



Attwood, A. S. (2012). Caffeinated Alcohol Beverages: A Public Health Concern. *Alcohol and Alcoholism*, 47(4), 370-371. DOI: 10.1093/alcalc/ags062

Peer reviewed version

Link to published version (if available):
[10.1093/alcalc/ags062](https://doi.org/10.1093/alcalc/ags062)

[Link to publication record in Explore Bristol Research](#)
PDF-document

University of Bristol - Explore Bristol Research

General rights

This document is made available in accordance with publisher policies. Please cite only the published version using the reference above. Full terms of use are available:
<http://www.bristol.ac.uk/pure/about/ebr-terms.html>

EDITORIAL

Caffeinated Alcohol Beverages: A Public Health Concern

Angela S. Attwood, School of Experimental Psychology, University of Bristol, UK

Angela.Attwood@bristol.ac.uk

Abstract: Consumption of alcohol mixed with caffeinated energy drinks is becoming popular, and the number of pre-mixed caffeinated alcohol products on the worldwide market is increasing. There is public health concern and even occasional legal restriction relating to these drinks, due to associations with increased intoxication and harms. The precise nature and degree of the pharmacological relationship between caffeine and alcohol is not yet elucidated, but it is proposed that caffeine attenuates the sedative effects of alcohol intoxication while leaving motor and cognitive impairment unaffected. This creates a potentially precarious scenario for users who may underestimate their level of intoxication and impairment. While legislation in some countries has restricted production or marketing of pre-mixed products, many individuals mix their own energy drink-alcohol “cocktails”. Wider dissemination of the risks might help to balance marketing strategies that over-emphasise putative positive effects.

A paper in the current issue of *Alcohol and Alcoholism* identifies a trend for high levels of consumption of caffeinated alcohol drinks in Asian manual workers (Cheng et al., 2012). The authors state that these drinks are marketed as medicinal products that offset fatigue, and that a significant number of consumers use the drinks before or during work. This development of the functional use of caffeine/alcohol mixes could increase the frequency of accidents in manual occupations, which may spiral into a negative cycle of drinking to cope and in turn, increase the risk of negative health and dependence.

In Western societies, the public health focus of caffeine/alcohol combination drinks has centered on young social drinkers, due to anecdotal and observational reports of high levels of intoxication and increased risk of alcohol-related harms when the two are consumed together (Howland et al., 2011, O'Brien et al., 2008, Arria et al., 2011, Berger et al., 2011). The respective stimulatory and sedative effects of caffeine and alcohol are well known, and some users mistakenly believe that the two simply cancel each other out. In fact, it has been proposed that caffeine attenuates the sedative effects of acute alcohol consumption, thereby inducing a state sometimes referred to as “wide-awake drunk”. This can lead the consumer to underestimate their level of intoxication and drink for longer periods of time increasing the risk of alcohol overdose. In contrast, it has been proposed that the alcohol-related impairment of cognitive and motor function remains largely unaffected (Weldy, 2010), thereby creating a particularly precarious situation.

While the links between caffeinated alcohol drinks and increases in intoxication and harm cannot, and should not, be overlooked, one must stay mindful of the associational nature of these reports. We cannot for example rule out the impact of expectancy effects or sampling bias. The aggressive marketing of energy drinks targets young consumers and imply that these drinks induce states of arousal and psychological "highs". Therefore, many real-world instances of combined alcohol/caffeine consumption occur in young social drinkers on a night-out who are motivated to drink heavily and to become intoxicated, reflecting the social binge drinking trend in many Western countries. Thus, it is plausible that some of the direct pharmacological risks may be overestimated due to the motivations and situations associated with the co-administration.

To further understand these effects we can turn to the well-controlled, if somewhat artificial, laboratory studies that have examined the effects of alcohol when mixed with energy drinks or more specifically caffeine (using anhydrous caffeine powders). While there is variation in findings, in part due to methodological issues that are beyond the scope of this commentary, the consensus is of mild stimulatory effects of a combination drink. Unfortunately, the majority of studies examine aspects of cognitive and

motor function that do not extrapolate readily to real world alcohol-related behaviors (e.g. reaction time, digit symbol substitution, memory recall) (Mackay et al., 2002, Drake et al., 2003, Azcona et al., 1995, Howland et al., 2010). The few studies that utilize behavioral control measures (e.g. go-no-go, stop-signal tasks) report mixed findings, indicating that caffeine, when mixed with alcohol, improves alcohol-related detriment on some measures of behavioral control, while having no effect, or even worsening performance, on others (Marczinski and Fillmore, 2003, Fillmore and Vogel-Sprott, 1999, Attwood et al., 2011). Given that one of the main assumptions of the alcohol/caffeine relationship is that caffeine decreases perceived intoxication, the lack of subjective measurement of intoxication is also a surprising omission in many studies. The limited data available however, suggest a qualitative change in intoxication with the addition of caffeine characterized by increased stimulation (although not necessarily quantitative reductions in intoxication *per se*) (Attwood et al., 2011). Collectively, these studies provide partial support for a combined effect of caffeine and alcohol, but the findings are not particularly compelling, and certainly imply weaker effects than are suggested in anecdotal reports. However, experimental studies tend to administer single doses of caffeine/alcohol (albeit relatively high doses) that are markedly different to the pattern of sustained drinking that occur in social settings, and which has yet to be modeled in a laboratory study.

Numerous brands of alcohol/caffeine combination drinks have been produced, which contain high levels of caffeine and alcohol. In 2010, the US Food and Drug Administration issued warnings to several manufacturers of combination drinks identifying caffeine as an "unsafe food additive" and stated that their sale violated federal law. There are also restrictions on the production and sale of caffeinated alcohol beverages in some countries including Canada, where caffeine can only be mixed with alcohol if it comes from a natural source (e.g. guarana) and Mexico where caffeinated alcohol beverage sales are prohibited in bar rooms and night clubs. In the UK, alcohol-related harms and binge drinking are high on the political agenda and there have been calls for a legal restriction on the amount of caffeine that can be added to alcohol products, which would effectively ban many of the commercially available combination

drinks that contain relatively high levels of caffeine. However, the debate over caffeinated alcohol beverages is somewhat undermined by the fact that caffeinated energy drinks are widely available. Although they have been banned in various countries in the past (e.g. France, Denmark, Norway), many of these bans have since been revoked. And individuals are still free to mix their own caffeine/alcohol beverages. In fact, some UK licensed alcohol chains offer "energy cocktails" as part of their cocktail list that contain energy drink mixers, and many bars and clubs stock lower quantity versions of energy drinks that are ideally suited as mixers for alcoholic spirits.

In conclusion, public health concern over caffeinated alcohol drinks is justified, although the nature of the caffeine/alcohol relationship is yet to be fully elucidated. For example, the extent to which combined effects are due to an additive or synergistic pharmacological relationship, and whether they are mediated by expectancy effects, are unclear. So what now for legislation and policy? While there have been significant moves to control the production and sales of pre-mixed caffeine/alcohol drinks, these are somewhat undermined by the ability to "mix your own" at home or in social settings. One strategic option may be to restrict the sale of energy drinks in licensed alcohol premises, although such policies are often met with resistance and branded as signs of the "nanny-state". However, education should be improved. Positive effects of energy drinks and caffeine/alcohol combination drinks are readily and aggressively relayed in marketing campaigns but negative effects, if relayed at all, appear as "small print" on labels that consumers often fail to read. This balance needs to be addressed. Current European legislation (European Directive 2002/67/EC on the labeling of foodstuffs containing quinine and caffeine) rules that beverages containing upward of 150 mg/l (other than tea or coffee) must be marked as "high caffeine content" and that this statement should be in the same field of vision as the product name: but alone this is probably not enough. As a final note, we should be careful that pre-occupation with the caffeine/alcohol debate does not divert attention from the more pressing issue of harmful alcohol consumption. While restricting the availability of caffeinated alcohol drinks may reduce emergency alcohol-related hospital attendance for example, this will be a drop in the ocean.

References

- Arria AM, Caldeira KM, Kasperski SJ, Vincent KB, Griffiths RR and O'Grady KE. (2011). Energy drink consumption and increased risk for alcohol dependence. *Alcohol Clin Exp Res*, **35**, 365-75.
- Attwood AS, Rogers PJ, Ataya AF, Adams S and Munafo MR. (2011). Effects of caffeine on alcohol-related changes in behavioural control and perceived intoxication in light caffeine consumers. *Psychopharmacology (Berl)*.
- Azcona O, Barbanoj MJ, Torrent J and Jane F. (1995). Evaluation of the central effects of alcohol and caffeine interaction. *Br J Clin Pharmacol*, **40**, 393-400.
- Berger LK, Fendrich M, Chen HY, Arria AM and Cisler RA. (2011). Sociodemographic correlates of energy drink consumption with and without alcohol: results of a community survey. *Addict Behav*, **36**, 516-9.
- Cheng W, Cheng Y, Huang M and Chen C. (2012). Alcohol dependence, consumption of alcoholic energy drinks and the associated work characteristics in the general working population of Taiwan. *Alcohol and Alcoholism*.
- Drake CL, Roehrs T, Turner L, Scofield HM and Roth T. (2003). Caffeine reversal of ethanol effects on the multiple sleep latency test, memory, and psychomotor performance. *Neuropsychopharmacology*, **28**, 371-8.
- Fillmore MT and Vogel-Sprott M. (1999). An alcohol model of impaired inhibitory control and its treatment in humans. *Exp Clin Psychopharmacol*, **7**, 49-55.
- Howland J, Rohsenow DJ, Arnedt JT, Bliss CA, Hunt SK, Calise TV, Heeren T, Winter M, Littlefield C and Gottlieb DJ. (2010). The acute effects of caffeinated versus non-caffeinated alcoholic beverage on driving performance and attention/reaction time. *Addiction*, **106**, 335-41.
- Howland J, Rohsenow DJ, Calise TV, Mackillop J and Metrik J. (2011). Caffeinated alcoholic beverages: an emerging public health problem. *Am J Prev Med*, **40**, 268-71.
- Mackay M, Tiplady B and Scholey AB. (2002). Interactions between alcohol and caffeine in relation to psychomotor speed and accuracy. *Hum Psychopharmacol*, **17**, 151-6.
- Marczinski CA and Fillmore MT. (2003). Dissociative antagonistic effects of caffeine on alcohol-induced impairment of behavioral control. *Exp Clin Psychopharmacol*, **11**, 228-36.
- O'Brien MC, McCoy TP, Rhodes SD, Wagoner A and Wolfson M. (2008). Caffeinated cocktails: energy drink consumption, high-risk drinking, and alcohol-related consequences among college students. *Acad Emerg Med*, **15**, 453-60.
- Weldy DL. (2010). Risks of alcoholic energy drinks for youth. *J Am Board Fam Med*, **23**, 555-8.