Music Increases Alcohol Consumption Rate In Young females

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Abstract

Previous field research has shown that individuals consumed more alcohol and at a faster rate in environments paired with loud music. Theoretically, this effect has been linked to approach/avoidance accounts of how music influences arousal and mood, but no work has tested this experimentally. In the present study, female participants (n=45) consumed an alcoholic (4% alcohol-by-volume) beverage in one of three contexts: slow tempo, fast tempo music or no music control. Results revealed that compared to the control, the beverage was consumed fastest in the two music conditions. Interestingly, whereas arousal and negative mood declined in the control condition, this was not the case for either of the music conditions, suggesting a down regulation of alcohol effects. We additionally found evidence for music to disrupt sensory systems in that counter-intuitively, faster consumption was driven by increases in perceived alcohol strength, which in turn predicted lower BrAL. These findings suggest a unique interaction of music environment and psychoactive effects of alcohol itself on consumption rate. Since alcohol consumed at a faster rate induces greater intoxication, these findings have implications for applied and theoretical work.

Keywords

Alcohol, Environment, Music, Consumption, Mood, Arousal

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1. Introduction

The psychopharmacology of attention has been examined from a number of different perspectives. In terms of addiction, a large body of research has demonstrated how environmental stimuli frequently associated to a drug (e.g. packet of cigarettes, beer glass) capture attentional focus (Hogarth, Mogg, Bradley, Duka, & Dickinson, 2003; Townshend & Duka, 2001) in such drug users. Apart from addiction, work has shown how drugs consumed in particular environments can lead to differences in their actual effects. For instance one study found that alcohol produced contrasts in physical sensations (e.g. face numb) when consumed alone compared to a group environment (Sher, 1985). Using a conditioning paradigm, more recent work found that alcohol impaired cognition when consumed in the unfamiliar environment (Birak, Higgs, & Terry, 2011). It is therefore clear that environment has a potent effect on responses to alcohol, but few experimental studies have examined the influence of another important context: music. Field research (Gueguen, Jacob, Le Guellec, Morineau, & Lourel, 2008; Gueguen, Le Guellec, & Jacob, 2004) has already shown that music can affect the speed and amount of alcohol consumption but no research has examined the mechanism underlying these effects.

Excessive alcohol consumption is a concern for any government due to its risks to both individual health (Parry, Patra, & Rehm, 2011) and the associated burden of costs to healthcare, law and order (POST, 2005). Young people are a priority since hazardous drinking habits learned whilst young may well shape such behavior later in life (Jefferis, Power, & Manor, 2005). It is therefore especially worrying that university students consume more alcohol than their non-student peers (Dawson, Grant, Stinson, & Chou, 2004; Gill, 2002).

In a recent UK study (Craigs, Bewick, Gill, O'May, & Radley, 2012) 32% of undergraduates reported consuming alcohol at levels that are considered hazardous and additionally 24% of females reported consuming alcohol at levels thought to be harmful to health (see Table 1 for UK recommendations and US equivalents). To put this into a larger context, if we define female heavy drinking as consuming more than 4 drinks on at least one occasion in the past 2 weeks, one large international study found similar rates for UK (33%) and US (27%) females, compared to Ireland (57%) at the top end and Germany, France & Italy (≤7%) at the lower end of the range (Dantzer, Wardle, Fuller, Pampalone, & Steptoe, 2006). Connecting this to the present study, it is likely that a large proportion of students total alcohol intake takes place in environments paired with music, which make it particularly important to study the effects of music on alcohol consumption in this population.

In considering the influence of music it is worth remembering that music is not a single entity but a multitude of different elements (Bruner, 1990) such as timbre (tone that differentiates music) and tempo (pace of music). Tempo is particularly relevant to the present investigation, as related work has already demonstrated how music that is faster in tempo can speed up behavior, leading to faster food/soft drink consumption (McElrea & Standing, 1992; Roballey et al., 1985) and less time spent in a restaurant (Milliman, 1986). One theory to explain these effects is based on how music alters arousal and mood systems and their impact on approach/avoidance behavior (Mehrabian & Russel, 1974). Hence music of a faster tempo is generally considered as more arousing compared to slower music (Berlyne, 1971), and indeed has been shown to increase treadmill running speed and arousal (Edworthy & Waring, 2006).

Separately, it is well known that certain music has the ability to increase positive mood (Gerrardshesse, Spies, & Hesse, 1994). It is therefore theorized that increases in arousal lead to increases in avoidant behavior, thus explaining faster consumption (Roballey et al., 1985; (McElrea & Standing, 1992). In contrast, increases in positive mood lead to increases in approach behavior. Support for the theory comes mainly from consumer research, where increased arousal predicted less time spent shopping but increases in positive mood (pleasure) predicted increases in shopping time (Donovan, Rossiter, Marcoolyn, & Nesdale, 1994).

In terms of alcohol consumption, in addition to possible changes to arousal/mood systems, another important factor is alterations to alcohol taste, since research has demonstrated that slower consumption of an alcoholic drink was accompanied by increases in perceived alcohol strength (Higgs, Stafford, Attwood, Walker, & Terry, 2008). So, presumably alcohol strength was a cue to slow down the rate of consumption. Moreover, a recent study found that individuals estimated the initial taste of alcohol beverages as sweeter in the context of background music (Stafford, Fernandes, & Agobiani, 2012). Since humans have an innate preference for sweet foods (Steiner, 1979) and habitual alcohol consumption is higher if found sweeter (Lanier, Hayes, & Duffy, 2005) all provide a plausible explanation as to how music can increase consumption.

Theoretically, the ability of alcohol taste to be affected by background music might also be explained using Cognitive Load Theory (CLT), which posits that completion of two concurrent tasks can result in excessive demands on attentional resources, resulting in impaired performance/judgement. This model can explain related work where individuals consumed more food in a distracted condition (Bellisle & Dalix, 2001). So in that study, one assumes that listening to a distracting story resulted in less attentional resources available to monitor energy (food) consumption. In a similar way, listening to background music could distract individuals attention on the taste attributes (bitter, sweet, alcohol strength) on the alcoholic beverage and thereby influence the rate at which it is consumed. However, what is not known is how these effects are influenced by alcohol itself, which is important since episodes of alcohol consumption are always accompanied by the pharmacological effect of alcohol and we therefore need to know how this combines with music to influence alcohol perception. Although we might expect fast tempo music to increase arousal and consequent avoidant behavior (faster consumption), just how this interacts with the sedative effect of alcohol itself is unknown. Additionally, could the presence of music act to distract attention to the effects of alcohol itself as well as the taste attributes.

To test this theory in the present study, females consumed an alcoholic beverage in the context of either a slow, fast tempo or no music condition. There were a number of reasons for using only females. Firstly, there is evidence that males and females differ in their rate of alcohol metabolism (Dettling et al., 2007) and hence using both genders would have added a confound to the study. Secondly, a number of previous studies have used males only to study the effects of environment on alcohol consumption (Gueguen et al., 2008; Higgs et al., 2008), and it was therefore thought important to extend the research to females. Finally, selecting an alcoholic beverage for the study that was liked and consumed equally by both males and females would be challenging.

We predicted that the drink would be consumed fastest in the fast tempo music condition, and this would most likely be related to alterations in arousal, mood and drink taste. We also planned to explore the relationships between drink duration and the sensory evaluations of the beverage.

2. Method

2.1 Participants

Forty-five female university students participated in the study, aged between 18 and 28 years of age (M = 18.9, SD = 1.7). Participants were recruited using an online system where the study was advertised as examining the factors which influence alcohol related behaviour. Participants were invited to take part if they were aged between 18 and 25 and were regular consumers of alcohol. Since the test drink to be consumed was vodka based, an additional criteria was that potential participants' habitual consumption had to include vodka based beverages. The study protocol was given ethical approval from the department's ethics committee (BPS guidelines).

2.2 Design

The study used a between-subjects design where participants were randomly allocated to one of 3 groups (Table 2) based on music condition: Control (No music), Slow Tempo, Fast Tempo. The main dependent variable was the duration to consume the test beverage.

2.3 Materials

2.3.1 Alcohol Usage Questionnaire (AUQ)

Patterns of habitual alcohol consumption were measured using a questionnaire (based on (Mehrabian & Russell, 1978). Participants were accepted into the study only if their total weekly alcohol consumption was between 8 and 50 units of alcohol, consistent with previous research (Higgs, et al., 2008).

2.3.2 Olfactory & Taste Tests

The olfactory and taste tests were similar to those used in a previous study (Stafford et al., 2012) and were taken to check for any differences between conditions. For the olfactory test, participants were asked to smell the odor from a plastic squeeze bottle (250ml), containing 50ml distilled water and 4% n-butanol (a neutral odor). Participants were asked to complete ratings using Visual Analogue Scales (VAS), with three 100mm unmarked lines labelled "not at all" and "extremely" at either end, with the adjectives: intensity, bitterness, sweetness, pleasantness centred above each line. For the taste test, participants were presented with a bitter (0.005g quinine hydrochloride in 10g water) followed by a sweet (1g sucrose in 10g water) tastant (counterbalanced order) which was sprayed onto the tongue. After each taste, they completed the same VAS ratings and sipped some water before the next taste. The bitter and sweet taste sprays were part of a larger test from the 'Sniffin sticks' battery (Burghart Instruments, West Germany).

2.3.3 Arousal, Thirst & Hunger

Arousal, thirst and hunger were measured using VAS with the adjectives centred above each line in the following order; "alert", "thirsty", "drowsy", "hungry".

2.3.4 Positive and Negative Mood

The Positive and Negative Affect Schedule (PANAS) from (Watson, Clark, & Tellegen, 1988) was used to measure mood during the experiment. The PANAS consisted of a 5 point Likert scales ranging from 1 (very slightly or not at all) to 5 (extremely) on which participants rated their feelings and indicated the extent to which they currently experienced 10 positive and 10 negative emotions.

2.3.5 Music

A contemporary piece of instrumental music ('Stress' by Justice – Justice Cross) was selected for the study, being typical of that played currently in nightclubs. The music was modified using the software BestPractice to produce slow (85 bpm) and fast (142 bpm) tempo versions. The music was played from iTunes through headphones being played at the same volume (≈80db).

2.3.6 Sensory Ratings

For each beverage, participants used VAS anchored with "Low" or "Not at all" followed by the relevant adjective, and "High" or "Very", again followed by the relevant adjective. The following descriptors within the context of a sentence verifying the question were centred above each line in the following order; "cold", "familiar", "alcohol strength", "like", "sweet", "bitter". These descriptors were the same as those used in previous research (Higgs, et al., 2008).

2.3.7 Drinks and administration

A mini-study was conducted in order to select the most appropriate alcoholic beverage to use in the study. Five female participants were presented with five shot glasses, each containing 25ml of a shop purchased vodka based drink: Vodka Kick Apple (4% ABV), Smirnoff Ice (4% ABV), Smirnoff and Cranberry(6.4% ABV), WKD (4% ABV) and Orange Reef (5% ABV), refrigerated separately at a temperature of 7°C. These beverages were chosen as they are frequently consumed by young females in the UK. Drinks were presented in a counterbalanced order; participants rated the taste (and other sensory characteristics including alcohol strength) using VAS. WKD was selected for the main study since it was rated as one of the most pleasant drinks and provided variability in terms of bitter/sweet. For the main study, participants were presented with a glass containing 275ml of freshly opened WKD.

2.4 Procedure

All testing took place between 1200 and 1700 in test rooms at the Psychology dept. Upon arrival, participants provided informed consent, had their weight measured and then completed a breathalyzer test using a digital personal breathalyzer (Alcoscan AL7000) to ensure their Breath Alcohol Level (BrAL) was zero (all readings were '0'). Next, participants completed the AUQ, arousal thirst & hunger ratings, followed by the PANAS mood questionnaire. Participants then consumed water to ensure they were at similar levels of thirst. Participants then completed the olfactory and taste tests, followed by the taste test. Participants took two sips of the alcoholic beverage (WKD) and then completed the VAS on the sensory characteristics of the beverage.

Participants were then instructed to consume all of the drink whilst watching a DVD programme ('The blue planet', a natural history of the oceans, BBCDVD 1089, 2001) and either listen to music or be told there was no sound. The main purpose of showing subjects a television programme, was to provide a more naturalistic environment and also divert attention away from any suspicion that the rate of consumption was being measured, particularly important for those participants in the control condition and is similar to previous research (Higgs et al., 2008). The participants were timed covertly using a stopwatch on a mobile phone. The stopwatch began when they took their first sip of the beverage and stopped when participants placed the empty glass back on the table. Participants then made their final sensory ratings for the drink, their arousal, thirst and hunger ratings and positive and negative mood. Their BrAL was measured for a final time. The participant was then given a partial debriefing on the purpose of the study and told a full debriefing would be sent to participants by email after completion of the study. A partial debriefing was felt necessary since a full debriefing might well have compromised the study for future participants. Although the amount of alcohol consumed was relatively small (≈1.5 UK Alcohol units/1 standard 125ml glass of wine), participants were asked to wait for 10 minutes in a waiting area to ensure no adverse reaction to alcohol. They were additionally informed not to operate heavy machinery, drive a car, ride a bicycle for at least 3 hours (by which time the alcohol would have been fully metabolized). Participants were given course credit for participation.

2.5 Analysis

The time taken to consume the beverage was analysed using a Univariate ANOVA with the between-subjects factor of Group (No Music/Slow Tempo/Fast Tempo). Sensory data, positive and negative affect and arousal, thirst and hunger were analysed by using repeated measures ANOVAs with the within subjects factor of Time (Baseline/End of study) and the between-subjects factor of Group (No Music/Slow Tempo/Fast Tempo).

3. Results

3.1 Participant characteristics

For participants weight, analysis revealed a significant effect of Group (Table 2), with those in the Slow tempo group being heavier than the Control ($p = .015$) and Fast tempo group ($p =.06$), who did not differ from each other ($p = .52$). There were no group differences in any of the olfactory and taste tests.

3.2 Consumption Duration

We found a significant effect of Group, $F(2, 42) = 10.35$, $p < .001$, $\eta^2 = .33$, where partially agreeing with our prediction, both fast and slow tempo groups consumed the drink faster than the control (both ps <.01), though no difference was found in the former two groups ($p = .51$) (Figure 1). Since there were differences in weight between groups we completed an ANCOVA with weight as covariate which did not alter these findings.

-Insert Figure 1 about here-

3.3 Sensory Ratings

We found significant effects of Time for alcohol strength and liking, with increases and decreases respectively (Table 3). There were however no main effects of Group or Group x Time interactions which was against our prediction. None of the other sensory ratings were significant.

3.3 Arousal/Thirst/Hunger

For alertness, there was an approaching effect of Time, $F(1, 42) = 3.67$, $p = .06$, $\eta^2 = .08$ and although the Group and Group x Time effects were not significant (Fs < 1.3), the reduction in alertness from baseline to the end of study is clearly more gradual in the two music conditions (Figure 2), which partially agrees with our prediction that differences in arousal would be seen in the music versus no music conditions.

-Insert Figure 2 about here-

For ratings of thirst, there was a significant main effect of Time, $F(1, 42) = 5.34$, $p = .02$, $\eta^2 = .11$, with as expected, thirst ratings decreasing from baseline ($M = 58$, $SE = 2.8$) to post drink task ($M = 47.5$, $SE = 3.8$). The absence of any Group effects confirm that drink duration could not be attributable to differences in thirst between conditions.

3.4 Positive and Negative Mood

Positive mood ratings revealed significant effects of Time and separately Group (Table 3), where positive mood was highest in the Fast versus both Slow ($p = .01$) and Control ($p = .001$) groups, who did not differ from each other ($p = .30$). For negative mood, we found a significant effect of Time qualified by a Group x Time interaction, $F(2, 42) = 3.35$, $p < .05$, $\eta^2 = .14$. To examine this further, we completed separate ANOVAs for each group, which revealed for the Control group only, a significant effect of Time, $F(1, 14) = 9.00$, $p = .01$, $\eta^2 = .39$, with negative mood declining from baseline (Table 4). In summary, the clearest effects for mood revealed that negative mood declined in the control group but remained constant for both music groups. This supports the prediction of differences in mood between music and control conditions.

3.5 Correlations

In order to explore what other factors might modulate consumption rate in the context of music and since there were no differences between the two music conditions, we merged this data and completed correlations between consumption rate, mood and sensory ratings, comparing these to the control group. We then repeated these correlations replacing consumption rate with BrAL, since it was theoretically interesting to compare changes in alcohol perception in the light of objective BrALs (Table 5). In terms of duration we found that for control individuals, increases in drink liking and sweetness predicted faster consumption, which could in turn be related to increased drink liking being related to decreased negative mood. In contrast, none of these associations were found for those exposed to music who against intuition consumed the drink more quickly when it was perceived as higher in alcohol strength. This latter finding could be explained by the inverse association between BrAL and alcohol strength; hence (paradoxically) decreases in BrAL were associated with higher perceived alcohol strength. We also found that whereas increases in negative mood predicted a higher BrAL in the control group, no such association was found for those exposed to music. Since the ascending limb of blood alcohol concentration is normally associated with more positive mood, we calculated a change from baseline score separately for positive and negative mood. This revealed that for control participants only that decreases in negative mood were associated with higher BrAL, $r(15) = -.49$, $p = .06$, which conforms more to what we would expect.

In summary, these correlations suggest a disruption to both sensory and affective systems in those exposed to music.

4. Discussion

The study found that in a sample of young female drinkers that consumption of an alcoholic beverage was faster in the presence of both slow and fast tempo music compared to a no music control. This result agrees with the prediction that music would lead to faster alcohol consumption, though we also expected faster consumption in the fast versus slow tempo condition, which was not seen. Previous work in this field demonstrated that a soft drink was consumed quicker in the presence of a fast versus slow tempo environment (McElrea & Standing, 1992). However, since their design did not include a 'no music' control, we cannot be sure if drink duration actually differed from individuals not exposed to any music. Additionally, that study used piano music played at a speed of either 54(slow) or 132(fast) bpm, compared to contemporary club music 85/142 bpm in the present study. It is therefore possible that using a higher magnitude between the two conditions as that study might elicit contrasts in alcohol consumption speed.

Surprisingly, there were no differences in sensory ratings between the three conditions, which one might have expected as a way of explaining the contrasting rates of consumption. In previous research, we found that individuals rated alcohol as sweeter in the context of music (Stafford et al., 2012). However, that work examined the effects of music on the initial taste of alcohol and it is therefore possible that the combined influence of the pharmacological effect of alcohol itself and music act to diminish any absolute differences in taste. Nevertheless, the findings from the correlational data do suggest some differences in the relationship between consumption speed and taste.

For control participants, the association between final sweetness/ liking ratings of the beverage and consumption speed appear normal in that one might be expected to consume something faster the more it is liked (also found in food research, (Hill & McCutcheon, 1984). In contrast for participants in the music conditions, no such pattern was found but rather increased ratings of alcohol strength predicting faster consumption, which is counterintuitive given that in other work, individuals who took longer to consume a 7% versus 3% abv drink also rated the drink as higher in alcohol strength (Higgs et al., 2008). Hence higher perceived alcohol strength was likely used as a cue to 'slow' down the speed of consumption, which is opposite to the findings here. We also found that for control participants, increases in negative mood were strongly associated with lower liking for the drink, i.e. the sadder individuals became, the less they liked the drink, which was not seen in those exposed to music. Since liking was related to the speed of consumption, this suggests that music altered the relationship between sensory and affective systems which influence the rate of alcohol consumption.

In terms of alterations in arousal and mood, compared to controls we found evidence for music to prevent the fall in alertness and maintain a static level of negative mood. The fact that negative mood declined over the course of the study for the control group is particularly noteworthy. If we assume the net effect of negative mood reduction is feeling more positive, this is precisely what we would expect in the ascending limb of blood alcohol concentration per previous research (Sutker, Tabakoff, Goist, & Randall, 1983). Indeed, this gains support from the observation that for control participants only, decreases in negative mood predicted increases in breath alcohol level. The fact this was not seen in either music condition could be significant in its down regulation of alcohol effects on mood.

Based on the findings of the current study and previous work, we can now make some inferences on music's effect on alcohol perception. The initial effects of music on alcohol perception are principally via its ability to increase estimates of sweetness (Stafford et al., 2012), which may well prime individuals to consume greater volumes and at a faster rate as has been observed in field work (Gueguen, 2008). We now know that although the combined effects of music and psychoactive effects of alcohol itself do indeed lead to faster alcohol consumption, the causal nature of this effect are not straightforward. The approach/avoidance theory (Mehrabian & Russell, 1974) received some support from these findings, most notably from a persistence in negative mood in the two music conditions. Of course, it needs to be recalled that this theory has been most commonly applied to retail environments, whereas in the study here, the drug effects of alcohol itself likely interacted with music. Hence the arousing/mood altering properties of music were likely partially offset by the psychoactive effects of alcohol itself.

An alternative theory is that the environment of music may have induced a compensatory response to counteract the effects of alcohol, analogous to individuals who developed tolerance to alcohol received in the same environment (Birak et al., 2011). So, the contemporary music in the present study (typical of current club music) acted to curb some of the sedative effects of alcohol in the form of preventing a decline in arousal. However, since work has shown that perceiving the effects of alcohol can be a cue to drink strength (Higgs et al, 2008), the ability of music to reduce these effects may have led to a false appreciation of alcohol strength being lower than it actually was (BrAL) and thereby induce faster consumption. In other words in the present study, music caused a mismatch between the objective BrAL and the perceived alcohol strength, and this may explain why the drink was consumed faster with higher perceived alcohol strength.

The findings in the present study might also be accommodated by Cognitive Load Theory (CLT), similarly to how a distracting task led to greater food consumption (Bellisle & Dalix, 2001). However in that study, the distracting task entailed a much clearer cognitive load where participants were asked to listen to a story whose contents they would later be questioned upon, compared to listening to sensory information about the food (lower cognitive load). In the current study, participants were not asked to remember any of the distracting material and hence it is uncertain of the level of cognitive demand. Interestingly, in terms of the initial perception of alcoholic beverages, our previous study (Stafford et al., 2012) demonstrated simply listening to music had a greater effect on distorting alcohol sweetness than a task with a higher cognitive load (listening to music and shadowing a news story), which might seem to challenge cognitive load accounts in this area. Importantly however, that study did not examine the rate of consumption and effects of alcohol itself. Additional research is therefore needed, using tasks varying in cognitive load to understand whether they affect the rate of alcohol consumption.

In terms of limitations, since we only used female participants, we cannot be sure whether music would have similar effects in male drinkers. However, relevant here is the finding from observational research that there were no interactive effects of environment (music volume) and gender on alcohol consumption (Gueguen, 2004), which suggests that music would affect males and females equally. Following on from this, further research with a wider population (not just university students), age range and level of habitual consumption is encouraged to ascertain generalizability of these effects. Additional information on female use of contraceptives and menstrual cycle would also be useful, since it is possible that the mood alterations that accompany PMS (Kiesner, 2012) could affect alcohol perception. It would also be prudent to screen potential participants for alcohol related problems, for instance using the Michigan Alcohol Screening Test (MAST). We also recommend that future research obtain additional measures of alcohol intoxication (e.g. perceived lightheadedness) as it would be useful to understand how this might change with music context; together with a more comprehensive measure of arousal such as the Bond-Lader scale (Bond & Lader, 1974). In terms of the experimental design, although using a within-subjects has advantages (e.g. each participant acting as their own control) over the between-subjects design used here, there would also be a good chance of order effects as seen in previous research (Higgs et al., 2008), with participants consuming drinks more slowly on the second occasion irrespective of condition.

The current study found that individuals consumed an alcoholic beverage faster in the context of music. Since alcohol that is consumed at a faster rate will have a greater intoxicating effect and associated health risks, it is important that consumers are aware of this effect. In an era of unparalleled distractions on human attention, it is imperative that we understand further how these factors interact with the effect of drugs, particularly with one of the most widely consumed and controversial: alcohol.

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Table 1. UK/US Comparison Of Alcohol Measurements

	UK Guidelines[1] (UK Alcohol units per week)			
	Sensible		**Harmful**	
	Male	**Female**	**Male**	**Female**
	<21units	**<14units**	**50units+**	**35units+**
US Standard drinks equivalent	**12**	**8**	**29**	**20**

Notes
'1' UK Alcohol unit = 8g alcohol
'1' US Standard drink = 14g alcohol (eqv 5oz/116ml 12% wine)
Therefore 1 US Standard drink = 1.75 UK Alcohol units

[1] Department of Health. *Safe. sensible. social. The next steps in the National Alcohol Strategy*. London: DH Publications, 2007.

Table 2. Mean (SEM) Participant Characteristics

	Group						
	Control		Slow Tempo		Fast Tempo		Group
	M	SE	M	SE	M	SE	Differences
Age	19.9	0.2	19.9	0.40	20.3	0.3	F = 0.66, NS
UK Alcohol units (p/week)	23.6	3.4	26.0	4.1	30.1	3.0	F = 1.09, NS
Weight	62.0	2.5	72.3	3.6	64.6	2.4	F = 3.48, p = .04
BrAL	0.59	0.09	0.63	0.13	0.56	0.06	F = .126, NS
Smoker[1]/Non Smoker Ratio	2/13		0/15		5/10		

[1] Mostly social smokers, ≤ 5 cigarettes per day.

Table 3. Mean Drink Sensory Ratings Depending On Group

		Control		Slow Tempo		Fast Tempo		
	Time	**M**	**SE**	**M**	**SE**	**M**	**SE**	**Main Effect (Time)**
Alcohol Strength	**Baseline**	19.7	4.3	24.7	4.1	30.1	3.3	
	End	24.2	4.9	31.5	5.0	36.6	4.5	F = 9.00, p < .01
Liking	**Baseline**	68.4	6.2	78.1	4.3	77.3	5.2	
	End	67.8	6.7	70.1	5.7	74.2	6.6	F = 4.13, p < .05
Sweet	**Baseline**	80.7	4.6	86.2	2.2	86.2	2.1	
	End	83.5	4.4	87.2	2.7	84.1	2.8	F < 1, NS
Bitter	**Baseline**	15.3	4.4	17.2	2.6	11.2	1.6	
	End	13.1	3.5	15.3	3.5	16.5	4.3	F < 1, NS
Familiar	**Baseline**	89.3	2.8	88.6	3.3	91.3	2.1	
	End	89.9	3.3	92.3	1.7	90.1	2.9	F < 1, NS
Cold	**Baseline**	76.4	3.1	68.0	6.0	66.8	4.6	
	End	69.4	4.6	62.5	5.3	65.5	5.2	F = 3.39, p = .07

Table 4. Mean PANAS Ratings Depending On Time Period And Group

		Control		Slow Tempo		Fast Tempo		Main Effects	
	Time	**M**	**SE**	**M**	**SE**	**M**	**SE**	**Time**	**Group**
Positive	**Baseline**	25.8	1.7	27.7	1.6	32.7	1.1		
	End	23.6	1.8	25.6	1.6	31.0	1.3	$F = 7.76, p < .01$	$F = 6.89, p < .01$
Negative	**Baseline**	15.5	1.8	14.5	0.8	16.6	1.9		
	End	12.9	1.1	14.6	1.1	16.1	1.8	$F = 5.36, p < .05$	$F < 1$, NS

Table 5. Correlations Between Duration, BrAL, Mood And Sensory Ratings Depending On Group

	Control	**Slow & Fast Tempo**
Duration/Alcohol Strength	-.16	-.40**
Duration/Alcohol Liking	-.49*	-.24
Duration/Alcohol Sweetness	-.48*	12
Duration/Alcohol Bitterness	.09	.08
Duration/Positive Mood	-.05	.14
Duration/Negative Mood	-.01	-.18
BrAL/Duration	-.34	.06
BrAL/Alcohol Strength	.01	-.38**
BrAL/Alcohol Liking	-.39	-.21
BrAL/Alcohol Sweetness	.10	-.35*
BrAL/Alcohol Bitterness	.42	-.08
BrAL/Positive Mood	.34	-.11
BrAL/Negative Mood	.58**	-.04
Liking/Positive Mood	.13	.28
Liking/Negative Mood	-.71***	.06

***$p < .01$; **$p < .05$; *$p < .10$

Legends for figures:

Figure 1. Mean Duration To Consume Drink By Group
Error bars represent standard errors of the mean.

Figure 2. Mean Alertness Ratings Dependent On Time And Group
Error bars represent standard errors of the mean.