Drinking for negative reinforcement: The semantic priming of alcohol concepts

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ARTICLE INFO

ABSTRACT

Cognitive models of alcohol abuse posit that the context typically associated with alcohol use, such as negative affect, implicitly activates alcohol use cognitions, which in turn leads to alcohol consumption. We selected 40 undergraduate women based upon their alcohol use and reported anxiety sensitivity, and proposed that drinking for the purpose of negative reinforcement would predict increased semantic priming between anxiety and alcohol concepts. A lexical decision task compared the response latencies of alcohol targets preceded by anxiety words to those same targets preceded by neutral words (anxiety–alcohol priming). Level of anxiety sensitivity did not relate to anxiety–alcohol priming, but drinking following social conflict was associated with increased anxiety–alcohol priming. This study specifically suggests that the contextual antecedents to drinking behavior relate to the organization of semantic information about alcohol, and more generally supports cognitive models of substance abuse.

1. Implicit cognition theory and alcohol use

The implicit cognition theory (ICT) of drug urges and drug use behavior assumes that implicit memory associations are central to understanding alcohol use. Based upon neural network or connectionist models of cognition (e.g., Collins & Loftus, 1975), ICT posits that alcohol-related contextual cues are held within automatized action-use schemas (Tiffany, 1990), which develop after multiple pairings between contextual cues and alcohol use. As individuals encounter contextual cues associated with alcohol use, these implicit memory schemas are brought forth to subsequently influence behavior without awareness (Wiers & Stacy, 2006). Thus, ICT argues that cognitions are key to understanding drug use behavior, as cognitions mediate the relationship between affective states and substance use (see review, Birch, Stewart, & Zack, 2006). There has been increased interest in applying ICT and its measurements to alcohol abuse for several reasons. First, evidence suggests that implicit tasks are not as subject to demand characteristics or participant self-presentation bias as are explicit measures (Wiers, Stacy, et al., 2002; Wiers, Woerden, Smulders, & De Jong, 2002). Additionally, implicit measures may show incremental validity over explicit measures in situations in which behavior is more difficult to control, or in which motivation to control that behavior is low (e.g., alcohol abuse or dependence; Fazio & Olson, 2003; Ostafin & Palfai, 2005).

1.1. Means of measuring implicit cognitions

Cognitive psychologists have developed specific experimental methods, such as Stroop designs, Implicit Association Tests (IATs), the Extrinsic Affective Priming Task (EAST) and lexical decision tasks to measure implicit cognitions (DeHouwer, 2003). These methods are thought to measure underlying implicit associative memory networks, although there is some speculation that only lexical decision tasks do so directly (e.g., Gawronski & Bodenhause, 2005). Lexical decision tasks utilize a semantic priming paradigm to measure the associative strength between two words. Participants must make a lexical decision (i.e., decide if a word is indeed an English term) for a target word that is preceded by a prime word. The lexical decision response latency is typically

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shorter (faster) when the target word is preceded by highly associated primes (e.g., cat–dog) than less associated primes (e.g., tree–dog; see review, Neely, 1991). Semantic priming refers to the response latency between the prime–target pair, with shorter latencies reflecting increased priming or a stronger association between two concepts, and longer latencies reflecting decreased semantic priming or a weaker association between two concepts (see review, Neely, 1991). This paradigm has known-groups validity in that it can distinguish between alcohol dependent and non-dependent individuals (Hill & Paynter, 1992).

1.2. Using ICT to explain drinking in response to negative affect

While numerous studies have found support for ICT when differentiating problem and non-problem drinkers (e.g., Hill & Paynter, 1992; Palfai & Ostafin, 2003; Wiers, Woerden, et al., 2002), less research has utilized implicit measures, as described above, to investigate differences between problem drinking individuals who report distinct motives or antecedents for alcohol consumption. For a large subgroup of drinkers the experience of negative affect, including anxiety symptoms, serves as a cue for alcohol consumption (see review, Cooper, Frone, Russell, & Mudar 1995). Individuals who drink in response to negative affect are at an increased risk of developing problematic patterns of alcohol use and alcohol use diagnoses (Kushner, Abrams, & Borchardt, 2000). Individuals who report this style additionally demonstrate increased alcohol consumption levels (Park & Levenson, 2002), binge drinking behavior (Ichiyama & Kruse, 1998; Park & Levenson, 2002) and drinking for the purpose of intoxication (Tyssen, Vaglum, Aasland, Gronvold, & Ekeberg, 1998). Furthermore, college students who report using alcohol to regulate negative affect may be more likely to maintain or develop alcohol-related problems after leaving school (Park & Levenson, 2002). Thus, understanding factors, such as implicit cognitions, that may relate to drinking in response to negative affect is an issue of extreme importance.

According to ICT, drinking in response to negative affect should create an automatic association between negative affect and alcohol-related cognitions, which in turn leads to drinking behavior. To date, two studies have found support for ICT's predictions when examining individuals who drink during experiences of negative affect (see review, Birch et al., 2006). Zack, Toneatto, and Macleod (1999) examined individuals diagnosed with an alcohol use disorder and found that high psychiatric distress and drinking during negative mood states each predicted faster lexical decision time (increased priming) for negative affect–alcohol pairs in a semantic priming task. Similarly, Stewart, Hall, Wilkie, and Birch (2002) selected individuals who reported an extreme tendency to use alcohol to alleviate negative emotions (coping-motivated drinkers). Utilizing a Stroop task, they found that coping-motivated drinkers showed the predicted longer naming latencies (more interference) for negative affect, alcohol pairs (e.g., sad–beer) than for negative affect, non-alcohol pairs (e.g., sad–tree). In all, these studies provide preliminary evidence that individuals who drink in response to negative moods may implicitly associate negative affect with alcohol, although this effect may be specific to the implicit task used and/or the sample population studied.

1.3. ICT and anxiety sensitivity

Anxiety sensitivity, or the propensity to attribute a negative interpretation to feelings of anxiety, appears to be related to specific drinking motives and may be an especially important predictor of drinking in response to negative affect (Stewart, Zvolensky, & Eifert, 2001). Individuals with high anxiety sensitivity are more likely to report drinking during negative affective states than individuals with low anxiety sensitivity (Reyno, Stewart, Brown, Horvath, & Wiens, 2006; Samoluk & Stewart, 1998). As noted above, ICT would predict that the tendency of anxiety sensitive drinkers to consume alcohol in response to negative affect should cause anxiety-related concepts to automatically activate alcohol-related cognitions (Zack, Poulos, Fragopolous, & Macleod, 2003). That is, individuals high in anxiety sensitivity should demonstrate a stronger linkage between anxiety concepts and alcohol concepts than between neutral concepts and alcohol concepts.

Thus far, only one study has examined anxiety–alcohol associations in an anxiety sensitive population. In an innovative design, Zack et al. (2003) had college-age drinkers complete a phrase priming task, where negative and positive mood-related phrases served as primes for alcohol target words. Although this study found that self-reported tendency to drink in "bad" moods predicted negative mood phrase priming, the study did not find any association between negative mood phrase priming and anxiety sensitivity level. However, there were a few limitations to this study. First, a "drinker" in this study was an individual who had consumed one or more alcoholic drinks in the last week. It is unclear whether underclassmen in the high anxiety sensitivity condition had sufficient drinking experience to build an association between negative mood and alcohol. Secondly, individuals in the high anxiety subject group only needed to be at or above the 70th percentile for their anxiety sensitivity score. Recent data indicates that anxiety sensitivity may be taxonic in nature and may only affect a small proportion of the population (Bernstein et al., 2006), and thus it is unclear whether this study utilized a truly anxiety sensitive sample given their more liberal group criterion scores.

1.4. The relationship between gender, anxiety sensitivity, and alcohol use

As noted, anxiety sensitivity is a risk factor for drinking in response to negative affect, and drinking in response to negative affect is associated with subsequent alcohol use disorder development (Kushner et al., 2000; Novak, Burgess, Clark, Zvolensky, & Brown, 2000). However, there is some evidence that this relationship may be gender specific. Stewart et al. (2001) found that women with high anxiety sensitivity levels were more likely to report drinking in an effort to cope than were their less anxiety sensitive counterparts, but comparable results were not found for men. Likewise, Zack et al. (2003) found that female drinkers with