Alcohol and Caffeinated Energy Drinks:

A preliminary study exploring patterns of consumption and associated harms

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A preliminary study exploring patterns of consumption and associated harms

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Introduction

There is increasing evidence that a growing proportion of young people around the world are using alcohol in combination with energy drinks (such as Red Bull), particularly in licensed venues (Brache & Stockwell, 2010; O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008; Oteri, Salvo, Caputi, & Calapai, 2007). Energy drinks are typically combined with vodka or Jagermeister (known as 'Jagerbombs'), and a wide range of pre-packaged alcoholic energy drinks have also recently appeared on the market (Jones & Barrie, 2009; Jones, Barrie, & Berry, in press). There is no prevalence data available in Australia on alcohol energy drink (AED) use; however, estimates from the U.S., Canada and Italy indicate that between one quarter and one half of University students have consumed AED recently (Brache & Stockwell, 2010; O'Brien, et al., 2008; Oteri, et al., 2007). There is a small but growing body of research highlighting the harms associated with AED. The main harm identified is that energy drinks enable wakefulness and alertness, and mask the feelings of intoxication, which might lead to greater consumption of alcohol over a longer period of time. This may lead to a range of consequences such as alcohol poisoning, impaired judgment leading to accidents (e.g. stepping in front of traffic), poor decision making (e.g. driving while intoxicated) engaging in risky behaviour (e.g. risky sexual behaviour, violence) and experiencing more negative consequences from such alcohol (e.g. more severe hangover) (Brache & Stockwell, 2010; Ferreira, Tulio de Mello, Pompeia, & de Souza-Formigoni, 2006; Howland et al., 2010; Jones & Barrie, 2009; Jones, et al., in press; Marczinski & Fillmore, 2006; O'Brien, et al., 2008).

Although limited research examining the use and harms of AED has been conducted in North America and Europe, no such research is currently available within the Australian context. Aside from one recent qualitative study, there is no Australian data available on the relationship between energy drinks and alcohol, nor their potential link with intoxication, violence, risk-taking, lost productivity, injury and hospital attendance. There is also very little research available regarding the social and cultural contexts of AED consumption. Indeed, little is known about the self-perceived benefits of combining these beverages, nor in what ways, amounts, patterns, frequencies and locations they are being used. Finally, no information exists around the serving practices and marketing of these products, nor the challenges that arise from AED use for emergency service staff, venue staff, health workers and policy makers. This small pilot project attempts to develop the beginnings of an evidence base around some of these issues.

The aims of the study are:

1. To explore AED consumption patterns among consumers.
2. To explore the physical and social contexts in which AED are consumed in combination.
3. To explore the risks and harms associated with AED consumption.
4. To examine the challenges that AED pose for venue management and emergency services (including ambulance, accident and emergency and police), and to examine the current responses by these stakeholders.
5. To recommend possible interventions for the prevention of risks and harms associated with AED consumption based on improved understanding of the patterns, contexts and harms of use.
6. To provide policy-relevant advice to regulators about minimising the risks and harms associated with the use of AED.

Methods

There were three qualitative data collection components employed in this pilot study: five discreet sessions of observation in licensed venues, in-depth interviews with 10 regular consumers of AED and in-depth interviews with 12 'key informants' (including venue staff, emergency services personnel, community health workers and policy makers). Data were stored and analysed using NVivo8, a qualitative software package that enables thematic and content analysis of large amounts of text. Analysis was shaped by the themes arising, and was also informed by the themes derived from the literature review. Data was triangulated, examined for regularities, variations and contrasts between and within the different sources and methods.

Results

There were eight main themes that were drawn out of the three data collection methods:

1) AED consumption practices. Interestingly, participants were highly organised in their AED consumption practices and reported rarely altering this routine. This routine had become a learned experience, one that participants had established after a trial and error phase early in their use of AED. This learned routine was based on achieving maximum benefits from AED and avoiding or minimising negative consequences from use. The most commonly reported AED consumption practice involved the consumption of between three and five AED over the course of the night, beginning with one or two at the beginning of an evening as an initial 'booster' followed by a period of non-AED use (such as beer, wine and spirit consumption), followed by AED use again later in the evening (around midnight) when they began to feel tired or were drawn to a beverage with a sweeter taste. This usually involved

drinking between two and five AED; the most popular combinations included ‘bombs’ such as Jagerbombs or Skittlebombs (Cointreau and energy drinks) or mixers of vodka and energy drinks.

2) Normalisation of AED. One of the main themes that arose from interviews was that combining energy drinks with alcohol is now a normalised phenomenon. When asked how many of their friends consumed AED, interviewees reported between 50 to 100%. Interviewees also noted that they can now purchase these combined drinks in all licensed venues (which was the not the case a number of years ago). Interestingly, while it was expected that energy drinks would be more popular within certain types of licensed venue environments such as nightclubs, participants noted that they enjoyed drinking AED in the home, at local suburban pubs, and also in city bars and clubs. Emergency services staff suggested that AED had become so normalised that they when they treat people who are intoxicated from alcohol, consumers do not think to pass on information about having mixed energy drinks with alcohol.

3) Marketing and promotions. It was commonly observed, both among consumers and key informants, that energy drinks are marketed cleverly, and are highly associated with fun and energy. The link between energy drinks and extreme sports was specifically highlighted. Reference to the positive marketing of energy drinks were often contrasted with an absence of public messages about the negative consequences of energy drink use. No reference to the marketing of alcohol in combination with energy drinks was noted.

Red Bull was the brand of energy drink that was most commonly observed during sessions of observation and consumers reported noticing Red Bull imagery in most of the licensed venues they frequented. Perhaps as a consequence of this brand saturation, all ten participants said that Red Bull was their preferred energy drink to mix with alcohol.

The other key element to this was that young people were extremely attracted to promotions on energy drinks and AED. Participants said they were more likely to consume energy drinks and AED when they were discounted. Most venues sold AED for between $11 and $15; however, there were some “Uni pubs" and bars within “backpacker” accommodation where participants reported being able to buy discounted AED for between $5 and $7.

4) Benefits of AED use. Five primary benefits of AED were acknowledged:

- AED promote wakefulness and energy and thus enable people to continue drinking and having fun instead of going home.
- Taste. AED are sweet and palatable, particularly after drinking beer and wine. Jagerbombs taste better than many other forms of shots.
- Energy drinks counteract the drowsy effects of the alcohol. Participants drew a distinction between drowsy, sleepy, drunkenness and wakeful, energetic drunkenness.

- AED facilitates intoxication over just alcohol alone. This comment was particularly in relation to 'Jagerbombs' and 'Skittlebombs' (and other types of 'bombs') because these drinks are 'chugged' or 'skolled' and so consuming these drinks enabled reaching intoxication at a faster pace. Participants also noted that when they consumed a 'bomb' they also bought a 'chaser' (such as a beer), so they were consuming more drinks at a faster pace.
- The social aspect of consuming 'bombs' together at the bar was considered a benefit. Participants noted that the consumption of 'bombs' facilitated social interaction and humour by virtue of attending the bar together in a group, dropping the shot of liquor into an energy drink and skolling to see who could finish first.

5) Energy drinks as substitution for illicit stimulants. One theme that came up regularly among consumers is that energy drinks were often used in place of illicit stimulants, such as methamphetamine or cocaine. This is not to say that the effects of energy drinks are the same as illicit stimulants – because participants pointed out that energy drinks are not associated with the 'rush' and 'buzz' of illicit stimulants – but rather that energy drinks and illicit stimulants share some properties, such as wakefulness and counteracting the drowsy effects of alcohol.

6) Negative consequences of AED use. There were five types of problems reported by participants as a consequence of AED use:

- Difficulty sleeping. Participants noted after consuming AED it was common for them fall asleep when they arrived home from a licensed venue, but would then wake up after a number of hours (between one and six) and not be able to get back to sleep. It may be that alcohol is facilitating sleep initially but that when the effects of alcohol wear off the caffeine effects take over and prevent sleep.
- Worse hangover the day after consuming AED as compared with alcohol alone. It was suggested that this was likely due to dehydration, with caffeine and alcohol both diuretics.
- Increased heart rate, palpitations and shakiness in the hours following consumption.
- AED made it more likely that consumers would vomit both on the night and during the next day (as compared to occasions when they consumed alcohol alone).
- A small number of participants noted that consuming AED would negatively affect their sleeping patterns and routine for a number of days following use.

7) Challenges for key informants. Venue managers did not attribute any harms or unwanted behaviour to the consumption of AED. Emergency services personnel offered varying levels of concern about AED, with a paramedic and a harm reduction worker observing that the combination was associated with increasing presentations to ambulance and harm reduction stalls at music festivals, but an emergency department physician and police officer noted few problems associated with the combination. It was suggested that both

ambulance and emergency department processes be revised to screen for caffeine and energy drinks as neither do at present.

Community healthcare workers expressed concern about increasing anxiety in clients with mental health issues as a result of consuming energy drinks and AED. Another issue raised by community health workers was that young people (under the age of 18) found AED particularly appealing given their sweet, palatable taste and that young people did not understand that energy drinks were a stimulant; and it was hard for young people to effectively tease out the properties of energy drinks when they were still experimenting with alcohol.

Policy makers noted that the issue of AED was currently on the state government's radar, particularly given recent press coverage around AED and also recent calls from the Alcohol Policy Coalition to have the Foods and Safety Act re-examined. The main message that was presented by policy makers was that despite the many vested interests calling for regulatory action on AED, there is currently insufficient evidence regarding the harms of AED to make such changes. They indicated that more research is the main priority.

8) Awareness raising needed. Poor awareness of the harms associated with energy drinks and AED were commonly noted. Only two consumers and two key informants were aware of the recommendations around the maximum number of energy drinks that should be consumed daily. The following five activities were offered as suggestions, both by consumers and key informants as to increasing public awareness of the potential harms associated with AED use:

- Mass media campaigns
- Posters in nightclubs
- Education for venue staff
- General awareness raising for emergency services personnel and health workers
- Adding energy drinks and AED to school drug education programs

Discussion

This pilot project has attempted to develop the beginnings of a knowledge base around AED use in Australia. The use of AED is significantly under-researched both in Australia and internationally, and this is only the second qualitative study to our knowledge that has been conducted on this topic in the world. In particular this project has attempted to explore the social and cultural contexts of AED consumption in Australia, and describe the patterns of use, benefits and negative consequences of AED use among a sample of young consumers. This project has also attempted to investigate the impact that AED have on various industries, such as emergency services, healthcare and on-premise licenses, as well as explore the policy context of AED and potential policy and regulatory responses.

It appears that combining energy drinks with alcohol is now a normalised phenomenon. Given the apparent normalisation of AED, it is important that more research be conducted in this area. Most participants interviewed as part of this research consumed between three and five AED on a typical night out, while a smaller number reported consuming between ten and fifteen AED on a typical night out. Even those who drank less AED were still consuming above the maximum recommended daily number of energy drinks, and most consumers and key informants were unaware of these recommendations.

A body of work has explored the way that energy drinks (with and without alcohol) are carefully and selectively marketed to young people. These findings were indeed supported in this research, and this was contrasted by both consumers and key informants with an absence of public attention to the potential harms of AED. Consumers in particular wanted more information about the harms so they could make informed decisions about their continued use of AED.

Other countries have implemented a range of precautionary measures in relation to AED that might be considered in Australia. For example, in Europe energy drinks are required to have a 'high caffeine content' label and Canada requires labelling on energy drinks stating that it should not be mixed with alcohol. In Norway, only pharmacies are permitted to sell energy drinks (Reissig, Strain, & Griffiths, 2009). In Ireland, the 'Stimulant Drinks Committee' recommended that energy drinks should be labelled with an indication that they are unsuitable for children (under age 16), pregnant women and individuals sensitive to caffeine. This committee also suggested that labels should caution against combining energy drinks with alcohol and against the consumption of energy drinks during or after sport/exercise because they are not hydration agents and in fact are likely to cause dehydration (Finnegan, 2003). In sum, it appears that potential avenues for regulatory action include better labelling, restriction of energy drinks to people underage, restrictions on the place and sale of energy drinks and controlled advertising (Reissig, et al., 2009). To what extent this extends to AED is still unknown.

In 2010, the Victorian Department of Justice issued a set of guidelines for responsible liquor advertising and promotions (www.justice.vic.gov.au). These guidelines include things such as: "the advertising or promotion of liquor involving 'happy hours', free drinks or discounted drinks must have reasonable limits and controls to minimise the risk of rapid, excessive or irresponsible consumption of liquor" and "the advertising or promotion of liquor must not suggest any association with risk taking". However, there is no mention of AED promotions in these guidelines. Given that it was noted in this research that young people were more likely to consume AED when they were promoted and/or discounted, we recommend that these guidelines be altered to include promotions on AED. We also propose that these guidelines be developed across all states. A second policy option that we recommend is that, given that energy drinks are labelled with a warning stating that a maximum of two energy drinks should be consumed daily, pre-packaged alcohol energy drinks should be labelled the same way.

In this study, consumers and key informants were less concerned about regulatory approaches and more concerned with raising awareness of the harms of AED, and avenues for potential exploration included raising awareness at a population level through mass media campaigns, or targeted awareness to venue staff, consumers of licensed venues (using posters) and to children in schools as part of the standard alcohol and drug curriculum. Given the significant costs associated with mass media campaigns, our recommendation would be that targeted awareness be the priority, beginning with young people in schools who are likely to be approaching, or are in the early stages of, the experimentation phase of energy drink and AED consumption, followed by information and posters within licensed venues and education to emergency services personnel and health workers. At the very least, all of these awareness raising activities should incorporate a visible and prominent message about the recommended maximum number of energy drinks that should be consumed daily.

It is important to note that there are many limitations of this study. In particular, the sample was too small to generalise the findings to all young consumers of AED. In addition, the participants in this research were recruited using a convenience sampling approach. Future research should be conducted in larger samples using both purposive and random sampling approaches.

Future research directions:

- Clearly, further research is required to explore the social and cultural contexts of AED use, patterns of consumption, benefits, harms and challenges to different service industries. Future research should be conducted in larger and more diverse samples, including various sub-groups of AED users.

- Australia must begin to regularly collect AED prevalence data at a population level. One suggestion would be to add questions about energy drink use and AED use to national surveys such as the National Drug Strategy Household Survey.

- Future research should focus on young people who are still in the early period of experimentation with AED; particularly people under the age of 18.

- Future research should investigate the use of AED among people attending University, people attending ‘schoolies’ celebrations and other groups of people planning to consume large amounts of alcohol over consecutive days.

- Changes should be made to the coding structures of hospital and ambulance data systems so that energy drinks are routinely screened for and analysis of this data can be undertaken.

- Rigorous randomised controlled trials need to be conducted to investigate the physiological and psychological effects of AED on different groups of the population, at different quantities and across different beverage types.

Chapter 1:
Introduction

1.1 Background

Caffeinated energy drinks (hereafter referred to as 'energy drinks') are beverages that are designed to provide a boost of energy or enhance alertness (Miller, 2008a; O'Brien, et al., 2008). The three most popular types of energy drinks in Australia are 'Red Bull', 'V' and 'Mother'. Red Bull claims to "vitalise body and mind", V "stimulates your mental and physical energy" and Mother is the "mother of all energy kicks".

Energy drinks are sold in cans ranging from 250mL to 500mL in size, but smaller bottles or 'shots' of concentrated energy drinks are also increasingly available. Energy drinks first appeared in Europe and Asia in the 1960s but did not become popular until the most widely known brand, Red Bull, was released in Austria in 1987; hitting the US market in 1997. By 2006 there were over 500 brands of energy drinks around the world, with sales exceeding $500 million per annum in the US (Miller, 2008b).

Energy drinks contain a range of ingredients including caffeine, plant-based stimulants (e.g. guarana), sugar, glucuronolactone, amino acids (e.g. taurine), herbs (e.g. ginkgobiloba) and B vitamins (O'Brien, et al., 2008). The standard energy drink contains 80mg of caffeine, which is equivalent to one strong cup of coffee. However, some brands of energy drinks increase the amount of caffeine (to over 500mg or 170mg per fluid ounce) by inclusion of various natural sources of caffeine such as guarana, yerba mate and flavouring from coca leaves (Kuhns, Clodfelter, & Bersot, 2010; O'Brien, et al., 2008; Reissig, et al., 2009).

Guarana, a native South American plant, is a substance chemically similar to caffeine, with comparable stimulant effects. Guarana contains around twice the stimulant strength of caffeine and is more slowly absorbed into the gastrointestinal tract than caffeine and thus is said to have a longer-lasting effect (Finnegan, 2003). Taurine is an amino acid, naturally produced in the body. There is some evidence that taurine improves brain function and exercise performance, as well as lowers blood pressure. Some energy drinks contain more than ten times the average person's suggested daily limit of taurine, which is between 40 and 400mg (Finnegan, 2003). Glucuronolactone is a naturally occurring metabolite formed from glucose. It is thought to fight fatigue and provide a sense of well-being. In some energy drinks, the amount of glucuronolactone is more than 250 times the amount found in other food sources (Finnegan, 2003).

Alcohol and Energy Drinks

Around the early 2000s, energy drinks became a popular mixer with alcohol, particularly with spirits such as vodka and Jagermeister, and in 2003 pre-packaged or 'ready-to-drink' alcohol energy drinks (AED) were introduced (Jones, et al., in press; Reissig, et al., 2009).

There is very little prevalence data available on the use of AED aside from three international studies which have measured their popularity among university students. In the US, a web-based survey of 4271 university students showed that 24% of current drinkers reported consuming AED in the past month (O'Brien, et al., 2008). This is consistent with a Canadian online survey of 465 university students, which showed that 26% of current drinkers reported consuming AED in the past month (Brache & Stockwell, 2010). In Italy, nearly half (48.4%) of a sample of 450 students reported using AED in the past month and 36% of students reported using AED more than three times in the past month (Oteri, et al., 2007).

Prevalence rates of AED use in Australia are unknown, except among regular ecstasy users. Sixty nine percent of regular ecstasy users surveyed as part of the Ecstasy and Related Drugs Reporting System had used AED in the past twelve months. This sample of 756 ecstasy users from around Australia (with a mean age of 24) reported consuming an average of three AED in their last session of alcohol and drug use (Sindich & Burns, 2010), which exceeds the recommended intake of two energy drinks per day (Australia New Zealand Food Authority, 2001).

We also know little about the demographics of AED users and whether there are particular subgroups of the population who are more likely to consume AED. Previous prevalence studies have been limited to university students. The US study found that students who drank AED were more likely to be male, Caucasian, younger and athletes, and the average age of first consumption of AED was 15 years (O'Brien, et al., 2008). In the Canadian study, female students were as likely as males to consume AED (Brache & Stockwell, 2010).

In both the US and Canadian studies, students who consumed AED in the past month reported more than twice as many heavy episodic drinking days in the past month and drank significantly more during a typical session than those who reported consuming alcohol alone (Brache & Stockwell, 2010; O'Brien, et al., 2008). This finding has also been found in an emergency department study (Price, Hilchey, Darredeau, Fulton, & Barrett, 2010). A portal study, in which young people were interviewed and breathalysed leaving licensed venues between 10pm and 3am, showed that participants who had consumed AED were 3.3 times more likely to have a blood alcohol concentration of 0.08 or more than those drinking alcohol alone, and were more likely to exit the venue later in the evening, had engaged in drinking for a longer time and had consumed more drinks (Thombs et al., 2010).

Interestingly, Brache and Stockwell (2010) found a significant association between the consumption of AED and illicit stimulants, with those who reported consuming AED also

engaging in more cocaine, amphetamine and ecstasy use in the past twelve months than those who had not consumed AED (Brache & Stockwell, 2010).

Motivating factors of AED use

Very few studies have been conducted investigating the reasons why people consume AED and the benefits that they receive from this beverage combination. In an online survey of US students, 55% of students reported mixing energy drinks with alcohol to hide the flavour of alcohol and 15% reported mixing the combination to be able to drink more and not feel as drunk (O'Brien, et al., 2008).

Only one qualitative study has been conducted investigating the motivations for use of AED, and this is the only published Australian study on AED (Jones & Barrie, 2009; Jones, et al., in press). This study, which involved focus groups among 21 university students aged 18-25 years, showed that the majority of young participants reported drinking AEDs to help keep themselves awake and alert so that they could continue drinking and socialising for a longer period of time. In particular, AEDs were popular at the beginning of the night to provide an initial energy boost, and also later in the evening to provide a boost when it was past their usual bed-time or when alcohol intoxication induced tiredness (Jones, et al., in press).

Participants in this study also noted being attracted to the high alcohol content of ready-to-drink AEDs and drank AEDs to accelerate intoxication. In particular participants noted that AEDs provided an extra psychoactive effect above and beyond alcohol. Drawing on previous work on drinking among young people (Measham & Brain, 2005), Jones et al. note that the desire for bigger and better effects are important in a 'culture of intoxication'. In particular, participants noted that intoxication from drinking AED was more appealing because the effects were a wakeful drunkenness – as distinct from 'normal drunkenness' which was not associated with the same levels of "energy" and "invincibility" (Jones, et al., in press).

Other advantages of AEDs noted by the sample (which is consistent in other research among ready-to-drink beverages) included taste, palatability, portability and convenient packaging (Measham & Brain, 2005). Further, the clever marketing of AEDs, with tantalising brand names, bright colours and provocative imagery contributed to their symbolic status as 'cool'. Participants noted that these drinks were marketed heavily in bottle shops and in pubs and clubs. The social bonding aspect of drinking AEDs was also noted as a factor in their popularity (for example, the group consumption of 'Jagerbombs'), and this aspect was noted to be exploited in the marketing and promotions of these drinks (Jones & Barrie, 2009; Jones, et al., in press).

Harms of Energy Drinks

There are a number of harms related to energy drinks alone, and also in combination with alcohol, which have been established in the literature. Health problems associated with energy drinks alone relate to excessive caffeine intake, particularly if people are consuming more than 200mg of caffeine daily. Symptoms of excessive caffeine consumption (or poisoning) include insomnia, nervousness, headache, nausea, vomiting, tachycardia and palpitations (Clauson, Shields, McQueen, & Persad, 2008). In large amounts, guarana is associated with many of the same adverse effects of caffeine, including insomnia, tremors, anxiety, palpitations, urinary frequency and hyperactivity (Finnegan, 2003). While taurine and glucuronolactone are not necessarily harmful when consumed alone, it is widely regarded that there is insufficient data regarding their potential synergistic effects with one another, or with caffeine and guarana (Finnegan, 2003; Reissig, et al., 2009; Thombs, et al., 2010).

Between 2004 and 2006, there were 41 reported cases of adverse reactions from energy drinks in the US. Common symptoms included nausea/vomiting, tachycardia, hypertension, agitation, tremors, dizziness and chest pain (Reissig, et al., 2009). In some cases, energy drink consumption has been associated with death (Clauson, et al., 2008). This is most often in the context of consumption during or after sport. Energy drinks were banned in France and Denmark after a number of deaths associated with energy drinks were reported. In Ireland, an 18 year-old male died after consuming four cans of Red Bull during a basketball tournament. In Sweden, three people have died from consuming energy drinks, one after consuming several cans following a gym workout and two after mixing it with vodka (Finnegan, 2003).

Harms of AED

There is a substantial and growing international literature emphasising the harms associated with AED. For example, the web-based surveys conducted in the US and Canada showed that those students who consumed AED (as opposed to alcohol without energy drinks) were more likely to have experienced negative consequences from a session of drinking. They were at increased risk of passing out from drinking or drug use, taking advantage of someone else sexually or having been taken advantage of by someone else sexually, having unprotected sex with someone who was not well known, riding home with a driver who had been drinking, been in a verbal fight and been injured or hurt in the past twelve months (Brache & Stockwell, 2010; O'Brien, et al., 2008).

The negative effects of AEDs as reported by Australian University students who participated in focus groups included difficulty sleeping, worse hangovers than when consuming alcohol without energy drinks, aggression and violence. Increased aggression and violence, as well as worse hangovers were thought to be the result of energy drinks creating the perception of wakefulness and thus facilitating more alcohol consumption than usual. Energy drinks were noted to mask the effects of intoxication so that the students did not feel as inebriated as they

might have otherwise, until later when participants realised how drunk they were. Other harms as noted by participants as a result of consuming AEDs included heart palpitations, black outs, vomiting, twitching, and even admission to hospital. Despite the harms noted by the sample, they did not appear to act as a deterrent to their consumption (Jones & Barrie, 2009; Jones, et al., in press).

Several studies have confirmed that consuming energy drinks – and caffeine and taurine in other sources – moderately improves cognitive performance (concentration, reaction time, short-term memory, attention and verbal reasoning) and physical performance (endurance) for a short period of time (Alford, Cox, & Westcott, 2001; Warburton, Bersellini, & Sweeney, 2001). However, whether such moderately positive effects are experienced by people consuming caffeine and taurine with alcohol is unknown. A number of well-controlled trials have attempted to address the question of whether combining alcohol with energy drinks increases alertness and cognition in the same way that it is does without alcohol.

A well-controlled trial testing the breath alcohol intoxication, subjective evaluation of intoxication and objective effects on motor coordination and visual reaction time among those who had consumed alcohol alone and AED showed that AED reduced participants' perceptions of headache, weakness, dry mouth and impairment of motor coordination. However, energy drinks did not reduce the deficits caused by alcohol on objective motor coordination and visual reaction time and did not alter breath alcohol concentration (Ferreira, et al., 2006). A second study measuring the effect of alcohol and caffeine on a psychological task and reaction time showed that the co-administration of caffeine had no effect on the degree to which alcohol increased errors on these tasks; however, subjective measures of intoxication showed that caffeine did reduce participants' perceptions of intoxication (Ferreira, et al., 2006). A third well-controlled trial testing the effect of caffeine on driving performance among those who had consumed alcohol showed that the addition of caffeine to alcohol did not enhance driving or sustained attention/reaction time compared with alcohol alone (Howland, et al., 2010).

In summary, it is important to note that while combining energy drinks or caffeine with alcohol may reduce subjective perceptions of alcohol-induced impairment, there is no evidence to suggest that co-ingestion reduces objective measurements of impairment. This is particularly concerning because becoming desensitised to the effects of alcohol, with alcohol impairment remaining the same, may increase the potential for alcohol-related harm, including alcohol poisoning, risk-taking and injury (Thombs, et al., 2010).

1.2 Rationale for the current study

Although limited research examining the harms of AED has been conducted in North America and Europe, no such research is currently available within the Australian context. Aside from one recent qualitative study, there is no Australian data available on the relationship between

energy drinks and alcohol, nor their potential link with intoxication, violence, risk-taking, lost productivity, injury and hospital attendance. There is also very little research available regarding the social and cultural contexts of AED consumption. Indeed, little is known about the self-perceived benefits of combining these beverages, nor in what ways, amounts, patterns, frequencies and locations they are being used. Finally, there exists no information around the serving practices and marketing of these products, nor the challenges that arise from AED use for emergency service staff, venue staff, health workers and policy makers. This pilot project attempts to explore some of these issues.

1.3 Aims of the current study

1. To explore AED consumption patterns among consumers.
2. To explore the physical and social contexts in which AED are consumed in combination.
3. To explore the risks and harms associated with AED consumption.
4. To examine the challenges that AED pose for venue management and emergency services (including ambulance, accident and emergency and police), and to examine the current responses by these stakeholders.
5. To recommend possible interventions for the prevention of risks and harms associated with AED consumption based on improved understanding of the patterns, contexts and harms of use.
6. To provide policy-relevant advice to regulators about minimising the risks and harms associated with the use of AED.

Chapter 2:
Methods

This study utilised qualitative research methods. There were three data collection components employed in the research, which allowed for triangulation of data sources. These were: five discreet sessions of observation in licensed venues, in-depth interviews with 10 consumers and in-depth interviews with 12 'key informants'. Ethics approval to conduct the study was granted by Eastern Health Research and Ethics Committee.

2.1 Observation

Five sessions of observation were conducted over five separate weeks in a variety of licensed venue-types in Melbourne, including pubs, bars and nightclubs. During sessions of observation, particular attention was paid to:

- the level of alcohol and AED promotion;
- serving practices of alcohol and AED;
- frequency and combinations of AED consumption and consumption behaviours (i.e. 'shots', 'rounds', 'chugging');
- specific behaviours such as dancing, talking, humour, annoyance, aggression, violence and other such behaviours;
- experience of harms, and harm reduction measures employed by patrons (i.e. drinking water, helping friends); and
- behaviour of venue staff, including security staff, bar staff and venue managers, including the 'policing' of intoxicated behaviour (i.e. removing patrons, talking to patrons, intervening in arguments).

Observations involved interaction with patrons where possible. In each venue, a number of particular groups of people were selected for detailed observation of consumption and other behavioural habits, but the general behaviour of all patrons were noted where possible. Sessions of observation were as unobtrusive as possible to maximise the naturalistic setting.

Detailed notes were taken during and immediately following sessions of observation. When notes were taken during a session of observation they were done so in a concealed way (i.e. on an i-phone) so as to ensure the setting remained naturalistic and those being observed were unaware of this practice.

2.2 Interviews with consumers

In-depth qualitative interviews were undertaken with 10 young people who regularly consumed more than two AED during a session of alcohol use. Participants were recruited by a process of email snowballing. An email was sent out to personal contacts with a direction to forward the email on to personal networks. The email invited eligible participants (over the age of 18, regular consumers of AED) to contact the research coordinator if they were interested in participating. This method proved successful in eliciting a wide response.

Interviewees were screened over the telephone to ensure they regularly consumed AED and then a time was made to conduct the interview at a private and convenient location for the interviewee. All participants signed a written information and consent form prior to commencing the interview, which was digitally recorded and professionally transcribed.

The interview schedule was semi-structured, enabling a certain level of control over the questions while also allowing responses to dictate the flow of conversation and issues arising.

During interviews there was a consistent focus on identifying the practices, motivations, harms and risks associated with AED consumption. Interviews lasted for around 30 minutes. Participants were reimbursed $30 to compensate for time and travel costs.

Six of the interviewees were male and the average age of interviewees was 25 (range 21-31). Interviewees either worked (n=8) or studied (n=2) full time and either owned their own home (n=1), lived in a rental property (n=7) or lived with their parents (n=2).

2.3 Interviews with key informants

In-depth interviews were also undertaken with 12 ‘key informants’. Key informants were sourced via the personal contacts of the authors and through a process of snowballing (i.e. one key informant would recommend another). In some cases, key informants were contacted via generic email (i.e. to bar managers and venue owners through the ‘general information’ email available on their website).

Interviewees were initially emailed and sent a plain language statement, and then a time was organised to conduct the interview at a private and convenient location for the interviewee. Interviews lasted from 20 to 60 minutes. Interviews were digitally recorded and professionally transcribed except in three instances (due to complications with the digital recorder or because the interview was done in an impromptu manner over the phone). In these instances detailed notes were taken.

The interview schedule was semi-structured, enabling a certain level of control over the questions while also allowing responses to dictate the flow of conversation and issues arising.

Interviews focused on professional observations of AED consumption, challenges that AED consumption provides for their work and their current procedures and needs regarding AED consumption.

Key informants included four venue staff from three venues (one pub, one bar and one nightclub), two representatives from the Victorian Department of Health, one paramedic, one emergency department physician, one police officer, one peer educator/harm reduction worker, one youth outreach worker and one dual diagnosis clinician.

2.4 Data analysis

Data collected via observation and in-depth interviews were stored and analysed using NVivo8, a qualitative software package that enables thematic and content analysis of large amounts of text. Analysis was shaped by the themes arising, and was also informed by the themes derived from the literature review. Data was triangulated, examined for regularities, variations and contrasts between and within the different sources and methods.

Chapter 3:
Results

The results chapter is structured by the most common themes that were drawn out of the thematic data analysis and informed by the themes derived from the literature review.

3.1 AED consumption practices

Participants were asked to describe their patterns of consumption of AED on a typical weekend session of alcohol use. Interestingly, participants were highly organised in their AED consumption practices and reported rarely altering this routine. This routine had become a learned experience, one that they had established after a trial and error phase early in their use of AED. This learned routine was based on achieving maximum benefits from AED and avoiding or minimising negative consequences from use. There were three distinct routines that participants described:

1. The first routine, which was discussed by the majority of participants (seven of the ten) involved the consumption of between three and five AED over the course of the night, beginning with one or two at the beginning of an evening (often at home after work or sport), followed by attending a licensed venue, which involved a period of non-AED use, usually a number of hours of drinking beer, wine and/or spirits with softdrink. Participants returned to AED use later in the evening (often around midnight) when they began to feel tired or were drawn to a beverage with a sweeter taste. This usually involved drinking between two and five AED; the most popular combinations included 'bombs' such as Jagerbombs or Skittlebombs (Cointreau and energy drinks) or mixers of vodka and energy drinks. Often AED were interspersed with other drinks over a number of hours to prolong the evening. For example:

> "I'll often have one [Jagerbomb] before I go out or when I first get to the pub, and then I'll have maybe five or six beers before I start drinking spirits, such as bourbon and coke or vodka and some type of drink and mixed drinks or, and then usually have one [vodka with energy drink] when I start to get tired, around midnight, or I start to get sick of other drinks. Because I like the taste of it so much, I'll have it when I start to get sick of other things, but also when I start to get bored with the night or, or get tired. I find it gives me a pick-me-up and I can, I feel much more energetic and have more fun again" (Male 28 years).

All seven of these participants noted that they restricted themselves to between three and five AED a night so that they would not have trouble sleeping or would not feel too unwell the following day.

2. One participant's routine was quite different from this. This participant said he consistently drank Jagerbombs all night, from when he first arrived at the pub until he left. He said that every time it was his shout he would order a round of beers and a round of Jagerbombs, and his mates did the same. This resulted in him consuming around ten Jagerbombs (and ten beers) a night.

3. The final two participants were illicit drug users (methamphetamine, cocaine and/or ecstasy) and both of these consumers reported drinking AED before they departed for a licensed venue (at home), along with a few lines of speed. One of these participants then drank Skittlebombs all night (around 8-10) and the other drank beer and spirits before switching to vodka and energy drinks (consuming around 10-12). He also drank a number of Jagerbombs throughout the evening:

> "Usually just start off drinking beer to start the night and then probably move on to like a bourbon or a scotch or something like that. Maybe have a couple of lines of speed just before going out and then as we get out I probably get onto Red Bull and vodka, that's pretty easy to drink and you can pretty much drink them all night and not feel sick [...] Yeah pretty much every time we go out we have Jagerbombs and just to start the night off or whatever" (Male, 29 years).

These patterns of consumption were supported by sessions of observation. The most noticed practices of consumption during sessions of observation were 'bombs' because they involved the group consumption of these drinks at the bar, and often involved group banter, skolling and cheering. Vodka mixed with energy drinks was also clearly visible but patrons tended to drink these more slowly.

The only exception to these routines of AED use was noted by men when they attended a 'football trip' or some sort of equivalent 'boys weekend'. This generally involved a group of around 20 men going on vacation for a weekend and consuming alcohol for most of the trip. Two men reported that during such occasions energy drinks would often be consumed with beer throughout the day. For example:

> "For example if you start on a, if you start drinking on a Friday for example when you go away [...] You start drinking beer that day, and then I'll drink vodka and Red Bull that night, throughout the night because it would generally be a long day and a long night. Then the next day, Saturday, and it's the same on the Sunday, you sort of get up and you have breakfast and you tend to go to a pub and start drinking again at about nine or ten in the morning and the beers are a bit rough at that hour of the morning after a big night so, usually pretty early on I'll start just putting a little bit of Red Bull in it just to ah, make the flavour of beer taste better and allow me to, and give me, once again give me a pick up and allow me to keep drinking beer all day. So it's almost a cheap, a cheaper way of being able to drink beer all day instead of having to drink expensive spirits all day. Then at night I'll switch back to the vodka Red Bulls" (Male, 28 years).

Two other males and one female commented that when they were at University they often added energy drinks to their jugs of beer. Apparently this is called the “party jug” and is particularly popular among University students because beer is the cheapest form of alcohol, and energy drinks make the beer taste sweeter, and also allows them to keep drinking for longer, particularly if they have gone out drinking two or three nights in a row.

3.2 Normalisation of AED

One of the main themes that arose from interviews was that combining energy drinks with alcohol is now a ‘normalised’ phenomenon. Normalisation refers to a process whereby an activity is seen as ‘normal’, or at least is a standard or taken-for-granted activity. In order to suggest that an activity has become normalised, it must be shown that the activity has become widespread and a range of audiences understand the activity as normal (Rief, 2009; Shiner & Newburn, 1999). Indeed, in this study, both consumers and key informants discussed the normalisation of AED.

When asked how many of their friends consumed AED, interviewees reported between 50 to 100%. Interviewees also noted that it is now possible to purchase AED in all licensed venues – whereas a number of years ago some venues did not sell energy drinks. It was suggested by one participant, that although she had been drinking AED for “nearly ten years”, she had only noticed the drink had become normalised in the past two or three years:

> “It has become far more popular to use alcohol and energy drinks combined, definitely the last 18 months, probably started closer to three years. There seems to be more of energy drinks available and they seem to become, they are now essentially standard fare in the, in most clubs. Yeah or you go to some of the big clubs and the fridge is just essentially just all, the only thing you can see is energy drinks essentially” (Female, 29 years).

A peer-educator, who often spent time in nightclubs providing harm reduction advice to patrons noted:

> “Jagerbombs are highly popular and anyone who goes to a nightclub would know that they are probably one of the most sold drinks at a nightclub”.

In support of this view, a venue worker commented that the reason they sell AED is because of the high demand for it:

> “If we didn’t sell Jagerbombs and energy drinks, we’d be neglecting what our customers want and risk losing business. The reason we sell energy drinks is because there is a demand for it”.

Both a paramedic and a harm reduction worker commented that AED had become so normalised that they when they ‘treat’ people who are intoxicated from alcohol, consumers do

not think to pass on information about having mixed energy drinks with alcohol. A harm reduction worker commented:

> "It has become quite normal, no one would actually come to us telling us that they have taken energy drinks and alcohol because it's nothing to tell, it's normal. It's like saying 'I drank vodka with coke'".

Similarly, a paramedic commented:

> "When you ask how many drinks people have had, they just start reeling off how many drinks they've had. It doesn't even occur to them to tell you they've also combined energy drinks, because it's just so normal".

The same paramedic also noted that energy drinks (without alcohol), are extremely popular among school-aged children:

> "More and more people are drinking this stuff on quite large scales … you don't have to go to too many high schools to know that if you're in year nine and above that they'll drink four or five of these in a day and that's not consistent with what the manufacturers are recommending".

Interestingly, while it was expected that energy drinks would be more popular within certain types of licensed venue environments such as nightclubs, participants noted that they enjoyed drinking AED in the home (some always kept the fridge stocked with a six pack of energy drinks and a bottle of Cointreau or Jagermeister so they could have 'bombs' before they went out), at suburban pubs, and also in city bars and clubs. The only place where it was noted that AED were unavailable were local sporting clubs. This finding was supported by the sessions of observation, in which AED were as popular in pubs as they were in nightclubs (with at least three groups of people drinking 'bombs' and vodka AEDs in both types of venues).

3.3 Marketing and promotions

It was commonly observed, both among consumers and key informants, that energy drinks and AED are marketed cleverly. One consumer noted that with alcohol, people are regularly exposed to messages about both the benefits and negative consequences; however, with energy drinks and AED, there is no information about the negative consequences. In contrast, energy drinks and AED are associated with fun and energy. For example, one youth worker commented:

> "The views I got from young people were that energy drinks are a fun, well marketed drink for young people that gives you a little bit of a boost, nothing else than that. You know, the association is with, high energy, extreme sports and it's extremely clever as far as a marketing sense goes. These young people weren't

> aware of any real dangers associated with it... Young people are all about marketing, and because of this they will sell, and sell well".

Given the degree at which this youth worker believed that marketing was a clever way to tap into young people, she suggested that a marketing campaign targeting the harms of mixing these drinks with alcohol would be influential in reaching young people.

The young people interviewed as part of this research did not readily reflect on the advertising of energy drinks in combination with alcohol. More commonly, they reflected on brand identification, and even brand saturation. Red Bull was the brand of energy drink that was most commonly observed during sessions of observation. Red Bull branding was evident in almost all licensed venues, from posters, to bar towelling, to Red Bull ice buckets, to Red Bull fridges. When asked about the marketing of energy drinks, all ten consumers reported that they noticed Red Bull imagery in most of the licensed venues they frequented. For example:

> "Red Bull's pretty much everywhere. Like all the fridges would have to have Red Bull in it and Red Bull signs all over it" (Female, 23 years).

Whether this brand saturation is linked to brand preference was not explicitly investigated; however, seven of the ten participants interviewed identified Red Bull as their preferred energy drink (with two saying 'V' and one saying 'Mother'). However, when asked which energy drink they preferred to consume with alcohol, all ten said that Red Bull was their preference with alcohol.

The other key element to this was that young people were extremely attracted to promotions on energy drinks and AED. It was consistently reported by consumers that service stations often have promotions on energy drinks; for example, two cans for $5 or buy one, get one free. Service stations were also noted to sell cans for $1 on selected days. In terms of promotions on AED, most consumers noted that the licensed venues they frequented did not regularly offer discounted AED. However, two consumers reported that "Uni bars" and bars within backpacker accommodation were the two types of venues where you could commonly find discounted AED, from between $5 and $7 (as opposed to between $11 and $15 in other venues). Others commented that although they often didn't see cheap or discounted AED, many licensed venues have signs or blackboards listing all the types of 'bombs' you can buy, and this often encouraged the impromptu consumption of a Jagerbomb or Skittlebomb, or equivalent. For example:

> "If you see a sign then, yeah, you start thinking about it harder [...] If you're in the bar and you see a sign you kind of know you're going to do one later" (Male, 24 years).

3.4 Benefits of AED use

Consumers were asked about the benefits of consuming AED. Participants identified five primary benefits:

1. All ten consumers interviewed noted that wakefulness and energy was the primary benefit of consuming AED. For example:

> "I've found on a Friday you work so you're already tired, so you want something to pick yourself up [...] that's one of the reasons why I like to have them on Friday because you are half asleep" (Male, 24 years).
>
> "I'm getting older, so I definitely want to try and keep up with the crowd, like you can't stay out as long as you used to, so I think it's just an easy option" (Female, 29 years).

It was widely regarded among consumers that energy drinks did not provide a 'rush' or 'buzz' like stronger stimulants (such as methamphetamine or cocaine), but that energy drinks enabled them to stay awake longer.

2. Seven interviewees commented that one of the reasons they consumed AED is because they enjoyed the taste of them. It was particularly common for participants to report switching to vodka AED after a period of drinking beer or wine for a sweeter, more palatable taste. Participants who wanted to increase their alcohol intoxication by consuming shots also noted that they selected Jagerbombs because they were more palatable than other shots, such as tequila, for example.

3. Five participants noted that AED were beneficial because the energy drink effectively counteracted the effects of the alcohol. When discussing this, participants drew a distinction between drowsy drunkenness and wakeful drunkenness; for example:

> "I've just got a lot more energy whilst I'm drunk [when consuming AED]. You're not slurring or a lethargic drunk; you're an energetic, happy drunk" (Male, 24 years).
>
> "You're slightly more energetic and chatty. You get to be less of, like, an inebriated drunk" (Male, 21 years).

4. While some participants noted that AED counteracted the effects of alcohol, four participants suggested that AED facilitated intoxication over just alcohol alone. These participants indicated that energy drinks enabled the faster consumption of alcohol. This comment was particularly in relation to 'Jagerbombs' and 'Skittlebombs' (and other types of 'bombs') because these drinks are 'chugged' or 'skolled' and so consuming these drinks enabled reaching intoxication at a faster pace. Participants also noted that when they consumed a 'bomb' they also bought a 'chaser' (such as a beer), so they were drinking more drinks at a

faster pace. The following comment was made by a participant after she was asked what differentiates a night out when drinking AED from a night without energy drinks:

> "I just get really drunk [when I consume AED]. Because I think it like, it makes, like, you excited, and then you drink more as well. I find if I have them, like I start on them, then I drink more of other drinks as well. Does that make sense? So, like, you're more, like if I just start like, chilled, I'll just like chill on my drink for the night, but if I start like with something hypo then it'll just make me skoll the rest of my drinks" (Female, 23 years).

The following observation also highlights this theme:

> I noticed three males who appeared to be playing drinking games with each other. I overheard a conversation between them and a female at the bar, and it appeared they had been drinking all day at the horse races. I noticed at one point they were skolling Jagerbombs, and they all went in a shout for a round of Jagerbombs straight after one another (three shouts in a row). They were particularly rowdy and seemed to be having a good time. Their energy seemed to really pick up after consuming these Jagerbombs and they danced and laughed for a while. Two hours later; however, the three men were preparing to leave the bar. I heard one of their female friends (possibly a girlfriend) chastising one of the males for ending their night early because he was too drunk. I heard the men talking about desperately needing to find food before going home (Fieldnote, March).

5. The fifth and final benefit as noted by consumers was the social aspect of consuming AED. Participants noted that the consumption of 'bombs' facilitated social interaction and humour by virtue of attending the bar together in a group, dropping the shot of liquor into an energy drink and skolling, seeing who could finish first. One participant commented:

> "It's the interaction with everybody else. I think that's where you get sucked in the most. I've got a friend that loves the shots and then all of a sudden you know, you're all part, not like a team, but you're all part of a group, and then, yeah. The highlight on the bar is when the bartender's flicking them all, sometimes up to 10 shots, in the glasses" (Female, 29 years).

3.5 Energy drinks as substitution for illicit stimulants

One theme that came up regularly among consumers is that energy drinks were often used in place of illicit stimulants, such as methamphetamine or cocaine. This is not to say that the effects of energy drinks are the same as illicit stimulants – because participants pointed out that energy drinks are not associated with the 'rush' and 'buzz' of illicit stimulants – but rather

that energy drinks and illicit stimulants share some properties, such as wakefulness and counteracting the drowsy effects of alcohol. For example, the following observation:

> While at the bar, I spoke with Female A who told me that she'd had a big weekend the one before on the 'Red Bulls'. She said that she went out with a big group of people on Saturday night who were smoking crack pipes before they went out (methamphetamine) and she was "off the speed" at the moment, so had resisted, but managed to stay awake all night drinking energy drinks instead, and had a really good night. Her friend, Female B, overheard us and told me that she used to use cocaine and speed but doesn't anymore, so energy drinks are her substitute when she goes to bars. She said energy drinks can make her feel "speedy" (Fieldnote, April).

Interestingly, three participants commented that they were non-drug users, but that most of their social group consumed illicit stimulants. All three of these participants reported mixing energy drinks with alcohol to attempt to stay out longer with their friends who had used these drugs. For example:

> Interviewer: "Have you ever used illicit stimulants"?
> Participant: "No, that's why I sort of drink energy drinks to keep up with people that are".
> Interviewer: "That are using stimulants"?
> Participant: "Yeah, otherwise I can't keep up" (Female, 27 years).

While two participants reported consuming energy drinks with alcohol and illicit stimulants, these participants said it was only because they liked the taste of AED, not because illicit stimulants and energy drinks were a good combination. These participants said the effects of energy drinks were lost when also co-consuming illicit stimulants. Interestingly, a police officer and a venue owner both commented that they'd observed that energy drinks and ecstasy were a popular combination. The police officer said that energy drinks and ecstasy were popular because they boosted the effects of one another, while the venue owner said that ecstasy and energy drinks were combined because when people are on ecstasy they don't usually feel like alcohol, so it's more about the sweet taste.

3.6 Negative consequences of AED use

Participants were asked to describe any negative outcomes that they had experienced as a result of consuming AED, and there were five negative experiences that participants reported:

1. The main problem associated with AED, as noted by seven of the ten participants, was that after consuming AED it was common for them to fall asleep when they arrived home from a

licensed venue, but would then wake up after a number of hours (between one and six) and not be able to get back to sleep. For example:

> "Even if I've had a heap of them I fall asleep straight away when I get home, but four or five hours later I wake up and there's just no getting back to sleep. You just, your body feels like it's dead and hung over and you don't want to get out of bed and you don't want to move, but your mind just won't let you sleep" (Male, 28 years).

It is interesting to note that no participants observed having trouble sleeping upon first arriving home, but only that they had trouble staying sleep. It may be that alcohol is facilitating sleep initially but when the effects of alcohol wear off the caffeine effects take over.

2. Six of the ten participants commented that they felt more 'hungover' and unwell the day following an evening of AED use. For example:

> "I don't usually get hangovers, like I don't get headachy or feel nauseous or anything, but if I've had too many energy drinks I just feel terrible and paranoid and, anxious I think it is, cause I just, I don't know, it's something, I don't know what it does, it just makes you feel… weird" (Male, 28 years).

Two participants suggested this was likely to be associated with dehydration, acknowledging that both caffeine and alcohol are diuretics.

3. The third most common concern noted by participants was the experience of "racing heart", "heart palpitations", "shakiness" and "twitching" either later in the night after sleeping for a few hours or during the following day. Five participants reported these consequences. One description of such an event is presented here:

> "Ah, oh there was one, one night when me and a mate went out and I think we worked out we'd spent close to $200, $250, on vodka and Red Bulls and Jagerbombs that night. We got home at, we didn't get home til seven or eight o'clock um… my mate slept in another room and I think I'd only been asleep for an hour and I started having panic attacks and my heart was racing and I just, I couldn't work it, I just felt like I was going to die. And eventually it wore off but it was, it felt horrible and my mate was the same. We just drank way too many of them. It just, you couldn't get comfortable, you were just wriggling around, heart racing, mind going a thousand miles an hour" (Male, 24 years).

4. Five participants noted that consuming AED made it more likely that they would vomit both on the night and during the next day. This was in comparison to drinking alcohol alone (without energy drinks), in which there was a lower chance of vomiting. The interviewer posed the question as to whether this might be because energy drinks had facilitated more alcohol consumption and some participants were open to this explanation, while others suggested perhaps it was a result of mixing their drinks, skolling their drinks and consuming hard liquor such as Jagermeister. Participants commented that vomiting energy drinks was particularly

painful and bad tasting, that the vomit was very concentrated and only the syrup seemed to come up.

5. The final problem noted by participants, and this was only observed by two of the ten, was that a night consuming AED would negatively affect their sleeping patterns and routine in the days following use. These participants said that they noticed after consuming AED they would still struggle to sleep properly two nights later and this would negatively affect their early week routine. These two people were those that consumed over ten AED on a typical night out.

   No harms as a result of AED use were observed during sessions of observation, even though it was evident that consuming AED facilitated drunkenness.

3.7 Challenges for key informants

Key informants noted a variety of challenges presented by the consumption of AED, which naturally varied depending on their role. It should be noted that some key informants reported very few challenges provided by AED. Most notably this included venue managers, who appeared unconcerned about AED.

Venue managers commented that they did not notice AED were in any way associated with violence or other types of unwanted behaviour, and that while they were a popular drink, they were not in their top five most sold beverage types. One venue owner noted that she had observed that more people tended to stay until 3am closing time than in previous years, but it would be purely speculation to assume this was related to energy drinks given that illicit drug use is common among licensed venue patrons.

Emergency services personnel offered varying levels of concern about AED, with a paramedic and a harm reduction worker observing that the combination was associated with increasing presentations to ambulance and harm reduction stalls at music festivals, but an emergency department physician and police officer noted few problems associated with the combination. The police officer indicated that alcohol alone was still the major concern for them, far above and beyond alcohol in combination with any form of stimulants. The emergency department physician suggested that while he personally had not noticed patients presenting with problems relating to AED, this might be because hospitals currently don't routinely screen for energy drinks or caffeine among people who present with alcohol problems:

> "I don't directly ask people about their intake of caffeine. I do ask them about alcohol and other drugs, perhaps we should [ask them about energy drinks]. But I have noticed perhaps in the last few years a lot more people turning up, say 7am on Sunday morning. I'm sure that always happens, so they've obviously been out all night; whether the caffeine's helping them stay awake for that long. I

certainly couldn't... It would be very interesting to know, to actually survey people and perhaps even measure their caffeine levels, now that I think about it".

A paramedic commented that he personally sees a lot of people negatively affected by AED at music festivals and in the central business district area on a Friday and Saturday night and that they will often be treated before they go the emergency department, perhaps accounting for the apparently low number of patients presenting to hospital with these issues. When asked what a person affected by AED looked like and how they were treated, he commented:

> "They present with hypertension, nausea, low blood, sorry, high blood pressure and usually palpitations, so associated with an increased heart rate [...] Giving these people medication is counter-productive. At some point the effects of the caffeine wear off and they just go, they do post caffeine crash and essentially it's about just keeping them comfortable and safe and consistently reassured that it will wear off at some point fairly soon and that they're going to be OK. In a festival environment where there is onsite medical services, we'll do that at the venue. They'll never go to an emergency department. If we're in the middle of Friday, Saturday night, we're frantically busy we'll just scoop them up and put them in the waiting room of the emergency department and that will be where that occurs. They're unlikely, you know, at some point it will wear off, they'll feel better and they'll just leave".

This paramedic also noted that consumers of AED don't necessarily realise that they are experiencing these symptoms as a result of consuming energy drinks, either because AED use is so normalised or because they are unaware of the potential harms of drinking excessive levels of caffeine and so there is an increasing tendency for people to claim that their drink has been spiked. However, when they are prompted about their alcohol and other drug use over the course of the evening, it becomes evident they have consumed far too much caffeine. These drink spiking claims can occur both on the night of intoxication, but also the following day:

> "One of the new phenomenon's is, "my drink got spiked last night" [...] We now get called to attend to people who've had their drinks, who believe they've had their drinks spiked the night before because they feel like their world is falling apart. They feel crap; something must have happened, someone must have done something to me. They can't relate the fact that they ingested all this garbage and that they actually did it to themselves. But, yes they are now: "Oh my God, I must be dying" the next day. Yeah it's bad enough on a night but 12 hours, 24 hours later in some cases, people are calling an ambulance".

A harm reduction worker, who regularly attended raves and dance parties noted that alcohol is still the primary presenting complaint, in at least 70% of cases; however the co-administration of alcohol and stimulants, whether it be caffeine or other stimulants, was still a common presentation. This worker noted that when stimulants are co-administered with

alcohol it enables the consumption of more alcohol which then leads to over-consumption, and often alcohol poisoning:

> "What we do get is a lot of alcohol poisoning with taking amphetamines and alcohol and I think the energy drinks are contributing to that as well. Especially if someone is taking energy drinks and alcohol with another stimulant as well, then you have two different operatives that's counteracting alcohol and by the time you realise, by the time the alcohol has actually caught up with you, you're way too drunk and you're not feeling drunk but your, physically your body can't take anymore alcohol and you're getting alcohol poisoning and that's happening a lot".

We spoke with two **community healthcare workers**, one from the dual diagnosis field and one youth outreach worker, who both noted that AED provided particular challenges for their role. From the dual diagnosis worker's perspective, AED had been raised as a potential explanation for increasing anxiety-related problems observed in clients with mental health issues:

> "They're dealing with people with serious mental illness and they're noticing they have a lot more energy drinks and alcohol mixed in too. Look some services were concerned about [...] should we be thinking the level of anxiety and agitation that we're starting to see in this client, could it be related to their increased consumption [of AED]? And so we would say, given that it has high levels of caffeine and the mix with caffeine and alcohol, we'd anticipate it may be a factor [...] A couple of clients in the last two or three years have been able to make a definite link to the levels of anxiety".

The youth worker had quite different concerns from this dual diagnosis worker. Her concerns were more around the misleading marketing of energy drinks and the lack of information that young people have access to regarding the harms of these drinks. She said that most people she'd spoken with who were consuming AED (people between the ages of 12-18) were unaware that energy drinks were a form of stimulant. Of particular concern for her was that it was hard for young people, who were going through a standard adolescent phase of experimentation with a range of substances including alcohol, energy drinks and other drugs, to effectively tease out the properties of the various substances when they were being used in combination. So for example, if they felt hungover and unwell after drinking AED, they often did not know whether it was the effects of the alcohol or the energy drinks that were causing them to feel bad because they were still in the very early experimentation phase. She also had observed that young people often consumed numerous cans of energy drinks before and after school (without alcohol), purchased from service stations, and that some young people consumed up to eight cans a day.

The last type of key informants consulted were **policy makers**, representatives from both the Alcohol Policy and the Food Standards Committee of the Victorian Department of Health.

Both policy makers noted that the issue of AED was currently on the Department's radar, particularly given the recent press coverage around AED and also recent calls from the Alcohol Policy Coalition to have the Foods and Safety Act re-examined. The main message that was presented by policy makers was that despite the many vested interests calling for regulatory action around AED, there is still currently insufficient evidence regarding the harms of AED to make any such changes. One policy maker said that as it stands, they can't prohibit the manufacture of pre-packaged AED because the Food Standards Code is written in such a way that their combination is permitted and they cannot change this without evidence showing AED are causing significant harm over that of alcohol alone:

> "We've had a legal look at the way the code is drafted up and really outside just them mucking up the formulation in some minor degree, there isn't much you can do about actually going out and saying that this product is illegal under the Food Standards Code, because it isn't. These are the pre-packaged ones I'm talking about. And I think there is some acknowledgement there that we're still in a position really where we've got concerns but we don't necessarily have significant evidence, you know, recognising that the, the bar we have to jump, in terms of significant evidence for regulatory action is reasonably high".

3.8 Awareness raising needed

Consumers and key informants were asked if they were aware of the recommendations around how many energy drinks should be consumed daily. Only two consumers and two key informants were aware of this recommendation. Participants were shocked when they found this out and a number posed the question why this knowledge was not more publically available. All participants noted that they would be interested in knowing more about the effects and harms associated with AED. One person said "I'd really like to know the statistics on how damaging it could be". It was suggested by both consumers and key informants that the following approaches might be useful in raising awareness about AED:

1. **Mass media campaigns**

Given their limited knowledge around the recommended maximum daily intake of energy drinks, a number of participants suggested that public media campaigns such as those associated with alcohol and illicit drugs might be a useful way of getting this information across because television and print were their main sources of information. However, the issue of whether AED was a high enough priority for the state or federal government to spend millions of dollars on an advertising campaign was contested. One policy maker suggested that it would be more feasible to consider adding a component of energy drinks to an existing alcohol campaign rather than running a separate campaign.

2. **Posters in nightclubs**

It was suggested by a number of key informants, including policy makers, health workers and emergency services personnel, that advertising the harms of AED should be made a priority; but that these messages should be targeted (rather than mass media campaigns). One popular suggestion was the development of posters for display in nightclubs which portray the potential harms of combining AED, and recommendations around the maximum number of AED that should be consumed in one session. It was suggested that at the very least these posters should provide information on the recommended maximum daily number of energy drinks per day. These posters could be displayed on the back of toilet doors, on bar mats and areas of the venue that are observable when queuing at the bar.

3. **Education for venue staff**

It was evident that venue staff were as ignorant around the recommended maximum daily intake of energy drinks as consumers; so another suggestion that was offered by policy makers, health workers and emergency services personnel was to engage in more education with venue staff about safe levels and potential harms of AED use.

4. **General awareness raising for emergency services personnel and health workers**

It was noted by emergency services staff and health workers that they do not routinely collect information about energy drink consumption, even though they routinely collect information about alcohol and other drug use. It is suggested that personnel that work in emergency services and community health care should be educated about the growing prevalence or likelihood of co-occurring alcohol and energy drink consumption and be encouraged to collect information on AED consumption in the course of their daily work.

5. **Adding energy drinks and AED to school drug education programs**

It was also suggested by policy makers and community health workers that young people should be targeted with information about energy drinks and combining alcohol with energy drinks at an early age; given that young people are increasingly purchasing energy drinks from supermarkets and service stations and consuming energy drinks before and after school. Given that this curriculum already exists, it was suggested that this might be a cost effective way of disseminating messages around safe levels of use and potential harms of use.

At the very least, all of these awareness raising activities should incorporate a visible and prominent message about the recommended maximum number of energy drinks that should be consumed daily.

Chapter 4:
Discussion

This small pilot project has attempted to develop the beginnings of a knowledge base around AED use in Australia. The use of AED is significantly under-researched both in Australia and internationally, and this is only the second qualitative study to our knowledge that has been conducted on this topic in the world. In particular this project has attempted to explore the social and cultural contexts of AED consumption in Australia, and describe the patterns of use, benefits and negative consequences of AED among a sample of young consumers. This project has also attempted to investigate the impact that AED have on various industries, such as emergency services, healthcare and on-premise licenses, as well as explore the policy context of AED and potential policy and regulatory responses.

The young people interviewed as part of this research were highly organised in their AED consumption practices, and had developed a routine after an experimentation phase early in their use of AED. This learned routine was based on achieving maximum benefits from AED and avoiding or minimising negative consequences from use. Most participants interviewed as part of this research consumed between three and five AED on a typical night out, while a smaller number reported consuming between ten and fifteen AED on a typical night out. Even those who drank less AED were still consuming above the maximum recommended daily number of energy drinks; and most consumers and key informants were unaware of these recommendations.

One of the main themes that arose from interviews was that combining energy drinks with alcohol is now a normalised phenomenon. Both consumers and key informants noted that it is so common that you can now purchase these drinks at any licensed venue and over 50% of participants' peers were reported to consume these drinks. The combination has become so common that it is often not divulged to emergency services staff. Given the apparent normalisation of AED, it is important that more research be conducted in this area.

A body of work has explored the way that energy drinks (with and without alcohol) are carefully and selectively marketed to young people. This research shows that AED are cleverly marketed using tantalising brand names, bright colours and provocative imagery (including sexual prowess, masculinity, performance enhancement and extreme sports), and are marketed cleverly in pubs and clubs, where it is not uncommon to see 'Red Bull' bar mats, fridges and towels. They are also often sold cheaply in licensed venues via promotional activities (Jones & Barrie, 2009; Kuhns, et al., 2010; Miller, 2008b; O'Brien, et al., 2008; Reissig, et al., 2009). These findings were indeed supported in this research, and this was contrasted by both consumers and key informants, with an absence of public attention to the potential harms of AED. Consumers in particular wanted more information about the harms so they could make informed decisions about their continued use of AED.

The benefits and harms of AED experienced in this sample were similar to the recent qualitative study by Jones et al. (Jones, et al., in press), with the exception of violence, which was not noted among this sample. Perhaps unsurprisingly, wakefulness was the main benefit of AED and difficulty sleeping was the main concern. Interestingly, there appears to be one group of AED users who consume AED to feel less drunk (feel more alert and energetic) and one group who use AED to facilitate drunkenness (through the faster paced consumption of 'bombs'). While participants reported many negative consequences associated with AED use, the benefits were noted to outweigh the harms at this point in their lives, a time when they are actively pursuing leisure and pleasure during their weekends and are willing to spend a Sunday feeling hungover or unwell. It is expected that as these young people move into more traditional adult roles such as starting a family, their use of AED is likely to decline.

Key informants noted varying concerns associated with AED, but these were much less than concerns associated with alcohol alone. All key informants suggested that alcohol alone provided the biggest challenge for their role but that energy drinks played some role in keeping people awake longer and enabling them to drink more alcohol, leading to increased levels of alcohol overdose/poisoning, worse hangovers and "the drink spike" phenomena reported by a paramedic. There was also some evidence of short-term anxiety associated with AED.

In Australia the only regulatory approach to AED that we are aware of is in Western Australia, where the state government has banned the sale of AED in licensed venues after midnight (Midnight drinks ban in Perth, April 10, 2011). While AED is on the Victorian state government's radar, policy makers indicated that there is little they can do in terms of regulatory action in light of the lack of research evidence on AED.

Other countries have implemented a range of precautionary measures in relation to AED that might be considered in Australia. For example, in Europe energy drinks are required to have a 'high caffeine content' label and Canada requires labelling on energy drinks stating that it should not be mixed with alcohol. In Norway, only pharmacies are permitted to sell energy drinks (Reissig, et al., 2009). In Ireland, the 'Stimulant Drinks Committee' recommended that energy drinks should be labelled with an indication that they are unsuitable for children (under age 16), pregnant women and individuals sensitive to caffeine. This committee also suggested that labels should caution against combining energy drinks with alcohol and against the consumption of energy drinks during or after sport/exercise because they are not hydration agents and in fact are likely to cause dehydration (Finnegan, 2003). In sum, it appears that potential avenues for regulatory action include better labelling, restriction of energy drinks to people underage, restrictions on the place and sale of energy drinks and controlled advertising (Reissig, et al., 2009). To what extent this extends to AED is still unknown.

In 2010, the Victorian Department of Justice issued a set of guidelines for responsible liquor advertising and promotions (www.justice.vic.gov.au). These guidelines include things such as: "the advertising or promotion of liquor involving 'happy hours', free drinks or discounted drinks must have reasonable limits and controls to minimise the risk of rapid, excessive or irresponsible consumption of liquor" and "the advertising or promotion of liquor must not suggest any association with risk taking". However, there is no mention of AED promotions in these guidelines. Given that it was noted in this research that young people were more likely to consume AED when they were promoted and/or discounted, we recommend that these guidelines be altered to include promotions on AED. We also propose that these guidelines be developed across all states. A second policy option that we recommend is that, given that energy drinks are labelled with a warning stating that a maximum of two energy drinks should be consumed daily, pre-packaged alcohol energy drinks should be labelled the same way.

In this study, consumers and key informants were less concerned about regulatory approaches and more concerned with raising awareness of the harms of AED, and avenues proposed included raising awareness at a population level through mass media campaigns, or targeted awareness to venue staff, consumers of licensed venues (using posters) and to children in schools as part of the standard alcohol and drug curriculum. Given the significant costs associated with mass media campaigns, our recommendation would be that targeted awareness be the priority, beginning with young people in schools who are likely to be approaching, or are in the early stages of, the experimentation phase of energy drink and AED consumption, followed by information and posters within licensed venues and education to emergency services personnel and health workers. At the very least, all of these awareness raising activities should incorporate a visible and prominent message about the recommended maximum number of energy drinks that should be consumed daily.

It is important to note that this study has limitations. In particular, the sample was too small to generalise the findings to all young consumers of AED. In addition, the participants in this research were recruited using a convenience sampling approach. Future research should be conducted in larger samples using both purposive and random sampling approaches.

4.1 Future research directions

As identified in this project, there are still many 'unknowns' of AED. The use of AED is significantly under-researched both in Australia and internationally which makes it difficult to begin to develop policy responses and harm reduction strategies. We have identified a number of areas that we believe future research efforts should be targeted:

- Clearly, further research is required to explore the social and cultural contexts of AED use, patterns of consumption, benefits and harms and challenges to service industries. The current study should be furthered by replication in larger and more

diverse samples, including various sub-groups of AED users. In particular, this research noted different groups of AED users, including those who consume around five AED a night and those who consume over 10 AED a night. Some young people are also consuming AED while concurrently using illicit drugs. Future research should attempt to gather more detailed information across these different consumption groups and flesh out the harms and benefits for these young people. Further, more research is clearly needed to understand the role that AED plays for venue workers, emergency services personnel and health workers given that the scope of this project limited our capacity to speak to representative numbers of these groups.

- In Australia we still don't know the actual prevalence of AED in general population samples or among selected subgroups such as students or young people. We don't know how many people are consuming energy drinks alone, or in combination with AED and we don't have a good understanding of the demographics of AED users. It is important that this type of prevalence data is collected, and one of the most effective ways to collect this data regularly would be to add questions about the consumption of energy drinks and AED to existing national surveys such as the National Drug Strategy Household Survey and the Victorian Youth Alcohol and Drugs Survey.

- The young people in this research had been regular consumers of AED for some time and had developed their patterns of consumption after a period of experimentation in the past. Future research should focus on young people who are still in this period of experimentation; particularly people under the age of 18, as these people might be more likely to experience acute harms from the consumption of AED (through over-consumption) and be most susceptible to the marketing and advertising of these products.

- In terms of risky consumption, it was identified in this project that AED are consumed in greater amounts by people attending "Uni bars" and among men attending "footy trips" or equivalent types of vacations. It appears that AED are used in greater levels among young people who intend to be drinking alcohol over a number of days. Future research should investigate the use of AED among people attending University, people attending 'schoolies' celebrations and other groups of people planning 'drinking holidays' or drinking over a number of days.

- It was reported by emergency department staff, paramedics and police that information about the consumption of energy drinks is not collected in the same way that alcohol and other drug consumption is collected in their official records. So if people are presenting to emergency services having consumed AED, often they will only be asked about, and will only share information about, the number of alcoholic drinks they have had. Hospital staff and ambulance staff currently collect data on the

use of alcohol and other drugs and this information is used in official statistics. Changes should be made to these systems so that energy drinks are included as an official code in these systems, so that information on energy drinks alone and AED are both recorded and accessible at a state level.

- The 'actual' harms associated with AED are still somewhat of a mystery. While young people report adverse effects such as sleep difficulty, worse hangover and racing heart (including palpitations and anxiety), it is unknown at what quantities these problems occur, whether they occur in everyone, whether they occur with all types of alcohol and whether they are specific to energy drinks (and may be a function of other ingredients such as taurine) or also a feature of caffeine in other sources (such as coffee and cola softdrinks). As such, rigorous randomised controlled trials need to be conducted to investigate the physiological and psychological effects of AED on different groups of the population, at different quantities and across different beverage types.

References

Alford, C., Cox, H., & Westcott, R. (2001). The effects of Red Bull energy drink on human performance and mood. *Amino Acids, 21*, 139-150.

Australia New Zealand Food Authority. (2001). *Inquiry Report. Application A394. Formulated Caffeinated Beverages*. Canberra: Australia New Zealand Food Authority.

Brache, K., & Stockwell, T. (2010). *Drinking patterns and risk behaviours associated with combined alcohol and energy drink consumption*. Paper presented at the Kettil Bruun Society.

Clauson, K. A., Shields, K. M., McQueen, C. E., & Persad, N. (2008). Safety issues associated with commercially available energy drinks. *Journal of the American Pharmacists, 48*(3), 55-63.

Ferreira, S. E., Tulio de Mello, M., Pompeia, S., & de Souza-Formigoni, M. L. (2006). Effects of Energy Drink Ingestion on Alcohol Intoxication. *Alcoholism: Clinical and Experimental Research, 30*(4), 598-605.

Finnegan, D. (2003). The health effects of stimulant drinks. *Nutrition Bulletin, 28*, 147-155.

Howland, J., Rohsenow, D. J., Arnedt, J. T., Bliss, C. A., Hunt, S. K., Vehige-Calise, T., et al. (2010). The acute effects of caffeinated versus non-caffeinated alcoholic beverage on driving performance and attention/reaction time. *Addiction, 106*, 335-341.

Jones, S. C., & Barrie, L. (2009). *Alcohol energy drinks: engaging young consumers in co-creation of alcohol related harm*. Paper presented at the ANZMAC.

Jones, S. C., Barrie, L., & Berry, N. (in press). Why (not) alcohol energy drinks? A qualitative study with Australian university students. *Drug and Alcohol Review*.

Kuhns, J. B., Clodfelter, T. A., & Bersot, H. Y. (2010). Examining and understanding the joint role of caffeine and alcohol in facilitating violent offending and victimization. *Contemporary Drug Problems, 37*(Summer), 267-287.

Marczinski, C. A., & Fillmore, M. T. (2006). Clubgoers and their Trendy Cocktails: Implications of Mixing Caffeine into Alcohol on Information Processing and Subjective Reports of Intoxication. *Experimental and Clinical Psychopharmacology, 14*(4), 450-458.

Measham, F., & Brain, K., 1(3) 262-283. (2005). 'Binge' drinking, British alcohol policy and the new culture of intoxication. *Crime, Media, Culture: An International Journal, 1*(3), 262-283.

Midnight drinks ban in Perth. (April 10, 2011). Western Australia Today. http://www.watoday.com.au/wa-news/midnight-drinks-ban-in-perth-20110410-1d94x.html. Retrieved 24/08/11

Miller, K. E. (2008a). Energy Drinks, Race, and Problem Behaviors Among College Students. *Journal of Adolescent Health, 43*, 490-497.

Miller, K. E. (2008b). Wired: Energy Drinks: Jock Identity, Masculine Norms, and Risk Taking. *Journal of American College Health, 56*(5), 481-489.

O'Brien, M. C., McCoy, T. P., Rhodes, S. D., Wagoner, A., & Wolfson, M. (2008). Caffeinated Cocktails: Energy Drink Consumption, High-risk Drinking, and Alcohol-related Consequences among College Students. *Academic Emergency Medicine, 15*(5), 453-460.

Oteri, A., Salvo, F., Caputi, A. P., & Calapai, G. (2007). Intake of energy drinks in association with alcohol beverages in a cohort of students of the School of Medicine of the University of Messina. *Alcoholism: Clinical and Experimental Research, 31*(10), 1677-1680.

Price, S. R., Hilchey, C. A., Darredeau, C., Fulton, H. G., & Barrett, S. P. (2010). Energy drink co-administration is associated with increased reported alcohol ingestion. *Drug and Alcohol Review, 29*, 331-333.

Reissig, C. J., Strain, E. C., & Griffiths, R. R. (2009). Caffeinated Energy Drinks - A Growing Problem. *Drug and Alcohol Dependence, 99*(1-3), 1-10.

Rief, S. (2009). *Club Cultures: Boundaries, Identities, and Otherness*. New York: Routledge.

Shiner, M., & Newburn, T. (1999). Taking tea with noel: The place and meaning of drug use in everyday life. In N. South (Ed.), *Drugs: Cultures, controls and everyday life*. London: Sage.

Sindich, N., & Burns, L. (2010). *Australian Trends in Ecstasy and Related Drug Markets 2009: Findings from the Ecstasy and Related Drugs Reporting System (EDRS). Australian Drug Trends Series No. 46*. Sydney: National Drug and Alcohol Research Centre, University of New South Wales.

Thombs, D. L., O'Mara, R. J., Tsukamoto, M., Rossheim, M. E., Weiler, R. M., Merves, M. L., et al. (2010). Event-level analyses of energy drink consumption and alcohol intoxication in bar patrons. *Addictive Behaviors, 35*, 325-330.

Warburton, D. M., Bersellini, E., & Sweeney, E. (2001). An evaluation of a caffeinated taurine drink on mood, memory and information processing in healthy volunteers without caffeine abstinence. *Psychopharmacology, 158*, 322-328.

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