
**Drinking To Go Out or Going Out To Drink?**

*A Longitudinal Study Of Alcohol In Night-Time Entertainment Districts.*

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Abstract

Background. Recent research has highlighted the growing trend of alcohol preloading before a night out. We wished to look at people’s motivations for preloading, their estimation for drinking during the night, and assess the impact that preloading has on how inebriated people become across the night, as measured by Breath Approximated blood Alcohol Content (BrAC).

Method. We randomly surveyed and breath-tested patrons as they entered and exited Night Time Entertainment Districts (NEDs) in Brisbane, Queensland. We obtained 360 participants who were encouraged to contact us at the end of their night, compensating them for their time with a taxi voucher. Of these, 143 people returned and completed an exit questionnaire.

Findings. We found that people: were motivated to preload in order to save money and socialise; were likely to drink more than they predicted over the course of the night; were more surprised by their alcohol reading the higher their BrAC; and this trajectory displayed little difference between men and women. It was further found that, for men, personality contributed 19% of the variance to exit BrAC, but entry BrAC accounted for nearly 38% of unique variance. For women, body mass index significantly predicted exit BrAC (9% unique variance), but entry BrAC accounted for nearly 30% unique variance.

Interpretation. To reduce general levels of intoxication in city NEDs, interventions should focus on having people come in earlier, less drunk and be taught to have more realistic appraisals of their drinking.

Key Words: Alcohol use; night-time entertainment districts; preloading; end-of-night; longitudinal study; legislation;
1. Introduction

Alcohol has long been an integral part of social practice, with almost all known cultures having some recorded history of alcohol use as a means of integration and tribal ritual (McGovern, 2009). The production of alcoholic beverages has now been industrialised, with global reviews estimating the net revenue of the 26 largest alcoholic beverage companies to be $155 billion USD (Jernigan, 2009). Whilst collective motivations may vary, the popularity of alcohol consumption may plausibly be attributed to the ‘positive’ effects of alcohol consumption such as relaxation, body warmth and altered mood (Centers for Disease Control and Prevention, 2015) and facilitated by the widespread availability of the drug.

1.1 Burden of Alcohol Use

Despite these desired effects, numerous studies have demonstrated the detrimental effects of alcohol - effects which have typically been associated with increased quantity and frequency of consumption (Rehm et al., 2009; Wood et al., 2018). National evaluations of economic costs in Australia, specifically, have also demonstrated the potential detrimental effect of alcohol misuse, with a cost-to-society estimated to be $14.35 billion (Manning, Smith, and Mazerolle, 2013; See S1, 1.1, for more details).

1.2 Study Overview

Whilst the studies mentioned above provide insight into alcohol use and cost at a global level, less is known about consumption at an individual level over the course of a night in entertainment districts, leaving us with few intervention options at a societal or clinically useful level. The primary purpose of the current study was to look at alcohol intoxication predictors when people exit night-time entertainment districts (NEDs) using variables assessed from those same people as they entered the NEDs. NEDs are localised areas of high-density pubs and clubs and nightlife focused amenities, usually with commensurate public safety resources allocated by the
local government or council. In Queensland, Australia, NEDs tend to also be designated as Safe Night Precincts.

Whilst NEDs are typically renowned for higher rates of alcohol consumption, specifics remain unknown or have received limited examination. In the current study we aimed to gauge alcohol use around NEDs longitudinally, by assessing degree of intoxication upon entry into, and at exit from, NEDs. The research also examined two variables that may add understanding of drinking behaviours which may be used for later interventions: motivations for alcohol use and accuracy of consumption estimation across a night. Finally, predictors of end of night intoxication will be examined as this has frequently been tied to violence and, therefore, a focus for legislative intervention (e.g., Mazerolle, White, Ransley and Ferguson, 2012).

1.3 Preloading

Recent research investigating alcohol use in Queensland NEDs (Devilly, Allen, and Brown, 2017) has found these districts to be particularly populated on Thursday, Friday, and Saturday nights by individuals typically in their early 20s ($M_{age} = 22.61, SD = 5.49$). Preloading (also referred to as “pre-drinking”, “pre-gaming” or “pre-partying”) occurs when people consume alcohol, individually or in groups, prior to entering NEDs, typically in a private house, hotel or suburban pub (Devilly, 2018; Devilly, Allen & Brown, 2017; Foster & Ferguson, 2014). This research into preloading found that, of the 2,751 participants from Brisbane (the State capital of Queensland), more than 79% of people reported to preload and 71% returned a breath approximated blood alcohol content (BrAC) greater than zero, with both figures showing little difference between the genders. Further, and contrary to other research which used a retrospective methodology (see Devilly, 2018 for a discussion of this), it was found that the primary reason for preloading was ‘to socialise’, with ‘to save money’ being a close secondary reason. Seminal research in the United States (e.g., Borsari et al., 2007; Chaney et al., 2019) has demonstrated that preloading (or, pregaming, as termed there) is a unique predictor of intoxication and addiction in mandated students. Such results lead to questions regarding the role of preloading in city-wide intoxication
levels and end of night inebriation and possible violence. Such questions require longitudinal research.

1.4 Longitudinal Research

Perhaps the most comprehensive longitudinal assessment of alcohol consumption was completed by Wells et al. (2015) in Canadian NEDs. The authors assessed 287 patrons, both as they entered and exited popular NEDs. A particular strength of the research was that they breathalysed and administered surveys at both points of contact with participants. Whilst the researchers reported that 51% of participants preloaded, no entry BrAC analyses were reported and so differences at intake (e.g., gender or age differences) could not be appraised. The average BrAC at end of the night was reported to be a BrAC of 0.08%. However, this research only completed assessments between 10pm and 12:30am, and we have found in our prior research that entry into popular NEDs in Queensland is well after 10pm and there is a significant, but very small, linear relationship between time of the night and BrAC readings – a relationship which, admittedly, only accounts for a shared variance of 1.44% ($r = .12$; Devilly et al., 2017). An ideal longitudinal study into drinking in the NEDs, therefore, should be naturalistic and assess people as they leave the NEDs, no matter what time that may be.

Research examining the impact of preloading across a night of drinking has generally produced uniform results, suggesting a positive association between pre-drinking and total alcohol consumption (e.g., Ostergaard and Skov, 2014; Kuntsche and Labhart, 2013; see S1, 1.4, for more detail). Overall, these research suggest a positive association between preloading and alcohol consumption. However, no study could be found utilising BrAC as a measurement of pre-drinking, or of end of night intoxication. The current study will build upon these studies by directly assessing the degree of intoxication of patrons at entry and exit of NEDs across their night out, while also measuring other factors likely to be related to the end of night BrAC. In this regard, drinking motivations have been found to predict alcohol consumption.
1.5 Drinking Motivations

Utilising the Revised Drinking Motivation Questionnaire (DMQ-R; Cooper, 1994). Ruiz, Valmas, Sawyer, Kemppainen, and Oscar-Berman (2015) found that individuals with a dependency on alcohol were primarily motivated to consume alcohol for enhancement and coping, whilst those without dependency concerns primarily utilised alcohol for social and enhancement reasons. Mohr et al. (2005; and Koyama and Belli, 2011) found similar results to Oscar-Barman’s non-alcoholic controls in their investigation of American college students’ motivations towards alcohol consumption. Indeed, numerous studies across cultures and age groups have applied the Theory of Planned Behaviour (TPB; Ajzen, 1991) to alcohol consumption. They have predominantly found intention to be a strong predictor of use and misuse of alcohol, explaining between 8-30% of variance in use (Barmpagianni, Travlos, Kalokairinou, Sachlas, and Zyga, 2014; Kam, Matsunaga, Hecht, and Ndiaye, 2009; Marcoux and Shope, 1997). However, research exploring the application of the TPB to alcohol consumption has been limited to examining the outcome variable ‘alcohol use’ retrospectively. No studies could be found in the literature examining the ability of individuals to make an accurate a priori estimation of their intended consumption across a night of drinking, particularly in NEDs. We wished to address this research gap, along with a clarification of demographic variables that may affect drinking across the night.

1.6 Demographic Issues

In looking at what predicts end of night intoxication levels in the NEDs, there are known differences in alcohol metabolism due to body mass (SA Health, 2012) and stage of lifespan (Meier and Seitz, 2008), and so we also need to assess these variables. Furthermore, males and females should be analysed separately due to known effects of gender on alcohol metabolism (e.g., Baranoa et al., 2001; Kwo et al., 1998). We also have research pointing to a relationship between personality variables and binge drinking generally. These variables include: high Impulsivity; high Sensation seeking; Anxiety sensitivity; Neuroticism; Extraversion and low Conscientiousness (Adan, Forero, and Navarro, 2017). However, nearly all this research has come from University students as
participants and not a sample of patrons in the night time economy. The obvious reason for this is the lack of time one has with such samples to get them to complete any meaningful personality measures while they are inebriated. However, with our methods of data collection (see Devilly, 2018), and the availability of short item personality questionnaires (e.g., the Ten Item Personality Inventory; Gosling, Rentfrow and Swann, 2003), we believe that the most stable personality variables can now be approximated and taken into account into any model predicting end of night BrAC.

1.7 Study Aims

In this study we wished to gauge the rate of preloading before entry into the NED, people’s entry inebriation level, past drinking behaviour, predictions for their drinking behaviour once inside the NED and their alcohol use status generally. We then wished to test the relationship between this entry data and their exit data: does the NED entry BrAC predict their exit BrAC once known factors are taken into account? We further predict that individuals will underestimate their alcohol consumption across a night of drinking, and people will be more surprised by their BrAC reading the higher that reading goes. Lastly we wished to inspect people’s motivations for preloading.

2. Method

2.1 Participants and Procedure

An *a priori* power analysis led us to require 164 participants (82 females and 82 males) to complete both entry and exit assessments (See S1, 2.1). This research was completed in conjunction with a larger overarching study that was completed in partnership with the Queensland Police investigating alcohol and illicit substance use in NEDs (manuscript in preparation). Refusal rate was 11.23%. Three hundred and sixty individuals (162 males and 198 females) completed the entry survey relevant to the current research of whom 143 returned to complete the exit survey.

Following ethical approval (obtained through the Human Research Ethics Committee of Griffith University - 2015/704), participants were recruited at main bottlenecks into and out of
popular Brisbane NEDs between 7:30pm and 5am. This included: train stations, taxi ranks, and outside entertainment venues. Recruitment occurred in the warmer months (between November 2015 and April 2016) on most Thursday, Friday, and Saturday nights (no data collection was completed over the Christmas holiday).

Every fourth individual was approached (or every individual after a rejection occurred) and was invited to participate in the study. Participants were given a brief introduction to the study before being invited to complete a survey. Researchers ensured all potential participants were entering the NED, and had not consumed alcohol in the NED already. Those who had consumed alcohol in the NED were offered a breath test as a public service. Participants were also informed of a $20 taxi voucher incentive for completing the entry survey at the beginning of the night, as long as they returned to complete the leaving survey upon exit from the NED. To facilitate the return of participants to complete the exit survey, participants were provided with a mobile number (which was written on the ID cards) to text when they were ready to leave the NED. Upon doing so, an auto-response text message was sent to the participant informing them of the research team’s current location. As a primary goal of the study was to estimate general alcohol consumption in entertainment districts, no exclusion criteria applied.

Similar to previous comparable research (e.g., Devilly et al., 2017; Devilly, Hides & Kavanagh, 2019), the majority of participants were in their early-20s ($\bar{x} = 21.18$ years, $SD = 4.45$). Most identified as students (52.1%), followed by ‘professional role’ employment (10.8%), followed by sales worker (7.2%), then labourer or managerial employment (both 6.1%).

2.2 Materials

2.2.1 Apparatus.

Individuals were breathalysed using the Alcolizer LE5, which is the only hand-held breathalyser which has been demonstrated to have good reliability and validity in field trials
(Sorbello, Devilly, Allen, Hughes and Brown, 2018). All questionnaires were completed by participants on iPads using QuickTapSurvey.

2.2.2 Surveys

The entry and exit surveys (see S1, 2.2.2 for more details) assessed: demographics and body mass index; Personality (TIPI; Gosling, Rentfrow and Swann, 2003); expected alcohol consumption whilst in the NED and actual drug and alcohol consumption before entry; alcohol drinking motivations – preloading and whilst in the NED; behavioural intentions at the end of the night; retrospective estimations of number of drinks consumed; and BrAC at entry and exit to the NED.

3. Results

3.1 Data Diagnostics

Data was cleaned and outliers were investigated (see S1, 3.1). A logarithmic transformation was applied and appeared to resolve normality concerns for “age” (with so many 18 and 19 year old patrons). All analyses were undertaken using SPSS 22.0 (IBM Corp., 2013), ClinTools 4.1 (Devilly, 2007), and Statistica 13 (Tibco Software, 2017).

3.2 Methodology Check

Our ‘return’ sample did not significantly differ from our non-return sample on any of the important intake variables (personality, age, BrAC, number of people with a BrAC of zero). Those with a higher BMI were less likely to return (small effect), and our exit BrAC was less than the average BrAC at exit found in the overarching study up to that point (see S1, 3.2, for more details).

3.3 Intoxication across the Night

Table 1 presents data for those who completed the entry survey, whilst Table 2 presents longitudinal data for those who completed both the entry and exit survey. Analyses are reported by gender and also combined. The average length of time spent in the NED (i.e., between the two
assessments) by our sample was nearly 3 hours (\(\bar{x} = 2.92\) hours, \(sd = 1.48\); \(min = .35, max = 6.47; median = 2.75; n=138\)).

If one were to adopt the legal BrAC driving limit as a cut-off for intoxication (BrAC > .05%), one can see from Table 1 that 46.48% of our intake sample met this criterium and 61.80% of preloaders scored above this cut-off. Males and females did not significantly differ in the rate of intoxication, using this cut-off. In fact the rates were exceptionally similar, whether seen as a proportion of those scoring above zero (Males = 61.16%; Females = 62.33%; \(x^2[n = 267, df = 1] = 0.04, p = .84, Phi = .01\)) or seen as a proportion of the entire sample (Males = 47.13%; Females = 45.96%; \(x^2[n = 355, df = 1] = 0.05, p = .83, Phi = .01\)). Another way of checking our sample at intake was similar as those returning, and instructive under the rubric of ‘intoxication across the night’, is the number of people scoring above or below this intoxication criterium of .05% (yes / no) and those who returned (yes / no) for the follow-up. This was also not significant (\(x^2[n = 355, df = 1] = 0.30, p = .58, Phi = .03\)), and further supports our sampling methodology.

Eighty-five percent of participants reported that they had preloaded before entering the NED, though only approximately 74% of individuals assessed at entry had a BrAC reading greater than zero. Of those who endorsed preloading and later returned, 16 out of the 19 who had a zero BrAC reading reported to have had 2 or fewer standard drinks in the previous 2 hours. Paired-sample t-tests revealed that individuals were higher BrACs at exit relative to entry \(t(142) = 5.18, p < .001, g = 0.43\), with a moderate effect size observed. Participants estimated that on average they consumed 4.99 standard drinks (sd=5.02) whilst they were in the entertainment district. Data were also analysed where they were limited to participants with BrACs greater than zero to examine data explicitly for those that had been drinking. Based upon the longitudinal data, no significant difference of BrAC at entry to NED was observed between males (\(\bar{x} = 0.070, sd = 0.042\)) and females (\(\bar{x} = 0.067, sd = 0.040\)), \(t(265) = 0.63, p = 0.53, g = 0.08 [-0.16, 0.32]\).

Similarly, males with a BrAC > 0 at exit (\(\bar{x} = 0.076, sd = 0.042; Table 2\)) were not significantly different to females with a BrAC > 0 at exit (\(\bar{x} = 0.072, sd = 0.044\)), \(t(125) = 0.53, p = \)
BrAC readings were also analysed by time of night that individuals were entering or leaving the NED. For entry, a significant positive correlation was found, \( r(359) = .19, p < .001 \), although explaining only 3.69% of the variance (representing a relatively small effect size). However, no significant correlation between time of night and BrAC reading was observed for those leaving the NED with the relationship explaining only 1% of the variance, \( r(138) = -.08, p = .36 \).

Of particular interest to legislators, it was found that the length of time spent inside the NED was negatively correlated with BrAC at entry \( (r(138) = -.28, p = .001) \): the higher the BrAC of patrons at entry, the less time they spent in the city. It was also negatively correlated to a smaller degree with exit BrAC \( (r(138) = -.18, p = .03) \), although this may be a side effect of entry and exit BrAC being interdependent. However, time inside the NED was not significantly correlated with change in BrAC from entry to exit \( (r(138) = -.10, p = .23) \), which somewhat clarifies this issue.

### 3.3.1 Predictors of End of Night BrAC

Hierarchical regressions were employed to examine the variance explained in BrAC at the end of the night by BrAC at entry to NEDs, whilst statistically controlling for age and BMI and also personality variables. As explained above, separate analyses were undertaken for males and females. Agreeableness \( (r(143) = -.17) \) was the only personality variable which correlated significantly across the entire sample with exit BrAC.

Looking within each gender, Conscientiousness \( (r(56) = -.34) \), Emotional Stability \( (r(56) = -.29) \), and Openness To Experiences \( (r(56) = -.28) \) correlated negatively with exit BrAC for males. Extraversion \( (r(56) = -.20) \) displayed a small, but non-significant, negative relationship with exit BrAC, while Agreeableness \( (r(56) = -.09) \) did not relate for males.

For females, none of the personality variables significantly correlated with exit BrAC. Extroversion \( (r(87) = .17) \), and Agreeableness \( (r(87) = -.20) \) demonstrated small, non-significant, relationships, while Conscientiousness \( (r(87) = -.03) \), Emotional Stability \( (r(87) = .08) \), and
openness To Experiences ($r(87) = .03$) did not relate for females. Due to the reduced power of analysing within each gender it was decided to include all the personality variables as a second step in the hierarchical regressions. This is a more conservative approach, leaving less unique variance available for the third step of the model. On the one hand we do not wish to saturate the model, carving variance with a thousand strokes, but on the other it does not appear a valid approach to exclude the one personality variable which correlated with outcome for the entire sample (Agreeableness), because reduced power within each gender meant a lack of significance. Likewise, it does not give the impression of a level playing field if we were to analyse the males with a second step of personality and not the females.

### 3.3.2 Males.
BMI and logarithmically transformed age were entered first into the model, prior to the personality variables being entered into the model at Step 2. BrAC at entry was entered into the model at Step 3. Table 3 provides a summary of the hierarchical regression analysis for males and females. Analysis revealed that Step 1 did not significantly contribute to the regression model ($R^2 = .08, F(2, 52) = 2.18, p = .12$). The addition of Step 2 significantly added to the model ($\Delta R^2 = .21, F(5,47) = 2.76, p = .03$). Analysis revealed that the second stage of the model, containing demographic and personality variables, was significantly different to zero ($R^2 = .29, F(7,47) = 2.70, p = .02$). However, adding entry BrAC at Step 3 significantly added to the model again ($\Delta R^2 = .38, F(1,46) = 51.59, p < .001$). This represents a very large effect size and the resultant model was unsurprisingly different to zero ($R^2 = .66, F(8,46) = 11.35, p < .001$). BrAC at entry was found to be the major significant predictor of BrAC at exit ($p < .001$), representing a large positive prediction explaining 37.7% of unique variance. To place this in perspective, the unique variance contributed in a flipped model by personality variables at Step 3 was 19%, and by the age and BMI variables at Step 3 was only 7.2%.

### 3.3.3 Females.
Variables were entered into the hierarchical regression model in the same order as males. In contrast to males, analysis revealed that Step 1 significantly contributed to the model ($R^2 = .17, F(2, 79) = 8.10 , p = .001$). The addition of personality variables at Step 2 did
not significantly add to the model ($\Delta R^2 = .09, F(5,74) = 1.84, p = .12$). Analysis revealed that the second stage of the model, containing demographic and personality variables, remained significantly different to zero, but with a reduced effect ($R^2 = .26, F(7,74) = 3.75, p = .002$).

However, and similar to the analysis for males, adding entry BrAC at Step 3 significantly added to the model again ($\Delta R^2 = .29, F(1,73) = 46.53, p < .001$). This represents a very large effect size and the resultant model was also different to zero ($R^2 = .55, F(8,73) = 11.12, p < .001$). BrAC at entry was found to be the major significant predictor of BrAC at exit ($p < .001$), representing a large positive prediction explaining 29.7% of unique variance. As males, and to place this in perspective, the unique variance contributed in a flipped model by personality variables at Step 3 was only 4.7%, and by the age and BMI variables at Step 3 was just 9%.

3.3.4 Ancillary Analysis. As personality variables may be correlated with entry BrAC these correlations were also checked. Male entry BrAC significantly and negatively correlated with conscientiousness ($r = -0.26$) and there were no significant correlations between personality variables and entry BrAC for females.

3.4 Motivation for Drinking

Table 4 displays participant self-reported motivations to consume alcohol both prior to (preloading) and whilst in NEDs. ‘To save money’ followed by ‘to socialise with friends’ were endorsed to be the greatest motivators regarding preloading. ‘To socialise with friends’ followed by ‘I enjoy the feeling’ received the greatest endorsement as the primary motivating factor to drink alcohol whilst in the NEDs. The BrAC of people at entry and those at exit, and change in BrAC from entry to exit, was not significantly different between those who specified their primary reason for preloading was to save money and those who specified socialisation as the main reason for preloading (see Figure 1). Considering the financial lure to return for exit interviews, it is not surprising that more of the people who at entry specified preloading ‘to save money’ returned at exit, compared to those who specified ‘to socialise’. However, this did not reach significance with two-tailed testing ($x^2(n = 341, df = 1) = 2.85, p = .09$).
3.5 Accuracy in Drinking Intentions and Future Intentions

A paired-samples t-test indicated that individuals reported drinking significantly more standard drinks whilst out (\( \bar{x} = 4.99, \text{sd} = 3.48 \)) than what they intended (\( \bar{x} = 4.06, \text{sd} = 2.64 \)), with a small to medium effect size observed (\( t(126) = 2.59, p = .01; g = 0.3 \ [0.07, 0.053] \)). Number of intended drinks did correlate with change in BrAC from entry to exit (\( r(n=139) = .25, p = .003 \)).

Participants were also asked whether they intended to ‘endload’ (continue drinking after leaving the NED) as they were leaving the NED. With 20.28% intending to endload, there was a higher percentage of males intending to endload than women, but this did not quite reach significance (\( x^2(df = 1, n = 143) = 2.41, p = .12, \Phi = .13 \)). The most frequently cited place to endload was ‘at home’ (44.83%), followed by ‘at another venue in a different suburb’ (24.14%) and ‘at a friend’s house’ (17.24%). Intention to endload was not significantly differentiated by exit BrAC (\( F(1, 141) = 2.22, p = .14 \)), although it should be noted that only 29 participants intended to endload. With a possible effect size of \( g = 0.31 [-.1, 0.7] \) and a counternull (Rosenthal and Rubin, 1994) of \( g = 0.62 \), this requires further clarification.

3.6 Reaction To BrAC Reading

After being breathalysed on entry to the NED and given their BrAC reading, the participants were asked whether the reading surprised them. A one way ANOVA with ‘Surprise’ rating as the independent variable and entry BrAC as the dependent variable was highly significant (\( F(4, 350) = 3.71, p = .006 \)). As demonstrated in Figure 2, people were increasingly surprised by their rating as they obtained higher inebriation scores.

4. Discussion

The broad aim of the current research was to assess alcohol consumption behaviours within night time entertainment districts (NEDs) by: investigating alcohol use longitudinally across a night in the NED; examining variables that may be utilised for later interventions; and exploring the contribution of preloading to end of night intoxication.
The results of the current study generated considerable differences when examining preloading in an Australian NED context relative to previously conducted research. Specifically, whilst recent research conducted in the UK found that approximately a quarter to a third of individuals preloaded on the sample nights (McClatchley, Shorter and Chalmers, 2014), the results of the current research revealed that 85% of NED patrons endorsed preloading on that night. The endorsement rate found in the current research was also considerably higher than research conducted in a Canadian sample that revealed approximately half of patrons preloaded (Wells et al., 2015). Our preloading rate is, however, consistent with our other, more large scale, studies from the same locations (Devilly et al., 2017; Devilly, Hides and Kavanagh, 2019). These sizable disparities may be attributed to cultural differences between the samples. Furthermore, the greater endorsement rate in the current sample may be further explained due to the comprehensive sampling utilised in the current research. Specifically, the current study sampled individuals from 7:30pm to 5am across numerous nights of the week, whilst previous research was limited to sampling until approximately midnight.

It was also found that people had higher BrACs on exit compared to on entry. While this may seem an obvious result, it should be pointed out that the effect size was only small to moderate. Time spent inside the NED was correlated with Entry BrAC and, to a smaller degree, exit BrAC. However, and in light of the hierarchical regressions, it is evident that this relationship between Exit BrAC and time spent inside the NED is mostly related to their entry BrAC. In support of this hypothesis, it was found that the change in BrAC from entry to exit was not correlated with how long the patrons had been inside the NED. In effect, it appears that assumed inebriation level at entry to the NED is the stronger determinant for how long people stay inside the NED: the higher their BrAC at entry, the less time they spend inside the NED.

Relatedly, Exit BrAC was predicted in males by body mass index (but not age), and by some personality variables (specifically, extraversion and openness to new experiences). However, the lion’s share of variance was attributable to entry BrAC, accounting for 37.7% of unique variance in
exit BrAC. For females, while BMI predicted exit BrAC, so did age. Personality variables added little to the prediction (Agreeableness was the only one to significantly add to the model), but entry BrAC was again a very large predictor, accounting for 29.7% of unique variance in exit BrAC. That we can account for more than 50% of the variance in Exit BrAC, while using a conservative approach to the analysis (i.e., including all variables for both males and females) and not saturating the model, more than outweighs the reduced sample sizes required when analysing by genders. In effect, the old adage that the best predictor of future behaviour is past behaviour rings true again. This result is consistent with those of Borsari et al (2007) and are consistent with PRIME theory (West, 2007). If preloading with alcohol is primarily a system for socialisation, then one would expect that the behaviour of entering NEDs with other people is demonstrative of our motivations to continue drinking whilst still socialising. That said, most of the people we spoke to oscillated between ‘to socialise’ and ‘to save money’. In our previous research where people could select multiple reasons for preloading, these two reasons were selected in 49.54% (to socialise) and 44.12% (to save money) of answers (Devilly et al., 2017).

In relation to the Theory of Planned Behaviour, we found that people were likely to drink more than they had planned and, at entry, were increasingly surprised by their BrAC reading the higher that reading registered. That said, the mean difference between what they intended to drink and what they actually reported to have drunk was less than 1 drink on average. Furthermore, the number of intended drinks whilst inside the NED did correlate with change in BrAC from entry to exit. With people underestimating their future drinking, this predicted drinking being related to change in inebriation from entry to exit. With increasing inebriation levels being associated with increasing surprise at their BrAC score, it seems that entry into the NED may offer a timely avenue for intervention.

Endloading intentions were endorsed by more than 20% of people who returned at exit. While not of statistical significance in the current research, we believe that it is worth following-up on these statistics in future research as it may be that those with intentions to endload may have
higher BrACs or / and be more behaviourally inebriated. Consistent with Ostergaard and Skov (2014) and Kunutsche and Labhart (2013), it appears throughout all of our results that it is the people who pre-drink the most that continue to drink most throughout the night and into the morning.

Those who returned at exit were not significantly less inebriated at entry than those who did not return, as measured by BrAC. Those returning were also no more or less inclined to have scored zero at entry. However, we believe that it is likely that those who returned were more able to send a text and interact with their phone than those who did not. As such it is likely that our return sample were less behaviourally inebriated than the non-return sample at NED exit. Indeed, compared to a sample of people who were breathalysed at exit as part of another, broader, study, our sample scored lower BrACs. This is unavoidable when obtaining a random sample at entry into the NED and trying to track these people through to NED exit. That said, we believe that the current study may only be underestimating the effect of intake BrAC on exit BrAC. With personality and demographic variables contributing so little in unique variance to exit BrAC, the fact that we may have been under-represented by the higher BrACs in our exit data does not detract from the main results in this research. To the contrary, we would argue that our results would only be stronger if we were more represented at exit by those with the highest BrACs. We believe that the small degree of uncertainty introduced by this lack of returns by the ‘top ends’ of inebriation is more than compensated by the ecological validity inherent to our study design.

The results of the current research hold implications for future interventions related to alcohol consumption - specifically in NEDs. Subsequently, these interventions may in turn affect previously cited consequences of alcohol consumption at hazardous levels (e.g., crime, health, and productivity; Manning, Smith, and Mazerolle, 2013). These interventions may include: addressing public policy; policing practices in NEDs; and individual interventions. Whilst it is beyond the scope of the current research to begin to outline specific public policies that may be employed, broad principles based upon the results of the current research may add to the efficacy of these interventions. The results of this study clearly explicated the need to target drinking behaviours at
point of contact, rather than simply basing interventions on time of night. For example, if motivations are to be addressed, these must be unique to preloading or drinking whilst in NEDs. Furthermore, if the aim of these interventions is to reduce intoxication levels of individuals leaving NEDs, preloading must be addressed given the magnitude of its predictive power. Additionally, interventions aimed at assisting individuals to track their consumption may be pertinent, given that individuals in the current research drank significantly more than intended and, at entry to the NEDs, were increasingly surprised by their BrAC readings. Realistic appraisal of one’s inebriation level may even be consequently related to assault rates within the NED, as suggested by Devilly, Allen & Brown (2017).

In conclusion, the current research holds value for the currently dynamic landscape of entertainment district, safe-consumption policies. With various policies being proposed and implemented, we believe that these should be based upon ecologically valid research. If assertions are to be made regarding safe-drinking practices, their basis and aim must be made clear so that their efficacy may be appropriately evaluated. From our research, it seems that people who drink to go out then carry-on drinking once they are out.
5. References


Devilly, G.J., 2018. “All the King’s horses and all the King’s men . . .”: What is broken should not always be put back together again. Int. J. Drug. Pol., 51, 105-110


IBM Corp, 2013. SPSS Statistics for Windows (Version 23.0) [Computer Software]. Armonk, NY: IBM Corporation


Table 1.

*BrAC Readings at Entry*

<table>
<thead>
<tr>
<th>Sample</th>
<th>Group</th>
<th>n</th>
<th>M(SD)</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
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</thead>
<tbody>
<tr>
<td>Including BrAC Readings Of 0</td>
<td>Combined</td>
<td>355</td>
<td>.051 (.05)</td>
<td>.046</td>
<td>.00</td>
<td>.212</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>157</td>
<td>.054 (.05)</td>
<td>.047</td>
<td>.00</td>
<td>.112</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>198</td>
<td>.049 (.05)</td>
<td>.044</td>
<td>.00</td>
<td>.203</td>
</tr>
<tr>
<td>Only BrAC Readings Above</td>
<td>Combined</td>
<td>267</td>
<td>.068 (.04)</td>
<td>.061</td>
<td>.008</td>
<td>.212</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>121</td>
<td>.07 (.04)</td>
<td>.061</td>
<td>.008</td>
<td>.212</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>146</td>
<td>.067 (.04)</td>
<td>.062</td>
<td>.008</td>
<td>.203</td>
</tr>
<tr>
<td>Only BrAC Readings Above .05%</td>
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<td>.082</td>
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<td>.212</td>
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<tr>
<td></td>
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<td>74</td>
<td>.094 (.04)</td>
<td>.082</td>
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<tr>
<td></td>
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<td>.09 (.034)</td>
<td>.085</td>
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</table>
Table 2.

*BrAC Readings for Longitudinal Data (Including BrAC Zero Readings)*

<table>
<thead>
<tr>
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<th>Max</th>
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<tr>
<td>Entry</td>
<td>143</td>
<td>.049 (.041)</td>
<td>.047</td>
<td>.000</td>
<td>.160</td>
</tr>
<tr>
<td>Exit</td>
<td>143</td>
<td>.065 (.047)</td>
<td>.060</td>
<td>.000</td>
<td>.210</td>
</tr>
<tr>
<td>ΔBrAC</td>
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<td>.016 (.038)</td>
<td>.010</td>
<td>-.065</td>
<td>.119</td>
</tr>
<tr>
<td>Absolute ΔBrAC</td>
<td>143</td>
<td>.031 (.027)</td>
<td>.027</td>
<td>.000</td>
<td>.119</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entry</td>
<td>56</td>
<td>.048 (.041)</td>
<td>.049</td>
<td>.000</td>
<td>.155</td>
</tr>
<tr>
<td>Exit</td>
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<td>.069 (.046)</td>
<td>.066</td>
<td>.000</td>
<td>.190</td>
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<tr>
<td>ΔBrAC</td>
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<td>.021 (.037)</td>
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<tr>
<td>Absolute ΔBrAC</td>
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<td>.028</td>
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<td>.116</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entry</td>
<td>87</td>
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<td>.045</td>
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<td>.160</td>
</tr>
<tr>
<td>Exit</td>
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<td>.063 (.048)</td>
<td>.058</td>
<td>.000</td>
<td>.210</td>
</tr>
<tr>
<td>ΔBrAC</td>
<td>87</td>
<td>.013 (.038)</td>
<td>.008</td>
<td>-.065</td>
<td>.119</td>
</tr>
<tr>
<td>Absolute ΔBrAC</td>
<td>87</td>
<td>.030 (.026)</td>
<td>.022</td>
<td>.000</td>
<td>.119</td>
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</table>
Table 3.

Hierarchical Multiple Regression Analyses of Exit BrAC Using Demographics, Personality And Entry BrAC as Predictors.

<table>
<thead>
<tr>
<th>Analytic Approach</th>
<th>Variable Statistics</th>
<th>Model Statistics</th>
</tr>
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<tr>
<td>Gender</td>
<td>Model Step</td>
<td>Variable</td>
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<tr>
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<td></td>
<td></td>
<td>lnAge</td>
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<tr>
<td></td>
<td>Step 2</td>
<td>BMI</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Extraversion</td>
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<tr>
<td></td>
<td></td>
<td>Agreeableness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conscientiousness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Emotional Stability</td>
</tr>
<tr>
<td>Factor</td>
<td>Beta 1</td>
<td>Beta 2</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Openness</td>
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<td>-.02</td>
</tr>
<tr>
<td>BMI</td>
<td>-.01</td>
<td>-.01</td>
</tr>
<tr>
<td>lnAge</td>
<td>-.02</td>
<td>-.12</td>
</tr>
<tr>
<td>Extraversion</td>
<td>-.01</td>
<td>-.01</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>-.01</td>
<td>-.01</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>-.01</td>
<td>-.01</td>
</tr>
<tr>
<td>Emotional Stability</td>
<td>-.01</td>
<td>-.01</td>
</tr>
<tr>
<td>Openness</td>
<td>-.01</td>
<td>-.01</td>
</tr>
<tr>
<td>Entry BrAC</td>
<td>.64</td>
<td>.46</td>
</tr>
</tbody>
</table>

**Step 1**
- Females
  - BMI: -.01, -.01, -.27, <.01
  - lnAge: .23, .1, .37, .36, <.01, .17, .15, 8.10, <.01

**Step 2**
- BMI: -.01, -.01, -.28, <.01
- lnAge: .25, .12, .39, .39, <.001
<table>
<thead>
<tr>
<th></th>
<th>Extraversion</th>
<th>Agreeableness</th>
<th>Conscientiousness</th>
<th>Emotional Stability</th>
<th>Openness</th>
<th>Entry BrAC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.01</td>
<td>-.01, .01</td>
<td>.12</td>
<td>.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-.01</td>
<td>-.02, -.01</td>
<td>-.25</td>
<td>.02</td>
<td></td>
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<tr>
<td></td>
<td>-.01</td>
<td>-.01, .01</td>
<td>-.06</td>
<td>.59</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>.01</td>
<td>-.01, .01</td>
<td>.08</td>
<td>.45</td>
<td></td>
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<tr>
<td></td>
<td>.01</td>
<td>-.01, .01</td>
<td>.08</td>
<td>.48</td>
<td>.26</td>
<td>.19</td>
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</table>

**Step 3**

<table>
<thead>
<tr>
<th></th>
<th>BMI</th>
<th>lnAge</th>
<th>Extraversion</th>
<th>Agreeableness</th>
<th>Conscientiousness</th>
<th>Emotional Stability</th>
<th>Openness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-.01</td>
<td>-.01, .00</td>
<td>-.24</td>
<td>&lt;.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.16</td>
<td>.05, .27</td>
<td>.24</td>
<td>&lt;.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.01</td>
<td>-.01, .01</td>
<td>.08</td>
<td>.39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-.01</td>
<td>-.01, .00</td>
<td>-.19</td>
<td>.03</td>
<td></td>
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<td>.08</td>
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<td>.02</td>
<td>.79</td>
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<tr>
<td></td>
<td>.89</td>
<td>.42, .77</td>
<td>.57</td>
<td>.00</td>
<td>.55</td>
<td>.50</td>
<td>46.53</td>
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</tbody>
</table>

*Note: lnAge = normalised log Age; Coefficients less than .005 also rounded upward to .01.*
### Table 4.

**Self-reported Motivations to Consume Alcohol Prior to and Whilst in NEDs**

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Prior to Entry ( n=306 )</th>
<th>Whilst in NEDs ( n=128 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Enjoy the feeling’</td>
<td>7.5% ( n=23 )</td>
<td>18.8% ( n=24 )</td>
</tr>
<tr>
<td>‘Pressure from friends’</td>
<td>2.2% ( n=7 )</td>
<td>0.8% ( n=1 )</td>
</tr>
<tr>
<td>‘Socialise with friends’</td>
<td>28.1% ( n=86 )</td>
<td>50.0% ( n=64 )</td>
</tr>
<tr>
<td>‘To feel more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>comfortable/relaxed’</td>
<td>5.2% ( n=16 )</td>
<td>10.2% ( n=13 )</td>
</tr>
<tr>
<td>‘Get as drunk as possible’</td>
<td>6.5% ( n=20 )</td>
<td>7.8% ( n=10 )</td>
</tr>
<tr>
<td>‘Increase confidence’</td>
<td>1.0% ( n=3 )</td>
<td>0.8% ( n=1 )</td>
</tr>
<tr>
<td>‘To save money’</td>
<td>49.3% ( n=151 )</td>
<td>11.7% ( n=15 )</td>
</tr>
</tbody>
</table>
Figure 1.
Figure 2.
Figure Legend

Figure 1.

*BrAC At Entry and Exit, By Motivation To Preload.*

Figure 2.

*Surprise by Entry BrAC Reading As A Function of Entry BrAC.*
1. Further Details on the Introduction

1.1 Burden of Alcohol Use

Despite these desired effects, numerous studies have demonstrated the detrimental effects of alcohol, effects which have typically been associated with increased quantity and frequency of consumption. For example, Rehm et al. (2009) analysed data from the World Health Organization’s (WHO) review of alcohol effects and found that 3.8% of all global deaths (6.3% for men and 1.1% for women) and 4.6% of global disability-adjusted life-years (7.6% for men and 1.4% for women) were attributable to alcohol. Diseases accredited to alcohol included: cancer; neuropsychiatric disorders; cardiovascular disease; liver cirrhosis; and intentional and unintentional injuries. Notably, an increased volume of alcohol consumption was linked to higher rates of disease and burden in their review. This has been recently reinforced by a major review finding a linear relationship between alcohol consumption and major health risks, even above just 100g per week (1 drink per day; Wood et al., 2018).

National evaluations of economic costs in Australia, specifically, have also demonstrated the potential detrimental effect of alcohol misuse. In 2010 the problems related to alcohol use in Australia had a cost-to-society estimated to be $14.35 billion AUD, twice the income generated by taxation on alcoholic beverages (Manning, Smith, and Mazerolle, 2013). This expense was generated by aggregating costs to the criminal justice system, health system, productivity, and traffic accidents with a link to alcohol use.

1.4 Longitudinal Research

Research examining the impact of preloading across a night of drinking has generally produced uniform results, suggesting a positive association between pre-drinking and total alcohol consumption. For example, Ostergaard and Skov (2014) approached individuals outside popular English and Danish bars, pubs, and nightclubs and queried their drinking practices for that evening (drinks consumed before and whilst out in licensed venues). The authors then utilised mobile surveys the following day to assess recall of consumption for the previous evening. The researchers found that despite drinking less whilst in licenced venues, those who pre-drank reported greater consumption across the entire evening.

Similar research by Kuntsche and Labhart (2013) in a Swiss setting produced similar results. The researchers again used mobile surveys to query the consumption of individuals in certain time periods between 5pm and 11am the following day (5-8pm, 8-9pm, 9-10pm, 10-11pm, 11pm - 12am, 12am to 11am the following day). Participants were classified as pre-drinkers if they consumed one or more drinks before entering the NEDs. The authors found pre-drinkers were significantly more likely to engage in what they classified as ‘heavy drinking on a given evening’ than non-pre-drinkers. Whilst the cited research is useful in assessing overall consumption, no distinction was made regarding degree of preloading, i.e., pre-drinkers were simply compared to non-pre-drinkers. Furthermore, no assessment was made regarding degree of intoxication due to consumption.

1.5 Drinking Motivations
Previous research exploring drinking motivations has primarily utilised the Revised Drinking Motivation Questionnaire (DMQ-R) developed by Cooper (1994). The questionnaire assesses four main drinking motivations: Social (e.g. “to be sociable”), coping (e.g. “to forget your worries”), enhancement (e.g., “pleasant feeling”), and conformity (e.g., “so you won’t feel left out”). Ruiz, Valmas, Sawyer, Kemppainen, and Oscar-Berman (2015) utilised the questionnaire to assess drinking motivation differences between American ‘alcoholic’ and ‘non-alcoholic’ samples. Their results indicated that individuals with a dependency on alcohol were primarily motivated to consume alcohol for enhancement and coping, whilst those without dependency concerns primarily utilised alcohol for social and enhancement reasons. Mohr et al. (2005) found similar results to Oscar-Berman’s non-alcoholic controls in their investigation of American college students’ motivations towards alcohol consumption. They found that social reasons were the primary motivator, followed by enhancement, then coping, whilst conformity received the least endorsement. No difference was observed in order of motivations between males and females. These results were mirrored by more recent research by Koyama and Belli (2011) that investigated International students attending American colleges. Of importance is that these authors noted that all motivations received relatively low endorsement, suggesting that factors not assessed by the DMQ-R may be influencing alcohol consumption motivations across the night.

Numerous studies across cultures and age groups have applied the Theory of Planned Behaviour (TPB; Ajzen, 1991) to alcohol consumption. They have predominantly found intention to be a strong predictor of use and misuse of alcohol, explaining between 8-30% of variance in use (Barmpagianni, Travlos, Kalokairinou, Sachlas, and Zygia, 2014; Kam, Matsunaga, Hecht, and Ndiaye, 2009; Marcoux and Shope, 1997). However, research exploring the application of the TPB to alcohol consumption has been limited to examining the outcome variable ‘alcohol use’ retrospectively: for example “Have you consumed alcohol in the last 30 days?” No studies could be found in the literature examining the ability of individuals to make an accurate a priori estimation of their intended consumption across a night of drinking, particularly in NEDs. We wished to address this research gap, along with a clarification of demographic variables that may affect drinking across the night.

2. Further Details on the Method

2.1 Participants & Procedure

An a priori power analysis was undertaken using The Effect Size Generator (Devilly, 2007) to determine the required sample size for the hypotheses. Without previous research to guide a power analysis we wanted to be able to at least detect a moderate effect size (d=0.5; Cohen, 1992). For comparing group means (two-tailed testing) using 95% confidence intervals, 63 participants per group would be required to have an 80% chance to reject the null hypothesis. For multiple regression analysis (N ≥ 50 + 8m; see Tabachnick and Fidell, 2007) a sample of 82 was required. This was computed because four predictor types related to end of night BrAC were proposed (Body Mass Index - BMI, age, personality and BrAC at entry to NEDs). As we analysed males and females separately, 164 participants (82 females and 82 males) would be required to complete both entry and exit assessments.

Approximately a third of individuals approached denied participation to the larger research project. However, this may be misleading. In the current study, researchers were asked to log not only rejections from the individuals that they approached directly, but also to include the number of individuals in the group with that individual. For example, if a researcher approached an individual travelling in a group of five, and the one individual that was approached refused participation, this was counted as five rejections, not one. Rejections were logged in this way as it was plausible that as
individuals accepted participation, they may have invited other members of their group to participate. As such to only count those directly approached may have minimised the rejection rate. On the other hand, it has been common practice to count one refusal per group as just a single refusal (e.g., Devilly et al., 2017) and, as such, the rejection rate reported here is considered a likely overestimation in comparison to other research. In order to equate this rejection rate to other research we can estimate based upon our collected data. At entry we asked participants how many people they had come into town with that night. We found that the participants who did take part in the research came into the NED with an average of 4.06 other people. Ceteris paribus, we can estimate that the 1,047 refusals equated to approximately 262 group refusals. This equates to an 11.23% refusal rate – quite similar to a past study in Brisbane (14.67% Devilly et al., 2017).

2.2 Materials

2.2.1 Apparatus

Individuals were breathalysed using the Alcolizer LE5. This breathalyser uses an electro-chemical fuel cell (platinum) which was recalibrated prior to data collection. This state-of-the-art device is used by law enforcement agencies throughout Australia and South East Asia, is Australia Standard 3547 certified, with an accuracy of greater than 0.005 at 0.100 BrAC g/100ml. The device also logs time of assessment. This is the only hand-held breathalyser which has been demonstrated to have good reliability and validity in field trials (Sorbello, Devilly, Allen, Hughes and Brown, 2018).

2.2.2 Surveys

The entry survey aimed to assess: demographics (i.e., age, gender, occupation, and weight and height to allow calculation of BMI); expected alcohol consumption whilst in the NED (i.e., ‘How many standard drinks do you intend to drink in the entertainment district tonight before you leave?’); alcohol and other drug consumption before entering the NED; and alcohol consumption motivations. ‘Intentions’ included this expected alcohol consumption and also behavioural intentions at the end of the night: “After you leave here, do you intend to continue drinking elsewhere?” For BMI estimation the statistics came from self-reported height and weight – although height could be checked with a tape measure we carried. Surprisingly, no-one required this and all people had a good idea of their height and weight – an estimation that did not raise concern with the researchers when people spoke this out loud. We did have multiple people who spoke in feet and inches or in stones and pounds and we carried a conversion chart to obtain centimetres and kilograms. Participants were also administered the Ten Item Personality Inventory (TIPI; Gosling, Rentfrow and Swann, 2003). This questionnaire contains two items from each of the Big 5 personality dimensions (Extraversion, Agreeableness, Conscientiousness, Emotional Stability, Openness to Experiences), one positively framed and one negatively framed (requiring reverse scoring). The questionnaire was designed with content validity in mind rather than internal stability (which is as one would expect with only 2 items per dimension). The scale has good temporal reliability ($r = .80$) and convergent reliability ranging from $r = .70$ to $r = .82$ with a 100-item measure of the Big 5 Personality dimensions. This measure is usually scored on a 7 point scale (1 = Disagree strongly, 2 = Disagree moderately, 3 = Disagree a little, 4 = Neither agree nor disagree, 5 = Agree a little, 6 = Agree moderately, 7 = Agree strongly). However, such a 7 point scale did not lend itself to quick administration to inebriated people using iPad software. This was amended to a 5 point scale which enabled data collection from a quite volatile population (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree). All participants who completed the entry survey were breathalysed to provide a BrAC reading to three decimal places.
The exit survey again assessed alcohol consumption motivation, however, the question was phrased to include motivations whilst out in NEDs (i.e., what was your primary (first) reason to drink alcohol tonight?). The survey also probed participant retrospective recall of alcohol consumption in the NEDs (i.e., ‘roughly how many standard drinks did you have inside the NED’). Participants were also asked whether they intended to continue drinking once they left the NED. Similar to the entry survey, all participants provided a breathalyser sample.

3. Further Details on the Results

3.1 Data Diagnostics

Prior to analyses, all variables were examined for data entry errors, missing values, the presence of univariate outliers and non-normality. All analyses were undertaken using SPSS 22.0 (IBM Corp., 2013), ClinTools 4.1 (Devilly, 2007), and Statistica 13 (Tibco Software, 2017). As participants were required to enter a response to each question before proceeding through the survey on the iPads, no missing values were detected. As participants (many of whom were highly intoxicated) entered their own responses into the iPads, data entries were found. If a data point was clearly an ineligible response (e.g., age entered as 10 years old or height as 800cm), it was removed from the data set. Likewise, the researchers entered the participants’ BrACs at the end of the questionnaire and these were likewise scanned for data entry errors. In an effort to maintain power, we applied pairwise deletions where possible.

To identify the presence of univariate outliers, Z scores were generated for each of the variables to be examined. Nine data points for age; two data points for BMI; five data points for intended standard drink consumption whilst out; one data point for retrospective recall for standard drink consumption whilst out; and one data point for both BrAC reading whilst entering and exiting the NED exceeded the \( \alpha = .001 \) criterion of 3.29 for two-tailed testing (Tabachnick and Fidell, 2007). Analyses were run with these data points both present and excluded to determine whether their inclusion would adjust significance values into or out of significance thresholds. As no differences were observed between these analyses, results reported are those with outliers included. Visual inspection of the histograms indicated acceptable normality, with the exception of age that produced positive skew. This was attributed to the high frequency of 18- and 19-year olds in the entertainment district. A logarithmic transformation was applied and appeared to resolve normality concerns allowing this variable to be utilised for parametric tests.

3.2 Methodology Check

When looking at those who returned or did not return, we found no significant differences on personality variables or age, but found those with a higher BMI were less likely to return, although this effect was relatively small \((F(1, 346) = 6.31, p = .01, g = 0.27)\).

Those who returned and those who did not return for an exit survey were compared to each other for entry BrAC. There was no significant difference on entry BrAC between those who returned and those who did not return to our researchers \((F(1, 353) = .5, p = .48)\). Likewise, the ‘returned’ sample were not more represented by people with BrACs of zero compared to the non-returned sample \((\chi^2(n = 355, df = 1) = 1.24, p = .27)\).

No significant difference was observed between the average BrAC at entry for the current research compared to the average BrAC at entry that was found in our overarching study up to the point of the current data collection \((\bar{x} = 0.054, sd = 0.052)\). \(t(796) = -0.82, p = 0.21, g = -.06 [-0.20, 0.08]\). However, the average BrAC at exit for the current research was found to be significantly less
compared to the average BrAC at exit found in the overarching study up to that point (\(x = 0.092, \text{sd} = 0.054\)), \(t(1,773) = 5.79, p < .001, g = 0.50 \ [0.33, 0.68]\).