

The Relationship between the Cognitive Underpinnings of Addiction and Compulsive Eating Behavior

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Abstract

Obesity is a national epidemic that jeopardizes individual longevity and incurs significant increases in both healthcare and employee assistance program costs (Anderson, 2008; Cawley, Rizzo, & Haas, 2007). Subsequently, efforts are mounting to encourage healthy lifestyles and support individuals wishing to proactively improve their health (Grawitch, Ledford, Ballard, & Barber, 2009; Heinen & Darling, 2009; Pronk & Kottke, 2009; Quick, 1999). An implicit personality measure may assist in identifying the cognitive biases that present obstacles to these efforts. Specifically, this study examined the relationship between the implicit cognitions related to addiction and an assessment of compulsive eating behavior. Results indicated that reliance on the implicit cognitions related to addiction are significantly related ($r = .31$) to outcomes associated with overeating. Implications for research and practice are discussed.

Keywords: addiction; compulsive eating; personality; conditional reasoning

1. Introduction

Obesity is a growing epidemic that has recently gained significant empirical attention (e.g., Blass, 2008; Volkow & Wise, 2005; Yaskin, Toner, & Goldfarb, 2009). The obesity rate has more than doubled in the last 30 years (Cawley, Rizzo, & Hawes, 2007; Flegal, Carroll, Ogden, & Johnson, 2002; Ogden et al., 2006), and nearly two-thirds of the U.S. population are now classified as either overweight or obese (defined as having body mass index scores ≥ 25 and 30, respectively). Obesity in particular engenders a host of major health problems and is currently the second leading preventable cause of disease and death in the U.S. (Anderson, 2008; Yaskin et al., 2009). Furthermore, organizations sustain significant costs related to obese employees via increased insurance premiums, primary care costs, and employee assistance program spending (Cawley et al., 2007; Finkelstein, Fiebelkorn, and Wang, 2005; Schmier, Jones, & Halpern, 2006; Yaskin et al., 2009). Thus, efforts to curtail behaviors that facilitate the progression of obesity (e.g., compulsive eating) offer both individual and organizational benefits (Grawitch et al., 2009; Heinen & Darling, 2009; Pronk & Kottke, 2009).

A variety of factors have been implicated in the prevalence of obesity, and although biological factors are readily acknowledged in an individual's susceptibility to become overweight or obese (Baessler et al., 2005; Blass, 2008), behavioral factors are pivotal in either reversing or perpetuating this condition (Ogden, Yanovski, Carroll, & Flegal, 2007). Specifically, compulsive eating patterns and binge eating disorder have been implicated in laying the groundwork for obesity to ensue (Yanovski, 2003).

Regarding compulsive behavior, the term addiction is most frequently associated with substances that are inherently detrimental (e.g., nicotine, illicit drugs); however, even otherwise innocuous activities (e.g., shopping, exercise, and Internet use) may become the basis of an addiction when taken to an extreme, particularly when pursued at the expense of one's overarching quality of life (Grant, Brewer, & Potenza, 2006). In this context, compulsive eating behavior is now recognized as a form of addiction (Barry, Clarke, & Petry, 2009; Davis & Carter, 2009; Gold, Graham, Cocores, & Nixon, 2009).

Addictive behavior transcends geographic, demographic, and socioeconomic boundaries and it afflicts the workplace via increased job-related injuries and accidents (Frone, 2004; Hermalin, Husband, & Platt, 1991; Schmier et al., 2006; Spicer, Miller, & Smith, 2003; Veazie & Smith, 2000), illness and absenteeism (Birnbaum et al., 2011; Cawley et al., 2007; Finkelstein et al., 2005; Hermalin et al., 1991; Ricci and Chee, 2005; Schmier et al., 2006), turnover (Hermalin et al., 1991), and productivity losses (Coombs & McAndrews, 1994; Frone, 2009; Gates, Succop, Brehm, Gillespie, & Sommers, 2008; Hermalin et al., 1991; Wolf & Colditz, 1998). Moreover, as a greater percentage of the working population becomes overweight or obese, organizations incur significant healthcare and employee assistance program expenses (Cawley et al., 2007; Yaskin et al., 2009). Efforts to halt this trend are mounting. Toward this end, research suggests that distinct personality traits facilitate addictive behavioral cycles (Conway, Kane, Ball, Poling, & Rounsaville, 2003; Sutker & Allain, 1988). Addictive behavior is self-perpetuating, and preventive efforts such as early intervention appear to offer the most promising avenue to success (Brister & Brister, 1987; Malanga & Kosofsky, 2003). In this interest, identifying addictive proclivities that facilitate compulsive eating patterns before significant health decrements transpire constitutes an important first step.

1.1 Addiction

The definition of addiction is a point of contention among researchers and clinicians; however, the need to recognize both physiological and psychological dependence is a recurrent theme (Lubman, Yücel, & Pantelis, 2004; World Health Organization, 1992). Physiological dependence consists of physical tolerance to the substance, including withdrawal symptoms that follow cessation of substance use (Lubman et al., 2004). In contrast, psychological dependence describes a strong desire for the substance, feelings of powerlessness, and constant pursuit and consumption of the substance (World Health Organization, 1992). For the purpose of this study, addictive behavior is characterized by the inability to discontinue an activity despite realization of its negative consequences (Hirschman, 1992). Addicted individuals live in a world of dysfunction and chaos, but despite the havoc that compulsive behavior wreaks on their physical, professional, and social well-being, they are compelled to continue their activities.

1.2 Factors Related to Addiction

Addiction is a multifaceted issue and, as previously noted, its causes are the subject of considerable debate. Genetic factors are implicated in addictive patterns (Baessler et al., 2005; Blass, 2008; National Institute on Drug Abuse, 2008), as are environmental factors, such as family, school, and peer relationships, as well as socioeconomic status and overall stress (Garnefski & Okma, 1996; National Institute on Drug Abuse, 2008). Despite this evidence, most individuals who actively engage in compulsive tendencies are able to refrain from these activities at will and thus do not become addicts (Peele, 1987), which strengthens the assertion that personality factors are implicated in addiction (Sutker & Allain, 1988). Dependency appears to stem from addicts' inability to manage emotions and relationships, and addictive behavior provides a means of self-preservation, a vehicle for satisfying unfulfilled needs, and a tool for coping with psychological weaknesses (Khantzian, 1985). The question remains, namely, what specific personality factors typify addiction-prone individuals that render them incapable of managing these issues?

The idea that addiction-prone individuals share specific personality characteristics remains somewhat controversial (Graham & Strenger, 1988; Shulman, 1991). Moreover, it seems likely that frequent use of self-report measures have hampered efforts to clarify the dispositional qualities that engender addictive proclivities. Although self-report measures provide an effective tool for assessing socially acceptable phenomena, the transparent nature of these measures leads respondents to respond in a socially desirable manner (LeBreton, Barksdale, Robin, & James, 2007; Viswesvaran & Ones, 1999), which is particularly problematic when assessing socially sensitive constructs (e.g., addiction proneness, aggression). As a consequence, these measures consistently exhibit low validity, resulting in weak correlations with many behavioral criteria (James, McIntyre, Glisson, Bowler, & Mitchell, 2004).

Moreover, self-report measures specifically assess explicit cognitions rather than the implicit processes that are of interest in this case (Greenwald & Banaji, 1995; Nosek, Hawkins, & Frazier, 2011; Wilson & Brekke, 1994).

1.3 Using Conditional Reasoning to Measure Addiction Proneness

As social creatures, people seek to make sense of their own behavior as well as the behavior of others. In this interest, people wish to view their behavior as logical and reasonable (James, 1998), and justifications are often necessary to achieve this perception (James & Mazerolle, 2002). These justifications provide the premise for conditional reasoning (CR) methodology. In each situation, individuals process information and events in a characteristic way. These assumptions, inferences, and implicit theories affect the way in which people view and react to new circumstances such that individuals with different dispositions rely on qualitatively different cognitive biases when observing and interpreting other people, situations, and events (James, 1998). The process in which individuals' cognitive biases alter their perceptions is known as differential framing, and the rationalizations employed are termed justification mechanisms (JMs).

The CR format is designed to assess the implicit cognitions that characterize distinct personality dispositions (James, 1998). Although it was originally developed to identify individuals with aggressive proclivities (James & Mazerolle, 2002; James et al., 2005), a version has recently been developed to assess the cognitive biases related to addiction proneness (Bowler, Bowler, & James, 2011). Unlike traditional self-report items, when completing a CR-based measure, respondents are first presented with a reasoning problem and are then asked to select the most logical explanation. Individuals' chosen responses reflect reliance upon the JMs that rationalize their preferred choice (James, 1998). Thus, addiction-prone individuals (i.e., those with a history of substance abuse) reason differently than their non-addiction-prone counterparts, as evidenced by the CR responses to which they gravitate (Bowler, Bowler, & James, 2011).

As CR measures focus on assessing specific implicit cognitions, the objectivity of these measures is critical (James, 1998). Each CR item includes four possible response choices: one addiction-prone response, one non-addiction-prone response, and two distracter (illogical) responses that are typically ignored because they bear no logical connection to the inductive reasoning problem (James, 1998; LeBreton et al., 2007). Distracters are included to improve the test's face validity and to ensure the indirect nature of the measurement (James et al., 2004). With respect to the Conditional Reasoning Test for Addiction Proneness (CRT-AP), the inductive reasoning problems are designed to elicit JMs that reveal reasoning processes that justify addiction proneness (Bowler et al., 2011). Due to the operation of the JMs, responses that appear completely rational and logical to addiction-prone individuals are not considered to be reasonable by non-addiction-prone individuals. Respondents believe they are selecting the most logical response based on critical intellectual skills; however, their responses in fact reflect latent personality characteristics that lead them to frame information in distinctly different ways.

1.3.1 Justification Mechanisms (JMs) for Addiction

Five JMs for addictive behavior have been identified to date. The first rationalization, the Evasion of Discomfort Bias, suggests that addictive behavior is pursued in order to attain a sense of calmness and to disregard stressful or unpleasant realities (Cooper, Wood, Orcurt, & Albino, 2003; Frone, 1999; Sayette, 1999). Individuals who eat compulsively often use food to relieve anxiety rather than hunger (Evers, Stock, & de Ridder, 2010; Parylak, Koob, & Zorrilla, 2011). The second JM, the Immediate Gratification Bias, suggests that addicts focus on the instantaneous satisfaction their habits impart while failing to address the negative long-term consequences of this behavior (Comeau, Stewart, & Loba, 2001; Cooper, Frone, Russell, & Mudar, 1995; de Wit, 2009; Garavan & Hester, 2007).

Compulsive eaters initially tend to focus on short-term aspects of their consumption patterns (e.g., taste, satiation) rather than its long-term consequences (e.g., cholesterol, weight gain) (Parylak et al., 2011). The third rationalization, Negative Self-Bias, holds that individuals view themselves in an inaccurate, negative light (Brister & Brister, 1987; Nielsen & Scarpitti, 1997) and pursue addictive activities that negate feelings of inadequacy and depleted self-worth (Donnelly, 2000; Dryfoos, 1990). Individuals who eat compulsively often seek foods that provide a sense of comfort rather than true sources of nutrition (Evers et al., 2010; Kandiah, Yake, & Willett, 2008). The fourth JM, Self-Revision Bias, describes a tendency to seek specific activities in order to transform oneself and perceive oneself more favorably. Qualities that are deemed attractive appear to be enhanced through addictive activities (Grillo, 2010) while negatively-viewed characteristics are overshadowed (Hirschman, 1992; Pearson & Little, 1969).

Compulsive eaters may view themselves differently in the context of their consumption patterns, which may then become a self-reinforcing pattern (Hirschman, 1992). Finally, in the Displacement of Responsibility Bias, individuals perceive themselves as being out of control and powerless to choose their own behaviors, frequently playing the role of the victim and shifting responsibility for their behavior to others and to external circumstances (Balmford & Borland, 2008; Schaler, 2000). Individuals who eat compulsively may resign themselves to unhealthy patterns due to the knowledge that family members also struggle with these behavioral cycles and health issues, which often engenders a sense of helplessness and decreased self-efficacy (McKinley, 2009; Umeh, 2003).

1.4 The Present Study

The present study seeks to determine whether the CRT-AP effectively assesses proclivities associated with overeating. Whereas the CRT-AP is known to assess cognitive biases that are consistent with other forms of addiction (e.g., substance use, Bowler et al., 2011), we specifically wish to test it with regard to eating behaviors. It is expected that a robust relationship will emerge between scores on the CRT-AP and an indicator of compulsive eating (i.e., BMI scores).

Hypothesis 1: There will be a significant correlation between participants' CRT-AP scores and their respective BMI scores.

In addition, it is relevant to evaluate the effectiveness of a traditional measure of addiction in identifying individuals who exhibit this form of compulsive behavior. Thus, the validity of a self-report measure of addiction in assessing compulsive eating behavior will also be examined. It is expected that the transparency of this measure will engender socially desirable responding (Gorber, Tremblay, Moher, & Gorber, 2007), which should be evidenced by a nonexistent relationship between scores on the self-report measure and the propensity to overeat.

Hypothesis 2: The relationship between participants' scores on the self-report measure and their respective BMI scores will be insignificant.

2. Method

2.1 Participants

Data were collected from 456 undergraduate students from a large southeastern university. The mean age of participants was 18.89 years ($SD = 2.15$, range 17-43 years) and 69% were women. The sample was composed of individuals who identified themselves as Caucasian (77%), African American (17%), Asian (2%), and Hispanic (2%). The average BMI score for the entire sample was 24.62 ($SD = 4.95$), and varied between men ($M = 25.41$, $SD = 4.67$) and women ($M = 24.29$, $SD = 5.05$) and among Caucasian ($M = 24.08$, $SD = 4.47$), African American ($M = 27.16$, $SD = 6.51$), Asian ($M = 23.45$, $SD = 3.41$), and Hispanic ($M = 25.25$, $SD = 2.50$) respondents. In exchange for completion of the study, participants received credit toward their psychology course grade. All participants were treated in accordance with the APA Ethical Guidelines (American Psychological Association, 2002).

2.2 Measures

2.2.1 Conditional Reasoning Test of Addiction Proneness (CRT-AP)

The CRT-AP is comprised of 23 inductive reasoning items that measure latent orientation towards addictive behavior (Bowler et al., 2011). Its instructions indicate that it is a reasoning test, and participants are asked to select the most logical response for each item. Following CR methodology (James & McIntyre, 2000), responses are scored +1 for each addiction-prone response and 0 for each non-addiction-prone response. Thus, this scale may potentially range from 0 to +23, with highly positive scores indicating a strong latent orientation toward addiction proneness.

2.2.2 Self-Assessment of Behavior (SAB)

The SAB consists of 35 self-report items designed to assess an individual's propensity towards addictive behavior. Although existing measures of addictive behavior are plentiful, review of the literature failed to yield a measure that assessed the specific behaviors desired for this study. However, the format of the items on the SAB was specifically designed to be representative of existing addiction measures.

Ten items inquire about eating behavior specifically (e.g., “Do you eat to escape from worries or trouble in your life?”; “Do you eat sensibly with others but overeat when alone?”), and these items are comparable to those found in existing measures of compulsive eating and binge-eating disorder (e.g., Gearhardt, Corbin, & Brownell, 2009; Stice, Telch, & Rizvi, 2000). An additional eight items inquire about compulsive activities in general, which may include compulsive eating behavior (e.g., “Do you undergo personality changes or mood swings related to compulsive behavior?”; “Have compulsive habits caused conflicts with family members or friends?”). The remaining 17 items focus on other types of compulsive activities including shopping, gambling, and substance use (e.g., “Has excessive shopping resulted in financial difficulties for you?”; “Do you often gamble until you run out of money?”), and again are reflective of existing self-report measures of these constructs (e.g., Christo et al., 2003; Holtgraves, 2009). The instructions ask respondents to select the most appropriate response (i.e., yes or no) to each item. Responses are scored +1 for each positive (addiction-prone) response and 0 for each negative (non-addiction-prone) response. Therefore, potential scores on this measure may range from 0 to +35, with higher scores reflecting greater inclination towards addiction.

2.2.3. Body Mass Index (BMI)

We elected to utilize body mass index (BMI) as a criterion based on its established relationship with disordered eating (Erol, Toprak, & Yazici, 2006), eating beyond satiety (Yanover & Sacco, 2008), binge severity (Picot & Lilienfeld, 2003), and obesity (Reilly, 2010).

2.3 Procedure

Each participant was provided with a survey packet that included the CRT-AP, the Self-Assessment of Behavior self-report measure, and a classification sheet requesting basic demographic information. The CRT-AP was presented first. Participants were informed that they were completing a reasoning test and were asked to select the most logical response for each item. This measure was administered first to prevent participants from surmising the construct of interest. Second, participants completed the SAB, in which they were asked to select the most appropriate response based on their typical behavioral habits. Lastly, participants completed a classification sheet requesting basic demographic information. Upon completion of the survey packet, each participant was escorted to a separate room and asked to step on a digital scale for one final measurement. Each participant's height and weight was then assessed and recorded and BMI was subsequently calculated via the following formula:

$$\text{BMI} = W * 703 / H^2 \quad (1)$$

in which

W = weight in pounds and

H = height in inches.

At this point, each participant was thanked for their participation and dismissed from the study.

3. Results

3.1 Item Reliability

According to previous CR research, the selection of five or more illogical responses is considered to invalidate the results of the measure (James & McIntyre, 2000), as scores may reflect reading difficulties, comprehension issues, or a lack of motivation to complete the test according to the instructions. Thus, individuals who selected five or more illogical responses were removed from the study, resulting in an elimination of 12 individuals from subsequent analyses. Thus, the final sample consisted of 444 individuals.

The internal consistency of the CRT-AP was measured using a derivation of the Kuder-Richardson Formula (Formula 21), which estimates reliability by measuring inter-item consistency and assumes that all items on a measure are of comparable difficulty (see James et al., 2004). Using this derivative, the reliability of the CRT-AP was estimated to be .73. This result is consistent with previous research using this measure (Bowler et al., 2011) and suggests acceptable internal consistency. Similarly, the SAB demonstrated an acceptable internal consistency ($\alpha = .74$)

3.2 Correlation with BMI Scores

The primary question of interest in this study concerned the applicability of the CRT-AP to the assessment of food addiction. In order to assess this, scores on the CRT-AP were correlated with participants' BMI scores. A significant correlation resulted, $r = .31$, $p < .001$, indicating that higher scores on this implicit measure were indeed reflective of higher BMI scores.

Thus, Hypothesis 1 was supported. It appears that the cognitive biases that are associated with other forms of addiction are also utilized by individuals who show evidence of compulsive eating behavior.

A secondary interest in this study was the ability of a traditional (i.e., self-report) measure of addictive behavior to assess compulsive eating behavior. Thus, scores on the SAB were also correlated with participants' BMI scores. As expected, the relationship between participants' BMI scores and overall SAB scores was not significant, $r = -.003$, *ns*. This trend also held when BMI scores were correlated with the compulsive behavior subscale of the SAB, $r = -.005$, *ns*, and the compulsive eating subscale specifically, $r = .064$, *ns*. Taken together, these results indicate that scores on this measure did not effectively assess the propensity to overeat. Thus, Hypothesis 2 was also supported. It appears that the transparency of traditional measures of addictive behavior render them less applicable to the assessment of compulsive eating behavior.

4. Discussion

The purpose of this study was to assess the applicability of a conditional reasoning measure of addiction proneness to compulsive eating behavior and to compare its effectiveness to that of traditional measures of the construct. The CRT-AP is designed to assess implicit cognitions that reflect an individual's propensity towards addiction proneness. It has previously been validated with other forms of addictive behavior (e.g., substance abuse), but up until this point its effectiveness in assessing food addiction had not been specifically evaluated. The results of this study suggest that individuals who are more likely to overeat (as evidenced by extreme BMI scores) utilize the same cognitive biases that are used to support other forms of addictive behavior. This further supports the applicability of the CRT-AP in identifying individuals who are at risk of developing health-sacrificing behavioral patterns such as compulsive eating behavior. The implications for clinicians are also significant, as clarification of the cognitive processes underlying compulsive behavior may facilitate a more customized approach to treatment.

Moreover, the capacity to address underlying beliefs that have supported problematic behavior patterns will yield more successful efforts to change these behavioral cycles. A secondary aim in this study was to compare the effectiveness of the CRT-AP in assessing compulsive eating behavior to that of a traditional (e.g., self-report) measure of addiction proneness. Results indicated that the SAB did not effectively assess compulsive eating behavior. It is well known that respondents are consistently able to distort their responses on self-report measures (LeBreton et al., 2007; Viswesvaran & Ones, 1999), and the transparency of the self-report items, coupled with the sensitivity of the construct of interest, likely encouraged participants to provide socially desirable responses. These results further strengthen the assertion that self-report measures are easily falsified and may not be the best instrument when evaluating personality constructs that are sensitive in nature.

4.1 Limitations and Directions for Future Research

As with all studies of this nature, the use of students as research participants is a valid concern. Despite this limitation, the initial results of this study are encouraging, and it will be desirable to replicate this study with a variety of populations to ensure that the cognitive biases that characterized compulsive eating in this sample are ubiquitous among the greater populous.

In addition, due to IRB considerations participants in this study were not asked to report whether they engaged in any other addictive behaviors (e.g., smoking, alcohol use, substance use). The CRT-AP has been validated for use in identifying individuals who are prone to alcoholism or substance abuse, and this study represented its logical extension to other forms of addiction (i.e., compulsive eating behavior). In future studies it would be ideal to assess all major forms of addiction simultaneously if feasible. The use of BMI as a measure of compulsive eating behavior in this study was admittedly imperfect. Although body mass indices provide an estimate of individual adiposity, which is customarily reflective of one's characteristic consumption patterns, the applicability of this assessment is obviously limited in scope. BMI scores may also be influenced by a variety of factors in addition to one's eating patterns and can overestimate the percentage of body fat in extremely muscular individuals. Thus, future studies should employ additional measures of compulsive eating behavior and physical health.

Lastly, this study should be replicated with additional self-report measures of compulsive eating behavior. The SAB, while representative of existing measures of addiction, does not focus exclusively on compulsive eating behavior but rather includes a variety of forms of addictive activities.

So while the results of this study are promising, additional studies with self-report measures that exclusively target compulsive eating behavior are warranted.

5. Conclusion

The present study investigated whether the implicit cognitions that are associated with common addictive proclivities (e.g., alcohol and substance abuse) generalize to food addiction. The results of this study suggest that the cognitive biases that are used to support addictive habits may also be utilized to justify compulsive eating behavior. This finding constitutes an important first step that has numerous implications for the prevention and treatment of obesity as well as eating disorders more generally.

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