Caffeinated alcohol consumption profiles and associations with use severity and outcome expectancies ☆

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HIGHLIGHTS

- Sought to identify patterns and correlates of caffeinated alcohol (CA) use.
- Identified four distinct classes of CA users.
- Classes differed on caffeine and alcohol use severity and outcome expectancies.

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ABSTRACT

Growing evidence suggests that the consumption of caffeinated alcoholic beverages (CAB) may be riskier than alcohol alone. Efforts to identify patterns of CAB use and the correlates of such drinking patterns could further our conceptualization of and intervention for this health issue. Consequently, the current study aimed to (1) identify distinct classes of CAB users, (2) examine differences between classes on measures of alcohol and caffeine problems, and (3) compare distinct classes of CAB users on caffeine and alcohol outcome expectancies. Participants were 583 (31% men) undergraduate students from a psychology research pool. Latent profile analysis models were derived using four indicators: CAB use quantity, CAB use frequency, alcohol use quantity, and alcohol use frequency. Finding revealed four classes of drinkers: High Alcohol/High CAB (6.00%), High Alcohol/Moderate CAB (5.15%), High Alcohol/Low CAB (22.99%), and Low Alcohol/Low CAB (65.87%). The Low Alcohol/Low CAB class reported the lowest relative levels of caffeine dependence symptoms, caffeine withdrawal, alcohol use problems, and heavy episodic drinking frequency. Further, results indicated differential expectancy endorsement based on use profiles. CAB users in the High Alcohol/Low CAB class endorsed more positive alcohol expectancies than the Low Alcohol/Low CAB group. Those in the High Alcohol/High CAB class endorsed stronger withdrawal symptom caffeine expectancies than all other classes. Inclusion of substance-specific expectancies into larger theoretical frameworks in future work of CAB use may be beneficial. Findings may inform intervention efforts for those at greatest risk related to CAB consumption.

1. Introduction

The consumption of alcohol mixed with caffeine, or caffeinated alcoholic beverages (CAB), is prevalent among emerging adults (e.g., Berger, Fendrich, & Fuhrmann, 2013). These beverages may be either pre-mixed with alcohol and caffeine, such as original versions of Four Loko and Sparks, or mixed by the user (e.g., vodka or Jagermeister mixed with Red Bull). It has been estimated that approximately one fourth to one half of college drinkers report consuming CAB in the

previous 30 days (Brache & Stockwell, 2011; MacKillop et al., 2012; Miller, 2008; O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008). Additionally, past year prevalence rate is 65% while lifetime use rate is 75% (Berger et al., 2013). Emerging adults cite a number of reasons for using CAB that include pleasurable taste, ability to socialize longer, alertness, and greater intoxication (Jones, Barrie, & Berry, 2012; Peacock, Bruno, & Martin, 2012).

While users perceive benefits to drinking CAB, growing research suggests that the co-consumption of alcohol with caffeine may be riskier and result in more severe behavioral consequences than alcohol use alone. Compared to alcohol-only drinkers, college students who consume CAB tend to drink alcohol in greater quantities and drink more frequently (MacKillop et al., 2012; O'Brien et al., 2008; Price, Hilchey, Darredeau, Fulton, & Barrett, 2010; Thombs et al., 2010). They also are more likely to experience negative alcohol-related harms including being taken advantage of sexually, physically hurt or injured,

riding with an intoxicated driver, and requiring medical attention (O'Brien et al., 2008). The odds of engaging in risky behaviors or experiencing negative outcomes appear to increase as the frequency of CAB use increases, even after controlling for individual differences like age, sex, and risk taking tendency (Brache & Stockwell, 2011). A field study of college student bar patrons found that those who consumed CAB are at increased risk for leaving the bar with a blood alcohol concentration (BAC) above .08 and intending to drive under the influence (Thombs et al., 2010). When users are asked about adverse consequences that were unique to CAB over alcohol-only beverages, college drinkers noted experiencing heart palpations, blackouts, and consuming greater amounts of alcohol than intended (Jones et al., 2012).

Beyond alcohol consequences, the co-consumption of alcohol and caffeine may be associated with caffeine-related harms. One study found a greater likelihood of experiencing both physiological (e.g., sleep difficulties, tremors, heart palpations, rapid speech) and psychological (e.g., irritability, tension) caffeine-related outcomes on days in which CAB were consumed versus alcohol-only days (Peacock et al., 2012). Similar findings with regard to physiological effects from CAB consumption have been found in other studies (Jones et al., 2012; Pennay & Lubman, 2012; Woolsey, Waigandt, & Beck, 2010). Overall, evidence supports that the use of CAB may increase the likelihood that young adults will engage in risky behaviors and experience undesirable consequences.

Of the growing studies that address CAB consumption and associated risks, few have explored outcome expectancies for drug effects. Outcome expectancies are our beliefs regarding the behavioral effects of a particular substance and may be acquired through both direct and indirect experience (see Jones, Corbin, & Fromme, 2001). Expectancies have been shown to be a consistent predictor of substance use behavior including tobacco, marijuana, and cocaine (e.g., Ashare, Weinberger, McKee, & Sullivan, 2011; Heinz, Kassel, & Smith, 2009; Smith, Goldman, Greenbaum, & Christiansen, 1995). The largest body of work supporting expectancy effects on substance use has come from alcohol research. Alcohol expectancies are well established as an important determinant of alcohol use outcomes (see Goldman, Darkes, & Del Boca, 1999). They predict alcohol use both concurrently and longitudinally (Christiansen & Goldman, 1983; Stacy, Newcomb, & Bentler, 1991) as well as drinking initiation and development of problem drinking (Christiansen, Smith, Roehling, & Goldman, 1989). Alcohol expectancies partially mediate the influence of other antecedents on alcohol use (Sher, Walitzer, Wood, & Brent, 1991) and have been shown to be modifiable with corresponding changes in drinking (Dunn, Lau, & Cruz, 2000; Lau-Barraco & Dunn, 2008).

Efforts to extend the expectancy framework to caffeine research have revealed that expected outcomes of caffeine correlate with caffeine-related behavior. In general, expectations of the positive effects of caffeine predict consumption quantity and frequency of caffeine as well as caffeine problems (Bradley & Petree, 1990; Heinz et al., 2009; Huntley & Juliano, 2012). More specifically, expectations that caffeine will result in withdrawal/dependence effects, energy/work enhancement, appetite suppression, social/mood enhancement, and physical performance enhancement positively predict caffeine consumption (Huntley & Juliano, 2012). Generally, low expectation of negative caffeine outcomes, such as anxiety/negative physical effects and sleep disturbance, predicts greater caffeine use and lower desire to cut down or stop caffeine consumption. Caffeine expectancies also have been shown to relate to greater severity of caffeine use. Heinz et al. (2009) found that stronger endorsement of the expected effects of caffeine, be it positive or negative, was positively related to greater reports of caffeine withdrawal symptoms, dependence symptoms, cessation difficulty, and perceived dependence.

There has been a paucity of research investigating expectancies as it relates to CAB consumption specifically. Given that CAB contain both caffeine and alcohol, it is likely that expectancies for each substance

would play an important role. To explore this idea, one preliminary study examined the incremental and relative contributions of caffeine and alcohol expectancies in predicting CAB use outcomes (Lau-Barraco & Linden, under review). Findings revealed that both alcohol and caffeine expectancies uniquely predict CAB use quantity, frequency and related problems. However, alcohol expectancies appeared to be a stronger predictor than caffeine expectancies. Other researchers have examined caffeine expectancies and found a positive relationship between CAB use and withdrawal expectancies for caffeine (Heinz et al., 2009) and that consumers as compared to nonconsumers of CAB endorsed stronger social/mood enhancement caffeine expectancies (Huntley & Juliano, 2012). Several recent investigations specifically focused on CAB-specific expectancies. MacKillop et al. (2012) developed a measure of CAB expectancies with two factors: "intoxication enhancement" and "avoid negative consequences." Only endorsement of intoxication enhancement expectancies predicted CAB use frequency, suggesting that college students' decision to consume CAB is driven more by a desire to achieve intoxication (e.g., get high or "drunk" quicker) rather than by the avoidance of negative harms (e.g., drive safer) by consuming CAB. Two other investigations compared empirically derived profiles of CAB users on CAB-specific expectancies. One study found that profiles characterized by higher proportion of CAB use to alcohol-only use were associated with greater endorsement of CAB expectancies (Mallett, Marzell, Scaglione, Hultgren, & Turrisi, in press). Another study found that CAB risk profiles based on CAB expectancies and other CAB-related attitudes are associated with CAB use and negative consequences longitudinally (Varvil-Weld, Marzell, Turrisi, Mallett, & Cleveland, 2013). In general, while previous research applying the expectancy paradigm to CAB have been limited, initial findings support additional efforts to understand outcome expectancies and their role in the CAB consumption of young adults.

Considering the heightened risks associated with CAB, research into identifying patterns of CAB use and the correlates of specific CAB drinking patterns could further our conceptualization of this increasingly pervasive health issue. Latent profile analysis (LPA), a person-centered analytical strategy that groups individuals into categories based on shared characteristics, would allow us to identify classes of CAB users. These classes then can be compared on relevant key dimensions as to identify potential risk factors associated with CAB use. Previous research has not examined CAB profiles as they relate to caffeine and alcohol use problems or to cognitions related to caffeine and alcohol separately. Consequently, the aims of the present study were to (1) identify distinct subtypes or classes of CAB consumers based on relevant indicators while taking into consideration typical alcohol use, (2) examine differences between classes on measures of alcohol and caffeine use severity (i.e., alcohol use problems, heavy drinking status, caffeine dependence and withdrawal), and (3) examine differences between classes on caffeine and alcohol expectancies. We hypothesized that CAB use could be characterized by distinct patterns based on quantity and frequency of CAB consumption, as well as typical alcohol consumption. We expected to find a relatively larger group of low frequency and quantity users of CAB and a smaller group of high frequency and quantity of CAB users. We expected the heavier and more frequent group of CAB consumers to report greater alcohol and caffeine use severity, as well as stronger endorsement of alcohol and caffeine expectancies.

2. Method

2.1. Participants and procedure

Participants were 583 (402 female) college student drinkers recruited from an undergraduate psychology research pool at a mid-size east coast university. To be eligible, participants must have (1) been between the ages of 18–25, (2) reported consuming alcohol at least once in the previous 12 months, and (3) have reported