout the 1960s. Reports of widespread heroin use by American soldiers in Vietnam prompted an investigation by the White House Special Action Office on Drug Abuse Prevention. The initial findings were shocking. While in Vietnam, nearly half of the U.S. soldiers had tried narcotics, and 20 percent had become addicted to heroin during their tours (Robins, 1990, p. 1044). Despite widespread narcotic use in Vietnam, most soldiers did not appear to struggle with symptoms of addiction upon returning to the U.S. Although most of those who actively used narcotics in Vietnam did not receive treatment, only six percent of addicts became re-addicted after returning home (Robins, 1990, p. 1045).

Flummoxed experts offered numerous plausible explanations for what they believed to be anomalous findings (e.g., fraudulent research, extraordinary circumstances, lack of available heroin supplies in the U.S.) (see Robins, 1990). None of these explanations, however, satisfactorily accounted for the results. Soldiers were returning to the U.S. addicted to a drug known to generate intense physical cravings, and yet they were dropping the habit. To further complicate matters, there was evidence that other groups of addicts commonly recovered without treatment (Biernacke, 1990; Robins & Murphy, 1967). Eventually, spontaneous remission was found to be common among those with a preference for other habit-forming drugs, such as cocaine (Waldorf,

Reinarnman, & Murphy, 1991). Most drug users appear to recover from substance-use disorders without official interventions, although the vast majority of drug users do not become drug dependent in the first place (Friser & Beckett, 2006). Overall, approximately 76 percent of individuals classified as substance dependent eventually recover (Warner, Kessler, Hughes, Anthony, & Nelson, 1995).

Spontaneous remission also occurs among alcoholics. While analyzing findings from the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions, researchers at the NIAAA were surprised to find that about three-quarters of people who meet the DSM-IV criteria for alcohol dependence recover without any treatment whatsoever (NIAAA, 2009). Although shocking to some, this has been a recurring theme in addiction research for over half a century. Decades ago, some researchers were beginning to recognize these individuals as a “silent majority” (Tuchfeld, 1981). More conservative estimates during the same period were that approximately one-third of heavy drinkers, including diagnosed alcoholics, improved over time without receiving treatment, and an even higher number of people with stable personal and social lives recovered on their own without professional intervention (Fingarette, 1988).

As previously stated, a substantial portion of addiction trajectories appear to mirror the age/crime curve. For instance, those most likely to be problem drinkers are young men, and it is the young drinkers who show the highest rate of natural remission as they age (Cahalan & Room, 1974). Studies conducted by the Institute for Health and Aging have found that even the most severe drinking related problems, including blackouts (short term memory loss due to alcohol or drug consumption), which often accompany drinking in college and adolescence, almost never persist through middle age

(Fillmore, 1975). Use of all substances, including illicit drugs, has been shown to decrease with age (Frisher & Beckett, 2006).

Manipulation

The research on spontaneous remission demonstrates that many addicts can and do recover, even without treatment. The studies discussed thus far, however, have provided little insight into why or how addicts are able to overcome their addictions. Early theorists posited that remission may be tied to the life-cycle of the addicts or, relatedly, that addiction runs a natural course (Winick, 1962). Neither of these theories suggest that the addict is, in any meaningful way, able to exercise control over his consumption. A handful of controlled studies have attempted to determine whether addicts can be persuaded to abstain or control their levels of consumption (Marlatt, 1987; Cohen, Liebson, Faillace, & Speers, 1971). For ethical reasons, these studies have been conducted using alcohol rather than illicit drugs, and it is unlikely that, even with alcohol, they could be replicated today.

In a study designed to test the loss of control hypothesis, Marlatt (1987) directed separate groups of alcoholics to drink either beverages which were non-alcoholic, but which they believed contained alcohol, or alcoholic beverages which they were told did not contain alcohol. The participants who believed they were drinking alcohol (and actually were not) consumed far more than those who unknowingly received the alcoholic drinks. The findings tentatively suggest that, if there is a mechanism responsible for the loss of control displayed by so many addicts, it does not have a

physiological basis. Under these controlled conditions, the alcoholics who appeared most “out of control” were those who only *believed* they were consuming alcohol.

Another group of researchers was able to demonstrate that alcoholics could voluntarily abstain from alcohol or moderate their alcohol intake after they had begun drinking in exchange for monetary payment (Cohen et al., 1971). The study was conducted using participants in an inpatient alcohol treatment program. In one condition, researchers made alcohol available to the participants but paid them to abstain from drinking. In a second condition, clients were given a priming dose of alcohol in the morning and then paid to abstain from drinking for the remainder of the day. The participants were able to abstain or moderate, so long as that behavior was positively reinforced. This research has implications for non-addictive behaviors as well. The focus of the criminal justice system is usually on punishment rather than reinforcement. It is possible that providing positive reinforcement for non-criminal behavior might motivate offenders to refrain from criminal activity in the same way that alcoholics were able to abstain from drinking.

Choice Theories of Addiction

The evidence clearly suggests that addicts, at least under some circumstances, can exercise control over their consumption. The issue then becomes understanding why, when faced with numerous interpersonal, financial, health, and legal consequences, do so many addicts continually choose to use? Contemporary theories that explain the puzzling behavior of addicts are rooted in the rational choice tradition. In criminology, the rational

choice perspective can be traced to the work of Bentham (1825) and Beccaria (1764/1996), who assumed that people are rational actors who weigh the costs and benefits of their actions and behave so as to maximize pleasure and avoid pain.

Deterrence theory is also based on this assertion that people consider the risks and rewards of behavior before engaging in crime. Specifically, crime can be deterred when the punishment is swift, certain, and severe (Beccaria, 1764/1996). In addition, however, deterrence theories of crime acknowledge the importance of perception, so how punishment is perceived is more relevant to the commission of crime than the objective nature of the punishment itself (Gibbs, 1986). Deterrence can also be general or specific. General deterrence occurs when an individual is deterred from committing crime because of how someone else is punished. Specific deterrence refers to the idea that an individual, if punished, will be less likely to commit crime out of fear that s/he will be punished again. Stafford and Warr (1993) have noted that both general and specific deterrence can operate simultaneously for individuals.

Rational choice theories of addiction rely on behavioral and economic principles. One idea is that, while addicts may appear to be out of control, their behavior is a chosen response to environmental stimuli, or systems of reward and punishment (Gifford & Humphreys, 2006). Rational choice, in this sense, does not imply conscious or coherent deliberation on the part of the addict, only that s/he is behaving in such a way as to maximize some utility function (Rachlin, 1997). Rachlin's (1997, 2000) relative addiction theory is based on this conception of rational choice and relies heavily on the work of other behavioral and economic theories of addiction (see in particular Becker & Murphy, 1990; Herrnstein & Prelec, 1992; Stigler & Becker, 1977).

Relative Addiction Theory

In economic terms, relative addiction theory maintains that some behaviors lead to price habituation, while others lead to price sensitization. Price habituation is “the negative effect of present consumption on future local utility” (Rachlin, 2000, p. 87), where local utility is defined as the value of the behavior minus the cost (Rachlin, 2000, p. 84). Most addictive behaviors operate in this way, as consuming alcohol and drugs tends to decrease the value or pleasure generated by those behaviors over time. Regular alcohol or drug consumption also increases the cost by creating tolerance, whereby greater amounts of the substance are required in order to create the same effect. Imagine a moderate drinker who experiences a great deal of pleasure when she drinks. If she continues to drink and consumes greater amounts of alcohol over a longer period of time, she will eventually experience a decrease in the value of drinking (drinking, as well as many other activities, will become less pleasurable). At the same time, there will be an increase in the cost of drinking (she will develop a tolerance to alcohol).

Conversely, price sensitization is defined as “the positive effect of present consumption on future local utility” (Rachlin, 2000, p. 88). Competing or substitutable behaviors, such as social activity, lead to price sensitization since these behaviors increase in value and decrease in cost over time. Suppose that the moderate drinker from the previous example is a shy college student who decides to join a religious sorority which discourages alcohol use. The new interaction might be uncomfortable and costly initially because she cannot drink and must watch her language, but, over time, local

utility is increased. As she spends time with her new friends, the more comfortable and pleasurable their time together becomes and, after the initial investment, the less costly the interaction.

Whether or not an individual becomes addicted depends, in part, on the rate at which the addictive behavior decreases the value of future addictive activity as well as competing healthy activities. When drug use decreases the value of the addictive behavior more rapidly than competing behaviors, this is known as relative price habituation. Addiction is unlikely to occur under these circumstances. Even after joining the sorority, the hypothetical moderate drinker may still prefer drinking to interacting with her friends. Over time, as she continues to drink, her behavior decreases the local utility of both drinking and social interaction. Both activities become less valuable and more costly. If, however, the pleasure derived from drinking decreases more rapidly than that of socializing with her sorority, she is unlikely to become an alcoholic.

In some instances, relative price sensitization occurs, whereby the negative effects of drug use on competing behaviors are more pronounced. When the value of competing behaviors decreases more rapidly than the value of drug use, addiction is a likely outcome. If the sorority girl's drinking has a greater negative impact on her relationship with her sorority than it does on drinking itself, she will continue to choose drinking over socializing and might progress to alcoholism.

The primrose path. Rachlin (2000) also uses the allegory of the primrose path (Herrnstein & Prelec, 1992) to illustrate how it is possible for an individual to consistently make rational choices (those that maximize some utility function) and still

wind up in the throes of addiction. There are two stable states: sobriety and addiction. Theoretically, sobriety is the more highly valued, even among addicts. Unfortunately, one arrives at these states not through a single choice (if so, one would most certainly choose sobriety), but as the result of many smaller choices over time. This is what Herrnstein and Prelec (1992) refer to as distributed choice. Both sobriety and addiction, because they are the result of cumulative choices over time, are instances of distributed choice (Herrnstein & Prelec, 1992; Heyman, 2003). Rachlin (2000, p. 115) refers to this as complex ambivalence, or “where the larger reward is abstract, amorphous, and spread out in time, whereas the smaller reward is distinct and always preferred to a component of the larger.” Again, this has implications for criminal behavior as well. A crime-free lifestyle has many advantages (e.g., freedom, legitimate employment) most of which are abstract and long-term. On the other hand, most crimes have obvious but short-term rewards (e.g., quick cash, the satisfaction of a successful violent assault).

Under a local frame of reference, using (and possibly crime) is likely to be more highly valued than abstaining (or refraining) at any single point in time. Although drug use decreases the future value of the drug itself, it also decreases the value of competing behaviors, thus creating a possible scenario in which drug use continues to be the most highly valued alternative. In order to maximize local utility, using will consistently be chosen, resulting, ultimately, in addiction. The progression of the addict from a state of sobriety to a single episode of using, and then to repetitive use until addiction is reached, is the primrose path. It is important to emphasize that an individual will only progress down the primrose path to addiction when s/he operates under a local (as opposed to global) frame of reference *and* when the utility of competing behaviors (such as social

activity) decreases faster than those of addictive activities. This occurs even when the addict prefers long-term sobriety over addiction.

The straight and narrow. This, however, makes it difficult to understand what circumstances create the incentive to stop using and work toward sobriety. Rachlin (2000) suggests two possibilities. The first is that the addict is attempting to increase overall utility. This, of course, implies a shift from a local to a global frame of reference. The second, and more dismal, possibility is that the addict works toward sobriety in the hopes of exchanging negative reinforcement for positive reinforcement. Positive and negative reinforcement are similar in that they both strengthen the behavior. They differ, however, in that positive reinforcement entails the addition of a stimulus, whereas negative reinforcement entails the removal of a stimulus. Initially, drug use is positively reinforced—it is a pleasurable experience and creates a feeling of euphoria. Thus, it is repeatedly chosen. However, since drug use decreases the future utility of the drug, it is likely that, once an individual reaches the point of addiction, the primary motivation for drug use, rather than to produce pleasure, is to avoid pain (e.g., hangovers, withdrawal symptoms)—the behavior is negatively reinforced. An addict may be inspired to make the immediately lower-valued choice (to abstain rather than use) so that s/he may return to use that is positively reinforced.

This leads to a henceforth unexplored aspect of relative addiction theory. Rachlin (2000) specifies two distinct mechanisms for relapse. In order for relapse to occur, one must first be sober for some period of time. Choosing to be sober, according to the theory, may be brought on by either (1) a transition from a local to a global frame of

reference or (2) a desire to exchange negatively reinforced use for positively reinforced use. In the first instance, long-term sobriety becomes the goal, but relapse occurs when the addict begins to romanticize social or moderate use. This state is theorized to have even higher value than sobriety for most addicts, although this assertion has been met with contention (Fantino & Stolarz-Fantino, 2002; Rachlin, 2000). If, however, the addict's motivation was to achieve positively reinforced drug use, then relapse, rather than sobriety, was the goal all along.

Local versus global frames of reference. There appears to be some evidence that it is a shift from a local to a global frame of reference that allows the addict to return to a state of sobriety. Often, a local or global frame of reference is treated as fixed or static, but this is likely not the case. Observers have pointed out that people often rely on a global frame of reference when engaging in analytic activities but shift to a local frame of reference when actually making choices (Heyman, 2003). Several studies have attempted to determine whether, and under what conditions, individuals can transition from a local to a global frame of reference.

In one study, researchers attempted to teach pigeons to maximize global rewards. This was accomplished by switching on a light each time a choice was made that increased the overall reward. The pigeons subsequently learned to operate under a global frame of reference, but only when the light was present (Heyman & Tanz, 1995). In this case, the light acted as a discriminative stimulus, presented at the time the behavior was reinforced. Using human subjects, researchers were able to motivate participants to choose larger, temporally distal rewards over smaller sooner rewards by patterning

choices into groups of three (Kudadjie-Gyamfi & Rachlin, 1996). When making discrete choices, participants most often chose the smaller sooner reward, but when choices were grouped, participants were more likely to maximize overall utility. The researchers speculated that this was brought on by an increase in the saliency of the global reward for the participants. Additional research has suggested that individuals will operate under a global frame of reference when rewards vary in magnitude and a local frame of reference when rewards vary in probability (Tunney & Shanks, 2002).

Several studies have examined the relationship between substance abuse and decision-making patterns. In one instance, drug users (most of whom were dependent on heroin or cocaine) were more likely than non drug users to opt for local solutions or smaller sooner rewards (Heyman & Dunn, 2002). Even drug users, however, showed a preference for global rewards when the magnitude of the smaller sooner reward was diminished. This is congruent with the findings of Tunney and Shanks (2002).

Distributed choice and delay discounting. The studies discussed in the previous section have replicated distributed choice problems in laboratory settings. It is distributed choice, or the culmination of many small decisions over time that result in addiction or sobriety (Herrnstein & Prelec, 1992). A related but distinct concept is that of discounting. Discounting “refers to the reduction in the present value of a future reward as the delay to that reward increases” (Kirby, Petry, & Bickel, 1999, p. 78). In discounting problems, decisions do not affect the value of future choices. Individuals may disregard or discount the value of future rewards (based on their magnitude,

probability, or distance), but the objective value remains the same. When the value of future rewards is affected by present choices, this is a distributed-choice problem.

Given the choice between 10 dollars and 100 dollars, we would all choose 100 dollars. But given the choice between 10 dollars today and 100 dollars next week, some of us (including those with low self-control) would choose to have the 10 dollars immediately. Now, given the choice between an empty savings account and an account with 100 dollars in it, we would again all choose the 100 dollar savings account. When it comes time to put an extra 10 dollars into savings, however, at least some of us would prefer to spend, rather than save, the 10 dollars. By repeatedly choosing to spend our small bills, we would wind up with an empty bank account. The first example illustrates discounting, while the second is a distributed choice problem. Choosing to drink or use drugs at a discrete point in time does not make one an addict. Addiction is the result of distributed choice, or repeatedly choosing to drink or use drugs over other alternatives.

Nonetheless, discounting problems are similar to distributed-choice problems in that a local frame of reference results in a smaller sooner reward at the expense of a larger later reward. Studies of the discount rates of addicts have shown that many addicts have a propensity to discount future rewards more dramatically than non-addicts. Heroin addicts were found to discount monetary rewards at about twice the rate of non-addicts (Kirby, Petry, & Bickel, 1999). In another study, both heroin and cocaine addicts applied greater discounting to future monetary rewards, but alcoholics did not differ significantly from non-addicts (Kirby & Petry, 2004). In addition, abstinence was found to reduce the discount rates for heroin addicts, but not for other drug users in the study (Kirby & Petry, 2004). In a third study, heroin addicts were again found to exhibit greater discount rates

than non-addicts when faced with hypothetical monetary rewards (Madden, Petry, Badger, & Bickel, 1997). Researchers took the study a step further and presented the heroin-dependent group with hypothetical amounts of heroin. When faced with a choice between a smaller amount of heroin in the present or a larger amount of heroin in the future, subjects discounted heroin at even higher rates than monetary rewards.

While relative addiction theory provides a compelling explanation for the addictive sequence of events, Rachlin (1997, 2000) does not indicate what factors contribute to the development of a local frame of reference, a necessary condition for progressing down the primrose path to addiction. His work, however, is not incompatible with theories that might provide insight into why some individuals tend to disregard the effects of their current choices on future outcomes. Self-control theory (Gottfredson & Hirschi, 1990), in particular, provides a convincing explanation of not only how self-control develops, but of why a lack of self-control might lead to addiction.

Explaining Self-Control

Self-Control Theory

Gottfredson and Hirschi (1990) maintain that all deviant behavior results from the single trait of low self-control defined as “the extent to which [individuals] are vulnerable to the temptations of the moment” (p. 87). They claim that this is a byproduct of poor parenting, or the inability to recognize and punish low self-control, which creates children who lack the ability to delay gratification. This characteristic persists

throughout the life course and manifests itself in the use of force and fraud for immediate gratification as well as a host of other non-criminal behaviors (e.g. gambling, unprotected sex, smoking) that are consistent with low self-control. By focusing on what crimes have in common, rather than on how they differ, the authors come to the conclusion that it is really only people who differ in their propensity to commit crime.

Although the theory was developed primarily as an explanation of criminal behavior, Gottfredson and Hirschi (1990) contend that low self-control is the underlying factor in “almost any deviant, criminal, exciting, or dangerous act” (p. 88). Specifically, people with low self-control are characterized as “impulsive, insensitive, physical (as opposed to mental), risk-taking, short-sighted, and nonverbal” (p. 90). Gottfredson and Hirschi (1990) address the issue of drug use directly and assert that, rather than being a cause of delinquency, drug use is a manifestation of the same underlying characteristic. Thus, drug use results from an inability to delay gratification. Addiction, in their view, would be most prevalent among those who exhibit low self-control in other realms, including crime and a host of other risky or impulsive behaviors.

There is already some evidence that addictive behavior is correlated with one’s level of self-control. Smokers, for instance, are less likely to wear seatbelts and execute preventative health measures while, at the same time, they are more likely to choose riskier jobs and incur job-related injuries (Hersch & Viscusi, 1998). Similar patterns exist for alcohol and illicit drug users. In a series of studies, alcoholics, cocaine users, and heroin users were found to score higher on various measures of impulsivity, including the Barratt Impulsivity Scale and the impulsivity subscale of the Eysenck Personality Questionnaire (Kirby & Petry, 2004; Kirby et al., 1999; Madden et al., 1997).

Self-Control and Relative Addiction Theory

As previously stated, self-control theory is not incompatible with relative addiction theory. Both view substance abuse as a manifestation of an inability to delay gratification or as a possible outcome of short-sightedness on the part of the individual. Each theory explains a different segment of the progression toward addiction. Self-control theory serves to describe how one develops self-control early in life. Addiction is merely one of the possible outcomes of low-self control. Relative addiction theory, while largely ignoring the developmental aspect of self-control, focuses on how discrete choices, distributed over time, can lead to addiction.

Both theories, while semantically distinct, attribute substance abuse to adherence to a local, rather than global, frame of reference. Gottfredson and Hirschi (1990), however, maintain that low self-control (described here as a local frame of reference) is stable throughout the life course. Economic theories of addiction do not make this assumption. Rather, the frame of reference (local or global) is variable and can be influenced by environmental events (Heyman, 2003; Rachlin, 2000). Numerous studies using distributed choice and discounting problems have shown that the frame of reference can be manipulated by altering the magnitude, probability, or distance of anticipated rewards (Heyman & Dunn, 2002; Heyman & Tanz, 1995, Kirby & Petry, 2004; Kirby et al., 1999; Kudadjie-Gyamfie & Rachlin, 1996; Madden et al., 1997; Tunney & Shanks, 2002). Addictive substances, themselves, have certain properties (intoxication,

interference with conventional activities, and no natural satiating mechanism) that encourage a local frame of reference (Heyman, 2003).

Research Questions and Hypotheses

Evidence from a variety of fields has converged to indicate that addicts tend to operate under a local, rather than global, frame of reference (e.g., Heyman & Dunn, 2002; Heyman & Gibb, 2006; Kirby & Petry, 2004; Kirby et al., 1999; Madden et al., 1997). This is important because, as has been demonstrated, both theoretically and empirically, addiction is the result of distributed choice, or many small choices over time. Thus, we have a picture of individuals who become addicted by consistently choosing the highest immediate reward at the expense of the larger overall reward.

What have not been empirically tested are several of the underlying hypotheses in relative addiction theory, primarily that (1) addicts prefer to use in the short-term, while at the same time, (2) addicts prefer sobriety in the long-term. Rachlin (2000) has also suggested that, over longer periods of time, addicts value occasional consumption (using at moderate levels) even more highly than abstinence. This has been questioned (see Fantino & Stolarz-Fantino, 2002; Rachlin, 2000), but not empirically tested. A finding that addicts value moderate use over abstinence is important because, among other things, it may contribute to an explanation of the mechanism of relapse after a period of abstinence.

The study presented here was designed to test two related claims that underpin Rachlin's (2000) notion of complex ambivalence in the addict:

- (1) At any given point in time, addicts prefer using their drug of choice to not using their drug of choice.
- (2) Over a longer period of time (one year), addicts prefer being abstinent to daily/almost daily use.

In addition:

- (3) Over a longer period of time (one year), addicts prefer moderate use over either
(a) being abstinent or (b) daily/almost daily use.
- (4) The utility of using decreases over time as addicts continue to use their drug of choice.
- (5) The utility of being abstinent increases over time as addicts continue to abstain.

Two additional hypotheses that have been suggested in the literature but henceforth unexplored are:

- (6) Using after periods of abstinence is positively reinforced.
- (7) Using after periods of daily/almost daily use is negatively reinforced.

Taken together, these hypotheses present an alternative explanation for relapse among addicts.

Finally:

- (8) Individuals with low self-control are more likely to be addicts.

CHAPTER III

METHODS

Sampling Method

Studying deviant populations, such as addicts, presents unique challenges. Selecting a random sample from a deviant population is generally not possible, as there is often not an appropriate sampling frame. Nonrandom sampling techniques have been successfully used to study deviant populations, such as prostitutes and drug addicts (Faugier & Sargeant, 1997). This study employed maximum-variation sampling, a type of purposive sampling method where the researcher selects cases that vary along the dimensions of interest. In doing so, the researcher is able to examine variation within the group and, at the same time, identify “important patterns that cut across variations” (Patton, 1990, p. 182). Maximum-variation sampling can be useful when (1) the sample is relatively small and (2) there is little information available about the population (Patton, 1990).

In this study, the goal was to recruit approximately 30 participants who had substance-use disorders and 30 participants who did not, and there was no meaningful

sampling frame available. Maximum-variation sampling is often considered preferable to random sampling under these conditions and can be used to achieve a degree of representativeness among participants (Patton, 1990; Teddie & Yu, 2007; Vitcu, Lungu, Vitcu, & Marcu, 2007).

Sampling criteria

Drug of choice. The purpose of this study was to learn more about the behavioral patterns of a variety of addicts. Although, theoretically, all addicts (regardless of the type of addiction) are governed by the same behavioral principles, it was important to test this hypothesis by including addicts who were addicted to a variety of substances. It was not possible to recruit an equal number of participants from every drug class. Instead, participants were classified according to whether they selected alcohol, cannabis, or another illicit drug as their drug of choice.

Gender. The goal was to include approximately an equal number of male and female participants in the study. Although male participants were more readily available, additional effort was made to ensure that women were represented in the final sample.

Age. Another goal was to include participants from a variety of age groups. Particular attention was paid to including very young and very old participants. This was important, as age has been found to be a determinant of success in overcoming substance-use problems (Cahalan & Room, 1974; Fillmore, 1975; Fingarette, 1988; Hodgins, 2005).

Although it was desirable to have participants from all age ranges, all study participants were required to be at least 18 years of age for IRB purposes.

Severity of drug history. An effort was also made to include addicts with a variety of drug-use histories. A survey instrument was used to determine which participants had substance-use disorders and which did not. It was also possible to use the instrument to determine which participants used drugs but did not experience the problems associated with substance-use disorders.

Prior contact with Alcoholics Anonymous and other 12-Step programs. The literature indicates that prior contact with Alcoholics Anonymous and other 12 Step Programs affects addicts' success in substance-abuse treatment (Heather & Robertson, 1981; Peele, 1995). Additionally, it is possible that extended contact with Alcoholics Anonymous and other 12 Step Programs exerts an effect on an individual addicts' reliance on a local or global frame of reference. For this reason, it was desirable to include participants who varied with regard to their amount of contact with Alcoholics Anonymous and other 12 Step Programs. The expectation was that it would be difficult to locate addicts who had no prior contact with 12 Step Programs, as 95 percent of drug treatment facilities in the United States employ 12 Step Programs (Substance Abuse and Mental Health Services Administration, 2007), and addicts who come into contact with the legal system are routinely ordered by the court to attend 12 Step Meetings. Although every effort was made to include addicts with no prior contact with 12 Step Programs, many participants who were classified as addicts had prior contact with these programs.

Sober or active user. It is also probable that addicts' perceptions of their substance abuse are affected by whether (or how long) they have been sober. Whether an addict has been active or abstinent has been shown to affect how they weigh current and future rewards (Kirby & Petry, 2004). For this reason, an effort was made to include addicts who were current users (who had used in the past 90 days) as well as addicts who had been sober for a long period of time.

Recruitment

Participants were recruited from several locations. The first location was the 24 Hour Club of Austin. The facility is operated by the North Austin Foundation, a local non-profit organization. The 24 Hour Club offers a variety of services to addicts. Alcoholics Anonymous rents meeting space in the facility and hosts from four to seven meetings daily. In addition, the North Austin Foundation owns and operates Project Helping Hand, which (operating out of the same facility) provides six men's beds and four women's beds to addicts who are in the process of getting into substance-abuse treatment or a sober living home. People can stay in the Project Helping Hand dormitory for up to 30 days, free of charge. The facility also provides additional services to addicts who need assistance with acquiring food stamps, dealing with medical issues, or checking for active warrants.

Based on personal communication with someone who has used its services, it was believed that the 24 Hour Club was an ideal site to recruit participants for several reasons.

(1) The facility is frequented by individuals who have a history of abusing alcohol as well as other drugs. (2) The facility is frequented by women. Several of the 12 Step Meetings are women's meetings (although women often participate in the other meetings), and Project Helping Hand provides female bed spaces in the dormitory. (3) The facility is frequented by people of all ages. (4) Although many of the people who frequent the facility have extensive drug-use histories, there are some individuals who have been using for only a short amount of time. (5) Although many of the people who frequent the facility are long time Alcoholics Anonymous members, there are some who have little or no prior contact with 12 Step Programs. (6) The facility is frequented by people who have been sober for a number of years as well as people who are currently using or who have used in the past 90 days. Most participants who were asked to participate in the study agreed to fill out the questionnaire. There did not appear to be any obvious systematic differences between those who agreed to participate and the few who declined.

For comparison purposes, it was also necessary to recruit participants who did not have a history of substance abuse. While non-substance abusers were expected to be homogenous along many of the dimensions of interest, it was preferable that they be similar to the substance-abuse sample in regard to gender, age, and other demographic characteristics. A convenience sample of participants in the non-substance abuse group was recruited from two locations. The most notable drawback of utilizing a convenience sample is that the findings are unlikely to be generalizable. In this instance, however, the primary goal was not generalizability, but rather, to recruit a comparison group that was

demographically similar to the substance-abuse group while minimizing systematic differences between the two.

The first location of participant recruitment was the Austin Department of Public Safety. Researchers have utilized the Department of Public Safety to recruit participants when studying diverse issues, including physical activity, attitudes on the use of herbal supplements, parental roles in talking to children about sex, home design, and depression and anxiety disorders (George, Escobar, & Harris, 2008; Harnack, DeRosier, & Rydell, 2003; Harnack, Rydell, & Stang, 2001; Hutchinson & Cederbaum, 2010; Slater, Sirard, Laska, Pereria, & Lyle, 2011; Wetherell, Ayers, Nuevo, Stein, Ramsdell, & Patterson, 2010). DPS locations have been useful for achieving good response rates and for recruiting participants that are representative of people from various genders, ages, ethnicities, and education levels (George, Escobar, & Harris, 2008). Individuals were approached as they were entering the DPS and asked if they would mind filling out a questionnaire while they waited. Approximately one-third of those approached agreed to participate. Older white individuals declined to participate more often than other demographic groups. Young white individuals, as well as African-American and Hispanic individuals of all ages, showed a greater willingness to fill out the questionnaire.

The remainder of the participants were recruited from a nearby low-cost full service car wash where over half of those who were asked to participate agreed to fill out a questionnaire. Although the purpose of recruiting participants from these sites was to increase the number of participants without histories of substance abuse, it was ultimately

a substance use inventory that determined whether participants were classified as “addicts” or “non-addicts” for the purpose of the study.

Sample characteristics

Demographic characteristics. A total of 64 individuals were recruited for participation in the study. The majority of the addicts in the study were recruited from the 24 Hour Club of North Austin. Another 25 participants were recruited at the Austin Department of Public Safety. The remaining 14 participants were recruited from a nearby low-cost full service car wash. After classification procedures were used, it was determined that 55 percent of participants ($n=35$) were addicts and 45 percent ($n=29$) were non-addicts.

The demographic characteristics of the sample are presented in Table 1. For ease of comparison, percents are provided separately for addicts and non-addicts. The average age of study participants was 37.16 ($Min=18$, $Max=72$, $SD=14.77$). The ages of participants did not differ markedly between the addict and non-addict samples (see Table 1).

The full sample included a roughly equal number of male ($n=31$) and female ($n=32$) participants. Again, the gender of the participants did not differ markedly between the addict and non-addict samples (see Table 1).

Over half of the study participants (54 percent, $n=34$) reported being white, followed by African-American (20.6 percent, $n=13$), multi-racial (15.9 percent, $n=10$), American Indian or Alaskan Native (6.3 percent, $n=4$), and Asian (3.2 percent, $n=2$).

Slightly more addicts reported being African-American (see Table 1), but otherwise the samples had similar racial compositions. Overall, 22.2 percent ($n=11$) of study participants reported that they were Hispanic. The majority of these individuals (84.6 percent, $n=11$) were of Mexican descent.

Half of all participants ($n=30$) were employed full time. The majority (66.7 percent, $n=40$) were employed at least part time. As indicated in Table 1, however, addicts reported higher levels of unemployment.

Levels of criminal justice involvement were comparable among both groups of participants (see Table 1). The most common criminal justice status reported was probation (4.7 percent, $n=3$). Other criminal justice statuses not included in the survey instrument but which were self-reported by participants included “full pardon,” “old tickets,” and “on the lam.”

Substance involvement. The survey instrument included a substance use inventory that yields a substance involvement score that was used to classify individuals as addicts or non-addicts. These scores range from zero to 39, and all scores were represented within the sample ($M=12.42$, $Min=0$, $Max=39$, $SD=10.77$). Scores were necessarily higher for addicts ($M=18.94$, $Min=6$, $Max=39$, $SD=10.33$) than for non-addicts ($M=4.55$, $Min=0$, $Max=10$, $SD=3.73$). The reason that there is overlap between the two samples is because the threshold for alcohol abuse (11) is higher than for other drugs (four).

The majority of participants (57.8 percent, $n=37$) reported that alcohol was their drug of choice, although many participants reported poly-drug use (see Table 2). Non-

addicts were twice as likely (79.3 percent, $n=23$) as were addicts (40 percent, $n=14$) to report that alcohol was their drug of choice. Fourteen percent of respondents ($n=9$) preferred cannabis or marijuana, and the remainder of participants selected another illicit drug (see Table 3). As indicated in Table 3, 60 percent of addicts ($n=21$) selected a substance other than alcohol as their drug of choice. This was in part due to the maximum-variation sampling strategy.

Table 3 displays the percent of participants who report using each of nine substances during their lifetime as well as during the past three months. The vast majority of non-addicts (89.7 percent, $n=26$) reported lifetime use of at least one substance, most commonly alcohol. Addicts were more likely than non-addicts to have used cannabis or other drugs (see Table 2). However, the majority of non-addicts had used marijuana (62.1 percent, $n=18$), and roughly half had used cocaine (48.3 percent, $n=14$) or amphetamine-type stimulants (51.7 percent, $n=15$) in their lifetime. A significant number also reported lifetime use of hallucinogens (41.4 percent, $n=12$), opioids (34.5 percent, $n=10$), and sedatives (34.5 percent, $n=10$). As illustrated in Table 2, however, addicts were far more likely to have used these substances in the past three months. Addicts (22.9 percent, $n=8$) were also considerably more likely than non-addicts (10.3 percent, $n=3$) to have engaged in intravenous drug use. Very few participants reported use of substances other than those explicitly listed in the survey instrument. When participants did occasionally report use of “other” drugs, they were most often referring to designer drugs such as bath salts. As expected, participants reported having greater access to alcohol than to other, primarily illicit, drug classes (see Table 4).

Data and Instrumentation

All participants were surveyed using a self-administered paper-and-pencil questionnaire that contained several parts: the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), the Central Texas Lifestyle, Alcohol, and Drug Use Survey, the Grasmick Low Self-Control Scale, and several demographic questions. Self-administered surveys are not without their drawbacks. Researchers have less control over the data collection when using this format. In particular, respondents may respond to inapplicable items or fail to respond to those that are applicable (Dillman, Smyth, & Christian, 2009; Wright, Aquilino, & Supple, 1998).

Despite these drawbacks, however, self-administered questionnaires have several desirable features. They allow the researcher to collect a large amount of data, relatively quickly and inexpensively (Dillman, Smyth, & Christian, 2009). More importantly, self-administered questionnaires are particularly effective tools for collecting data on sensitive subjects, such as drug use. (Aquilino, W. S., 1994; Aquilino & LoSciuto, 1990; Bradburn, 1983; Dillman, Smyth, & Christian, 2009; Turner, Lessler, & Devore, 1992). In a comparison of different survey methods, respondents were most likely to admit to using drugs and alcohol when researchers used in-person self-administered questionnaires (Aquilino, 1994). The social distance of the researcher encourages participation and provides an opportunity to explain the confidentiality/anonymity of the survey (Aquilino, 1994), while the self-administration method provides anonymity and limits reactivity on the part of the respondents (Aquilino, 1994; Bradburn, 1983; Dillman, Smyth, & Christian, 2009). Since the primary focus of this study was alcohol and drug

use, self-administration was preferable in order to maximize the likelihood of honest responses and protect the anonymity of the participants.

In this study, participants were approached by the researcher and asked to voluntarily participate in the study. If they agreed, they were assured both verbally and in writing that their responses were completely anonymous. The questionnaire did not require participants to provide any personally identifying information, and surveys were returned to the researcher in sealed envelopes.

The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST)

All participants were administered the Alcohol, Smoking and Substance Involvement Screening Test [ASSIST] (See Appendix A). The ASSIST was developed in 1997 by the World Health Organization [WHO] to be administered in primary health care settings in order to detect problematic use of a variety of substances, including tobacco, alcohol, cannabis, cocaine, amphetamine-type stimulants, benzodiazepines, hallucinogens, inhalants, opioids, and other drugs (Humeniuk et al., 2010). The ASSIST was used in this study for several reasons, including its reliability and validity.

Reliability and validity. Soon after its development, the ASSIST was found in several countries to reliably measure substance use problems (WHO ASSIST Working Group, 2002). The ASSIST was also validated using several other instruments including the Addiction Severity Index-Lite [ASI-Lite], the Severity of Dependence Scale [SDS], the MINI International Neuropsychiatric Interview [MINI Plus], the Rating of Injection

Site Condition [RISC], the Drug Abuse Screening Test [DAST], the Alcohol Use Disorders Identification Test [AUDIT], the Revised Fagerstrom Tolerance Questionnaire [RTQ], and the Maudsley Addiction Profile [MAP] (Humeniuk et al., 2007; Humeniuk & Ali, 2006). The ASSIST demonstrated concurrent validity with the ASI, SDS, AUDIT, RTQ, and MINI-Plus.

Ease of use and versatility. The ASSIST is copyrighted by the World Health Organization. The instrument can be downloaded and used for non-commercial purposes free of charge from the WHO web site. User manuals and scoring guides are also publicly available. The ASSIST collects information about both lifetime and recent use of 10 types of substances. The instrument itself consists of eight items and can be administered in approximately five minutes (WHO ASSIST Working Group, 2002).

During feasibility testing, it was determined that most participants enjoyed the interview, found the items easy to understand, and did not find the interview to be either lengthy or offensive (WHO ASSIST Working Group, 2002). It is also possible to include additional questions or administer additional instruments in conjunction with the ASSIST. In the study reported here, two additional questions were added in order to determine when respondents most recently used each substance and how often they had access to each of those substances.

Although the ASSIST is most commonly administered in a structured interview in a primary care setting, it is not anticipated that self-administration affects the instrument's reliability (Henry-Edwards et al., 2003). For the purposes of this study, the ASSIST was formatted to be self-administered by the participants. This, however, did

not affect the scoring of the instrument. Again, self-administration of the ASSIST was optimal in order to reduce the amount of time necessary to complete the study and to protect the anonymity of respondents who might otherwise have been hesitant to report illicit drug use (WHO ASSIST Working Group, 2002).

Breadth of information. The ASSIST was administered to participants primarily in order to diagnose the severity of their substance use problems as well as to determine what drugs they were currently abusing or had abused in the past. Because the instrument is designed to account for both recent (past 90 days) and lifetime use, it was possible to collect information from those participants who were not currently using drugs or alcohol. The ASSIST yields several scores: (1) a specific substance involvement score for each substance, (2) a total substance involvement score across all substance classes, and (3) current frequency of substance use for each substance (Humenuik et al., 2007; Humenuik & Ali, 2006).

The ASSIST is also able to distinguish between low-risk use, abuse, and dependence for most substances. Cutoff scores have been established for classification purposes (Humenuik et al., 2007; Humenuik & Ali, 2006). Thus, the ASSIST can be used to (1) differentiate between participants who belong in the substance-use disorder group and those who do not have histories of substance-use disorders and (2) determine whether participants have experienced only low-risk use or more serious use.

Central Texas Lifestyle, Alcohol, and Drug Survey

The questionnaire also included a survey regarding reasons for drinking/drug use at different points in time (See Appendix B). Each participant's drug of choice was determined by responses on the ASSIST as well as a question at the beginning of Section B of the questionnaire. Participants were prompted to respond to all questions in Section B with that substance in mind.

Section B included a list of conditions, and the participants were asked to respond, on a scale from zero to 10 (with zero meaning no enjoyment at all and 10 meaning the most enjoyment possible) to indicate the level of enjoyment or pleasure they had felt, or believed they would feel under each of the conditions. A question was embedded into each condition to determine whether the individual participant had actually experienced the condition or was answering hypothetically. There were five categories of conditions in this section of the survey.

- (1) Having a drink/using their drug of choice after being sober for a specified period of time (one day, one week, one month, one year)
- (2) Having a drink/using their drug of choice after drinking/using their drug of choice daily or almost daily for a specified period of time (one day, one week, one month, one year)
- (3) Being sober for one day after being sober for a specified period of time (one day, one week, one month, one year)
- (4) Being sober for one day after drinking/using their drug of choice daily or almost daily for a specified period of time (one day, one week, one month, one year)

- (5) Engaging in a specified behavior (drinking/using their drug of choice daily, drinking/using their drug of choice in moderation, being sober) for one year

The purpose of asking these questions was to determine the utility addicts place on being sober or drinking/using their drug of choice at different points in time.

The remainder of this section consisted of questions prompting participants to provide information as to why they believe they drink/use their drug of choice or abstain from drinking/drug use under certain conditions. These questions can be found in APPENDIX B. The primary purpose of asking these questions was to determine at what points drinking/drug use is positively reinforced and at what points drinking/drug use is negatively reinforced.

Grasmick Low Self-Control Scale

The Grasmick self-control scale was administered to all participants in order to determine whether self-control was predictive of their level of substance involvement. The Grasmick self-control scale (Grasmick, Tittle, Bursik, & Arneklev, 1993) is a 23-item scale developed to measure the six components that Gottfredson and Hirschi (1990) claim comprise low self-control: impulsivity, a preference for simple tasks, risk-seeking, physical activities, self-centeredness, and having a temper. Many of the items are modified from the self-control subscale of the California Psychological Inventory (Grasmick, Tittle, Bursik, & Arneklev, 1993). The researchers pre-tested a 24-item scale, including four items representative of each of the six components of self-control, on several samples of college students. The scale includes statements such as “I lose my

temper pretty easily” followed by Likert-type responses including (4) strongly agree, (3) agree somewhat, (2) disagree somewhat, and (1) strongly disagree.

During pilot-testing, it was determined that removing one of the items increased the reliability of the scale, which is why the 23-item scale is the one most commonly used today. Factor analysis determined that all items loaded under a single unidimensional factor with a reliability coefficient of above .80 (Grasmick, Tittle, Bursik, & Arneklev, 1993).

Hirschi and Gottfredson (1993) have expressed displeasure over the use of attitudinal measures of self-control and, instead, advocate use of behavioral measures. They claim that self-control influences how individuals respond on surveys and, essentially, that those low in self-control are prone to lying. In addition, they reject the use of attitudinal measures of the concept because it was not their intention to suggest that crime is the result of a criminal personality or predisposition. They instead propose that “the best indicators of self-control are the acts we use self-control to explain: criminal, delinquent, and reckless acts” (p. 49).

The use of behavioral indicators of self-control, however, has opened the theory up to claims of tautology (see Barlow, 1991; Pratt & Cullen, 2000; Tittle, Ward, & Grasmick, 2003). Hirschi and Gottfredson (1993) view this as a compliment, inasmuch as an absence of tautology would “advance definitions of crime and of criminals that are independent of one another” (p. 52). Despite the contentions over tautology, several researchers have attempted to measure self-control using behavioral indicators (see Junger, West, & Timman, 2001; Keane, Maxim, & Teevan, 1993; Polakowski, 1994; White, Moffitt, Caspi, Bartusch, Needles, & Stouthamer-Loeber, 1994).

Most studies, however, measure self-control using attitudinal indices. In a meta-analysis of studies of self-control, 82 analyses included an attitudinal measure of self-control, and only 12 included a behavioral measure (Pratt & Cullen, 2000). The most common attitudinal index was the Grasmick low self-control scale. The meta-analysis indicated that the effect of self-control remains fairly constant, regardless of whether behavioral or attitudinal measures are employed (Pratt & Cullen, 2000). This has been corroborated by more recent studies as well (see Tittle, Ward, & Grasmick, 2003).

CHAPTER IV

FINDINGS

Local Preferences

In relative addiction theory, Rachlin (2000) posits that, although addicts prefer sobriety to using over long periods of time, addiction can occur because there still exists a preference for using in the short term. The survey used in this study (see Appendix B) asked addicts to rate their level of enjoyment (from zero to 10) for both using and abstaining under eight different circumstances (e.g., after using for one week, after being sober for one year). Paired samples t-tests were conducted to compare levels of enjoyment reported for using and abstaining under each condition. The results are presented in Table 5. For comparison purposes, the results for non-addicts are also presented.

The results are mixed and indicate that addicts show a preference for use at some discrete points and a preference for abstinence at others. There was a non-significant preference for using ($M=6.7$, $SD=3.18$) over abstaining ($M=5.85$, $SD=3.38$) after being sober for one day ($t=1.274$, $df=32$, $p=.212$). There was a non-significant preference for

using ($M=6.48$, $SD=3.15$) over abstaining ($M=6.32$, $SD=3.27$) after being sober for one week ($t=.283$, $df=30$, $p=.779$). The direction of the relationship switched after longer periods of sobriety. There was a non-significant preference for abstaining ($M=6.34$, $SD=3.53$) over using ($M=5.97$, $SD=3.52$) after being sober for one month ($t=-.513$, $df=31$, $p=.611$). There was also a non-significant preference for abstaining ($M=7.07$, $SD=3.68$) over using ($M=5.53$, $SD=4.07$) after being sober for one year ($t=-1.806$, $df=29$, $p=.081$). Addicts displayed a preference for using under all remaining conditions. There was a significant preference for using ($M=6.44$, $SD=3.01$) over abstaining ($M=4.88$, $SD=3.44$) after using for one day ($t=2.684$, $df=33$, $p=.011$). There was a significant preference for using ($M=6.09$, $SD=3.34$) over abstaining ($M=4.59$, $SD=3.65$) after using for one week ($t=2.273$, $df=31$, $p=.03$). There was a non-significant preference for using ($M=5.39$, $SD=3.34$) over abstaining ($M=4.64$, $SD=3.93$) after using for one month ($t=1.376$, $df=32$, $p=.178$). There was a non-significant preference for using ($M=5.18$, $SD=3.67$) over abstaining ($M=4.55$, $SD=4.19$) after using for one year ($t=1.146$, $df=32$, $p=.260$). It is worth noting that study participants who were not addicts displayed similar patterns under all conditions except for two. After being sober for one day, non-addicts preferred to abstain ($M=5.6$, $SD=3.97$) than to use ($M=4.96$, $SD=3.34$) ($t=-.703$, $df=24$, $p=.489$). They also preferred abstinence ($M=6.4$, $SD=3.61$) to using ($M=5.72$, $SD=2.92$) after being sober for one week ($t=-1.185$, $df=24$, $p=.247$).

Long-Term Preferences

Another central tenet of relative addiction theory (Rachlin, 2000) is that addicts, even while displaying behavior to the contrary, prefer abstinence to addictive levels of use in the long run. To test that hypothesis here, addicts were asked to rate their levels of enjoyment (from zero to 10) for abstaining for one year and using daily or almost daily for one year. A paired samples t-test confirmed that this was the case among study participants. The results of the analysis are presented in Table 6. Among addicts, there was a clear preference for abstaining ($M=7.91$, $SD=3.67$) versus using daily/almost daily ($M=5.79$, $SD=3.6$) for one year ($t=3.122$, $df=32$, $p=.004$). Non-addicts showed an even stronger preference for abstinence ($M=7.36$, $SD=3.32$) over daily/almost daily use ($M=3.64$, $SD=2.87$) for a one year period ($t=6.491$, $df=24$, $p<.001$).

Relative addiction theory suggests that, in spite of the realization that sobriety is a better long-term course of action than addiction, the underlying goal of addicts is to use, but in moderation (Rachlin, 2000). Thus, the theory predicts that addicts will display long-term preferences for moderate use over both addiction and abstinence. This offers one potential explanation for relapse—that addicts who have been sober for a period relapse in an attempt to begin using at moderate levels. The results of the analyses conducted here do not support this hypothesis. Addicts were asked to rate the level of enjoyment associated with using their drug of choice in moderation for one year. A paired samples t-test (see Table 7) showed that addicts do prefer moderation ($M=6.55$, $SD=3.08$) to daily/almost daily use ($M=5.76$, $SD=3.58$) over one year periods ($t=1.432$, $df=32$, $p=.162$). While non-addicts rated both moderate use ($M=4.58$, $SD=3.34$) and

daily/almost daily use ($M=3.58$, $SD=2.92$) lower than did addicts, the preference was still for moderate use ($t=1.563$, $df=23$, $p=.132$). Although both groups of participants demonstrated a preference for moderate use when compared to daily/almost daily use, the more important question is whether addicts demonstrate long-term preferences for moderation over abstinence. The results of the paired-samples t-test indicate that this was not the case for study participants (see Table 8). Addicts indicated a higher level of enjoyment for abstaining for one year ($M=8.03$, $SD=3.66$) than for one year of moderate use ($M=6.5$, $SD=3.12$) ($t=-2.211$, $df=31$, $p=.035$). Non-addicts displayed a similar preference for abstaining ($M=7.46$, $SD=3.29$) as opposed to moderate use ($M=5$, $SD=3.52$) ($t=-3.432$, $df=25$, $p=.002$).

Patterns Over Time

Relative addiction theory (Rachlin, 2000) also includes predictions about the utility of certain behaviors over time. Specifically, the theory suggests that the utility of using decreases over time as addicts continue to use their drug of choice but that the utility of abstinence increases the longer that one is abstinent. Since participants were surveyed about the level of enjoyment associated with using or abstaining at different points in time, it was possible to plot their responses to see if the hypothesized patterns emerged. Mean responses were plotted separately for addicts and non-addicts. As seen in Figure 1, the utility of using decreases over time for both groups of participants. Addicts reported the highest level of enjoyment for using after using for only one day ($M=6.44$, $SD=3.007$). The enjoyment rating decreased slightly for each subsequent time

period, reaching a low of 5.26 ($SD=3.654$) after using daily or almost daily for one year. While non-addicts displayed a similar pattern, their scores were somewhat lower overall, ranging from a high of 5.42 ($SD=2.942$) after using for one day to a low of 3.77 ($SD=3.433$) after using daily/almost daily for one year.

The responses to parallel questions regarding abstinence have been plotted in Figure 2. It does appear that abstinence becomes more enjoyable over time. Addicts reported higher levels of enjoyment for abstinence after being sober one year ($M=6.94$, $SD=3.749$) than they did after being sober for only one day ($M=6$, $SD=3.361$). Similarly, non-addicts reported that abstinence was more enjoyable after one year ($M=7.41$, $SD=3.634$) than after one day ($M=5.74$, $SD=3.849$).

Together, these findings indicate that, for addicts, the utility of using does decrease over time, while abstinence becomes more enjoyable over time. Theoretically, there is no reason to assume that non-addicts would differ from addicts in these respects. The patterns did hold for both addicts and non-addicts, although, as a group, non-addicts found using less enjoyable and abstinence more enjoyable than did addicts.

Modes of Reinforcement

Theoretically, it has been suggested that using becomes less enjoyable over time, in part, because there is a shift from positive reinforcement to negative reinforcement (Rachlin, 2000). Initial use is fueled by the euphoria associated with the drug, but long-term habitual use leads to both tolerance and withdrawal. In addition, habitual drug use can have deleterious effects on other aspects of the user's life. Thus, at the end of a

prolonged period of time, drug use may be negatively reinforced, either in an attempt to avoid withdrawal symptoms or to avoid dealing with the life consequences of drug use itself.

First Use and Beginning of Longest Period of Daily/Almost Daily Use

Two survey items were included to determine whether initial periods of use were positively reinforced. Participants were asked to describe how drinking/using their drug of choice made them feel the first time that they ever used and at the beginning of their longest period of daily/almost daily use. Response options were “It made me feel better than I already did” (positive reinforcement), “It helped me to avoid feeling bad” (negative reinforcement), and “It made me feel bad” (punishment). Participants could select more than one response. The results are presented in Table 9. The most common response for both addicts (46.9 percent, $n=15$) as well as non-addicts (68.2 percent, $n=15$) was that their first experience with their drug of choice was positively reinforced. Interestingly, several of the addict participants (12.5 percent, $n=4$) but none of the non-addict participants indicated that their first experience was negatively reinforced. Many participants selected more than one response (see Table 9). The results were similar for the beginning of participants’ longest periods of daily/almost daily use. The majority of addicts (58.8 percent, $n=20$) and non-addicts (63.6, $n=14$) again indicated that the drug “made them feel better than they already did.”

Participants were also presented with open-ended follow-up questions asking them to explain how drinking/using their drug of choice made them feel that way. Most

participants answered these questions. Qualitative responses are included here both because they provide a deeper understanding of how drug use may be reinforced at different points in time and also because there was some disagreement between participants' quantitative and qualitative responses.

Most non-addicts indicated that their first experience with alcohol or drugs was a positive one. One woman reported that the first time she tried opiates she "felt like a super mom." Other examples of pleasant experiences included "After a few beers, it starts to make you feel . . . buzzed," and "Drinking was a blast. I loved it the minute I tried it." For some, using for the first time was viewed as a rite of passage: "It was my 21st birthday. I was elated at the freedom I then had." "My parents let me have alcohol, and I was excited." It was also common for non-addicts to report that initial use was negatively reinforced inasmuch as it helped to reduce social anxiety: "I felt liberated and like I 'just fit in' with the crowd for the first time in my life," "I am naturally shy. When I got high and drank—that went away," "It erased my inhibitions." Although it was far less common, several non-addicts suggested that their first experience with drugs or alcohol was a punishing one. Occasionally this was associated with guilt: "I felt guilty for drinking underage." More often, however, the punishing effects were physical: "I got drunk the first time I drank. I blacked out. Woke up and discovered I had vomited all over my friend's bedroom-and I felt terrible-first hangover." The qualitative responses indicate that, for non-addicts, initial experiences that were punishing were due to three things: (1) disliking the taste (alcohol), (2) guilt, or (3) physical effects (either vomiting or a hangover).

Some addicts indicated that their initial experience with drugs or alcohol was positively reinforced: “I was having a good time with family,” “The first time I had a drink I felt like I was an adult and was very happy and energetic. I was very excited that my mother let me have a drink and then I was sneaking it for the rest of the night,” “It just made me feel good and I wanted to keep doing it.” A greater number of responses, however, indicated that, even at initial use, the effects of drugs and alcohol were negatively reinforcing for addicts. Whereas non-addicts reported that using helped to alleviate social anxiety, addicts were more likely to report that using helped them to deal with underlying stress: “It changed my state of mind so whatever I was feeling I could forget about,” “It made me forget the bad feelings and made me happy for a moment,” “It helped with panic attacks,” “It made me forget all my problems,” and “It helped me not to deal with all the things I go through in life.” These types of responses, indicating that using was a way to manage stress or life difficulties, were far more prevalent than those indicating positive reinforcement. Several addicts indicated that their initial use was punished, generally for the same reasons reported by non-addicts: “I felt guilty. I was a teenager and was taught that drinking was a sin,” “It reminded me of my mother who was an abusive alcoholic,” “I threw up.”

When non-addicts were asked to describe how drinking or drug use made them feel at the beginning of their longest period of regular use, many of them indicated that their use was socially supported: “Good times, lots of hanging out with people, enjoying the bar scene,” “Socializing was easy, drinking was part of having a good time.” Several female respondents, however, indicated that their use was associated with a significant other: “A lot of issues—abusive boyfriend—helped numb my emotions,” “During the

time, I was drinking and using cocaine and was in a relationship with someone who was doing the same. I was fooling myself into thinking we would be happier with common interests rather than fighting,” or with engaging in sexual relationships: “Alcohol helped me . . . lose inhibition (so I could have sex).”

When asked about the same period of time, addicts also noted the social aspects of using: “It made me feel cool.” One male marijuana addict explained that he enjoyed his circle of friends (fellow marijuana users): “It’s a lifestyle and I love it. I love being around the chill people and just enjoying life.” Again though, addicts were more likely than non-addicts to suggest that alcohol and drugs were a coping mechanism: “[I used to] forget problems and cope with daily life,” “I didn’t understand the pain I was feeling,” “I was depressed,” “I had no feelings so I was constantly high, I was just alive but not living,” “I was in pain and drank to kill pain.”

End of Longest Period of Daily/Almost Daily Use

Respondents were also asked to report how using made them feel at the end of their longest period of daily/almost daily use. Roughly half of addicts (48.4 percent, $n=15$) and more than half of non-addicts (55 percent, $n=11$) reported that using at that time made them feel bad (see Table 9). Negative reinforcement was the second most common response, chosen by 19.4 percent ($n=6$) of addicts and 30 percent ($n=6$) of non-addicts. Several addicts (19.4 percent, $n=6$) and non-addicts (15 percent, $n=3$) indicated that use was positively reinforced during this period.

Most non-addicts whose qualitative responses suggested that their use was punished during this period made mention of the health, legal, and social consequences associated with substance abuse: “Lots of bad things happened, such as loss of home, family, dogs, jobs, prison and jail time,” “Stopped—danger to myself and others,” “Yuck. Worn out. Health issues. Loss of friends and family,” “Toward the end of my drinking/using, I was getting in trouble a lot,” “I felt physically ill a lot of the time, confused and disoriented. I had wrecked a lot of friendships and lost a lot of jobs.” For others, the effects of drug use were negatively reinforcing at that time: “I think I drank a lot as a teenager to avoid growing up. I had a lot of anxiety and phobias when I was younger.”

Although many addicts also felt that drug use was punished after they had been using for a long period of time, they were less likely to reference health, legal, and social consequences, but instead their own emotional states: “I was completely miserable,” “I did not want to be like my mother,” “Low self-worth/self-esteem. Just didn’t care. Got real vulgar mouthed and cocky,” “Empty. Left me feeling like I accomplished little and was a failure.” When use was negatively reinforced, addicts were more likely than non-addicts to make comments indicative of physical or psychological dependence: “Depended on it, couldn’t do anything without it,” “I couldn’t stop. The drug was in total control. I wanted to stop but couldn’t,” “It hurt too bad to be straight,” “Satisfied cravings—addiction—physical and psychological.”

Relapse

Finally, all participants were asked to describe how they felt if they had ever used after being sober for a period of 30 days or more. Recall that relative addiction theory (Rachlin, 2000) suggests that using after a period of abstinence may be positively reinforced. If this is the case, then some addicts may sober up with the intention (although likely a subconscious one) of relapsing. The plots presented previously (see Figure 1) do indicate that using becomes less enjoyable over time. If this is due, in part, to a shift from positive to negative reinforcement, then a period of sobriety might allow an individual to return to use that is positively reinforced, and thus, more enjoyable.

The quantitative results indicate that both addicts (43.5 percent, $n=10$) and non-addicts (38.5 percent, $n=5$) who returned to using after a period of sobriety found the experience to be punishing (see Table 9). The second most common response for addicts (30.4 percent, $n=7$) and non-addicts (23.1 percent, $n=3$) was that use was positively reinforced. Slightly fewer addicts (17.4 percent, $n=4$) and an equal percent of non-addicts (23.1 percent, $n=3$) responded that use was negatively reinforced when they resumed using their drug of choice.

For non-addicts, relapsing was often associated with guilt and, thus, a punishing experience: “I hate myself for doing it,” “I felt like a failure and felt like I had let myself and others who cared about me down,” “I knew it was wrong and did it anyway.” The qualitative responses also suggest that using after a period of sobriety was negatively reinforced inasmuch as it helped to cope with depression and life stress: “I stayed sober for about four months without joining AA or anything. I was depressed all the time and felt better when I went back to drinking,” “I was depressed,” “I was without work, but after I relapsed I forgot about it.” Non-addicts whose qualitative responses corresponded

to positive reinforcement made mention of their moderate use: “I really don’t drink that much, so it’s fun to just do it and relax every once in a while,” “I love coke but did not overuse.”

The responses of addicts who felt that relapse was a punishing experience did not differ dramatically from those of non-addicts. They also strongly associated relapse with feelings of guilt: “I felt guilty and depressed and alcohol didn’t fix this,” “Guilt, remorse, despair,” “I let myself and others down.” Addicts, however, were more likely to associate their guilt with the work they had done prior to relapsing: “I hated myself because I took steps back and it brought me down,” “I would get two weeks and then relapse and would feel guilty,” “Too many years in recovery to do BS anymore,” “It made me feel bad because I threw away all my hard work I had done staying sober.” Addicts who felt that resumed use was negatively reinforced, once again, did not offer responses markedly different from those of non-addicts. Their comments suggested that they used drugs and alcohol to cope with depression and anxiety: “It eased my pain,” “It helps relieve stress and panic attacks, etc.,” “Prevented self-suicide.” Interestingly, some addicts did indicate that relapse was positively reinforcing for the reasons suggested by relative addiction theory (Rachlin, 2000): “It got me high again,” “It felt like the first time.”

Self-Control

Ordinary least-squares regression was used to determine the effect of self-control on overall substance involvement scores for participants’ drugs of choice. Substance

involvement scores were calculated using the ASSIST and ranged from zero to 39 ($M=12.42$, $Min=0$, $Max=39$, $SD=10.77$). Recall that the substance involvement scores were also used to classify participants as addicts or non-addicts in the previous analyses. It was not necessary, however, to collapse scores into a dichotomous variable for the multivariate analysis.

Independent variables in the regression analyses included several control variables: age, gender, race, ethnicity, employment, and drug of choice. The independent variables of interest were low self-control and opportunity. Low self-control was measured using the Grasmick low self-control scale. Opportunity was measured by a survey question asking participants how often they have access to their drug of choice. An interaction term representing the multiplicative effects of self-control and opportunity was also entered into the regression equation. Because product terms are usually correlated with the first-order terms used to create them, self-control and opportunity were mean centered prior to creating the interaction term.

Substance involvement was first regressed on the control variables and low self-control. As presented in Table 10, the model R^2 value was .395, indicating that the variables in the model explained about 40 percent of the variation in substance involvement. This also corresponds to a 40 percent reduction in prediction error when using the regression equation as opposed to using the average substance involvement score alone. The root mean square error indicates that, on average, use of the regression equation would result in a prediction error of 8.97 points on the substance involvement scale. The model test ($F=2.933$, $p<.05$) indicates that there is approximately three times more explained variance than unexplained variance in the model.

The analysis demonstrated that low self-control had a positive and statistically significant main effect on substance involvement ($b=.29$, $p=.004$). The slope indicated that, while controlling for the other variables in the model, every one point increase in low self-control resulted in a .29 point increase in substance involvement, on average.

Opportunity (in this case, perceived access to one's drug of choice) was added to the analysis presented in Equation 2 (see Table 10). Opportunity had a positive effect on substance involvement ($b=1.77$, $p=.183$); however, the effect was not statistically significant when controlling for the other variables in the model. Adding opportunity to the equation resulted in only a modest improvement to overall model fit ($R^2=.435$, $F=3.014$, $p=.005$, $RMSE=8.839$). Inclusion of the multiplicative term for low self-control and opportunity resulted in a decrease in overall model fit ($R^2=.435$, $F=2.699$, $p=.009$, $RMSE=8.943$) (see Table 10, Equation 3). Thus, the effect of low self-control on substance involvement did not depend on opportunity to use drugs or alcohol.

Several diagnostic procedures were used to ensure that collinearity was not a problem in the model. A correlation matrix was examined to determine that the zero-order correlations between the predictor variables did not exceed .4. None of the variance inflation factors exceeded 2.2, indicating that none of the independent variables were highly correlated with sets of other independent variables in the model. The condition number (10.82) further confirmed that there was no redundancy among the independent variables.

The model residuals were assessed for normality. The residuals appeared to be normally distributed in both a histogram and a normal q-q plot. Less than five percent of

the residuals fell outside of +/- two standard deviations, and none fell outside of +/- three standard deviations, indicating that the distribution of error was approximately normal.

In order to assess whether there was constant variance of the residuals, the residuals were plotted against the predicted values. The heteroscedasticity displayed in the residual plot indicated that there was a possible violation of one of the assumptions of OLS regression: that there is constant variance of error. A variety of measures were used in an attempt to address this violation.

First, because the substance involvement was positively skewed ($M=12.42$, $SD=10.77$, $skew=1.068$, $SE=.299$), it was transformed in order to impose normality. Several power transformations (Tukey, 1977) including the natural logarithm, base-10 logarithm, square-root, reciprocal, and reciprocal root transformations were compared. All transformations were conducted after adding one to the raw substance involvement scores, which contained zeroes. For inverse transformations, negative reciprocals were used in order to preserve the order of cases. The square-root transformation was most effective for imposing normality ($skew=.247$) (see Appendix D).

The analyses were then attempted using the transformed outcome variable. Although the square root transformation was successful in normalizing the dependent variable, this did not substantively change the model, nor did it improve heteroscedasticity in the residual analysis. Because the results did not differ substantively from the original model, they are not presented here.

One alternative when transformations do not result in constant variance of the residuals is to abandon OLS regression in favor of weighted least squares regression where each case is weighted based on the precision of the estimates. This option was not

optimal, however, because OLS tends to perform as well as, or better than weighted least squares when the sample size is small (Cohen, Cohen, West, & Aiken, 2003, p. 147).

Another potential cause of heteroscedasticity is model misspecification involving inclusion of irrelevant predictor variables. In order to test for irrelevant variables, a series of models were estimated excluding the control variables that were used in the original analyses. When excluding drug of choice from the model, the effect of opportunity was larger and statistically significant. Save for this instance, however, excluding individual covariates had no appreciable effect on the analyses, other than a small reduction in explained variance, and did not improve model fit.

Model misspecification, as indicated by heteroscedasticity, can also result from exclusion of relevant explanatory variables. Variable omission can cause biased regression coefficients and standard errors (Cohen, Cohen, West, & Aiken, 2003). Attempts were made to include other potential explanatory variables from the study in the regression analyses, but this did not improve the residual diagnostics, nor did it improve other indicators of model fit. The most plausible explanation, given that post-hoc remedies were not successful in diagnosing the cause of the heteroscedasticity, is that substance involvement depends, to some extent, on a variable or set of variables that were not measured with the survey.

Nonetheless, the effect of low self-control on substance involvement appears to be robust inasmuch as the effect remained stable across many model iterations. The results should still be interpreted with caution. The diagnostic procedures strongly indicate that one or more important predictor variables were missing from the analyses. If there was

covariance between any omitted variable(s) and self-control, then the coefficients for low self-control may have been artificially inflated by the omission.

Summary of Findings

Hypothesis 1

The expectation was that addicts would show a preference for using over abstaining at any discrete point in time, but that was not always the case. While addicts did rate using as more enjoyable at some points, they reported that abstaining was more enjoyable at others. Specifically, addicts reported that, after being sober for a period of time (a month or a year), it was more enjoyable to abstain. After a period of sobriety, it appears that addicts find further abstinence to be more enjoyable than resumed use.

Hypotheses 2 and 3

Although addicts showed a greater preference for use at discrete points in time, over a longer period of time (one year), they rated abstinence as more enjoyable than daily or almost daily use. This is in line with what is predicted by relative addiction theory (Rachlin, 2000). Relative addiction theory also predicts that addicts prefer moderate use to either abstinence or daily/almost daily use. This assertion was only partially supported by the findings here. When asked to rate their level of enjoyment for three year-long conditions (abstinence, moderate use, daily/almost daily use), addicts rated abstinence as the most enjoyable option. They did, however, believe that moderate use was more enjoyable than daily/almost daily use. If addicts do not prefer moderate use to abstinence, then long-term preferences do not explain their propensity for relapse.

Certainly, the results here appear to undermine one of the primary assertions of relative addiction theory.

Hypotheses 4 and 5

Although predictions about addicts' long-term preferences were not fully borne out by the data, other important patterns were apparent. It was clear that using became less enjoyable over time—addicts reported more enjoyment after using for only one day than they did after using for one year. It is notable that this pattern of price habituation held for both addicts and non-addicts alike. Although not explicitly stated, this is what relative addiction theory would predict. All else remaining equal, using becomes more costly over time simply due to the development of tolerance. Addiction, though, should only occur when there is relative price sensitization—that is, when the utility of competing behaviors deteriorates more rapidly than does using.

As expected, both addicts and non-addicts reported that abstaining became more enjoyable over time, which is evidence of price sensitization. What complicates matters, however, is that addicts did not report that moderating was more desirable over a one-year period. If the utility of abstaining increases over time, and abstaining is preferable to both using and moderating, then there is little explanation for relapse. It is possible that, after a period of sobriety, addicts begin to romanticize moderate use, but the survey data do not support that notion.

Hypotheses 6 and 7

The alternative explanation for relapse that Rachlin (2000) suggests is that, over time, using becomes negatively reinforced but that, after a relapse, addicts can briefly return to use that is positively reinforced. The quantitative and qualitative findings from the survey indicate mixed support for these hypotheses. Approximately half of the addicts surveyed claimed that their use was positively reinforced when they began using, while some indicated that even initial use was negatively reinforced. The qualitative responses showed that initial use was negatively, rather than positively reinforced, primarily because it helped them to cope with stress. At the end of their longest period of use, addicts tended to report that their use was either negatively reinforced or punished. After a period of sobriety, many of the addicts surveyed indicated that resumed use was punished—largely because of feelings of guilt or remorse over “throwing away” the work they put into being sober. A significant portion did, however, indicate that returning to alcohol or drug use was positively reinforced. For some of these individuals, it was apparent that abstaining had decreased their tolerance and allowed them to enjoy the full effects of the substances as they had when they used initially.

Hypothesis 8

One of the less ambiguous findings was that individuals with low self-control had higher substance involvement scores. This effect did not appear to be conditioned on opportunities for drug use. While self-control theory explicitly states that low self-

control only manifests when opportunities for crime and analogous behavior are present, Hirschi and Gottfredson (1993) have also made it clear that opportunity can play a greater or lesser role: “Opportunities to commit one or another crime or analogous acts are limitless. Opportunities to commit a particular crime may be severely limited . . . Self-control and opportunity may therefore interact for specific crimes, but are in the general case independent” (p. 50). In the case of substance use, opportunity is best captured by the availability of the substance, and that is how it was measured here. Considering that some drugs (particularly alcohol and, to a lesser extent, marijuana) are widely available, it is little surprise that the effect of self-control was not contingent on opportunity.

CHAPTER V

CONCLUSIONS

The results reported here suggest ambiguous support for Rachlin's (2000) theory of relative addiction and also demonstrate that low self-control is predictive of higher levels of substance involvement. Far from being mutually exclusive, these theoretical frameworks have much in common. Implicit in both theories is the notion that addiction is the result, to a greater or lesser extent, of short-sightedness or a failure to sacrifice short-term pleasure for greater long-term rewards.

The theories differ in that self-control theory asserts that self-control is formed in early childhood and is stable throughout the life-course. Hirschi and Gottfredson have been adamant that self-control, the trait responsible for crime and analogous behaviors, is not indicative of a particular personality or predisposition (1993). This appears to be at odds with several decades of psychological literature (see for example Buckland, 2008; Dalley et al., 2007; de Wit, 2009; Ersche, et al., 2010; Franques et al., 2000; Harding et al., 1980; Kirby & Petry, 2004; Kirby et al., 1999; Kreek et al., 2005; Madden et al., 1997; Moeller et al., 2002).

The general consensus among psychological researchers is that there is no “alcoholic gene.” Nonetheless, psychologists have acknowledged that some individuals do exhibit a predisposition for becoming addicted to alcohol and other substances. Most, if not all, of these researchers acknowledge the role of personality characteristics such as impulsivity, risk-taking, and sensation seeking, which very clearly align with Gottfredson and Hirschi’s (1990) notion of self-control. Indeed, many of the scales used to measure such personality traits (e.g., the Barratt Impulsivity Scale, the impulsivity subscale of the Eysenck Personality Questionnaire, the self-control subscale of the California Psychological Inventory) are substantively similar to the Grasmick low self-control scale.

Some criminologists have acknowledged that, rather than offering a new and unique explanation for crime and deviance, the general theory of crime implicitly relies upon established psychological constructs. Among the researchers who have made this connection are Andrews and Bonta: “It is not clear whether Gottfredson and Hirschi’s central concept of ‘low self-control’ is a newly discovered distinct propensity or merely an attempt to package old wine in a new bottle by bringing together, under the concept of self-control, a series of factors that ‘coincide with some of the empirically best established [psychological] correlates of criminal conduct’” (as cited in Pratt & Cullen, 2000, p. 951). Thus, it is no great surprise that self-control is related to addiction.

Determining the precise role that self-control (or parallel constructs from other disciplines) plays in addiction was beyond the scope of this study. The most sophisticated research to date suggests that impulsivity and related factors can be both causes and effects of substance use. While explicating the exact nature of those

relationships would be informative, the confusion has not stifled research on *whether* addicts behave impulsively and tend to value short-term rewards, often at the cost of more distal ones (Heyman, 2003; Heyman & Dunn, 2002; Rachlin, 2000; Tunney & Shanks, 2002). These studies have focused on the decision making processes of addicts under artificial conditions and demonstrated that addicts often do opt for short-term rewards. The purpose of the present study was to determine *if* addicts actually prefer drinking and using drugs at discrete points in time and, relatedly, if they would prefer abstinence or moderate use when presented with a long-term scenario. The results indicate that, more often than not, addicts prefer to use in a given situation but prefer to abstain in the long run.

These results tentatively suggest that programs aimed at preventing and treating substance-use disorders should incorporate behavioral interventions. Specifically, interventions that decrease the immediate utility of drug use, or increase the utility of competing healthy behaviors, are promising.

Many programs already incorporate these principles to some extent. Alcoholics Anonymous and other 12-Step Programs may be effective, in part, because they provide addicts with a pro-social network of individuals who (in theory) do not use alcohol or other drugs. This decreases the cost (thus increasing the utility) of social activity. Other programs which focus on increasing employment opportunities and pro-social activities may also work based on this principle.

The present study indicates that other current treatment practices may be less effective than previously thought. If addiction results from relative price sensitization (when the utility of competing behaviors decreases more rapidly than the utility of using),

it seems that keeping any existing pro-social networks (e.g., employment, family, friends) intact would be a barrier against addiction. However, proponents of 12-Step Programs often claim that treatment is unlikely to be of use until the individual “hits rock bottom.” It may instead be the case that interventions are more effective prior to this point.

Addicts are also encouraged to approach their recovery “one day at a time.” At face value, this appears to be a reasonable strategy. Intuitively, the decision to stay sober for one day is less difficult than the decision to remain sober for a lifetime. However, the results here indicate that addicts find using more enjoyable in discrete instances but actually prefer to abstain over longer periods of time. Patterning choices over time may, in fact, make sobriety a more achievable goal.

Limitations

Although the survey results provide support for many of the theoretical hypotheses in relative addiction theory, the study was limited in several regards. Most importantly, it is inadvisable to generalize the findings beyond the study participants. The sample was not randomly selected, as no sampling frame was available. Effort was made to select a heterogeneous sample (based on demographic characteristics, drug histories, and other factors), but it is still unlikely that these participants are fully representative of addicts as a group.

There are several indicators that the findings may be sample-specific. First, many of the addicts who were surveyed reported having prior contact with Alcoholics Anonymous and other 12-Step Programs. It is likely that 12-Step participation colors

individuals' attitudes, particularly those regarding moderate drinking and drug use. Second, survey participants, including those classified as non-addicts, reported using illicit drugs at rates higher than would be expected in the general population. It is impossible to determine if this was due to the specific sites where participants were selected, the region where the study was conducted, or to some other unknown factor.

A related limitation is that the classification instrument, the ASSIST, relies heavily on recent indicators of substance use problems. For this reason, some study participants who self-identified as addicts, but who had been sober for a long period of time, were classified as non-addicts for the purpose of the study. This may partially explain the high rate of illicit drug use among non-addicts in the sample.

Finally, the questionnaire required participants to recall a great deal of information. The use of surveys was necessary in order to collect the requisite amount of data in a timely manner. This format, while convenient, limited participants' ability to provide detailed information, particularly when they were being probed about complex issues.

Future Research

Future research should address the limitations discussed above. Although it will likely never be possible to obtain a representative sample of addicts, larger samples can increase confidence in study findings. It would also be preferable, if possible, to determine whether similar patterns emerge in samples of addicts who do not have prior contact with Alcoholics Anonymous and other 12-Step Programs.

It is also likely that in-depth qualitative interviews would be better suited for collecting detailed information from participants. Without more detailed information, it is impossible to know *why* addicts tend to prefer to use or abstain and what effects those choices have on competing behaviors. Additionally, qualitative techniques would allow researchers to determine which competing behaviors are involved. Rachlin (2000) suggests that social interaction plays an important role in the development and maintenance of addiction, but this has not been investigated empirically. It is possible, even probable, that other competing behaviors are involved in this process. Identifying these competing behaviors is likely to be the most fruitful avenue for those interested in improving treatment outcomes for addicts.

Table 1

<i>Sample characteristics</i>	Addicts		Non-Addicts	
	Percent	<i>n</i>	Percent	<i>n</i>
<i>Gender</i>				
Male	48.6	17	48.3	14
Female	48.6	17	51.7	15
<i>Race</i>				
American Indian/Alaskan Native	5.9	2	6.9	2
Asian	2.9	1	3.4	1
African-American	22.5	8	17.2	5
White	55.9	19	51.7	15
Multi-racial	11.8	4	20.7	6
<i>Ethnicity</i>				
Cuban-American	2.9	1	0.0	0
Mexican-American	20.0	7	17.2	5
Puerto Rican-American	2.9	1	0.0	0
Non-Hispanic	74.3	26	82.8	24
<i>Employment Status</i>				
Full-time	48.5	16	51.9	14
Part-time	12.1	4	18.5	5
Seasonal	0.0	0	3.7	1
Student	15.2	5	14.8	4
Retired	0.0	0	3.7	1
Disabled	9.1	3	6.9	2
Unemployed	15.2	5	0.0	0
<i>Criminal Justice Status</i>				
None	81.8	27	92.6	25
Probation	5.9	2	3.7	1
Parole	2.9	1	0.0	0
Awaiting trial	2.9	1	0.0	0
Awaiting sentencing	2.9	1	0.0	0
Other	2.9	1	7.4	2
<i>Age</i>				
Mean	35.4		39.4	
S.D.	14.4		15.1	
Range	45.0		54.0	

Totals may differ due to missing information.

Percentages may not total to 100 due to multiple responses on some items.

Table 2

Self-reported drug of choice

Substance	Addicts		Non-Addicts	
	Percent	<i>n</i>	Percent	<i>n</i>
No history of substance use	0.0	0	10.3	3
Alcohol	40.0	14	79.3	23
Cannabis	25.7	9	0.0	0
Cocaine	11.4	4	3.4	1
Stimulants	8.6	3	3.4	1
Inhalants	0.0	0	0.0	0
Sedatives	5.7	2	0.0	0
Hallucinogens	2.9	1	0.0	0
Opioids	5.7	2	3.4	1
Other	0.0	0	0.0	0

Table 3

Percent reporting lifetime, current (past three months), and intravenous drug use

Substance	Addicts		Non-Addicts	
	Percent	<i>n</i>	Percent	<i>n</i>
<i>Any</i>				
Lifetime	100.0	35	89.7	26
Current	82.9	29	48.3	14
<i>Alcohol</i>				
Lifetime	88.6	31	89.7	26
Current	74.3	26	39.3	11
<i>Cannabis</i>				
Lifetime	80.0	28	62.1	18
Current	44.1	15	3.4	1
<i>Cocaine</i>				
Lifetime	55.9	19	48.3	14
Current	17.1	6	0.0	0
<i>Stimulants</i>				
Lifetime	54.3	19	51.7	15
Current	20.0	7	0.0	0
<i>Inhalants</i>				
Lifetime	29.4	10	20.7	6
Current	5.7	2	0.0	0
<i>Sedatives</i>				
Lifetime	44.1	15	34.5	10
Current	22.9	8	10.3	3
<i>Hallucinogens</i>				
Lifetime	51.4	18	41.4	12
Current	14.3	5	0.0	0
<i>Opioids</i>				
Lifetime	45.7	16	34.5	10
Current	17.1	6	6.9	2
<i>Other</i>				
Lifetime	11.4	4	3.4	1
Current	0.0	0	3.4	1
<i>Intravenous drug use</i>				
Lifetime	22.9	8	10.3	3
Current	2.9	1	0.0	0

Table 4

Perceived access to various substances

Substance	Addicts		Non-Addicts	
	Percent	<i>n</i>	Percent	<i>n</i>
<i>Alcohol</i>				
Never	11.8	4	14.3	4
Rarely	0.0	0	7.1	2
Sometimes	14.7	5	7.1	2
Often	73.5	25	71.4	20
<i>Cannabis</i>				
Never	29.4	10	46.4	13
Rarely	5.9	2	10.7	3
Sometimes	20.6	7	10.7	3
Often	44.1	15	32.1	9
<i>Cocaine</i>				
Never	58.8	20	75.0	21
Rarely	17.6	6	14.3	4
Sometimes	5.9	2	7.1	2
Often	17.6	6	3.6	1
<i>Stimulants</i>				
Never	67.6	23	75.0	21
Rarely	17.6	6	21.4	6
Sometimes	2.9	1	3.6	1
Often	11.8	4	0.0	0
<i>Inhalants</i>				
Never	64.7	22	71.4	20
Rarely	8.8	3	14.3	4
Sometimes	2.9	1	10.7	3
Often	23.5	8	3.6	1
<i>Sedatives</i>				
Never	58.8	20	66.7	18
Rarely	11.8	4	7.4	2
Sometimes	11.8	4	11.1	3
Often	17.6	6	14.8	4
<i>Hallucinogens</i>				
Never	70.6	24	92.9	26
Rarely	17.6	6	7.1	2
Sometimes	5.9	2	0.0	0
Often	5.9	2	0.0	0
<i>Opioids</i>				
Never	58.8	20	85.2	23
Rarely	20.0	7	7.4	2
Sometimes	5.9	2	0.0	0
Often	14.7	5	7.4	2
<i>Other</i>				
Never	86.4	19	94.7	18
Rarely	4.5	1	0.0	0
Sometimes	0.0	0	0.0	0
Often	5.7	2	5.3	1

Table 5

Paired samples t-tests of differences in perceived level of enjoyment for using or abstaining at discrete points in time

	Level of Enjoyment		<i>n</i>	<i>t</i>	<i>p</i>
	Use	Abstain			
<i>After being sober one day</i>					
Addicts	6.70 (3.18)	5.85 (3.38)	33	1.274	.212
Non-addicts	4.96 (3.34)	5.60 (3.97)	25	-.703	.489
<i>After being sober one week</i>					
Addicts	6.48 (3.15)	6.32 (3.27)	31	.283	.779
Non-addicts	5.72(2.92)	6.40 (3.61)	25	-1.185	.247
<i>After being sober one month</i>					
Addicts	5.97 (3.52)	6.34 (3.53)	32	-.513	.611
Non-addicts	5.19 (3.03)	6.62 (3.53)	26	-2.190	.038
<i>After being sober one year</i>					
Addicts	5.53 (4.07)	7.07 (3.68)	30	-1.806	.081
Non-addicts	4.16 (3.60)	7.32 (3.67)	25	-4.106	<.001
<hr/>					
<i>After using one day</i>					
Addicts	6.44 (3.01)	4.88 (3.44)	34	2.684	.011
Non-addicts	5.42 (2.94)	4.69 (3.27)	26	1.259	.220
<i>After using one week</i>					
Addicts	6.09 (3.34)	4.59 (3.65)	32	2.273	.030
Non-addicts	4.56 (3.30)	4.15 (3.09)	27	.565	.577
<i>After using one month</i>					
Addicts	5.39 (3.34)	4.64 (3.93)	33	1.376	.178
Non-addicts	4.12 (3.28)	3.88 (3.06)	26	.343	.735
<i>After using one year</i>					
Addicts	5.18 (3.67)	4.55 (4.19)	33	1.146	.260
Non-addicts	3.77 (3.43)	4.27 (3.78)	27	-.650	.522

Standard deviations appear in parentheses after means.

Table 6

Paired samples t-test of perceived level of enjoyment for abstinence or daily/almost daily use over one year

	Level of Enjoyment		<i>n</i>	<i>t</i>	<i>p</i>
	Abstain	Use			
Addicts	7.91 (3.67)	5.79 (3.60)	33	3.122	.004
Non-addicts	7.36 (3.32)	3.64 (2.87)	25	6.491	<.001

Standard deviations appear in parentheses after means.

Table 7

Paired samples t-test of perceived level of enjoyment for moderate use or daily/almost daily use over one year

	Level of Enjoyment		<i>n</i>	<i>t</i>	<i>p</i>
	Moderate	Use			
Addicts	6.55 (3.08)	5.76 (3.58)	33	1.432	.162
Non-addicts	4.58 (3.34)	3.58 (2.92)	24	1.563	.132

Standard deviations appear in parentheses after means.

Table 8

Paired samples t-test of perceived level of enjoyment for moderate use or abstinence over one year

	Level of Enjoyment		<i>n</i>	<i>t</i>	<i>p</i>
	Moderate	Abstain			
Addicts	6.50 (3.12)	8.03 (3.66)	32	-2.211	.035
Non-addicts	5.00 (3.52)	7.46 (3.29)	26	-3.432	.002

Standard deviations appear in parentheses after means.

Table 9

Percent reporting positive reinforcement, negative reinforcement, or punishment after using at various points in time

	Addicts		Non-Addicts	
	Percent	<i>n</i>	Percent	<i>n</i>
<i>First time using alcohol/drug of choice</i>				
Pos. reinforcement	46.9	15	68.2	15
Neg. reinforcement	12.5	4	0.0	0
Punishment	12.5	4	18.2	4
Pos. and neg. reinforcement	18.8	6	9.1	2
Pos. reinforcement and punishment	3.1	1	0.0	0
Neg. reinforcement and punishment	0.0	0	0.0	0
Pos. reinforcement, neg. reinforcement, and punishment	6.3	2	4.5	1
<i>Beginning of longest period of daily/almost daily use</i>				
Pos. reinforcement	58.8	20	63.6	14
Neg. reinforcement	17.6	6	9.1	2
Punishment	8.8	3	4.5	1
Pos. and neg. reinforcement	11.8	4	18.2	4
Pos. reinforcement and punishment	0.0	0	0.0	0
Neg. reinforcement and punishment	0.0	0	0.0	0
Pos. reinforcement, neg. reinforcement, and punishment	2.9	1	4.5	1
<i>End of longest period of daily/almost daily use</i>				
Pos. reinforcement	19.4	6	15.0	3
Neg. reinforcement	19.4	6	30.0	6
Punishment	48.4	15	55.0	11
Pos. and neg. reinforcement	9.7	3	0.0	0
Pos. reinforcement and punishment	0.0	0	0.0	0
Neg. reinforcement and punishment	0.0	0	0.0	0
Pos. reinforcement, neg. reinforcement, and punishment	3.2	1	0.0	0
<i>Use after being sober for 30 days or more</i>				
Pos. reinforcement	30.4	7	23.1	3
Neg. reinforcement	17.4	4	23.1	3
Punishment	43.5	10	38.5	5
Pos. and neg. reinforcement	4.3	1	15.4	2
Pos. reinforcement and punishment	0.0	0	0.0	0
Neg. reinforcement and punishment	0.0	0	0.0	0
Pos. reinforcement, neg. reinforcement, and punishment	4.3	1	0.0	0

Totals may differ due to missing information.

Table 10

Regression of substance involvement scores on self-control and opportunity

	Equation 1		Equation 2		Equation 3	
	Effect	t	Effect	t	Effect	t
Age	-.09	-.891	-.11	-1.070	-.11	-1.023
Gender (Female is reference group.)						
Male	1.05	.405	1.74	.673	1.74	.664
Race (White is reference group.)						
Black	2.60	.647	1.45	.367	1.44	.358
Other races	-3.76	-1.158	-4.64	-1.425	-4.64	-1.407
Ethnicity (Non-hispanic is reference group.)						
Hispanic	1.94	.570	.21	.060	.21	.056
Employment (Employed at least part time is reference group.)						
Less than part time	3.45	1.187	3.71	1.29	3.71	1.262
Drug of Choice (Alcohol is reference group.)						
None	-15.28	-1.522	-10.64	-.996	-10.64	-.984
Cannabis	2.22	.566	.134	.032	.13	.032
Other illicit drug	-3.21	-.955	-.85	-.219	-.85	-.216
Low self-control (centered)	.29*	3.020	.30*	3.190	.30*	3.147
Opportunity (centered)			1.77	1.354	1.77	1.293
Self-control X opportunity (centered)					<.001	.002
Sample size	56		55		55	
Model statistics						
	F = 2.933*		F = 3.014*		F = 2.699*	
	R2 = .395		R2 = .435		R2 = .435	
	RMSE = 8.969		RMSE = 8.839		RMSE = 8.943	

*p<.05

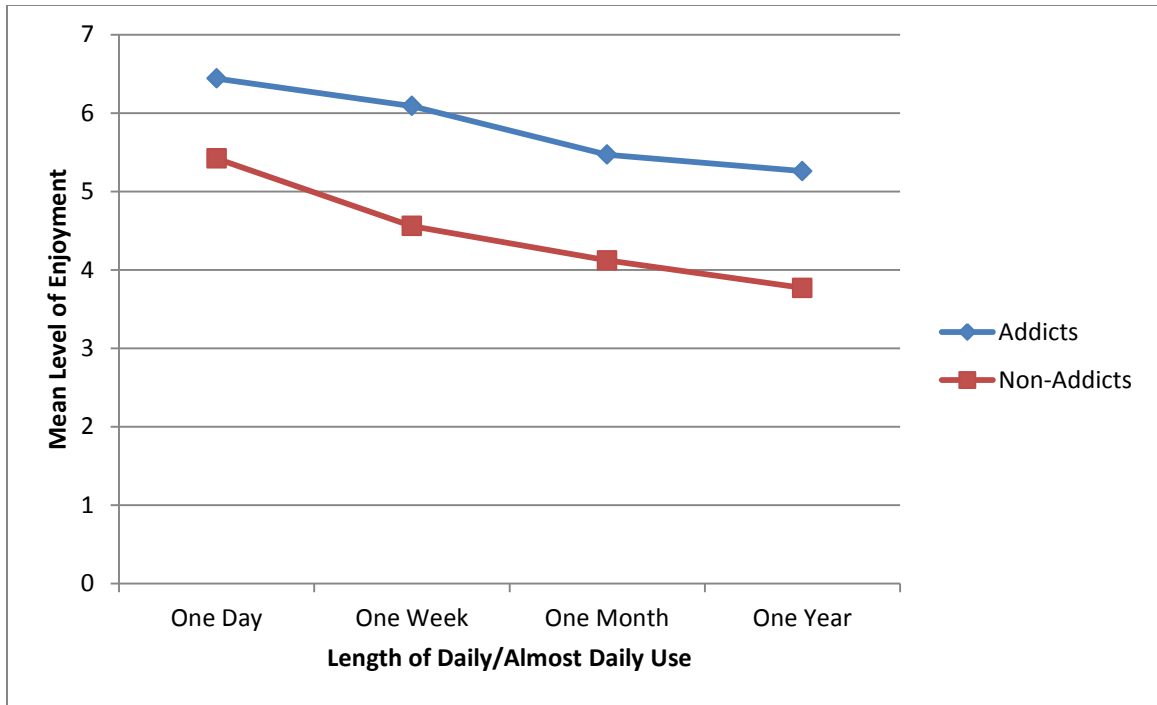


Figure 1. Utility of using over time

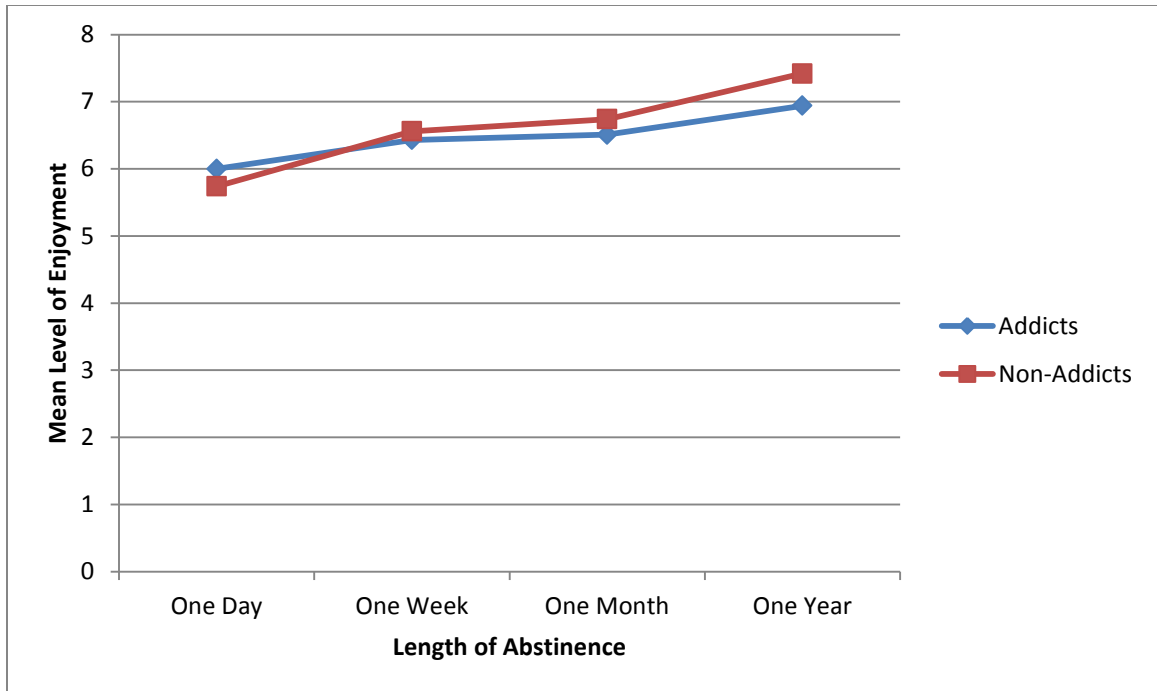


Figure 2. Utility of abstaining over time

APPENDIX A

DIAGNOSTIC CRITERIA FOR SUBSTANCE ABUSE AND DEPENDENCE

Criteria for Substance Abuse

- A. A maladaptive pattern of substance use leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring within a 12-month period:
- (1) recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home (e.g., repeated absences or poor work performance related to substance use; substance-related absences, suspensions, or expulsions from school; neglect of children or household)
 - (2) recurrent substance use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired by substance use)
 - (3) recurrent substance-related legal problems (e.g., arrests for substance-related disorderly conduct)
 - (4) continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance (e.g., arguments with spouse about consequences of intoxication, physical fights)
- B. The symptoms have never met the criteria for Substance Dependence for this class of substance.

Criteria for Substance Dependence

A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:

- (1) tolerance, as defined by either of the following:
 - (a) a need for markedly increased amounts of the substance to achieve intoxication or desired effect
 - (b) markedly diminished effect with continued use of the same amount of the substance
- (2) withdrawal, as manifested by either of the following:
 - (a) the characteristic withdrawal syndrome for the substance (refer to Criteria A and B of the criteria sets for Withdrawal from the specific substances)
 - (b) the same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms
- (3) the substance is often taken in larger amounts or over a longer period than was intended
- (4) there is a persistent desire or unsuccessful efforts to cut down or control substance use
- (5) a great deal of time is spent in activities necessary to obtain the substance (e.g., visiting multiple doctors or driving long distances), use the substance (e.g., chain-smoking), or recover from its effects

- (6) important social, occupational, or recreational activities are given up or reduced because of substance use
- (7) the substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite recognition that an ulcer was made worse by alcohol consumption)

APPENDIX B
QUESTIONNAIRE

SECTION A

The next several questions are about your experience of using several substances across your lifetime and in the past three months. These substances can be smoked, swallowed, snorted, inhaled, injected or taken in the form of pills.

Some of the substances listed may be prescribed by a doctor (like amphetamines, sedatives, pain medications). For this survey, you do *not* need to record medications that are used *as prescribed* by your doctor. However, if you have taken such medications for reasons *other* than prescription, or taken them more frequently or at higher doses than prescribed, please indicate that on the survey. While we are also interested in knowing about your use of various illicit drugs, please be assured that information on such use will be treated as strictly confidential.

Please mark the box that best indicates your response.

Q. A1

In your life, which of the following substances have you <u>ever used</u> ? (Non-medical use only)	No	Yes
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
b. Alcoholic beverages (beer, wine, spirits, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
c. Cannabis (marijuana, pot, grass, hash, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
d. Cocaine (coke, crack, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
f. Inhalants (nitrous, glue, gasoline, paint thinner, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
i. Opioids (heroin, morphine, methadone, codeine, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
j. Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>

If you answered NO for all substances in QUESTION A1, SKIP to QUESTION B1.

Q. A2

In the <i>past three months</i> , how often have you used the substance(s) you marked in QUESTION A1?	Never	Once or Twice	Monthly	Weekly	Daily or Almost Daily
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Alcoholic beverages (beer, wine, spirits, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Cannabis (marijuana, pot, grass, hash, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Cocaine (coke, crack, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Inhalants (nitrous, glue, gasoline, paint thinner, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Opioids (heroin, morphine, methadone, codeine, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you answered NO for all substances in QUESTION A2, SKIP to QUESTION A6.

Q. A3

In the <i>past three months</i> , how often have you had a strong desire or urge to use the substance(s) you marked in QUESTION A2?	Never	Once or Twice	Monthly	Weekly	Daily or Almost Daily
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Alcoholic beverages (beer, wine, spirits, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Cannabis (marijuana, pot, grass, hash, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Cocaine (coke, crack, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Inhalants (nitrous, glue, gasoline, paint thinner, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

i. Opioids (heroin, morphine, methadone, codeine, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q. A4

In the <i>past three months</i> , how often has your use of the substance(s) marked in QUESTION A2 led to health, social, legal or financial problems?	Never	Once or Twice	Monthly	Weekly	Daily or Almost Daily
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Alcoholic beverages (beer, wine, spirits, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Cannabis (marijuana, pot, grass, hash, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Cocaine (coke, crack, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Inhalants (nitrous, glue, gasoline, paint thinner, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Opioids (heroin, morphine, methadone, codeine, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q. A5

In the <i>past three months</i> , how often have you failed to do what was normally expected of you because of your use of the substance(s) marked in QUESTION A2?	Never	Once or Twice	Monthly	Weekly	Daily or Almost Daily
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Alcoholic beverages (beer, wine, spirits, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Cannabis (marijuana, pot, grass, hash, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Cocaine (coke, crack, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Inhalants (nitrous, glue, gasoline, paint thinner, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Opioids (heroin, morphine, methadone, codeine, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q. A6

Has a friend or relative or anyone else <u>ever</u> expressed concern about your use of?	No, Never	Yes, in the past 3 months	Yes, but not in the past 3 months
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Alcoholic beverages (beer, wine, spirits, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Cannabis (marijuana, pot, grass, hash, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Cocaine (coke, crack, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Inhalants (nitrous, glue, gasoline, paint thinner, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Opioids (heroin, morphine, methadone, codeine, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q. A7

Have you <u>ever</u> tried and failed to control, cut down or stop using?	No, Never	Yes, in the past 3 months	Yes, but not in the past 3 months
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Alcoholic beverages (beer, wine, spirits, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Cannabis (marijuana, pot, grass, hash, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Cocaine (coke, crack, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Inhalants (nitrous, glue, gasoline, paint thinner, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Opioids (heroin, morphine, methadone, codeine, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q. A8

	No, Never	Yes, in the past 3 months	Yes, but not in the past 3 months
Have you <u>ever</u> used any drug by injection? (Non-medical use only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

For Question A9, indicate the last time you used each of the substances.

EXAMPLE

If you last used tobacco three months ago, your answer would look like this:

When was the last time you used?	#	Days	Weeks	Months	Years	N/A
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	3	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q. A9

When was the last time you used?	#	Days	Weeks	Months	Years	N/A
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Alcoholic beverages (beer, wine, spirits, etc.)	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Cannabis (marijuana, pot, grass, hash, etc.)	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Cocaine (coke, crack, etc.)	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Inhalants (nitrous, glue, gasoline, paint thinner, etc.)	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Opioids (heroin, morphine, methadone, codeine, etc.)	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Other – specify:	—	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q. A10

How often do you have access to?	Never	Rarely	Sometimes	Often
k. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Alcoholic beverages (beer, wine, spirits, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. Cannabis (marijuana, pot, grass, hash, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n. Cocaine (coke, crack, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
p. Inhalants (nitrous, glue, gasoline, paint thinner, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
q. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
r. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
s. Opioids (heroin, morphine, methadone, codeine, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
t. Other – specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION B

Below are several questions about your alcohol and drug history. Please answer the questions to the best of your ability.

Q. B1 What is your drug of choice? (Check only one.)

- I have *never* used alcohol or drugs.
- Alcohol (beer, wine, spirits, etc.)
- Cannabis (marijuana, pot, grass, hash, etc.)
- Cocaine (coke, crack, etc.)
- Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)
- Inhalants (nitrous, glue, gasoline, paint thinner, etc.)
- Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)
- Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)
- Opioids (heroin, morphine, methadone, codeine, etc.)
- Other (specify) _____

If you responded "*I have never used alcohol or drugs,*" SKIP to QUESTION B5.

Q. B2 At what age (in years) did you begin to use the substance you selected in QUESTION B1?

Q. B3 Have you ever received treatment for alcohol or drug problems? (Check all that apply.)

- I have *never* received treatment for alcohol or drug problems.
- Detoxification
- Halfway House
- Inpatient Treatment
- Outpatient Treatment
- Alcoholics Anonymous or Other 12 Step Program
- Other (specify): _____

The next several questions ask you about some of your experiences with alcohol and drugs. If you have *never* used alcohol or drugs, SKIP to QUESTION C1.

Q. B24 Do you remember the first time that you drank alcohol/used your drug of choice? (If NO, SKIP to QUESTION B26.)

YES NO

Q. B25 How did drinking/using your drug of choice make you feel at that time? (Check all that apply.)

It made me feel better than I already did.

It helped me to avoid feeling bad.

It made me feel bad.

Please explain how drinking/using your drug of choice made you feel this way:

Q. B26 What is the longest period of time (in months) you have spent drinking or using your drug of choice daily/almost daily?

Q. B27 How did drinking/using your drug of choice make you feel at the beginning of that time?

It made me feel better than I already did.

It helped me to avoid feeling bad.

It made me feel bad.

Please explain how drinking/using your drug of choice made you feel this way:

Q. B28 How did drinking/using your drug of choice make you feel at the end of that time? (If that time leads up to today, how does drinking/using your drug of choice make you feel at this time?)

Does that time lead up to today? YES NO

- It made me feel better than I already did.
- It helped me to avoid feeling bad.
- It made me feel bad.

Please explain how drinking/using your drug of choice made you feel this way:

Q. B29 Has there ever been a period of time when you were drinking or using your drug of choice daily or almost daily and then stopped (for a period of 30 days or more) and then started to drink or use drugs again? (If NO, SKIP to QUESTION C1.)

YES NO

Q. B30 How did drinking/using your drug of choice make you feel when you started to drink/use drugs again? (If you have started drinking or using drugs again more than once, answer for the most recent time.)

- It made me feel better than I already did.
- It helped me to avoid feeling bad.
- It made me feel bad.

Please explain how drinking/using your drug of choice made you feel this way:

SECTION C

Below is a series of statements. They are about your lifestyle and the things you like and dislike. Some of the statements may be personal. There are no right or wrong answers. Remember that your participation is anonymous, so there is no way for anyone to know how you respond to any of the questions.

Please check the box that indicates the extent to which you agree or disagree with each statement.

Q. C1 I often do whatever brings me pleasure here and now, even at the cost of some distant goal.

Strongly Agree Agree Disagree Strongly Disagree

Q. C2 I will try to get the things I want even when I know it's causing problems for other people.

Strongly Agree Agree Disagree Strongly Disagree

Q. C3 When things get complicated, I tend to quit or withdraw.

Strongly Agree Agree Disagree Strongly Disagree

Q. C4 Often, when I'm angry at people I feel more like hurting them than talking to them about why I am angry.

Strongly Agree Agree Disagree Strongly Disagree

Q. C5 I often act on the spur of the moment without stopping to think.

Strongly Agree Agree Disagree Strongly Disagree

Q. C6 I sometimes find it exciting to do things for which I might get in trouble.

Strongly Agree Agree Disagree Strongly Disagree

Q. C7 I'm more concerned with what happens to me in the short run than in the long run.

Strongly Agree Agree Disagree Strongly Disagree

Q. C8 When I am really angry, other people better stay away from me.

Strongly Agree Agree Disagree Strongly Disagree

Q. C9 I lose my temper pretty easily.

Strongly Agree Agree Disagree Strongly Disagree

Q. C10 I dislike really hard tasks that stretch my abilities to the limit.

Strongly Agree Agree Disagree Strongly Disagree

Q. C11 I don't devote much thought and effort to preparing for the future.

Strongly Agree Agree Disagree Strongly Disagree

Q. C12 If I had a choice, I would almost always rather do something physical than something mental.

Strongly Agree Agree Disagree Strongly Disagree

Q. C13 The things in life that are easiest to do bring me the most pleasure.

Strongly Agree Agree Disagree Strongly Disagree

Q. C14 I try to look out for myself first, even if it means making things difficult for other people.

Strongly Agree Agree Disagree Strongly Disagree

Q. C15 Excitement and adventure are more important to me than security.

Strongly Agree Agree Disagree Strongly Disagree

Q. C16 If things I do upset people, it's their problem, not mine.

Strongly Agree Agree Disagree Strongly Disagree

Q. C17 I like to get out and do things more than I like to read or contemplate ideas.

Strongly Agree Agree Disagree Strongly Disagree

Q. C18 I frequently try to avoid projects that I know will be difficult.

Strongly Agree Agree Disagree Strongly Disagree

Q. C19 Sometimes I will take a risk just for the fun of it.

Strongly Agree Agree Disagree Strongly Disagree

Q. C20 When I have a serious disagreement with someone, it is usually hard for me to talk calmly about it without getting upset.

Strongly Agree Agree Disagree Strongly Disagree

Q. C21 I'm not very sympathetic to other people when they are having problems.

Strongly Agree Agree Disagree Strongly Disagree

Q. C22 I almost always feel better when I am on the move than when I am sitting and thinking.

Strongly Agree Agree Disagree Strongly Disagree

Q. C23 I like to test myself every now and then by doing something a little risky.

Strongly Agree Agree Disagree Strongly Disagree

SECTION D

The next several questions are to help us learn a little more about you. Please answer the questions to the best of your ability.

Q. D1 What gender do you consider yourself to be?

Male

Female

Q. D2 How old are you (in years)? _____

Q. D3 What is your ethnic background?

Non-Hispanic/Non-Latino

Hispanic/Latino

If you are Hispanic/Latino, please specify: _____ (EX: Mexican American, Cuban American, etc.)

Q. D4 What is your racial background?

American Indian or Alaskan Native

Native Hawaiian or other Pacific Islander

Asian

Black or African-American

White

Multi-racial (specify:) _____

Q. D5 What is your employment status?

- Employed full-time
- Employed part-time
- Employed seasonally
- Student
- Retired
- Disabled
- Homemaker
- Unemployed

Q. D6 What is your current involvement with the criminal justice system?
(Check all that apply.)

- I do not currently have *any* involvement with the criminal justice system.
- I am on probation.
- I am on parole.
- I am currently awaiting trial for a criminal offense.
- I am currently awaiting sentencing for a criminal offense.
- Other (specify:) _____

APPENDIX C
QUESTIONNAIRE DEVELOPMENT

The questionnaire in Appendix B has undergone several revisions. The earliest version of the questionnaire contained a series of vignettes about a hypothetical other. Each vignette represented a particular point along the primrose path, and participants were asked to rate the hypothetical individual's level of happiness at each of these points. The consensus was that this method was confusing and did not tap addicts' perceptions of their own behavior.

A second questionnaire was developed to be administered in the form of a semi-structured interview. Although portions of this survey were retained, the final survey was designed to be self-administered. This allowed multiple participants to take the survey at one time and yielded data that could be analyzed more quickly. A summary of the changes that were made to the questionnaire and the reasoning behind them is provided below.

- Sections of the questionnaire were lettered (A through D), and questions were numbered within each section. This was done in order to facilitate use of filter and contingent questions throughout the questionnaire. In pilot testing, participants were able to move easily through the questionnaire in this format.
- Originally, the Addiction Severity Index (ASI) was going to be administered to all participants. The ASI contains 200 questions across seven subscales: medical status, employment and support, drug use, alcohol use, legal status, family/social status, and psychiatric status (Addiction Severity Index, 1990). The final version of the questionnaire includes the ASSIST rather than the ASI. Both screening instruments collect information on current and lifetime use for a variety of substances. The decision to use the ASSIST was based on the fact that it includes

only eight questions and can be self-administered in five minutes, whereas the ASI must be administered by a trained interviewer and takes approximately two hours to complete.

- One question (A9) was added to the ASSIST to determine the last time a participant used each of the substances referenced in the survey.
- One question (A10) was added to the ASSIST to determine participants' perceived level of access to various substances. This was meant to serve as a measure of opportunity.
- Each section and subsection of the final questionnaire contains brief instructions to the participant. Section B includes separate instructions for each subset of questions.
- During pilot testing, some participants did not provide responses to indicate their level of enjoyment for conditions that they had not experienced (see B5 through B23). This was addressed in two ways: (1) Sample responses were included to show participants how to answer when they (a) had experienced a condition (b) had not experienced a condition. (2) An abbreviated version of the instructions was repeated before each subset of questions in order to remind participants to respond even if they had not experienced a condition. The instructions that were added said: "If you have *ever* experienced an activity, indicate the level of enjoyment you felt when you did so. If you have *never* experienced an activity, indicate the level of enjoyment you *believe* you would feel."
- The scales in Questions B5 through B23 were modified to include verbal labels at the endpoints. In addition, the scales were converted from 10-point scales (1

through 10) to 11-point scales (0 through 10). This was done both because zero is more conceptually meaningful as an indicator of “no enjoyment” and because the eleven point scale provides for a true midpoint (5).

- Originally, each subset of questions (B5 through B23) included five different time periods: “one day,” “one week,” “one month,” “one year,” and “ten years.” One year and ten years were removed because it was believed that most people would not be able to reasonably infer how they would feel after being sober or using regularly for such lengthy periods of time. During pilot testing, addicts suggested that “one year” should be included because many addicts do reach a year of sobriety, and it is a particularly meaningful milestone. Thus, “one year” was included in the final version of the survey.
- Originally, the questionnaire made frequent reference to “regular” drinking or drug use, but “regular” was not defined. “Regular” use was omitted and replaced with “daily or almost daily” use. This is consistent with the phrasing used in the ASSIST.
- Section B makes frequent reference to “having a drink,” but this was not defined in earlier versions of the questionnaire. “Having a drink” was explicitly defined as “drinking more than a sip of alcohol” in the final version of the survey.
- Questions B24 through B30 have been altered in several ways. Originally these were open-ended questions that were intended to be asked during a semi-structured interview. For example, an earlier version of Question B24 read: “Do you remember the first time that you drank alcohol or used your drug of choice?” followed by “Why do you believe you drank or used your drug of choice at that

time?” The initial question is the same in the final version of the survey, but the follow-up question has been rephrased to ask “How did drinking/using your drug of choice make you feel at that time?” Response categories (“It made me feel better than I already did,” “It helped me to avoid feeling bad,” “It made me feel bad”) have now been included as well. There was still space provided if participants wished to provide qualitative information.

- Distinct responses (e.g., “I have never used alcohol or drugs”) were emphasized and placed first among the response categories. (See Questions B1, B3, and D5.)
- Temporal units (e.g., “in months,” “in years”) were added to several questions in order to ensure meaningful responses from participants. (See Questions B2, B26 and D2.)
- Sections (but not individual questions) of Section B were randomized in order to prevent order effects. For the same reason, the order of Questions B21 through B23 was randomized. Ultimately, there were eight different versions of the survey.

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