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# Identifying the Underpinnings of Compulsive Behavior: A New Measure of Addiction Proneness

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To the Graduate Council:

I am submitting herewith a dissertation written by Jennifer Lynn Bowler entitled "Identifying the Underpinnings of Compulsive Behavior: A New Measure of Addiction Proneness." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Industrial and Organizational Psychology.

Michael C. Rush, Major Professor

We have read this dissertation and recommend its acceptance:

Lawrence R. James, Michael D. McIntyre, Michael R. Nash

Accepted for the Council:

Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Accepted for the Council:

Anne Mayhew  
Vice Chancellor and Dean of Graduate Studies

(Original signatures are on file with official student records.)

IDENTIFYING THE UNDERPINNINGS OF COMPULSIVE BEHAVIOR:  
A NEW MEASURE OF ADDICTION PRONENESS

A Dissertation  
Presented for the  
Doctor of Philosophy  
Degree  
University of Tennessee, Knoxville

Jennifer Lynn Bowler  
May 2006

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## DEDICATION

I would like to dedicate this dissertation to the four most influential people in my life: to my parents, Ed and Ruth Ann Palmer, whose unwavering confidence in my abilities and boundless expressions of caring inspired me to press ahead toward the realization of my goals; to my brother, Ed Palmer, who continually cheered me on and who helped me to find humor in the midst of the challenges; and to my husband, Mark, for your love and encouragement through all of the ups and downs of graduate school, and, as importantly, for your constructive feedback on this project. To all of you, this project couldn't have happened without you, and I will always be grateful for your immeasurable love and support.

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## ABSTRACT

This dissertation describes the development and initial validation of an indirect measure of addiction proneness. This new measurement system is based on the concept of differential framing, that is, the idea that individuals with different personalities tend to frame the same situations and stimuli in qualitatively different ways. This new measure (called the Conditional Reasoning Test of Addiction Proneness, or CRT-AP) consisted of 23 items that were designed to assess framing proclivities associated with addiction proneness. These items used Conditional Reasoning methodology to assess the extent to which implicit biases are used to justify the perpetuation of chemical dependency. Data were collected and analyzed on two different samples: individuals with a known history of chemical dependency, and individuals whose history of addiction was unknown. Results indicated that these two groups of individuals could be distinguished based upon their scores on the CRT-AP. In addition, this measure displayed appropriate levels of internal consistency and construct validity, particularly given its early stage of development. Overall, it appears that Conditional Reasoning represents a viable approach to the measurement of implicit cognitions associated with addiction proneness. Potential limitations of the current study and directions for future research are discussed.

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## CHAPTER 1

### INTRODUCTION

Despite increased efforts to improve awareness regarding its detriments, substance abuse has escalated over the last decade (Johnston, O'Malley, & Bachman, 1998). In 1992, the collective economic burden inflicted by alcohol and illicit drug use was estimated to be \$245.7 billion. Of this amount, \$97.7 billion was attributed to substance abuse. This estimate encompasses deficits incurred by diminished job productivity, societal atrophy associated with crime and social welfare, and healthcare expenditures, including treatment and prevention costs. By 1999, it was estimated that roughly 14.8 million Americans abused alcohol and/or illicit drugs. Of this group, approximately 8.2 million individuals were alcoholics and 3.5 million individuals were addicted to illicit substances (e.g., narcotics; National Institute on Drug Abuse, 2002).

The impact of drug abuse transcends geographic, demographic, and socioeconomic boundaries, and its prevalence has been implicated in the escalation of theft, arson, assault, rape, and homicide (Center for Substance Abuse Prevention, 1995; Fendrich, Goldstein, Spunt, Brownstein, & Mackesy-Amiti, 1995; Goldstein, Brownstein, Ryan, & Bellucci, 1997; Mackesy-Amiti & Fendrich, 1999; National Institute on Drug Abuse, 2002; Spunt, Goldstein, Brownstein, & Fendrich, 1994; Spunt, Goldstein, Brownstein, Fendrich, & Langley, 1994). Additionally, substance abuse takes its toll on the workplace in the form of increased absenteeism, illness, demoralization of the work force, employee theft, errors, and injuries (Coombs &

McAndrews, 1994; Cohen, 1984; Frone, 2004; Gust, Walsh, Thomas, & Crouch, 1990; Martin, Kraft, & Roman, 1994; Spicer, Miller, & Smith, 2003). Furthermore, drug-abusing employees incur double the expense in medical and worker compensation claims as their drug-free coworkers. In the interest of reversing this trend, empirical efforts have focused on understanding the etiology of addiction, and drug abuse in particular. Relevant findings are channeled toward the improvement of treatment programs, with a focus on rehabilitative strategies. However, the success of these treatment programs is hampered by the high incidence of dropout (Crits-Christoph & Siqueland, 1996; Matas, Staley, & Griffin, 1992; Sparr, Moffitt, & Ward, 1993) and relapse (Brister & Brister, 1987; Linehan, 1997; Peele, 1985). This suggests that a more promising approach to curtailing the detriments of addiction may be to identify individuals who are susceptible to its grip *before* they develop any form of habitual dependency.

To date, the majority of efforts to assess addiction proneness have centered upon explicit measures of personality. Some of these efforts have proved to be enlightening with regard to understanding the consciousness of an addict (Hirschman, 1992); however, on the whole, self-report measures have offered little clarification with regard to the underlying processes that perpetuate addictive behavior (Correa & Sutker, 1986; Platt, 1986; Sutker & Allain, 1988). Although addiction has been conceptualized in a variety of ways over the years, the implicit or unconscious cognitions employed by addiction-prone individuals have yet to be significantly explored. The current study attempts to address this issue through the development and initial validation of a new

measure of the implicit cognitions associated with addiction proneness.

First, an operational definition of addiction and a description of the way in which it has been traditionally conceptualized and measured will be addressed. Second, an evaluation of the strengths and weaknesses of previous measurement techniques will be presented. Third, a new measurement system will be introduced that is designed to assess the implicit cognitions associated with compulsive behavior. Finally, the application of this measurement system to addiction, along with its benefits, will be discussed.

#### *Traditional Approaches to Defining and Measuring Addiction*

*Compulsion versus Addiction.* The classic definition of addiction is “the act of devoting or giving oneself habitually or compulsively to something” (Webster, 1984). The manifestations of addiction are diverse, encompassing such compulsions as alcoholism, substance abuse, anorexia, bulimia, gambling, shoplifting, and numerous other forms of aberrant behavior. However, it should be noted that not all compulsive behavior is problematic; in fact, certain compulsions can actually be constructive in nature. To some degree, any form of extreme dedication to a particular pursuit or activity could be characterized as compulsive. If compulsivity served as the sole criterion, the active pursuit of any ambitious endeavor (e.g., running a marathon, winning the Nobel Prize, sponsoring a philanthropy) could erroneously be classified as an addiction. Thus, in order to avoid confusion, a critical distinction must be drawn between compulsive behavior and addiction.

At first glance, the task of defining addiction appears to be straightforward.

Fierce devotion to a socially acceptable pursuit is typically lauded as ambition, motivation, or persistence, whereas the term “addiction” is generally reserved for activities that are characteristically destructive, illicit, or self-defeating in nature. Such a simplistic classification scheme is misleading for two reasons. First, many individuals consume potentially addictive substances (e.g., alcohol, nicotine, narcotics), yet they are very successful in regulating the frequency and intensity of this behavior; therefore, their use of these substances does not ultimately become destructive or self-defeating in nature. Designated as “controlled users,” these individuals are able to subordinate their activity of choice in such a way that it never becomes a dominant force in their lives (Peele, 1985). Second, it is important to clarify that even the most innocuous activity can become the basis of an addiction if it is pursued at the expense of one’s health, happiness, and overall well-being. Peele and Brodsky state that “an addiction may involve *any* attachment or sensation that grows to such proportions that it damages a person’s life” (1991, p. 42). Therefore, it is necessary to look beyond the behavior itself, as the ongoing *ramifications* of this behavior are significantly more informative.

A cardinal trait of the addict is his or her proclivity to pursue transitory short-term gains at the expense of long-term quality of life. Once an individual becomes ensnared in the spiral of addiction, instantaneous outcomes take precedence over any long-term consequences of behavior. However, the gratification that makes addictive habits so alluring is always tempered by concomitant costs. Thus, when in doubt, the simplest means of classifying behavior is by examining its long-term consequences. Whereas compulsive behavior typically engenders beneficial long-term outcomes,

addictive behavior is dysfunctional and deleterious in nature, inevitably wreaking havoc on the lives of the individuals who practice it. In short, the critical distinction between an enthusiast and an addict is the addict's willingness to *persist* in behavioral patterns that are ultimately self-defeating and self-destructive in nature, behaviors that inevitably erode his or her quality of life. This distinction is well articulated by Hirschman (1992), who states that

Compulsive, but non-addicted, consumers engage in consumption patterns that are potentially addictive and yet [they] are able to stop – or at least [to] control – themselves before accruing major negative consequences. Addicted consumers engage in compulsive consumption and – despite recognizing and realizing its damaging effects on themselves and [on] others they care about – are unable to stop. (p. 173)

As an illustrative example, consider the case of an amateur athlete. On the surface, the activity itself is constructive in nature, enhancing his health, providing social engagements, and enhancing his general well-being. However, after suffering a heart attack during training, the athlete was ordered by his physician to abstain from his exercise regimen indefinitely. Furthermore, his wife threatened to leave him due to his reluctance to comply with the physician's recommendations. Although this is an extreme case, it provides a useful illustration of the difference between an enthusiast and an addict. In the face of such dire consequences, an enthusiast would choose to modify his behavior, likely seeking a more favorable avocation, whereas an addict would persist, jeopardizing his health and his marriage in the interest of short-term

gratification. In such cases, a rationalization is necessary in order to justify the *perpetuation* of the addict's destructive behavioral patterns.

In short, for the purposes of this study, compulsion will be taken to denote the relentless pursuit of any activity, regardless of whether it is beneficial or deleterious in nature. In contrast, the term "addiction" will be reserved for those instances of compulsive behavior that threaten to compromise or jeopardize one's overall quality of life (e.g., one's health, career, relationships, etc.) and are therefore dysfunctional in nature. Accordingly, addiction proneness will be defined as an underlying proclivity to initiate, and more importantly, *to perpetuate* addictive behavioral patterns. It is important to underscore that addiction is defined in terms of its long-term consequences, not in terms of the activity itself. Thus, addictive behavior represents one form of compulsion, but compulsive behavior is not necessarily addictive (i.e., destructive) in nature.

*Common Themes in Addiction.* Nace (1995) aptly remarked that "the tentacles of addiction choke and potentially destroy character, ambition, accomplishment, reputation, health, family, and future" (p. 2). This inevitable truth causes one to ponder how any rational individual can justify the perpetuation of a cycle that depletes his or her life in such devastating ways. Additionally, it has been shown that most, if not all, addicts are capable of achieving spontaneous remission once they consciously resolve to quit, regardless of the type of substance or activity upon which they have become dependent (Falk, 1983; Fiore et al., 1990; Hoch & Loewenstein, 1991; Jaffe & Harris, 1973; Kandel & Raveis, 1989; Maddux & Desmond, 1981; Nurco, Cisin, & Balter,

1981; Peele, 1987, 1989; Ray, 1961; Schachter, 1982; Schaler, 1999; Shaffer & Jones, 1989; Vaillant, 1983; Waldorf, 1973, 1983; Zinberg & Jacobson, 1976). As Falk (1983) observed,

Popular thinking about drug dependence all but equates it with physical dependence, a physiological need state producing a reputed zombie-like uncontrolled drive for the needed drug. The role of physical dependence in drug taking is in most respects a minor one. (p. 389)

While addictive activities tend to be intrinsically reinforcing, it is nevertheless critical to explore the psychological components that motivate individuals to willingly maintain destructive behavioral patterns.

The cycle of addiction is undeniably complex. A mosaic of factors (e.g., individual and societal values, environmental stressors, social forces, coping skills, perceptions of self-control, and other personality-based differences) interacts to influence substance abuse and other forms of addictive behavior (Peele, 1985). However, evidence suggests that the behavioral effects of drugs are extremely malleable, and that each addict's experience is highly subjective in nature (Ames & Stacy, 1998; Falk, 1983; Nace, 1995). Falk (1983) insightfully noted that "with respect to whether exposed individuals became dependent ... people responded to drugs differently depending upon what sort of persons they were" (p. 385). Moreover, evidence shows that experimentation with drugs in adolescence does not predict future use or abuse (Shedler & Block, 1990). Although countless individuals engage in potentially addictive activities, only a fraction of them proceed to develop dependency.

Personality plays an instrumental role in both the initiation and maintenance of an addictive cycle. Pearson and Little (1969) made the following perceptive observation:

Primarily it is the personality of the patient rather than the chemical properties of the addicting agent that determines the nature of the addiction. The most devastating aspects of the addicting agent are not determined by its physiological properties but the manner in which it affects the personality of the addict. (p. 1170)

Thus, in order for addictive behavior to be sustained, it must occupy a position of significance in the addict's life. The activity in and of itself is not self-perpetuating; the addictive component resides in the mind of the addict. As Peele (1989) noted,

When a person becomes addicted, it is not to a chemical but to an experience. Anything that a person finds sufficiently consuming and that seems to remedy deficiencies in the person's life can serve as an addiction. The addictive potential of a substance or other involvement lies primarily in the meaning it has for a person. (p. 42)

Consequently, if we are to understand the underpinnings of addiction, it is necessary to examine the significance that such a dependency represents in the addict's life, as well as the reasoning that is used to validate its continuance.

*Conceptualizations of Addiction Proneness.* Attempts to explain addiction proneness span a variety of disciplines (e.g., psychology, biology, pharmacology, and sociology), and a diverse range of factors (e.g., biological, physiological, behavioral, cognitive, affective, social, and environmental) has been implicated in the initiation and

perpetuation of the addictive cycle. Despite many decades of deliberation, considerable disagreement still lingers with regard to the nature of addiction. Three major etiological paradigms have been advanced, and each of these viewpoints carries distinct implications for prevention and treatment.

The most prevalent paradigm is the disease model, which regards addiction strictly as an illness (Jellinek, 1960). According to this view, the addict is a helpless victim who possesses no control over his or her behavior. While some advocates of this model assert that addiction emanates from a genetic predisposition, others maintain that physiological dependency may develop regardless of one's genetic makeup. In any case, proponents of the disease model contend that addiction is all-or-nothing, that it is far too overpowering to be conquered by volition alone, and that recovery can only be achieved through medical intervention and participation in support groups (Isbell, 1958; Jellinek, 1960; Levine, 1978; Milam & Ketcham, 1984; Szasz, 1961). This radical position has sparked significant controversy. As was previously noted, a growing body of evidence attests to the viability of spontaneous remission. Moreover, it has been shown that members of recovery groups (e.g., AA) are far less successful at maintaining their abstinence than their self-regulating counterparts (Miller & Hester, 1986). Nonetheless, these findings have ceased to be assimilated into theories of addiction. The medical community has played an instrumental role in propagating the disease model, thus securing its position in the rehabilitative framework. Thus, the disease model constitutes a mixed blessing of sorts. On the one hand, labeling the addict as a victim of disease reduces the stigma that previously beset addiction. In addition, this

perspective engenders a more compassionate attitude toward the addict, which in turn encourages more addicts to seek treatment. On the other hand, labeling the addict a powerless victim serves to debilitate those who make genuine efforts to change. The act of exonerating the addict of all responsibility for his or her actions not only impedes rehabilitative efforts but subsequently increases the likelihood of recidivism (Peele & Brodsky, 1991).

Unlike the disease model, the moralistic model depicts addiction as impious, dishonorable conduct that emanates from a dearth of moral fortitude (Kolb, 1958). Addictive behavior is viewed as a voluntary transgression that is freely chosen by the individual. Thus, addiction is considered to be the reflection of a deficient value orientation, a condition warranting shame and remorse on the part of the addict. In an effort to hold addicts accountable for the irresponsibility of their misdeeds, punitive measures such as legal sanctions are typically imposed. The moralistic position is one of absolute right and wrong; thus, its straightforward nature appeals to some. However, its portrayal of the addict as a reprehensible, or at best, irresponsible reprobate has also propelled many addicts into lives of secrecy. The proscription of addictive behavior has done nothing to elucidate the actual process that precipitates addiction, nor has it served as an effective means of deterring addictive practices (Berridge & Edwards, 1987; Peele, 1985, 1989; Thombs, 1999). Moreover, Sutker and Allain (1988) state that “ample data have suggested that illicit drug use and alcoholism are commonplace ... despite the legal, statutory, and social sanctions established to discourage such behaviors” (p. 173).

In contrast to the first two paradigms, the free-will model offers a balanced viewpoint, approaching addiction from a social learning theory perspective. This paradigm views addiction as a behavioral disorder that stems from deficient learning conditions (Becker, 1953). The addict is not regarded as immoral, but rather as a well-meaning individual who has had the misfortune of adopting a set of maladaptive coping strategies. Addictive behavior is viewed not as a sin or a crime, but merely as an ineffective method of countering environmental stressors. Although addictive behavior is construed as being voluntarily chosen, it is not regarded as an indication of moral weakness, but rather as evidence of a limited knowledge base. Treatment approaches are cognitive in nature, with an emphasis on expanding the addict's repertoire of coping strategies and clarifying strategic pathways to goal attainment. Of all of the paradigms, the free-will model offers the most practical and constructive framework from which to understand addiction. It essentially combines the best aspects of the other two models. It successfully holds the addict accountable for his or her participation in addictive activity, while at the same time minimizing any sense of stigma that surrounds one's status as an addict. Moreover, it offers the addict pragmatic, applicable strategies that facilitate the modification of future behavior.

*The Addictive "Profile."* A growing body of evidence supports the assertion that addiction proneness is a function of individual psychological factors rather than genetic characteristics or the chemical properties of various substances (Alexander, 1987, 1990; Alexander & Schweighofer, 1988). Empirical efforts to reveal personality-related predictors of addictive behavior span several decades. Initial studies of

substance abusers were myopic in scope, yielding a misleading characterization of the addict as indolent, intellectually deficient, morally weak, irresponsible, and unmotivated to change (Morse, Mitchell, & Martin, 1977; Nicholi, 1983). This egregious misrepresentation arose from the reasoning that the negative consequences incurred by addictive behavior would only be tolerated by individuals with low self-esteem. However, this vast oversimplification was quickly demystified when cases of substance abuse among professionals were unearthed (Green, Carroll, & Buxton, 1976). With regard to this paradox, Nace (1995) pondered the following:

In the context of native ability, personal achievement, and substantial financial and social rewards, how are we to understand the emergence of a process that erases achievement, provokes punishment, and potentially compromises [one's] skills and abilities? (p. 5)

The revelation that highly successful individuals do indeed fall prey to addiction called all previous addictive hypotheses into question. With everything to lose and seemingly nothing to gain, what possible motivation could underlie such behavior? Why would such auspicious individuals willingly engage in acts of self-sabotage?

In an attempt to answer this question, empirical efforts focused on more clinical aspects of personality.

The search for an addictive profile continues. To date, the only consistent finding is that antisocial behavior in adolescence is associated with certain forms of addiction in adult life (Jessor & Jessor, 1977; Kandel, 1980; Nathan, 1988; Tarter, Alterman, & Edwards, 1988; Vaillant, 1983). However, the predictive utility of this

finding is dubious, as many addicts never exhibit antisocial behavior as adolescents, and a significant proportion of intractable teenagers never develop dependencies as adults. Proponents of the “addictive personality type” contend that addicts display a distinctive pattern of results on personality measures such as the MMPI (Lester, Burkman, Gandica, & Narkunski, 1976). The addict is described as exhibiting “a high degree of psychopathology and a high need for novelty and variety [sic] coupled with unsociability” (Lester et al., 1976, p. 57).

The assertion that a single personality type can encompass all addiction-prone individuals has been the subject of considerable debate (cf. Chiauzzi & Liljegren, 1993; Cohen, 1986; Graham & Strenger, 1988; Kagan, 1987; Kerr, 1996; Lang, 1983; Lavelle, Hammersley, & Forsyth, 1993; Millon, 1969; Platt, 1975; Rozin & Stoess, 1993; Shulman, 1991). The conflicting findings in this domain are most likely a function of the test measures employed, in that previous attempts to uncover an addictive profile have relied almost exclusively upon self-report measures of personality. This testing format is problematic for two reasons. First, the transparent nature of the self-report format renders it highly susceptible to response bias and subsequent distortion. Respondents can consciously manipulate their scores due to the overt nature of the testing format (Edwards, 1970; Ones, Viswesvaran, & Reiss, 1996; Paulhus, 1984; Rosse, Stecher, Miller, & Levin, 1998; Snell, Sydell, & Lueke, 1999). This issue is particularly problematic in addiction research (Babor, Brown, & Del Boca, 1990; Bobak, 2005; Feucht, Stephens, & Walker, 1994; Harrison & Hughes, 1997; Johnson & Richter, 2004; Magura, Goldsmith, Casriel, Goldstein, & Lipton, 1987; Rouse, Kozel,

& Richards, 1985; Sinnett, Benton, & Whitfill, 1991). Second, self-report measures have been plagued by low empirical validity. The tendency for self-report measures to correlate weakly with a wide range of behavioral criteria has been well documented in the addiction literature (Kosten, Rounsaville, & Kleber, 1983; Mäkelä, 2004; Zanis, McLellan, & Corse, 1997) as well as in the general psychological literature (Barrick & Mount, 1991; Hough, Eaton, Dunnette, Kamp, & McCloy, 1990; Hurtz & Donovan, 2000; Spangler, 1992; Tett, Jackson, & Rothstein, 1991). Specifically, James and Mazerolle (2002) note that the mean (uncorrected) criterion-related validity for self-report measures is approximately .12. This implies that the vast majority of the variance in behavioral criteria may be explained by other factors, such as implicit personality characteristics.

Although the critical limitations of the self-report approach have been readily acknowledged by proponents of the 'addictive personality type' hypothesis (Lester & Narkunski, 1978), empirical efforts to assess the implicit personality characteristics associated with addiction have not ensued. It is clear that more reliable measures of personality are needed in order for addiction proneness to be adequately addressed.

*Symbolism and Underlying Currents in Addiction.* The quest to discover an addictive personality profile remains inconclusive; however, the search for potential contributing factors reveals a number of recurring themes. First, addictive proclivities are often manifested in multiple ways by a single individual (Green et al., 1976; Hirschman, 1992; Nace, 1995). It is quite common for addicts to abuse more than one

substance or to engage in more than one addictive activity, thus suggesting that the driving force behind addictive behavior is more problematic than the behavior itself.

Another point of convergence among addicts is that dependency is frequently precipitated by major life transitions or personal crises (Hirschman, 1992; Schouten, 1991). In such cases, the addictive behavior becomes a source of respite and solace in the face of unpredictable turbulence. Moreover, the familiarity of the addictive behavior offers the addict an illusion of control in times of ambiguity or stress.

In addition, studies of substance abusers repeatedly cite the prevalence of psychological distress, depression, negative self-concept, pervasive feelings of worthlessness and inadequacy, and a profound disrespect for oneself (Dumont & Vamos, 1975; Nace, 1995; Pearson & Little, 1969; Sullivan & Guglielmo, 1985; Wills, McNamara, Vaccaro, & Hirky, 1996). The addict is plagued by enveloping feelings of insufficiency, hopelessness, and emptiness, which engenders an affinity for any behavioral analgesic that offsets the perpetual discomfort. The addictive behavior is not the problem; it simply constitutes a manifestation of the addict's inner turmoil. As Hirschman (1992) remarked, "Thus, unless the addicted consumer's underlying phenomenology of anxiety, depression, and alienation is remedied, [he or she] will likely return to the addiction" (p. 169).

Addictive behavior plays two meaningful roles in the addict's life: defense and repair. First, by engaging in addictive activity, the addict is shielded from confronting his or her inner turmoil (Khantzian, 1985; Nace, 1995; Wurmser, 1974). Addiction thus serves to deflect or offset pervasive feelings of distress, to offer a temporary source of

relief from inner chaos. In addition, addictive behavior serves a reparative function by superficially enhancing the addict's sense of wellbeing and self-sufficiency. In effect, the addiction constitutes a form of self-medication, albeit a transitory one. Pearson and Little (1969) note that "one way to view an addict is that he is an individual who treats himself but invariably is unsuccessful" (p. 1171).

This observation leads to the most pervasive and most instructive similarity among addicts, namely, the implicit need to distort reality or to escape from consciousness (Hirschman, 1992; Pearson & Little, 1969). The addict is often anxious, emotionally detached, and unable to deal with feelings of anger or fear (Leon, 1984). In an effort to circumvent these unpalatable aspects of life, the addict seeks refuge in behaviors that produce a transformed state. The addictive ritual evokes an alternative reality in which everything appears to be rational, logical, organized, and efficient. As Hirschman (1992) describes, "What active addicts construct for themselves is, in essence, the illusion of an orderly life, the illusion of self-management and self-control, and the illusion of self-identity" (p.174). With regard to this prevalent sense of unrest, she states the following:

Because the roots of addictive consumption often lie in personal feelings of inadequacy and inauthenticity, and not in chemical dependencies per se, they cannot be remedied by merely removing the addict from his [...] compulsion, whether it be cocaine, alcohol, or purchasing. Addicted consumers appear to have in common an emotional vacancy that they are compelled to fill with *something*. If one substance or behavior is denied to them, they will simply

seek out another. What addicts seek most is to escape themselves, their own minds, and their own thoughts. (p.178)

*Conclusions.* Contrary to popular belief, addiction is not solely a function of the physical properties of substances or of the neurochemical responses that addictive activities evoke. Rather, addiction is accompanied by a series of cognitive processes that take place within the individual. Thus, as Dumont and Vamos (1975) observed, “it is necessary to discover what it is that delinquents tell themselves ... that puts such constraints on their ability to change” (p. 32). Furthermore, Beck (1993) noted that the “same beliefs underlie all addictions.” It is clear that addicts do not view their activities in an objective light. Thus, it seems plausible that they rely upon a unique set of implicit biases that allow them to rationalize the pursuit of addictive behavior.

#### *The Use of Conditional Reasoning to Measure Implicit Cognitions*

All individuals harbor latent dispositional biases, or characteristic ways of viewing the world, that are relatively automatic and subliminal in nature. Although implicit in nature, these cognitive biases provide a powerful lens through which the world is viewed. This idiosyncratic “filter” is composed of implicit cognitions (e.g., assumptions, inferences, and implicit theories) that impact the way in which each new experience is perceived and explained. Thus, individuals with different personality dispositions rely upon different cognitive biases when observing and interpreting other people, situations, and events. This highly subjective process is known as “differential framing” (James, 1998).

Because the cognitions of interest are implicit in nature, it has been asserted that indirect measures are requisite in order for them to be assessed (Greenwald & Banaji, 1995). With this in mind, a unique measurement system has been developed (James, 1998; James & Mazerolle, 2002; James et al., 2005). This measurement system indirectly assesses implicit cognitions associated with a wide variety of personality dispositions. It is founded upon the premise that each individual favors a particular set of behavioral responses to evocative environmental stimuli, and that elaborate rationalizations have been developed to justify these favored responses (James, 1998). In the interest of ego-protection and positive self-regard, people prefer to view their own behavior as rational, logical, and situationally appropriate. The operation of these elaborate rationalizations (also known as justification mechanisms, or JMs) effectively accomplishes this by acting to validate, rationalize, and substantiate an individual's behavioral choices. Reasoning is thus conditional upon personality because these implicit, unconscious biases (McClelland, Koestner, & Weinberger, 1989) shape reasoning processes so as to enhance the rational appeal of one's desired behaviors (James, 1998; James & Mazerolle, 2002).

Conditional Reasoning measures must be carefully designed in order to ensure that latent dispositions are assessed objectively (James, 1998). Each Conditional Reasoning item is composed of three elements: an inductive reasoning problem, two logical solutions (e.g., one that represents a propensity for addiction proneness, and another that corresponds to a normative value orientation) and several illogical solutions (distracters). The illogical answers are extremely nonsensical, clearly identifiable, and

are rarely selected. Therefore, selecting an illogical answer is considered responding improperly to a question. The reasoning problem, which is presented in the stem of the item, is evocative in nature, and is designed to trigger the activation of JMs that correspond to a particular psychological construct.

This new methodology has been quite effective in identifying aggressive individuals through the assessment of their predominant reasoning strategies. The advent of Conditional Reasoning measures has advanced the study of individual differences by allowing underlying proclivities to be objectively assessed, unencumbered by natural self-presentation tendencies and response distortion hindrances that typically impede if not invalidate personality measurement efforts. Additionally, this measurement system has demonstrated robust psychometric properties including internal consistency reliability, test-retest reliability, and criterion-related validity (James, 1998; James & Mazerolle, 2002; James et al., 2005). Specifically, an average *uncorrected* validity of .43 against a range of behavioral criteria has been reported (James et al., 2005). This feat is undoubtedly a function of the indirect nature of Conditional Reasoning measures. Because each question is framed in terms of solving a reasoning problem, the Conditional Reasoning format is impervious to the distortion that is often engendered by traditional self-report instruments (LeBreton, Burgess, & James, 2000). In direct contrast to traditional self-report formats, which require individuals to assign meaning to a series of subjective descriptive statements, the object of Conditional Reasoning is to obtain the ‘correct’ solution to a series of inductive reasoning problems. Idiosyncratic biases, evidenced by

self-presentation tactics and the provision of socially desirable responses, are not introduced into the assessment process because respondents are unaware of the purpose of assessment. Thus, this assessment technique holds great promise in revealing personality constructs that were formerly beyond empirical reach.

*Differential Framing in Addiction.* In light of this research, it is hypothesized that individuals with an orientation toward addiction proneness view and reason about the world in a qualitatively different way than people who do not harbor this orientation. This assertion does not imply that addicts should be regarded as a homogeneous group (which obviously they are not) or that they share a singular personality type (which clearly they do not). Rather, my contention is that addiction-prone individuals rely upon a common set of justification mechanisms to exonerate their habit(s) of choice. Individuals who fall prey to addictive tendencies use a subset of these justification mechanisms to rationalize and vindicate their cravings as well as any pertinent behavior. As with aggression, different individuals may use different justification mechanisms, and any combination of these explanations is sufficient to rationalize addictive behavior. Thus, in order to identify individuals who are susceptible to addiction, we must first identify the reasoning processes that facilitate addictive habits. Once these are clarified, we can pinpoint individuals who harbor an orientation toward addiction proneness.

*Justification Mechanisms and Cognitive Biases for Addiction.* Due to the pivotal role that implicit cognitions play in the reasoning process, the justification mechanisms (JMs) that an addiction-prone individual endorses are qualitatively

different from those that are used by non-addiction-prone individuals. These rationalizations influence the way in which addiction-prone individuals perceive, analyze, and interpret situations, as well as their subsequent responses to these situations (James & Mazerolle, 2002). Specifically, JMs impact such cognitive processes as perception (e.g., selective attention), information seeking strategies (e.g., confirmatory biases), reasoning processes, and causal inference (e.g., attribution). Addiction-prone individuals employ these JMs in order to enhance the rational appeal of their behavior of choice. Moreover, the operation of these JMs creates a context that facilitates self-perceptions of rationality and appropriateness. Consequently, reliance upon a distinctive set of JMs can be used to differentiate addiction-prone individuals from the rest of the population.

Based on a review of the existing literature on addiction, five primary cognitive biases for addiction proneness have been identified to date. The first of these is Evasion of Discomfort, a proclivity to frame undesirable circumstances as overwhelming or intolerable, and to counteract these feelings by seeking to banish them from consciousness. Even the most minor sources of distress may be viewed through a lens of adversity, allowing the addiction-prone individual to justify any activity that brings some sense of relief or tranquility. The addictive activity is typically chosen on the basis of its ability to temporarily distort or reconstruct the individual's sense of reality, thus neutralizing the external source of apprehension. In this respect, the addictive activity may serve both as a distraction from life stresses and as a form of liberation from them. For example, after a particularly stressful day at work, Tim decides to meet

some friends at a casino to blow off steam. When he gambles, Tim feels as though nothing else exists, and for several hours he is able to relax and forget about the day's troubles. In isolated instances, this behavior does not represent addiction. However, if Tim develops a cyclical pattern of combating stress in this manner, other areas of his life will soon begin to suffer, and his behavior could be classified as destructive, and therefore addictive in nature. Moreover, it could become the case that even a relatively normal day at work could trigger a gambling session. One element of the Evasion of Discomfort JM is that an individual's threshold for discomfort may diminish with increased addictive activity. That is, stressors that were previously regarded as manageable may eventually register as being intolerable or unbearable, thus triggering the need to escape discomfort by engaging in the addictive activity.

The second type of bias is Immediate Gratification Bias, in which the individual assigns utmost precedence to any pleasurable experience (even an ephemeral one), regardless of its long-term consequences. Paramount importance is placed upon immediate gratification, and although the enjoyment itself may be artificial and transitory in nature, it is nevertheless pursued even at the expense of one's overarching quality of life. In some cases the pursuit of gratification is justified as being one's just reward for enduring some less pleasurable activity (e.g., completing a challenging project; spending time with difficult relatives). However, many addiction-prone individuals place superlative importance upon enjoyable experiences regardless of their life circumstances. This JM is similar to the Evasion of Discomfort in that a temporary escape or release is sought, however, in the case of the Immediate Gratification Bias,

the addictive activity is not triggered by an environmental stressor, but rather is sought based solely on the pleasurable experience it imparts. Thus, it may be pursued even in the context of an otherwise relaxing situation and is not precipitated by the perception of discomfort.

The third form of bias is Negative Self-Bias, which may be described as the tendency to view oneself through a lens of inadequacy. It manifests itself as a generalized feeling of unworthiness and incompetence in various life domains. These perceptions are negatively biased representations at best; however, the addiction-prone individual readily accepts them as accurate. In an effort to counter these feelings of depleted self-worth, the addiction-prone individual gravitates toward activities that transform his or her *perception* of self. For example, following a string of lost jobs, Mary's self-worth reached its nadir. Her lack of career advancement and sudden financial devastation caused her to feel depressed and utterly inadequate. In an effort to combat these feelings, she began shopping compulsively. She discovered that the act of making purchases (albeit ones that she could not afford to make) made her feel important and superior, if only momentarily. The act of acquiring material goods allowed her to temporarily perceive herself as prosperous and successful, even though these acts ultimately deepen her financial woes and thus deplete her self-esteem in the long run. This particular bias does not represent a justification mechanism per se, but it is a potent cognitive bias that sets the stage for reliance upon several of the other JMs.

The fourth JM is Self-Revision Bias, a propensity to perceive certain activities as being transforming in nature, and to gravitate toward them in an effort to alter

oneself. This desire for self-modification is typically instigated by private perceptions of inadequacy and depleted self-esteem. In essence, the activity of choice creates an illusory self in which desired qualities are amplified and objectionable characteristics are muted. In essence, the addictive activity merely distorts one's self-perceptions, creating a more favorable apparition that temporarily augments one's confidence and self-worth. Although these attempts at self-modification are largely superficial in nature, individuals frequently believe that participation in the activity actually enhances fundamental aspects of their personality. A classic example of this is an individual who rationalizes social drinking because it helps him or her to overcome shyness and to become more gregarious. This justification is particularly virulent because the individual's self-perceptions in the absence of the activity eventually become unacceptable compared to the "new and improved" self that is experienced in the context of the activity.

The final form of bias is Displacement of Responsibility, the tendency to regard one's behavioral patterns as involuntary in nature. The individual adopts the role of a victim who is plagued by and powerless to resist a recurring onslaught of compelling urges. This perception is often bolstered by the resolute belief that a biological predisposition is at work. A frequent assumption is that one's addictive tendencies are a function of genetic programming and are therefore inescapable. This perception typically engenders an attitude of passivity on the part of the individual. So long as addictive behavior is accepted as being irrepressible, it follows that any efforts to free oneself from its grip will be futile. This rationalization is particularly common when

the individual is aware that a family member has struggled with some form of addiction. For example, Cindy has been aware of her alcoholic tendencies for some time and has considered seeking help so that she can stop drinking. However, she recently discovered that her grandfather was also an alcoholic. This revelation caused her to attribute her own cravings for intoxication to a genetic predisposition toward alcoholism. As a result, Cindy comes to regard her own habits as predetermined and therefore inescapable, and she views any attempts to change her behavior as futile, and these perceptions in turn serve to perpetuate the cycle of addiction.

In summary, a variety of justifications may be used to rationalize addictive behavior. Although there are clear distinctions among them, a common theme pervading all of the cognitive biases is the inclination to favor an altered sense of reality over actuality. In the case of Evasion of Discomfort, one's awareness of external circumstances is clouded, whereas with Negative Self-Bias and Self-Revision Bias, the individual's self-perceptions become the target of distortion. With Immediate Gratification Bias, one's ordering of priorities is altered, and in the case of Displacement of Responsibility, one's self-regulatory abilities are misrepresented. Addiction-prone individuals may rely upon any combination of these JMs to validate or rationalize their self-destructive habits. In contrast, individuals who do not harbor addiction proneness typically espouse a qualitatively different set of guiding beliefs that is inconsistent with the operation of these JMs. The cognitive biases associated with addiction proneness are summarized in Figure 1-1.

1. *Evasion of Discomfort*: implicit proclivity to perceive undesirable circumstances as overwhelming or intolerable, and to counteract these feelings by seeking to banish them from consciousness. The addiction-prone individual often interprets even marginally unpleasant situations as stressful or unbearable. In an effort to offset the apprehension associated with these circumstances, the individual gravitates toward behavioral outlets that temporarily distort or reconstruct his or her perception of reality. Thus, the addictive activity serves an analgesic function, providing a sense of relief or tranquility from external sources of stress.
2. *Immediate Gratification Bias*: subliminal propensity to assign utmost precedence to any pleasurable experience (even an ephemeral one) while disregarding its potential long-term consequences. Addiction-prone individuals place paramount importance upon instant gratification, even at the expense of their overarching quality of life. Thus, they gravitate toward instant gratification, regardless of how superficial or fleeting it may be.
3. *Negative Self-Bias*: unrecognized propensity to view oneself through a lens of inadequacy. The addiction-prone individual unconsciously filters information in a manner that fosters negative self-perceptions at the conscious level. This implicit bias engenders a generalized sense of unworthiness and incompetence in various life domains. In an effort to counter these feelings of depleted self-worth, the addiction-prone individual gravitates toward activities that transform his or her *perceptions* of self. The Negative Self-Bias is thus the precursor for other justification mechanisms such as the Self-Revision Bias or the Displacement of Responsibility Bias.
4. *Self-Revision Bias*: unrecognized proclivity to regard self-destructive behaviors as being transforming in nature, and to gravitate toward these activities in an effort to alter oneself. In essence, the activity of choice creates an illusory self in which desired qualities are amplified and objectionable characteristics are muted. Often, even superficial forms of enhancement are perceived as a viable means of improving or reinventing oneself. This bias is founded on the belief that life events and challenges are handled more effectively when the addictive activity is in effect.
5. *Displacement of Responsibility*: implicit proclivity to regard self-destructive behavioral patterns as involuntary. Addiction-prone individuals often view themselves as unfortunate victims who are plagued by and powerless to resist a recurring barrage of compelling urges. This bias is often supported by the explicit belief that a biological predisposition is at work. Addiction-prone individuals frequently believe that their self-destructive tendencies are genetically inherited and are therefore inescapable. The perception that they are powerless over their activities and that any attempts to abstain from them will be futile ultimately leads to an attitude of passivity on the part of the individual.

Figure 1-1. *Justification Mechanisms and Cognitive Biases for Addiction Proneness*

*Conditional Reasoning Test of Addiction Proneness (CRT-AP)*. An illustrative Conditional Reasoning (CR) problem is presented in Figure 1-2. This item outlines the health risks associated with cigarette smoking as well as the benefits of abstaining from this habit. It additionally states that new breakthroughs make abstaining from smoking more palatable than ever before, yet many smokers continue to smoke in spite of the significant health risks that this habit incurs. An inference is required in order to explain why this habit would be condoned in the face of evidence that it may shorten one's life. In order to reach a solution, individuals must first eliminate the illogical alternatives (in this case, A and D) and then select what they consider to be the most reasonable explanation from the remaining two options. Because reasoning is conditional upon the strength of the individual's latent biases (James, 1998), the perceived rationality of each option will vary as a function of the individual's disposition. What appears logical to an addiction-prone individual will be regarded as irrational by a non-addiction-prone individual, and vice versa. In this example, Alternative B illustrates the Displacement of Responsibility JM. Addiction-prone individuals are inclined to view addiction as involuntary, and themselves as powerless to control addictive behavior. Thus, Alternative B appears to be the most viable explanation to these individuals because it is compatible with their reasoning process. In contrast, non-addiction-prone individuals view themselves as capable of regulating their activities. Thus, they gravitate toward Alternative C as the most logical explanation for this scenario, viewing addictive habits as the reflection of a deficient motivation rather than a lack of control over one's activities.

- 1) Cigarette smoking contributes to lung cancer, which can shorten one's life by as much as ten years. However, research suggests that these health risks can be reversed after several years of abstaining from smoking. Although this evidence has encouraged many smokers to quit, others are actually smoking more than ever before.

Which of the following is the most logical explanation why people continue to smoke?

- a) Most people are unaware of the risks of cigarette smoking.
- b) Long-term smoking creates a physical dependency that is impossible to reverse.
- c) Abstaining from smoking requires intense self-discipline, which many smokers lack.
- d) Workplaces are now allowing more smoking breaks.

Figure 1-2. *Illustrative Item from the CRT-AP*

### *Summary and Overview*

Addiction is a devastating and formidable problem, and one that is growing only more prevalent. Its myriad of manifestations is staggering, and rehabilitative efforts are thwarted by high rates of dropout and relapse. Furthermore, addiction afflicts not only the individuals within its grasp, but also everyone with whom they interact. Thus, addiction has become an organizational as well as a societal issue. One promising approach to curtailing addiction is to identify addiction-prone individuals *before* actual dependency ensues. Current measures of addiction are strictly behavioral in nature, and are merely designed to assess the status and severity of dependency once an addictive cycle has been firmly established. However, there is presently no measurement system capable of identifying addiction-prone individuals *before* dysfunctional behavior is manifested. This study represents an initial effort to surmount this limitation through the introduction of a new measure that assesses cognitive biases that facilitate addiction rather than overt behavioral manifestations of addiction per se. It is hoped that this new measure of addiction proneness will offer a *predictive* capacity that is currently absent from existing measures of addiction.

This dissertation describes the development and initial validation of a new measure that is designed to assess implicit cognitions associated with addiction proneness. Review of past research suggests that addiction-prone individuals display consistent reasoning patterns, particularly with regard to their own behavior, and that these cognitive biases provide a means of identifying individuals at risk for developing addictive behavioral cycles. Specifically, it is hypothesized that addictive reasoning

patterns (those that make extensive use of JMs that rationalize addictive behavior) will be associated with an increased probability of engaging in some form of chemical dependency, and that a new CR measure will identify these patterns. It is expected that the CRT-AP will correlate significantly with a behavioral indicator of addiction (i.e., entrance into a rehabilitation program). Hence, support for the null hypothesis would be indicated if the CRT-AP failed to discriminate between individuals with a known history of addiction and individuals whose addictive history is unknown. In addition, it is expected that within the general population the CRT-AP will display either a low or a nonsignificant correlation with an existing (self-report) measure of addiction, as is typically the case (Greenwald & Banaji, 1995; McClelland et al., 1989). However, it is anticipated that within certain populations (i.e., individuals in treatment programs) a positive relationship will be displayed between these two types of measures. Although self-report measures typically correlate weakly with projective measures, a departure from this trend is expected for individuals in treatment programs because conventional response biases (i.e., social desirability and self-presentation biases) are expected to be absent from this population. (This issue will be explored in more depth in Chapter 3.) Moreover, the CRT-AP is not expected to correlate with CR tests that measure unrelated constructs (e.g., aggression), although the potential for common method variance exists in any heterotrait-monomethod approach. Lastly, it is hypothesized that the distribution of scores on the CRT-AP will either be normal or negatively skewed for individuals with a known history of addiction, and that scores on this measure will be positively skewed for individuals whose history of addiction is unknown.

Thus, this dissertation represents an initial effort to determine whether Conditional Reasoning methodology is a viable means of assessing addiction proneness and to evaluate the degree to which it correlates with existing measures of addiction.

The following research questions will be addressed in the next three chapters:

1. Can CR methodology be implemented to measure addiction proneness?
2. If so, does this methodology demonstrate construct-related validity?
3. If so, does this methodology display criterion-related validity?
4. If so, is this methodology redundant with other measures of addiction?

Chapter 2 describes the development of a new measure of addiction proneness as well as the samples and procedures used during data collection. Chapter 3 contains relevant validity and reliability analyses. Finally, Chapter 4 summarizes the findings from Chapter 3, describes potential limitations of the current study, and discusses directions for future research.

## CHAPTER 2

### METHODOLOGY

Data were collected from two distinctly different populations. Sample 1 (also referred to as the “random group”) consisted of individuals whose history of substance abuse was unknown. Data for this sample were collected during the spring of 2005 from undergraduate students enrolled in an introductory business administration course. Sample 2 (also referred to as the “known group”) was composed of individuals with a self-acknowledged history of chemical dependency. Data for this sample were collected from participants enrolled in substance abuse treatment centers during the summer of 2005. All participants were treated in accordance with the APA Ethical Guidelines (American Psychological Association, 2002). The following section provides a detailed description of the participants, methods, and measures used in this dissertation.

#### *Participants*

Throughout the data collection process every attempt was made to maintain equivalence between the known and random groups with respect to gender, race, age, and educational status. Although this objective was achieved with regard to gender, race, and to a great extent, educational status, the composition of the two groups nevertheless differed with respect to age. Although measures were taken to deter such a discrepancy, the process of securing college-aged individuals from local treatment

centers proved to be a far more formidable task than anticipated. This disparity will be addressed in Chapter 3.

*Sample 1.* This sample consisted of a total of 495 undergraduate students from a large Southeastern university. Students were awarded extra credit in exchange for their participation in the study. The majority of participants in this sample were White (88%) and male (53%).

*Sample 2.* This sample consisted of 174 individuals from various substance abuse treatment centers in the Southeast. No incentives were offered for participation in this portion of the study. The majority of participants in this sample were White (87%) and male (54%).

#### *Data Collection Procedures*

Participants in the random group were asked to complete three different measures at the beginning or end of multiple class periods throughout the semester. First, these individuals completed the Conditional Reasoning Test of Addiction Proneness (CRT-AP). Second, in order to provide a reference point from a well-validated Conditional Reasoning measure, participants from Sample 1 completed the Conditional Reasoning Test of Aggression (CRT-A; James & McIntyre, 2000). In accordance with the administration procedures of the CRT-A, both of these measures were presented as assessments of critical reasoning skills. Finally, individuals in this sample were presented with a self-report test of addiction, the Michigan Alcoholism Screening Test (MAST; Selzer, 1971). These surveys were administered several weeks apart in an attempt to avoid context and cueing effects (Council, 1993; Harrison,

McLaughlin, & Coalter, 1996). Survey responses from different points in the semester were matched using student identification numbers. Once data collection was complete and responses were linked, student identification numbers were removed from the data files. Lastly, a record of student disciplinary infractions was collected from the University registrar.

Participants in the known group were asked to complete three measures that assess addictive proclivity as well as actual addictive behavior. First, these individuals answered a series of classification questions relating to their addictive history (i.e., the length of time that they had been aware of their addiction, as well as a checklist of substances and/or activities that they had abused). Second, the Conditional Reasoning Test of Addiction Proneness (CRT-AP) was administered. Finally, they completed the Michigan Alcoholism Screening Test (MAST).

### *Measures*

*Conditional Reasoning Test of Addiction Proneness (CRT-AP).* The CRT-AP consists of 23 inductive reasoning items (four to five items per cognitive bias) that assess individual latent orientation towards the justification of addictive behavior. (Representative items are located in Figure 2-1.) The instructions indicate that the test measures analytical ability, and respondents are instructed to select the most reasonable alternative for each item. Responses are scored such that a +1 is assigned for each addiction-prone response (AP) and a 0 is assigned for each non-addiction-prone response (NAP). Hence, this scale may potentially range from 0 to +23, with highly positive scores indicating a strong latent orientation toward addiction proneness. A

Instructions: For each question, identify the one answer that is the most logical based on the information presented. Sometimes this will require you to cut through answers that look logical in order to get to the most genuine or “real” answer. Circle your answers on this test.

The “American dream” can be summed up as the belief that anyone can succeed in life if they are willing to put forth enough effort. If you work hard and persevere, you can accomplish anything that you desire in life.

Which of the following is the biggest **weakness** of the “American dream” ideal?

- a) It assumes that all people have the ability to succeed.
- b) Some people become successful without working very hard.
- c) The “American dream” no longer exists.
- d) Some people enjoy menial labor.

Research shows that the number of traffic accidents (specifically fender benders) increases when it is raining. Although accidents obviously occur on sunny days as well, it seems that the likelihood of causing a traffic accident increases when there is precipitation.

Which of the following is the most logical explanation for this trend?

- a) Stores are open later on weekends.
- b) Rainy conditions require additional stopping distance, which drivers often forget.
- c) Many people enjoy driving in the rain.
- d) Brakes don’t function effectively on wet roads no matter how careful a driver is.

In recent years, more and more people have decided to start their own businesses. Many self-starters create successful businesses and become wealthy as a result. However, starting a business requires long hours and extreme dedication, with no guarantee of success. In fact, the failure rate for self-starters ranges between 30% and 80%.

Which of the following is the most reasonable explanation for this trend?

- a) Many entrepreneurs aren’t willing to do what is necessary to be successful.
- b) Some businesses are doomed to fail no matter what.
- c) Most self-starters lack ambition.
- d) Some entrepreneurs secretly wish to fail.

Figure 2-1. *Representative Items from the CRT-AP*

score of zero is considered a low addiction proneness score, indicating that a respondent typically awards logical preference to non-addiction-prone alternatives when solving Conditional Reasoning problems. This tendency provides an indirect indicator that the individual's reasoning processes are not significantly influenced by the JMs for addiction proneness.

*Conditional Reasoning Test of Aggression (CRT-A).* The Conditional Reasoning Test of Aggression consists of 22 inductive reasoning items that assess individual latent orientation towards the justification of aggressive, harmful behavior. (Representative items are displayed in Figure 2-2.) The instructions indicate that the test measures analytical ability, and respondents are instructed to select the most reasonable alternative for each item. Responses are scored such that a +1 is assigned for each aggressive response (AG) and a 0 is assigned for each nonaggressive response (NA). Thus, this scale may potentially range from 0 to +22, with highly positive scores indicating a strong latent orientation toward aggressive behavior. A score of zero to two is considered a low aggression score, indicating that a respondent tends to assign logical priority to nonaggressive alternatives when solving Conditional Reasoning problems. This propensity serves as an indirect indicator that JMs for aggression are not instrumental in guiding and shaping the individual's reasoning.

*Michigan Alcoholism Screening Test (MAST).* The MAST was used to provide a measure of self-reported addiction. This 22-item scale assesses self-perceptions related to addictive behavioral patterns. (Representative items are presented in Figure 2-3.) These items include (but are not limited to) assessments of the duration and

Instructions: For each question, identify the one answer that is the most logical based on the information presented. Sometimes this will require you to cut through answers that look logical in order to get to the most genuine or “real” answer. Circle your answers on this test.

Joe is usually on time for work and for meetings with his boss and clients. He is also on time for appointments with his doctor, dentist, and priest. However, Joe is always five or more minutes late for meetings with Bill.

Which of the following is the most logical explanation for Joe being late for meetings with Bill?

- a) Bill gets up later than Joe.
- b) Joe is usually on time for people he respects, so he must not respect Bill.
- c) Joe and Bill are both self-employed.
- d) Joe and Bill are friends, so they don't care about being on time for each other.

American cars have gotten better in the last 15 years. American car makers started to build better cars when they began to lose business to the Japanese. Many American buyers thought that foreign cars were better made.

Which of the following is the most logical conclusion based on the above?

- a) America was the world's largest producer of airplanes 15 years ago.
- b) Swedish car makers lost business in America 15 years ago.
- c) The Japanese knew more than Americans about building good cars 15 years ago.
- d) American car makers built cars to wear out 15 years ago, so they could make a lot of money selling parts.

Wild animals often fight to see who will breed. This ensures that only the strongest animals reproduce. When strong animals reproduce, their young tend to grow into strong and powerful animals. Unlike animals, people who are not strong often reproduce.

Which of the following is the most logical conclusion based on the above?

- a) People who are not strong can be successful.
- b) Animals breed most often in the Fall.
- c) The study of biology is getting less popular.
- d) Humans are becoming physically weaker.

Figure 2-2. *Representative Items from the CRT-A*

Instructions: Read each statement carefully and select the most appropriate answer for each one. In this survey, “substance use” refers to any type of habit-forming substance. Please provide what you feel to be the best answer, or the answer that is right most of the time.

	<u>Yes</u>	<u>No</u>
1. Do you feel that you are a normal drinker? (By normal, we mean that you drink less than or as much as most other people.)	<input type="checkbox"/>	<input type="checkbox"/>
2. Have you ever awakened the morning after drinking the night before and found that you could not remember a part of the evening?	<input type="checkbox"/>	<input type="checkbox"/>
3. Can you easily stop drinking after one or two drinks?	<input type="checkbox"/>	<input type="checkbox"/>
4. Do you ever feel guilty about your substance use?	<input type="checkbox"/>	<input type="checkbox"/>
5. Are you able to stop using substances when you want to?	<input type="checkbox"/>	<input type="checkbox"/>
6. Have you ever attended a support group to try to kick the habit?	<input type="checkbox"/>	<input type="checkbox"/>
7. Have you ever gotten into physical fights when you were under the influence?	<input type="checkbox"/>	<input type="checkbox"/>
8. Has substance use ever created problems between you and your significant other, parents, friends, or other close relatives?	<input type="checkbox"/>	<input type="checkbox"/>
9. Has anyone close to you ever encouraged you to seek help for your substance use?	<input type="checkbox"/>	<input type="checkbox"/>
10. Have you ever lost friends because of your substance use?	<input type="checkbox"/>	<input type="checkbox"/>
11. Have you ever been in trouble at work because of your substance use?	<input type="checkbox"/>	<input type="checkbox"/>
12. Have you ever neglected your obligations for two or more days in a row because you were using substances?	<input type="checkbox"/>	<input type="checkbox"/>
13. After heavy drinking have you ever had severe shaking, or have you heard or seen things that weren't really there?	<input type="checkbox"/>	<input type="checkbox"/>
14. Have you ever gone to anyone for help or advice about your substance use?	<input type="checkbox"/>	<input type="checkbox"/>
15. Have you ever been hospitalized because of your substance use?	<input type="checkbox"/>	<input type="checkbox"/>
16. Have you ever been arrested for driving under the influence of a substance?	<input type="checkbox"/>	<input type="checkbox"/>
17. Have you ever been arrested, even for a few hours, due to intoxicated behavior?	<input type="checkbox"/>	<input type="checkbox"/>

Figure 2-3. *Representative Items from the MAST*

intensity of addictive behavior, one's perceived ability to restrict or to abstain from the activity, the extent to which addictive activity interferes with fulfillment of one's obligations or normal functioning, and a description of any negative consequences (e.g., arrests, hospitalization, strained relationships, etc.) that have been incurred as a result of one's addictive habits. Responses are scored such that a +1 is assigned for each addiction-oriented response and a 0 is assigned for each non-addiction-oriented response. If the sum of addiction-oriented responses is less than or equal to four, the individual is classified as normal (not addicted), whereas the presence of five or more addiction-oriented responses suggests that the individual has an addiction problem.

*Conduct Violations.* Records of student misconduct were collected from the University registrar for Sample 1. These conduct violations are indicative of a variety of disciplinary infractions including public drunkenness, possession of illegal drugs, physical assault, vandalism, and theft. The registrar's coding system does not distinguish among these various offenses, but simply notes those instances in which a violation occurred. These data served as behavioral indicators of possible addiction proneness (and most certainly an indication of noncompliance, a construct that is highly associated with addiction proneness) in the analyses described in the following chapter.

## CHAPTER 3

## RESULTS

The results of this study are organized as follows: Analyses pertaining to the entire sample will be presented first, followed by analyses that were exclusive to the known group, and concluding with analyses that were unique to the random group.

*Item Analysis of the CRT-AP*

Item analysis was conducted on the CRT-AP so that the most effectual items could be identified. The 23 items from this measure were evaluated on the basis of their discrimination indices (item-total correlations). The *p-values* and discrimination indices for each item are displayed in Table 3-1, and the corresponding response proportions for each item are presented in Table 3-2. Fifteen items met Nunnally and Bernstein's (1994) recommended inclusion criterion ( $r \geq .30$ ), and these items were used to form a composite score for future analyses. The remaining eight items did not meet this criterion and were thus excluded from further analyses. The mean item-total correlation on the 15-item CRT-AP Composite was .46, whereas the mean item-total correlation for all 23 items was .36. The mean *p-value* for AP responses on the CRT-AP Composite was .40 for the known group and .19 for the random group, and the mean *p-value* for all 23 items was .41 for the known group and .27 for the random group.

It is relevant to note that the *p-values* for the AP responses of the random group are likely inflated, as this group undoubtedly contains an unknown percentage of addicted individuals and therefore does not constitute a purely non-addicted sample. In

Table 3-1

*CRT-AP Item Discrimination Indices*

Item	$p_{\text{known}}$	$p_{\text{random}}$	$D$	Item-Total Correlation	Item Reliability Index
1 *	.443	.289	.154	.41	.19
2 *	.408	.196	.212	.40	.17
3 *	.310	.034	.276	.58	.17
4 *	.454	.263	.191	.47	.21
5 *	.356	.319	.037	.39	.18
6 *	.667	.442	.225	.31	.14
7	.483	.440	.042	.29	.14
8 *	.218	.061	.158	.52	.15
9	.172	.119	.053	.26	.08
10	.741	.604	.137	.26	.07
11	.483	.628	-.146	.02	.01
12 *	.362	.101	.261	.50	.19
13	.851	.855	-.004	.05	.02
14 *	.236	.111	.125	.45	.15
15 *	.282	.042	.239	.53	.16
16	.086	.117	-.031	.13	.04
17 *	.437	.170	.267	.51	.21
18 *	.655	.416	.239	.35	.16
19	.230	.174	.056	.27	.10
20 *	.270	.067	.203	.51	.16
21 *	.448	.277	.171	.41	.18
22	.328	.386	-.058	.13	.04
23 *	.431	.107	.324	.57	.22

\*  $r \geq .30$

Table 3-2

*CRT-AP Item Response Proportions*

Item	Known Group Item Responses				Random Group Item Responses				Combined Group Item Responses			
	AP	Logical	Illog 1	Illog 2	AP	Logical	Illog 1	Illog 2	AP	Logical	Illog 1	Illog 2
1	.443	.489	.069	.000	.289	.659	.032	.020	.329	.614	.042	.015
2	.408	.575	.017	.000	.196	.768	.036	.000	.251	.717	.031	.000
3	.310	.489	.029	.172	.034	.897	.002	.067	.106	.791	.009	.094
4	.454	.517	.017	.011	.263	.693	.038	.006	.312	.647	.033	.007
5	.356	.598	.034	.011	.319	.659	.020	.002	.329	.643	.024	.004
6	.667	.241	.034	.057	.442	.475	.014	.069	.501	.414	.019	.066
7	.483	.483	.034	.000	.440	.537	.014	.008	.451	.523	.019	.006
8	.218	.730	.011	.040	.061	.895	.002	.042	.102	.852	.004	.042
9	.172	.724	.080	.023	.119	.776	.091	.014	.133	.762	.088	.016
10	.741	.132	.034	.092	.604	.105	.059	.232	.640	.112	.052	.196
11	.483	.500	.006	.011	.628	.366	.004	.002	.590	.401	.004	.004
12	.362	.603	.017	.017	.101	.891	.006	.002	.169	.816	.009	.006
13	.851	.121	.006	.023	.855	.105	.004	.036	.854	.109	.004	.033
14	.236	.672	.023	.069	.111	.879	.010	.000	.143	.825	.013	.018
15	.282	.695	.000	.023	.042	.952	.000	.006	.105	.885	.000	.010
16	.086	.902	.011	.000	.117	.869	.008	.006	.109	.877	.009	.004
17	.437	.546	.011	.006	.170	.816	.008	.006	.239	.746	.009	.006
18	.655	.310	.029	.006	.416	.535	.016	.032	.478	.477	.019	.025
19	.230	.753	.006	.011	.174	.818	.004	.004	.188	.801	.004	.006
20	.270	.713	.006	.011	.067	.909	.012	.012	.120	.857	.011	.012
21	.448	.460	.040	.052	.277	.627	.090	.006	.322	.583	.077	.018
22	.328	.178	.316	.178	.386	.267	.251	.097	.371	.244	.268	.118
23	.431	.523	.029	.017	.107	.844	.029	.021	.192	.759	.029	.020

Note: AP = Addiction-Prone (logical) response; Logical = Non-Addiction Prone (logical) response; Illog 1 and Illog 2 = Illogical responses.

an ideal research design, the division between comparison groups would be absolute; that is, the known group would consist entirely of individuals with an explicit history of addiction and the comparison group would be exclusively composed of individuals with no history of addiction. Unfortunately, no infallible means exists to ensure that a given sample of individuals is completely devoid of some history of addiction. Thus, a random sample must suffice, with the understanding that an unknown percentage of individuals within it likely have a history of addiction. Such is the case in this study: the composition of the known group is well defined, but the composition of the comparison group is somewhat ambiguous in nature. Thus, the  $p$ -values for the AP responses of the random group would likely be lower if there was a logistical way to identify (and subsequently reclassify) those individuals within this group with a history of addiction.

#### *Distribution of Scores on the CRT-AP Composite*

Following data collection and item analysis, the distribution of scores on the CRT-AP Composite was examined for both the known and random groups. The distribution of scores for the random group was a) positively skewed (as expected), and b) mesokurtic, with a mode of 3. In contrast, the distribution of CRT-AP Composite scores for the addicted group was expected to either be normal or negatively skewed, with scores clustering at the medium to high end of the scale. Contrary to expectations, the distribution for this group was bimodal, with a primary mode of 2 and a secondary mode of 13. This finding suggests that the known group encompasses two distinct

subgroups of addicted individuals. Possible explanations for this finding will be explored in Chapter 4.

*Factor Analysis.*

In the full CRT-AP measure, each cognitive bias was represented by either four or five items. However, following the item analysis, eight items were discarded from further analysis. Consequently, in the CRT-AP Composite, several of the cognitive biases for addiction proneness were only represented by one or two items. Thus, although an exploratory factor analysis had been planned, it was determined that this analysis would be premature based on the reduction in items within the CRT-AP Composite. However, when enough additional items have been developed, it is hoped that an exploratory factor analysis will reveal the five theoretical cognitive biases upon which they were based.

*Reliability of the CRT-AP Composite*

Internal consistency reliability was estimated using a derivative of the Kuder-Richardson (Formula 20) formula (see James et al., 2004). This formula computes internal consistency reliability using item-total polyserial correlation coefficients, as follows:

$$r_{xx} = \frac{K}{K-1} \left( 1 - \frac{\sum_g s_g^2}{\left( \sum r_g s_g \right)^2} \right) \quad (1)$$

where K refers to the number of items,  $s_g^2$  refers to the variance of the items, and  $r_g s_g$  refers to the product of the item-total polyserial and the standard deviation of the item,

respectively. Following James et al. (2004), standardized variables were assumed, thus variances are set to unity. This yielded the computational formula,

$$r_{xx} = \frac{K}{K-1} \left( 1 - \frac{K}{\left( \sum r_g \right)^2} \right) \quad (2)$$

Using Equation 2, the reliability of the CRT-AP Composite was estimated to be .73, which exceeds the lower bound of .70 that constitutes acceptable reliability for tests in the early stages of development (Nunnally & Bernstein, 1994). Thus, results indicate that the 15-item composite possesses a modest level of internal consistency.

#### *Validity of the CRT-AP Composite*

In preparation for the following data analyses, a validity check was performed, wherein any individuals who responded improperly (i.e., by omitting an item, by selecting multiple responses to a single item, or by selecting an illogical response) to five or more items on the CRT-AP Composite were removed from consideration. Research has shown that responding improperly to five or more questions invalidates the test (James & McIntyre, 2004). That is, for people who do not follow the instructions, Conditional Reasoning scores do not necessarily reflect the construct of interest. Instead, scores may reflect reading difficulties, carelessness, and/or a lack of motivation. Thus, this precautionary measure was taken in an effort to ensure that the following results are representative of individuals who responded to the CRT-AP Composite in a conscientious manner. This resulted in a total of 14 individuals being eliminated from the analyses (five individuals were dropped from the known group and

nine individuals were dropped from the random group). Thus, the final sample included 655 individuals (169 and 486 from the known and random groups, respectively).

Validity evidence for the following sections is displayed in Table 3-3.

*Construct-Related Validity.* The second research question inquires about the construct-related validity of the CRT-AP Composite. In order to address this question, the convergent and discriminant validities of the CRT-AP Composite were assessed. Convergent validity is traditionally evaluated by examining the relationship between two measures of a given construct. In this study, both the CRT-AP Composite (an implicit measure) and the MAST (an explicit measure) assess addictive proclivities, although the methodologies they employ are divergent in nature. Low or nonsignificant correlations are typically noted between implicit and explicit measures (Greenwald & Banaji, 1995; McClelland et al., 1989), and such was the case between the CRT-AP Composite and the MAST ( $r = .368, p < .001$ ). This tendency for implicit and explicit measures to display modest correlations (i.e., those in the .20 to .40 range; see Eich, 1984) is often interpreted as a lack of convergent validity. However, Bornstein (2002) suggested that this trend does not reflect a lack of convergent validity, but rather it implies that self-report and projective measures operate in a complementary fashion by assessing different aspects of the same trait, motive, or need state. As James and colleagues (2005) noted, “indeed, the explicit and implicit facets may conflict, one may compensate for the other, they may work in harmony, or they may work independently; it depends on the constructs and the people” (p. 93).

Table 3-3

*Correlations between Test Measures and Group Membership*

	CRT-AP	MAST	CRT-A	Group Membership
CRT-AP	--			
MAST	.368*	--		
CRT-A	.076	.085	--	
Group Membership <sup>1</sup>	.476*	.877*	N/A	--

\*  $p < .05$

<sup>1</sup> All correlations with group membership are point-biserial correlations.

Note: CRT-AP = 15-item Composite of the Conditional Reasoning Test of Addiction Proneness; MAST = Michigan Alcoholism Screening Test; CRT-A = Conditional Reasoning Test of Aggression; Group Membership = Classification as a member of either the Known Group or the Random Group. Correlations are based on sample sizes ranging from 314 to 655.

In order to evaluate the relative associations of the CRT-AP and the MAST with addiction, a logistic regression analysis was performed with group membership as the dependent variable (this analysis was chosen because group membership represents a true dichotomy). Table 3-4 displays the results of this analysis, which includes a total of four models. The first model (with scores on the CRT-AP Composite predicting group membership) was statistically significant ( $\chi^2(1, N = 641) = 140.79, p < .001$ ) and it correctly predicted 82.9% of the cases. The second model (with MAST scores predicting group membership) was also statistically significant ( $\chi^2(1) = 588.51, p < .001$ ), and this model correctly identified 95.9% of the cases. The third model included both CRT-AP Composite and MAST scores as predictors. This model was significant as well ( $\chi^2(2) = 607.05, p < .001$ ), and it accurately predicted group membership in 96.7% of the cases. Finally, the fourth model included three predictors: CRT-AP Composite scores, MAST scores, and the interaction between these two measures. The interaction term was not significant; thus, results for this model paralleled those of the previous model ( $\chi^2(3) = 607.87, p < .001$ ), with a 96.7% rate of accurate classification. In sum, these results indicate that scores on both the CRT-AP Composite and the MAST scale were highly associated with addictive proclivity, thus supporting the convergent validity of the CRT-AP Composite.

As an additional test of construct-related validity, the discriminant validity of the CRT-AP Composite was assessed by examining the correlation between scores on this measure and those on the Conditional Reasoning Test of Aggression. These tests share a common methodology (Conditional Reasoning) but they assess unrelated constructs

Table 3-4

*Logistic Regression Predicting Group Membership (N = 641)*

Model	R <sup>2</sup>	Variables	B	SE B	p	OR	95% CI
I	.193	CRT-AP	.392	.041	.000	1.480	1.37-1.60
II	.601	MAST	.685	.061	.000	1.984	1.76-2.24
III	.612	CRT-AP	.306	.083	.000	1.358	1.15-1.60
		MAST	.630	.060	.000	1.877	1.67-2.11
IV	.613	CRT-AP	.569	.306	.063	1.766	.97-3.22
		MAST	.724	.126	.000	2.062	1.61-2.64
		CRT-AP x MAST	-.025	.027	.360	.976	.93-1.03

Note: CRT-AP = 15-item Composite of the Conditional Reasoning Test of Addiction Proneness; MAST = Michigan Alcoholism Screening Test.

(addiction versus aggression). Thus, it was anticipated that no significant correlation would exist between them. Results concurred with this expectation, thus establishing the discriminant validity of the CRT-AP Composite.

*Criterion-Related Validity.* The third research question concerns the criterion-related validity of the CRT-AP Composite. Descriptive statistics for the CRT-AP Composite scores and the MAST scores of each sample are presented in Table 3-5. With regard to the CRT-AP Composite, the average score in the known group exceeded that of the random group by 3.19 points. Keep in mind that this difference was likely tempered by the heterogeneous (that is, not exclusively non-addicted) nature of the random group discussed earlier. Regardless, even this relatively modest difference in mean scores was highly significant ( $t(653) = -13.83, p < .001$ ). Thus, individuals in the known group relied more heavily on JMs associated with addiction proneness (as indicated by higher scores on the CRT-AP Composite) than individuals in the random group. This finding offers support for the hypothesis that addiction-prone individuals reason in a way that distinguishes them from the general population.

To further address the question of criterion-related validity, the concurrent validity of the CRT-AP Composite was assessed. In order to evaluate this type of criterion-related validity, scores on the CRT-AP Composite were correlated with a definitive behavioral indicator of addiction. For the purposes of this study, the defining characteristic of the known group, namely, their entrance into a rehabilitation program for chemical dependency, served as the primary behavioral indicator of addiction

Table 3-5

*Descriptive Statistics for the CRT-AP and MAST Scales*

	Sample	N	Mean	Std. Dev.
CRT-AP	Random Group	486	2.88	1.60
	Known Group	169	6.07	4.31
MAST	Random Group	472	2.81	2.66
	Known Group	169	14.80	3.49

Note: CRT-AP = 15-item Composite of the Conditional Reasoning Test of Addiction Proneness; MAST = Michigan Alcoholism Screening Test.

proneness. It was expected that scores on the CRT-AP Composite would correlate significantly with individual classification into either the known group or the random group, and results supported this hypothesis ( $r_{pb} = .476, p < .001$ ). Thus, in answer to the third research question, it appears that individual scores on the CRT-AP Composite are related to participation in treatment programs for chemical dependency.

Interestingly, the MAST also displayed a very robust correlation with group membership, well the validities typically evidenced by self-report measures. However, this finding is not terribly surprising given the context in which data was collected. First, although the personal nature of the questions on the MAST may appear intrusive to the average individual (and may therefore trigger the activation of self-presentation tactics), treatment center participants are accustomed to responding to precisely these types of questions. In most cases they were required to answer a similar battery of questions before being admitted into the treatment program. Furthermore, the individuals who comprised the known group had fully acknowledged the severity and consequences of their addiction. There was no incentive for them to tailor their responses in a favorable light, as their presence in the treatment program represented an admission of their addictive proclivities. However, it is important to underscore the point that these individuals' responses would almost certainly be altered substantially if the MAST were being administered by a potential employer or by a supervisor rather than in the context of a rehabilitation program. Thus, although the self-report nature of the MAST is quite conducive to treatment center settings, its effectiveness is unlikely to generalize to other situations in which social desirability biases may become activated

(Barrick & Mount, 1991). Consequently, in answer to the fourth research question, the implicit nature of the CRT-AP Composite precludes it from being redundant with current measures of addiction such as the MAST.

*Discriminant Function Analysis.* In order to evaluate the discriminative ability of the CRT-AP Composite, a discriminant function analysis was performed. Scores on the CRT-AP Composite served as the predictor, whereas individual classification into either the known or the random group served as the grouping variable. As shown in Table 3-6, scores on the CRT-AP Composite were a significant predictor of group membership, correctly classifying 75% of the cases. Specifically, scores on the CRT-AP Composite correctly classified 84% of individuals in the random group and 48% of individuals in the known group. Its lower rate of success in classifying members of the known group is likely related to the finding that this group encompassed two distinct subgroups of addicted individuals. This pattern of results suggests that scores on the CRT-AP Composite are very effective at classifying one of the two subgroups of addicted individuals; however, they are less effective at classifying the second faction. Possible explanations for this trend will be explored in Chapter 4.

#### *Relationships between the CRT-AP and Demographic Variables*

There was no theoretical basis to expect a correlation to exist between scores on the CRT-AP Composite and any of the demographic variables (i.e., gender, race, age, or educational status); however, it was important to evaluate the possibility that any one of these characteristics could potentially be confounded with responses on this measure.

Table 3-6

*Discriminant Function Analysis Using CRT-AP Composite Scores (N = 655)*

<i>Predictor</i>	<i>Test of Significance</i>	
	<i>Wilks' Lambda</i>	<i>Probability</i>
CRT-AP Composite Scores	.77	<.001

  

<i>Actual grouping</i>	<i>Predicted Group Membership</i>	
	<i>Random group</i>	<i>Known group</i>
Random Group	84%	16%
Known Group	52%	48%
Correctly classified	75%	

Thus, the relationships between scores on the CRT-AP Composite and each of these variables were examined.

*Relationships with Gender and Race.* The correlations between scores on the CRT-AP Composite and various demographic variables are presented in Table 3-7. There was no relationship between scores on the CRT-AP Composite and gender, as evidenced by a nonsignificant point-biserial correlation (this estimator was chosen because gender represents a true dichotomy). Thus, results indicate that mean scores on the CRT-AP Composite did not significantly differ between males and females. Additionally, an analysis of variance (ANOVA) was used to evaluate whether scores on the CRT-AP Composite differed as a function of race. This statistic was nonsignificant ( $F(7, 647) = .788, ns$ ), indicating that race was unrelated to mean scores on the CRT-AP Composite.

*Relationship with Age.* Correlational evidence was again used to evaluate whether a relationship existed between scores on the CRT-AP Composite and variance in the ages of participants. Age was a particular concern in this study, as it was quite challenging to secure individuals for the known group who were of college age. This analysis revealed a minimal but significant negative correlation between age and scores on the CRT-AP Composite ( $r = -.086, p < .05$ ). Thus, results indicate that older individuals had a slightly lower average score on the CRT-AP Composite than their younger counterparts.

Although a nonsignificant result was preferable in this analysis, this finding is nevertheless consistent with another finding that will be discussed in the next section,

Table 3-7

*Correlations between Test Measures and Demographic Variables*

	CRT-AP	MAST	Gender	Age	Education
CRT-AP	--				
MAST	.368*	--			
Gender <sup>1</sup>	.056	-.090*	--		
Age	-.086*	.504*	-.109*	--	
Education <sup>1</sup>	.000	.199*	-.017	.272*	--

\*  $p < .05$

<sup>1</sup> All correlations with gender and education are point-biserial correlations.

Note: Correlations are based on sample sizes ranging from 636 to 655.

namely, that within the known group, average scores on the CRT-AP Composite showed a significant negative relationship with the duration of one's addiction. Several theories are offered for this pattern of results, and findings suggest that the use of JMs for addiction proneness varies based upon one's stage in the addictive cycle. As one would expect, within the known group, there was a very robust correlation between age and addictive duration ( $r = .755, p < .001$ ). Thus, it may be the case that the small negative correlation between age and average score on the CRT-AP Composite is a function not of age itself, but of the number of years spent in an addictive cycle.

In an effort to better understand the implications of the correlation between age and scores on the CRT-AP Composite, a subset of the known group was sequestered for further analysis. This subset was restricted to treatment center individuals between the ages of 18 and 30, resulting in a sample size of 98. In so doing, analyses could be performed while holding the average age of participants constant between the two groups (the average age was 21 in both groups). To ensure that these two groups were indeed comparable with respect to age, a t-test was performed between them. Results confirmed that the random group and the subset of the known group were equivalent with regard to age ( $t(127) = -1.617, ns$ ). All of the validity analyses detailed above were repeated using the known group subset. The results of these analyses are displayed in Table 3-8. Despite the reduction in sample size, the results of each analysis concurred with those discussed earlier. In addition, this analysis yielded a much more robust correlation between scores on the CRT-AP Composite and group membership ( $r_{pb} = .647, p < .001$ ) than had been revealed when using the entire known

Table 3-8

*Correlations Using the Known Group Subset*

	Full Sample (Random Group and Known Group Subset)			
	CRT-AP	MAST	CRT-A	Group Membership
CRT-AP	--			
MAST	.536*	--		
CRT-A	.076	.085	--	
Group Membership <sup>1</sup>	.647*	.845*	N/A	--

\*  $p < .05$ <sup>1</sup> All correlations with group membership are point-biserial correlations.

Correlations are based on sample sizes ranging from 570 to 584.

	Known Group Subset Only			
	CRT-AP	MAST	Addictive Outlets	Addictive Duration
CRT-AP	--			
MAST	-.381*	--		
Addictive Outlets	-.049	.353*	--	
Addictive Duration	-.470*	.334*	.215	--

\*  $p < .05$ 

Correlations are based on sample sizes ranging from 64 to 98.

Note: CRT-AP = 15-Item Composite of the Conditional Reasoning Test of Addiction Proneness; MAST = Michigan Alcoholism Screening Test; Group Membership = Classification as a member of either the Known Group or the Random Group; Addictive Outlets = Number of Addictive Substances or Activities Abused; Addictive Duration = Length of Time that Individual has been Aware of his or her Addiction.

group ( $r_{pb} = .476, p < .001$ ). Thus, both the construct- and the criterion-related validity of the CRT-AP Composite were upheld when age differences were removed from the equation. In addition, correlations were again examined between the CRT-AP Composite and each of the demographic variables, and once again, all of the findings concurred with those discussed earlier. There was still a minimal but significant negative relationship between age and scores on the CRT-AP Composite ( $r = -.093, p < .05$ ). Taken together, findings suggest that the results of this study were not confounded by age discrepancies between the two groups.

*Relationship with Educational Status.* Differences in educational status were an additional concern in this study, as the known group reported fewer years of formal education overall (only 67% of the known group had attended college versus 100% of the random sample). In order to evaluate whether this discrepancy impacted responses on the CRT-AP Composite, a point-biserial correlation was computed. This statistic was nonsignificant ( $r_{pb} = .000, ns$ ), indicating that mean scores on the CRT-AP Composite did not vary as a function of educational status.

#### *Analyses within the Known Group*

*Differences among Treatment Center Groups.* As participants for the known group were drawn from several different substance abuse treatment centers, it was important to examine whether responses to items on the CRT-AP Composite varied as a function of the treatment center from which they were collected. In order to examine this, an analysis of variance was performed. Results of this analysis ( $F(4, 164) = 2.162, ns$ ) indicated that there were no significant differences in the response tendencies of

individuals from different treatment centers. Scores on the MAST were examined as well, and again, results of this analysis of variance ( $F(4, 164) = 1.961, ns$ ) indicated that responses on this measure did not vary as a function of the treatment center from which they were drawn.

*Correlations between Test Measures and Addiction Variables.* As an additional consideration, it was relevant to examine whether scores on addictive test measures (the CRT-AP Composite and the MAST) were influenced by particular variables that were unique to the known group, namely, addictive outlets (the number of substances and/or activities that each individual abused), and addictive duration (the length of time that each individual had been aware of his or her addictive tendencies). The correlations between these variables were examined, and these results are displayed in Table 3-9. In addition, Table 3-10 displays the distribution of addictive outlet scores as well as frequency statistics for the addictive substances and/or activities that were pertinent to this sample.

This examination revealed an interesting pattern of results. Although there was a significant positive relationship between the number of substances and/or activities abused and individual scores on the MAST ( $r = .338, p < .001$ ), there was no evidence of a relationship between this variable and scores on the CRT-AP Composite ( $r = .013, ns$ ). It appears that individual reliance upon JMs for addiction proneness is not a function of the number of substances an individual abuses or the number of addictive activities he or she engages in.

Table 3-9

*Correlations between Variables within the Known Group*

	CRT-AP	MAST	Addictive Outlets	Addictive Duration
CRT-AP	--			
MAST	-.365*	--		
Addictive Outlets	.013	.338*	--	
Addictive Duration	-.441*	.322*	.132	--

\*  $p < .05$ 

Note: CRT-AP = 15-Item Composite of the Conditional Reasoning Test of Addiction Proneness; MAST = Michigan Alcoholism Screening Test; Addictive Outlets = Number of Addictive Substances or Activities Abused; Addictive Duration = Length of Time that Individual has been Aware of his or her Addiction. Correlations are based on sample sizes ranging from 127 to 169.

Table 3-10

*Frequency Information for Addiction-Related Variables*

Addictive Outlets	Frequency	%	Cumulative %
1	19	11.2	11.2
2	23	13.6	24.9
3	56	33.1	58.0
4	41	24.3	82.2
5	14	8.3	90.5
6	13	7.7	98.2
7	3	1.8	100.0

  

Substances/Activities	Frequency	%
Alcohol	131	77.5
Nicotine	114	67.5
Prescription Medication	69	40.8
Illicit drugs	133	78.7
Compulsive Gambling	13	7.7
Compulsive Spending	44	26.0
Eating Disorders	27	16.0
Sexual Addiction	27	16.0
Other	8	4.7

Note: Addictive Outlets = Number of Addictive Substances or Activities Abused

An even more intriguing pattern of results emerged when test measures were correlated with the length of time that individuals had been aware of their addiction. Whereas scores on the MAST exhibited a significant positive correlation with addictive duration, scores on the CRT-AP Composite displayed a significant negative correlation with this variable. The observation that MAST scores increased as a function of the duration of an individual's addiction makes intuitive sense, as items on the MAST represent critical incidents that would have a higher probability of occurring the longer that an addictive cycle was maintained. MAST items inquire about a variety of consequences that range widely in severity, from relatively benign effects (e.g., a simple hangover) to very severe outcomes (e.g., incarceration). Thus, a beginning addict would likely have experienced only the more minor consequences, whereas a veteran addict would have a greater likelihood of having reaped the more serious repercussions of his or her dysfunctional habits.

#### *Analyses within the Random Group*

*Correlations between Test Measures and Conduct Violations.* One limitation of this study is that the comparison sample (i.e., the random group) presumably contained some percentage of addiction-prone individuals. Consequently, the demarcation between the known group and the random group is far less definitive than one would desire in a study of this nature, and there is no way to ascertain the exact percentage of this sample that are, in truth, non-addicted. In an effort to redress this quandary, it was desirable to examine a behavioral indicator for this group that would likely be associated with addictive proclivities. As direct manifestations of addiction were not

available for this sample, disciplinary infractions served as an indicator of explicit noncompliance and of possible addictive tendencies.

As one would expect, the base rate for disciplinary infractions was quite low. Of all of the individuals for whom this information was available ( $N = 402$ ), only 12% held a record of conduct violations (interestingly, a figure that concurs with estimates of addiction prevalence in the general population). Of the 49 individuals who had a record of disciplinary infractions, the number of offenses ranged from three to nine ( $M = 5.27$ ,  $SD = 1.68$ ).

In order to evaluate the relationship between relevant test measures and the incidence of disciplinary infractions, scores from the CRT-AP Composite, MAST, and CRT-A were correlated with individual conduct violations. As Table 3-11 shows, the CRT-AP Composite displayed a modest correlation with conduct violations, and the CRT-A exhibited a smaller, yet still significant, correlation with this criterion as well. There was no relationship between scores on the MAST and conduct violation occurrence, which is somewhat surprising as the MAST scale directly inquires about infractions of various types. This pattern of results suggests that the self-report nature of the MAST is highly conducive to response distortion and social desirability biases in most testing environments, whereas the indirect nature of the CRT-AP Composite and the CRT-A allows a latent orientation toward noncompliance to be assessed objectively.

Table 3-11

*Correlations between Variables within the Random Group*

	CRT-AP	MAST	CRT-A	Conduct Violations
CRT-AP	--			
MAST	.176*	--		
CRT-A	.076	.085	--	
Conduct Violations	.384*	.088	.122*	--

\* p &lt; .05

Note: CRT-AP = 15-Item Composite of the Conditional Reasoning Test of Addiction Proneness; MAST = Michigan Alcoholism Screening Test; CRT-A = Conditional Reasoning Test of Aggression; Conduct Violations = Record of Student Disciplinary Infractions. Correlations are based on sample sizes ranging from 306 to 472.

## CHAPTER 4

## DISCUSSION

This dissertation was conceptualized with two specific aims in mind. First, it represents an attempt to uncover the justification mechanisms associated with addiction proneness. In this respect, it constitutes a preliminary effort to clarify the underlying processes that motivate individuals to initiate and to perpetuate behavior that ultimately erodes their overarching quality of life.

Second, this study represents an initial effort to apply the principles of Conditional Reasoning to the domain of addictive behavior. The effectiveness of this methodology has been demonstrated with several other personality constructs, and the results of this study indicate that it holds great promise in facilitating the prediction of addictive proclivities as well. The results of this study offer affirmative responses to all four of the proposed research questions, and although there is considerable room for replication and refinement of the current study, it nevertheless represents an important foundation, and hopefully a springboard to inspire future empirical efforts.

*Summary: Reliability and Validity of the CRT-AP Composite*

Item analysis revealed that 15 of the 23 initial items on the CRT-AP satisfied Nunnally and Bernstein's (1994) recommended inclusion criterion ( $r \geq .30$ ). These items were subsequently used to construct the CRT-AP Composite.

*Reliability.* The data collected and analyzed in this study indicate that the CRT-AP Composite possesses an acceptable level of test reliability. Specifically, the internal consistency reliability estimate exceeded the recommended lower bound of .70 that constitutes acceptable reliability for tests in the early stages of development (Nunnally & Bernstein, 1994). Thus, results suggest that the CRT-AP Composite consistently and reliably measured implicit cognitions.

*Validity.* On the basis of the results detailed in Chapter 3, initial validation efforts for the CRT-AP Composite have been reasonably successful, particularly given its early stage of development. Specifically, the CRT-AP Composite displayed substantial criterion-related validity with behavioral indicators of addiction proneness. In addition, with regard to construct-related validity, it demonstrated significant convergent and discriminant validity. Specifically, results indicated that the CRT-AP Composite was unrelated to the Conditional Reasoning Test of Aggression, as expected. Moreover, it was significantly related to an existing measure of addiction (the MAST). In summary, results supported both the construct- and the criterion-related validity of the CRT-AP Composite.

#### *Limitations and Directions for Future Research*

One of the primary limitations of the current study is that the individuals who comprise the known group represent a unique faction of addicted individuals, namely, those who have realized and/or accepted the severity of their problem on some level and who are making active efforts to address it. The addicts who would be most desirable for a study of this nature are those who are currently in an earlier stage in the process,

those who are still actively perpetuating an addictive cycle and who would be most dependent on the utilization of the justification mechanisms of interest. Unfortunately, these types of participants are not readily accessible for recruitment into research projects; however, individuals who participate in treatment programs are nevertheless a valuable resource in enhancing our understanding of addiction. These individuals provide us with a glimpse into an otherwise clandestine world. Even so, it is important to examine the possibility that considerable differences may exist between the mindset of an individual who has entered a rehabilitation program versus that of an individual who has not yet accepted the severity of his or her addiction. Thus, to the extent that it is feasible to access addicted individuals who have not sought treatment of any kind, it would be beneficial to include this population in future studies, and, more specifically, to examine whether these individuals can be distinguished from their treatment center counterparts on the basis of JM use.

Several other limitations are also worth mentioning. First, as was discussed earlier, despite attempts to the contrary, discrepancies existed between the known and random groups on the basis of age and, to some extent, educational status. Fortunately, subsequent analyses suggested that the results of this study were not impacted by this disparity. Regardless, it is certainly advisable for future studies to obtain the most comparable samples possible with respect to demographic variables.

Additionally, with regard to the known group, two specific pieces of information about the treatment center individuals were unavailable in this study, but both of these details would be quite relevant in future studies that involve individuals in rehabilitation

programs. First, it would be beneficial to find out the circumstances surrounding each individual's entry into the treatment program, that is, whether each person's participation at the treatment facility is voluntary or mandatory (e.g., court-ordered). It is evident that individuals who participate in treatment programs of their own free will have a very different mindset than those who have been forced to participate against their will (and who may, in fact, resent the process). Second, it would be helpful to collect information regarding the incidence of recidivism for each individual, and to distinguish between those individuals who are in treatment for the first time versus those who have been in and out of rehabilitation with little success. It is possible that individuals with an extensive history of recidivism represent a distinct faction of addicted individuals. Moreover, they may rely upon a different set of JMs than individuals who experience success in rehabilitation programs the first time around.

Perhaps the most surprising finding in this study (and thus a fruitful area for future research) was the presence of a bimodal distribution of CRT-AP Composite scores within the known group. This pattern of results suggests that there were two distinct subgroups within this sample. Closer examination of CRT-AP Composite scores within the known group revealed an intriguing distinction between addicted individuals who rely heavily upon the Displacement of Responsibility JM and those who do not. In this study, reliance upon this particular JM was associated with the use of one or more of the other JMs for addiction proneness, resulting in a higher overall score on the CRT-AP Composite. In contrast, addicted individuals who did not utilize the Displacement of Responsibility JM exercised very few of the other JMs for

addiction proneness, resulting in lower average scores on the CRT-AP Composite. Thus, it appears that utilization of this particular JM facilitates the use of other addiction-related JMs. In essence, the Displacement of Responsibility justification appears to provide a foundation for, and perhaps a gateway to the operation of other JMs for addiction proneness. Furthermore, it seems likely that consistent reliance upon the Displacement of Responsibility JM may be related to the incidence of recidivism. It seems logical that individuals who accept responsibility for their addiction would experience markedly more success in rehabilitation than individuals who ascribe responsibility to external forces. Future studies will be necessary to evaluate the veracity of this hypothesis.

The finding that scores on the CRT-AP Composite were negatively related to addictive duration is somewhat puzzling. In essence, these results suggest that addicted individuals rely upon a variety of JMs in the early stages of the addictive cycle, and that the number of JMs that an individual uses actually decreases the longer that they continue to engage in destructive behavioral patterns. This finding initially appears counterintuitive; however, it is important to note that addictive duration varied markedly in this sample (ranging from 6 months to 39 years, with an average duration of 9.8 years).<sup>1</sup> In light of this, it seems plausible that individuals typically rely upon multiple JMs when they initiate an addictive cycle, but over the course of many years

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<sup>1</sup> In order to ensure that this finding was not engendered by a few extreme scores on either end of the distribution, the distribution of CRT-AP Composite scores for the known group was inspected for outliers. There were a total of nine outliers (two individuals with a score of zero, three individuals with a score of fourteen, and four individuals with a score of fifteen). These individuals were excluded, and correlational analysis was repeated. The results of this analysis ( $r = -.426$ ,  $p < .001$ ) paralleled those pertaining to the entire known group ( $r = -.441$ ,  $p < .001$ ), thus corroborating the negative relationship between scores on the CRT-AP Composite and addictive duration.

the addictive behavior becomes so customary that fewer rationalizations are required in order for these behavioral patterns to be maintained. A second (and related) explanation is that over the course of many years addicted individuals come to rely predominantly on one particular “default” JM rather than on a variety of different JMs. A final possibility is that there are two distinct sets of JMs that support different phases of the addictive cycle: one set that characterizes the initiation phase, and another set that is used to maintain or perpetuate the addictive cycle once it has been set into motion. Regardless, this issue certainly warrants future investigation as well.

Also, when inquiring about the types of substances that addicted individuals have abused, one category that was used in this study was “illicit drugs.” This category obviously encompasses a variety of different substances that vary in many respects, and as it turned out, the vast majority of individuals in the known group had abused at least one substance in this category. In future studies it would be beneficial to create more specific distinctions within the realm of illicit drugs. As noted earlier, the results of this study suggest that the known group included two distinct groups of addicted individuals. In light of this finding, it is recommended that future studies collect as much detailed information as possible on the past history of each individual. Although there is no reason to suspect that the use of addictive JMs is substance-specific, it is nevertheless possible that meaningful differences exist between individuals who use various types of illicit substances.

Finally, it is clear that the five cognitive biases for addiction proneness that were tested in this study are by no means exhaustive in nature. Many undiscovered JMs for

addiction undoubtedly exist, and, as was discussed earlier, it may also be the case that different sets of JMs correspond to various stages in the addictive cycle (i.e., initiation versus perpetuation phases). Thus, one promising area for future research is to identify additional JMs of addiction proneness.

### *Conclusions*

In conclusion, this study represents an important first step in a) identifying cognitive biases that are used to justify addictive behavior, and b) developing a new measure of implicit cognitions based upon these cognitive biases. This measurement system displayed significant concurrent validity and substantial internal consistency, particularly given its very early stage of development. Overall, results suggest that addiction-prone individuals display cognitive biases that distinguish them from the general population, and that Conditional Reasoning methodology represents a viable approach to measuring these implicit cognitions.

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## VITA

Jennifer Lynn Palmer Bowler was born in Davidson, North Carolina on December 7, 1971. She was raised in Davidson along with her brother Ed, by her parents, Ed and Ruth Ann Palmer. She attended South and Davidson Elementary Schools, Alexander Junior High School, and North Mecklenburg High School. She earned her B.S. degree in psychology in 1993 from Duke University, graduating with a neuroscience concentration. Jennifer continued her education at the College of William & Mary in Williamsburg, Virginia, where she earned her Master's degree in Experimental Psychology in May of 1997. While there, she worked with Dr. Kelly G. Shaver on projects relating to attribution and organizational creativity. In August of 1997, she enrolled in the Industrial and Organizational Psychology doctoral program at the University of Tennessee, Knoxville. In October of 2002 she married Mark Connor Bowler, a fellow doctoral student in the program. Throughout the doctoral program she worked with Dr. Lawrence R. James and Dr. Michael C. Rush. She completed the requirements for her doctorate in December of 2005.