Pre-drinking behaviour of people in the night-time economy

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Michael P. Cameron [a,b]
Nic Droste [c]
Peter G. Miller [c]
Matthew Roskruge [d]

[a] School of Accounting, Finance and Economics, University of Waikato

[b] National Institute of Demographic and Economic Analysis, University of Waikato

[c] School of Psychology, Faculty of Health, Deakin University

[d] School of Economics and Finance, Massey University

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Any queries regarding this report should be addressed to:

AProf. Michael P. Cameron
School of Accounting, Finance and Economics
University of Waikato
Private Bag 3105
Hamilton 3240
E-mail: mcam@waikato.ac.nz
Phone: +64 7 858 5082.

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Executive Summary

We report on results from a representative street-intercept survey of pedestrians in the night-time economy of Hamilton looking at pre-drinking and related behaviours. We focused on three research questions and two supplementary research questions described below.

Research question 1: **Where and when do pre-drinkers (people drinking before a night out or event) obtain their alcohol?**
- Approximately 90 percent of the research participants had consumed any alcohol that day, and 84 percent had engaged in pre-drinking, meaning that 94 percent of those who had consumed any alcohol that evening had been pre-drinking.
- Most pre-drinkers obtained their alcohol by purchasing it themselves. Pre-drinkers who purchased their own alcohol for pre-drinking mostly purchased from bottle stores, rather than supermarkets, with students more likely than non-students to have purchased from a bottle store.
- The majority of pre-drinkers purchased their alcohol for pre-drinking on the day that they consumed it. Women were more likely than men to have purchased their alcohol for pre-drinking more than one day before they were surveyed.
- Overall, more than half of same-day purchasers made their purchase of alcohol for pre-drinking after 5 p.m.

Research question 2: **What is the difference in the level of intoxication of pre-drinkers vs. non- pre-drinkers, and how does this difference vary over the course of a night?**
- Pre-drinkers had significantly higher breath alcohol content than non-pre-drinkers, throughout the night. The difference was greatest early in the evening, and later in the evening.

Research question 3: Is the level of intoxication of pre-drinkers related to where and when they obtain their alcohol?
- The level of intoxication of pre-drinkers did not appear to be related to where and when they obtained their alcohol.

Supplementary research questions
- *Motivations for pre-drinking*: The main motivations for pre-drinking were price (or to save money), and to a lesser extent 'to get drunk' and 'to have fun'. Women were more likely than men to pre-drink because of price.
- *Prevalence of side-loading* (the consumption of alcohol during a night out or event, occurring at a location other than a licensed venue): Side-loading behaviour was engaged in by nearly one in five people, and was more prevalent among men.

1. Introduction

Pre-drinking (also referred to as pre-loading, pre-partying, or pre-gaming) is defined as the consumption of alcohol before a night out or event (Borsari et al., 2007; Pedersen and LaBrie, 2007). Despite some objections that the research and policy focus on pre-drinking is somewhat misplaced (e.g. see Room and Livingston, 2009), pre-drinking has been associated with higher levels of intoxication (Hughes et al., 2011; Labhart et al., 2013; Labhart et al., 2014) and alcohol-related risks and harm (Boyle et al., 2010; Wahl et al., 2010; LaBrie et al., 2011; MacLean and Callinan, 2013; Foster and Ferguson, 2014; Miller et al., 2016).

However, most studies of pre-drinking behaviour have been limited to student or young adult populations (e.g. see DeJong et al., 2010; Paschall and Saltz, 2007; Kenney et al., 2010; Reed et al., 2011; McCreanor et al., 2015; Wells et al., 2015; Riordan et al., 2018), with few studies considering pre-drinking behaviour among the general population within the night-time economy (for notable exceptions, see Moore et al., 2007; Hughes et al., 2011; Miller et al., 2013; Miller et al., 2016). And yet, significant levels of alcohol-related harm occur in the night-time economy (Chikritzhs and Stockwell, 2002; Ireland and Thommeny, 1993), and it is the population present in the night-time economy that is at risk, many of whom are not students. Thus, it is important to develop a better understanding of the pre-drinking behaviour of the general population (which includes students as a notable sub-group) who are interacting in the night-time economy.

Routine activity theory (Clarke and Felson, 1993; Cohen and Felson, 1979) is one theoretical explanation for why it might be expected that pre-drinking poses risks to drinkers beyond those directly associated with drinking. Routine activity theory posits that crime occurs as a result of routine activity whereby motivated offenders interact with potential victims in the absence of suitable guardians. Alcohol acts as a chemical facilitator of these routine activities, as it reduces inhibitions towards committing crime among motivated offenders, and increases the vulnerability of potential victims to crime. Pre-drinking, through its influence on the level of intoxication of individuals in the night-time economy, will therefore contribute to the incidence of crime.

To mitigate or minimise the risks associated with alcohol (including pre-drinking), local authorities in New Zealand can attempt to control access to alcohol through enacting a local alcohol policy (LAP). LAPs allow the local authorities to, among other things, have greater control over the sale and supply of alcohol in the night-time economy. This can be achieved through implementing one-way door restrictions (also known as lockouts) on on-licence outlets, changes in trading hours for on-licence or off-licence outlets, and restrictions on the location of outlets. The evidence on the effectiveness of one-way door restrictions is weak, in that there remains little evidence of large reductions in alcohol-related harms (see, for example,

a recent review of the Whangarei one-way door policy by Cameron et al., 2018c). Along with structural changes in the operation of alcohol outlets, trading hours appears to be among the most effective avenue for reducing alcohol-related harms (Babor et al., 2010). However, the extant literature has not established a clear relationship between trading hours of off-licence outlets and pre-drinking behaviour.

Indeed, despite the associations between pre-drinking in night-time intoxication and crime identified in prior research (see references on the previous page), we know surprisingly little about where, and importantly when, pre-drinkers obtain the alcohol that they consume during pre-drinking. Obviously, alcohol for pre-drinking is ultimately obtained from an off-licensed premises, but without an understanding of the temporal pattern of such purchases it is difficult to formulate an appropriate policy response. If pre-drinkers typically purchase alcohol for pre-drinking soon before they enter the night-time economy, then earlier closing times for off-licensed outlets could potentially reduce pre-drinking behaviour, or shift pre-drinking to earlier in the evening. Alternatively, if pre-drinkers plan in advance and purchase their alcohol for pre-drinking earlier in the day (or earlier in the week, or before then), then changes in off-licensed premises hours will be relatively ineffective at reducing pre-drinking behaviour.

This report outlines the methodology and findings from research on pre-drinking behaviour in the night-time economy of Hamilton, New Zealand's fourth-largest city. Specifically, we undertook survey research in the Hamilton Central Business District (CBD) across six evenings in March and April 2019, from approximately 9 p.m. until 2:30 a.m. on Thursday, Friday, and Saturday nights.

The methodology (outlined later in the report) follows earlier research using street-intercept survey methods in New Zealand (Riordan et al., 2018; Cameron et al., 2018b; 2018c) and Australia (Miller et al., 2013; Miller et al., 2014), and similar research in the United Kingdom (Bellis et al., 2010). Importantly, our sample was not limited to the student population, and can be considered representative of the ambient population in the night-time economy. This addresses an important limitation of earlier research.

We aimed to answer the following research questions:
1. Where and when do pre-drinkers obtain their alcohol?;
2. What is the difference in the level of intoxication of pre-drinkers vs. non-pre-drinkers, and how does this difference vary over the course of a night?; and
3. Is the level of intoxication of pre-drinkers related to where and when they obtain their alcohol?

In addition, the research contributes to the emerging research on the temporal gradient of intoxication in the night-time economy (Cameron et al., 2018c), as well as contributing to our understanding of the motivations for pre-drinking among people in the night-time economy.

We also considered two supplementary research questions on the motivations for pre-drinking, and on the prevalence of side-loading behaviour (drinking during a night out or event, but not at a licensed venue).

The remainder of the report is structured as follows:
- Section 2 briefly outlines the research methods used in this study;
- Section 3 presents and discusses the results; and
- Section 4 concludes.

2. Research methods

This section briefly outlines the methods employed in the research. Further details on the theoretical framework, research site, and survey and analysis methods are provided in Appendix A.

The research questions are addressed using data obtained from a street-intercept survey conducted in the Hamilton Central Business District (CBD) in March and April 2019. Hamilton can be considered reasonably representative of other cities in New Zealand, being demographically and economically similar (see Appendix A for further details), with the majority of on-licence outlets (bars and restaurants) concentrated within a single entertainment precinct in the CBD.

Data collection occurred between 9 p.m. and 2:30 a.m. across three consecutive nights (Thursday, Friday, and Saturday) for one week in March 2019, and one week in April 2019. Following an established research protocol (Cameron et al., 2018b; 2018c), every seventh pedestrian passing through a fixed location was offered the opportunity to participate in the survey. Each consenting participant then completed a short (approximately five-minute) interview, then a breathalyser test was administered at the conclusion of each interview for those participants that consented to the breathalyser test.

The brief survey (included in the Appendix B) asked: demographic questions; questions about pre-drinking, including when and where alcohol was purchased and consumed in the case of pre-drinkers, as well as motivations for pre-drinking; and other questions about the current night out (whether this is a 'typical' night out for them, intentions for the rest of the night, number of hours expected in the night-time economy, side-loading behaviour (the consumption of alcohol during a night out or event, occurring at a location other than a licensed venue), self-evaluated level of intoxication, etc.). The study methods and protocols was approved by the Waikato Management School Human Research Ethics Committee, and also approved by the local New Zealand Police alcohol harm reduction officer.

In total, 1,133 people were selected and invited to participate in the research, and 477 interviews were undertaken – a response rate of 42.1%. After removing incomplete records, the final dataset is comprised of 469 responses, of which 451 (96.2%) completed a breathalyser test. The final sample size included in the analysis differs by research question, as some questions were not answered, and pre-drinking status could not be identified for some research participants (see Appendix A for details). The sample sizes for specific research questions are noted in the Results section below.

Pre-drinking was measured by the response to the question, "Did you consume any alcohol before going out tonight (e.g., in a private home or other private setting)?". Pre-drinkers who have bought their own pre-drinks were asked where and when they had bought them. Pre-drinking purchase day was re-coded into three categories for analysis: "today"; "yesterday"; and "earlier". Pre-drinking purchase time was only recorded for purchases on the day of the survey (i.e. those responses that were "today" for the pre-drinking purchase day).

Intoxication was measured both objectively and subjectively. The objective measure was the measured breath alcohol content from a breathalyser test (see Appendix A for details). Following Cameron et al. (2018c), the subjective measure was based on the response to the question "Can you rate how intoxicated you feel right now, on a scale of 0 to 10?" (where 10 represented the highest level of intoxication, and 0 represented completely sober). Motivations for pre-drinking were obtained from responses to the question, "Why did you drink before going out tonight?".

Data for Research question 1 (where and when do pre-drinkers obtain their alcohol) were analysed using simple tabulations and cross-tabulations to summarise the data. Differences were also evaluated between students and non-students, and between genders.

Data for Research question 2 (what is the difference in the level of intoxication of pre-drinkers vs. non-pre-drinkers, and how does this difference vary over the course of a night?) were analysed by creating graphs of the average level of intoxication at each point in time over the course of the night. Further details on the creation of these graphs are provided in Appendix A. These graphs were plotted separately by gender, and for pre-drinkers and non-pre-drinkers.

Data for Research question 3 (is the level of intoxication of pre-drinkers related to where and when they obtain their alcohol?) were analysed using linear regression models. The dependent variable in the regression models was the level of intoxication, as measured by breath alcohol content.

Finally, in supplementary analyses, we tabulate the responses to a question on the motivations for pre-drinking among pre-drinkers. We also compare these responses between students and non-students, and between genders. We also tabulate responses to questions on side-loading behaviour, comparing those responses between students and non-students, between genders, and between pre-drinkers and non-pre-drinkers.

The research methods have several limitations. First, data collected from intoxicated people may be subject to greater error than data collected from sober respondents. However, we base our analyses on data that are likely to be least subject to recall bias or social desirability bias, and

make use of an objective measure of intoxication (based on a breathalyzer reading). This reduces any measurement error problems within the data. Second, the response rate for this research was much lower than in prior intercept survey research in Hamilton (see Cameron et al., 2018b; 2018c), which may reduce somewhat the representativeness of the sample.

3. Results and discussion

In this section, we describe and discuss the results for the three main research questions, as well as the supplementary research questions on the motivations for pre-drinking and on the prevalence of side-loading behaviour.

Summary statistics for the sample are presented in Table A1 in Appendix A. Those who were not drinking are included in the analysis that follows, in order to ensure that the statistics are representative of the population in the night-time economy, rather than the sub-population of drinkers in the night-time economy.

Approximately 90 percent of the research participants had consumed any alcohol on that day, and the mean breath alcohol content at the time of interview (including those who were not drinking) was 330 mcg/L. This is well above the adult drink-driving limit of 250 mcg/L. The mean self-reported level of intoxication was 5.04 (range 0-10), which represents a moderate (subjective) level of intoxication.

A large majority (84.4%) of the research participants had engaged in pre-drinking, meaning that 93.8 percent of those who had consumed any alcohol that day had been pre-drinking. On average, the participants had been 'going' (i.e. drinking or partying) for nearly five hours at the time of the interview (range 0-15 hours), and a majority (55.8%) noted that this was a typical night out for them.

3.1   Research question 1: When and where do pre-drinkers obtain their alcohol

The source of drinks for pre-drinkers is summarised in Table 1 over. The vast majority (86.2%) of participants bought their own alcohol for pre-drinking, with 10.9% bought by a friend. 'Other' sources of drinks for pre-drinkers were mostly work-related, e.g. they drank at a work function, or at work.

Women are significantly less likely to have bought the drinks for pre-drinking themselves, while non-students were significantly less likely to have received the drinks for pre-drinking from 'other' sources.

Table 1: Sources of drinks for pre-drinkers[1]

Group	Bought themselves	Bought by friend	Bought by family	Given to them	Other (e.g. work)
Full Sample	86.2%	10.9%	2.3%	6.0%	1.7%
Men	88.9%	9.3%	1.3%	6.2%	1.8%
Women	81.3%	13.8%	4.1%	5.7%	1.6%
p-value	0.050**	0.199	0.104	0.842	0.917
Students	87.0%	9.9%	3.1%	6.8%	3.2%
Non-students	85.6%	11.8%	1.6%	5.3%	0.0%
p-value	0.707	0.586	0.351	0.562	0.022**

Note: *** $p<0.01$; ** $p<0.05$; * $p<0.1$.

For the pre-drinkers among our research participants who had purchased their own alcohol (for pre-drinking), the location of purchase is summarised in Table 2 over.

When buying their own alcohol for pre-drinking, the majority of research participants purchased from a bottle store (74.0%), with a much smaller proportion purchasing from a supermarket (11.9%). Only 1.3% of research participants had purchased from *both* a bottle store and a supermarket.

Although women were slightly more likely to purchase from a bottle store than men, this difference was not statistically significant. In contrast, students were statistically significantly more likely to purchase from a bottle store ($p = 0.005$) than non-students, but the difference in purchasing from supermarkets was not statistically significant.

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[1] *P*-values are based on the results of chi-squared tests for the equality of proportions between the genders, and between students and non-students.

Table 2: Sources of drinks for pre-drinkers who purchased their own alcohol for pre-drinking[2]

Group	Bottle store	Supermarket
Full Sample	74.0%	11.9%
Men	72.1%	12.0%
Women	77.7%	11.7%
p-value	0.294	0.925
Students	81.6%	9.2%
Non-students	67.7%	14.1%
p-value	0.005[***]	0.184

Note: [***] *p<0.01*; [**] *p<0.05*; [*] *p<0.1*.

The purchase day for pre-drinkers is summarised in Table 3 over. The majority (78.6%) of participants bought their alcohol on the day they were surveyed. Only 10.9% of participants had purchased more than one day before the day they were surveyed. Women were significantly more likely to have purchased more than one day before the day they were surveyed ($p = 0.003$).

Students were significantly less likely to have purchased the day before they were surveyed than non-students ($p = 0.006$), and significantly more likely to have purchased more than one day before the day they were surveyed ($p = 0.012$). These results imply that overall, the majority of pre-drinkers do not purchase more than one day in advance, even if they plan their drinking ahead of time.

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[2] *P*-values are based on the results of chi-squared tests for the equality of proportions between the genders, and between students and non-students. Percentages do not necessarily sum to 100%, because some people did not respond to this question, or their response was unable to be categorised.

Table 3: Purchase day for pre-drinking[3]

Group	Today	Yesterday	Earlier
Full Sample	78.6%	8.4%	10.9%
Men	81.8%	9.6%	7.0%
Women	72.5%	6.1%	18.4%
p-value	0.067[*]	0.067[*]	0.003[***]
Students	78.2%	3.2%	16.1%
Non-students	78.9%	12.4%	6.8%
p-value	0.893	0.006[***]	0.012[**]

Note: [***] $p<0.01$; [**] $p<0.05$; [*] $p<0.1$.

The purchase times for pre-drinkers who purchased on the day they were surveyed are summarised in Figure 1 over.

The median purchase time for the sample was 6:00 p.m. This again suggests that many pre-drinkers purchase their alcohol for pre-drinking in the afternoon and early evening, with 44 percent of same-day pre-drink purchasers making their purchase between 4 p.m. and 7 p.m. However, 12 percent of same-day pre-drink purchasers made their pre-drinks purchase after 9 p.m.[4]

On average, men purchased nearly one hour earlier than women, and this difference was statistically significant ($p = 0.021$, data not shown). There was no statistically significant difference in purchase times between students and non-students.

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[3] *P*-values are based on the results of chi-squared tests for the equality of proportions between the genders, and between students and non-students. Percentages do not necessarily sum to 100%, because some people did not respond to this question, or their response was unable to be categorised.

[4] There is little difference between Thursday/Friday and Saturday night in these percentages, with 39 percent and 47 percent of same-day pre-drink purchasers making their purchase between 4 p.m. and 7 p.m. on Thursday/Friday and Saturday respectively. Similarly, 15 percent and 10 percent of same-day pre-drink purchasers making their purchase after 9 p.m. on Thursday/Friday and Saturday respectively. These differences are not statistically significant.

Figure 1: Purchase time for pre-drinking, for purchases on the day of the survey
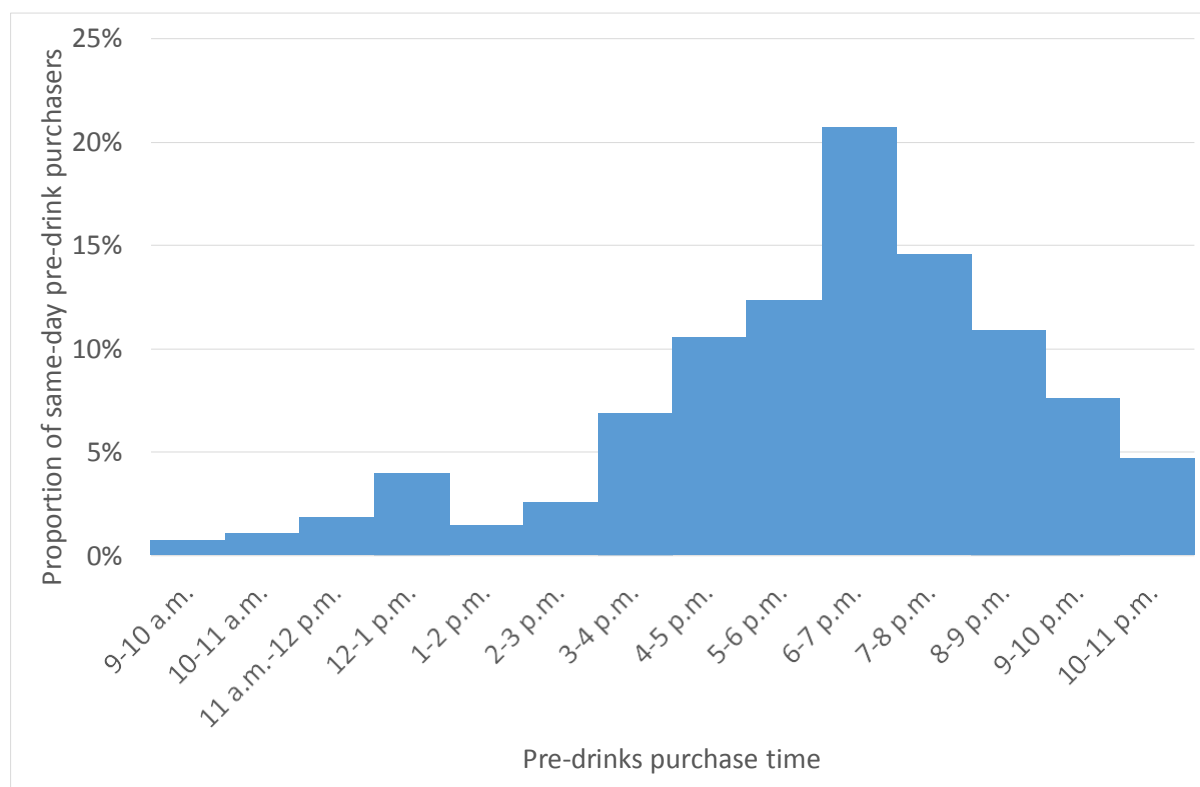
3.2 Research question 2: Intoxication over the course of the night

Following Cameron et al. (2018c), we illustrate the average level of intoxication over the course of the night using a graph of the moving average of the breath alcohol content from our survey participants. We refer to the changes in this average level of intoxication over time as the 'temporal gradient of intoxication' (Cameron et al., 2018c). Given that our sample is representative of pedestrians on the street in Hamilton CBD, this measure provides an unbiased estimate of the average level of intoxication at any point in time.

Figure 2 over illustrates how intoxication levels change over time for the full sample of 451 participants from whom we obtained breathalyser results. Each blue dot represents the mean of all breathalyser results within a ten-minute period. The dashed blue line represents a moving average of five ten-minute periods, which smooths the measure over time.

The average level of intoxication in the Hamilton CBD grows over the course of the night, from around 100-150 mcg/L before 10 p.m., to around 400 mcg/L by 1 a.m., after which it grows only slowly. For comparison, the adult legal breath alcohol limit for driving in New Zealand is currently 250 mcg/L. The average intoxication level drops substantially between 11 p.m. and Midnight, before returning to its previous level.

Figure 2: Measured Breath Alcohol Concentration over time
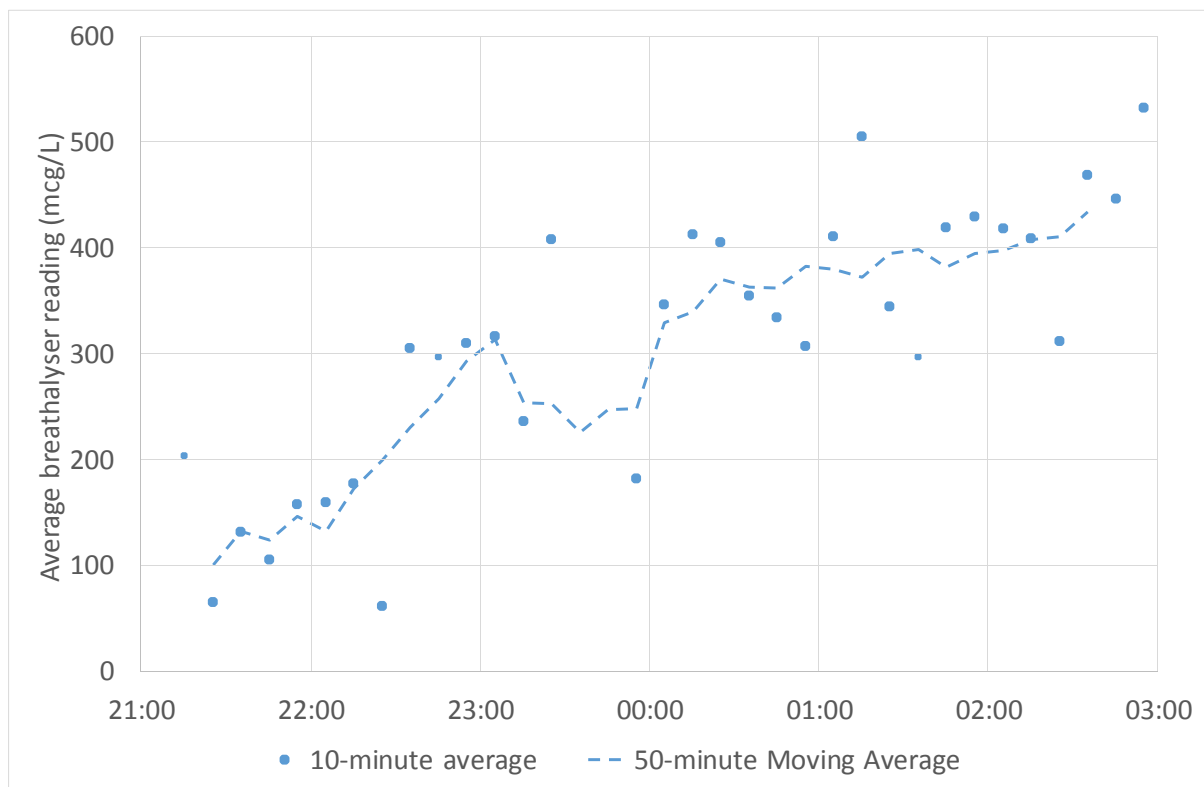
It is difficult to interpret why this dip may have happened. It may be an artefact of the data collection, as the research team tended to have a short break at some time between 10:45 p.m. and Midnight each night. On the other hand, it might be a real effect within the night-time economy, as the research team noted that there was a clear difference in the types of participants between the period when the 'dinner crowd' and early drinkers were leaving (prior to 11 p.m.) and when the majority of pre-drinkers arrived in the CBD (usually from Midnight onwards).

This effect was mostly not observed by Cameron et al. (2018c) in Hamilton in 2014, although in their data there was a noticeable flattening of the temporal gradient of intoxication from 10 p.m. to Midnight, and we might be observing something similar here. Also, it is worth reiterating that these are the *average* levels of intoxication among pedestrians in the Hamilton CBD at these times. Many of the research participants had not been drinking (and so had zero

breath alcohol), while others had substantially higher breath alcohol levels than the averages shown in Figure 2.

The interpretation that this might be a result of a transition in the night-time economy between a dinner crowd and the arrival of the majority of pre-drinkers is supported by Figure 3, which tracks the proportion of research participants who recorded a zero breathalyser reading over the course of the night.

As for Figure 2, in Figure 3 each blue dot represents the proportion of all breathalyser results that were zero within a ten-minute period. The dashed blue line represents a moving average of five ten-minute periods, which smooths the measure over time. The number of zero breathalyser readings reduces throughout the night, with a majority of research participants before 10 p.m. recording a zero breathalyser reading (including those who had not been drinking and therefore no breathalyser test was necessary). The exception to the reducing proportion of zero breathalyser readings over time is during the period between 11 p.m. and Midnight, where there is a substantial, and temporary, increase.

Figure 3: Proportion of zero Breath Alcohol Concentration readings over time
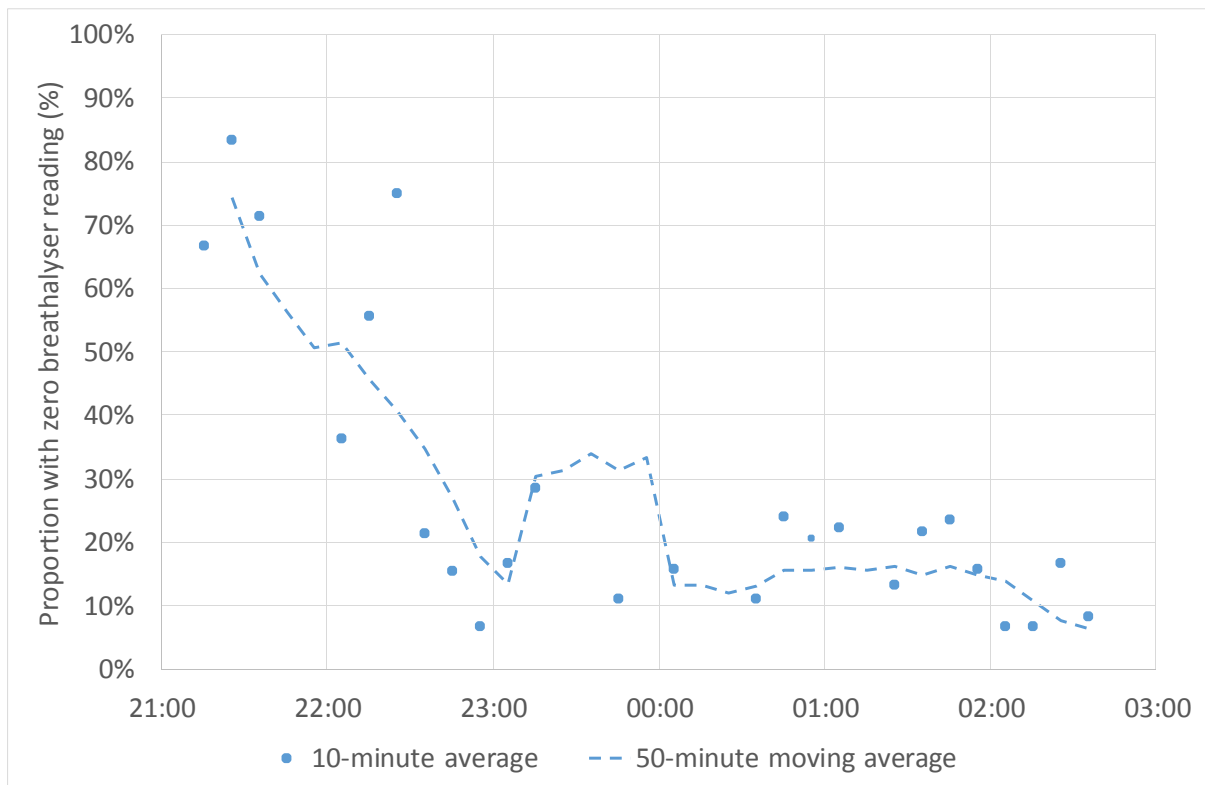
Figure 4 illustrates how intoxication levels change over time, separating the sample by gender. Both genders follow a relatively similar pattern in terms of average intoxication over the course of the night. Women have slightly higher breath alcohol concentrations between 10 p.m. and Midnight, but later in the night, and especially after 1 a.m., there is little difference in the averages between the genders.

Figure 4: Measured Breath Alcohol Concentration over time, by gender
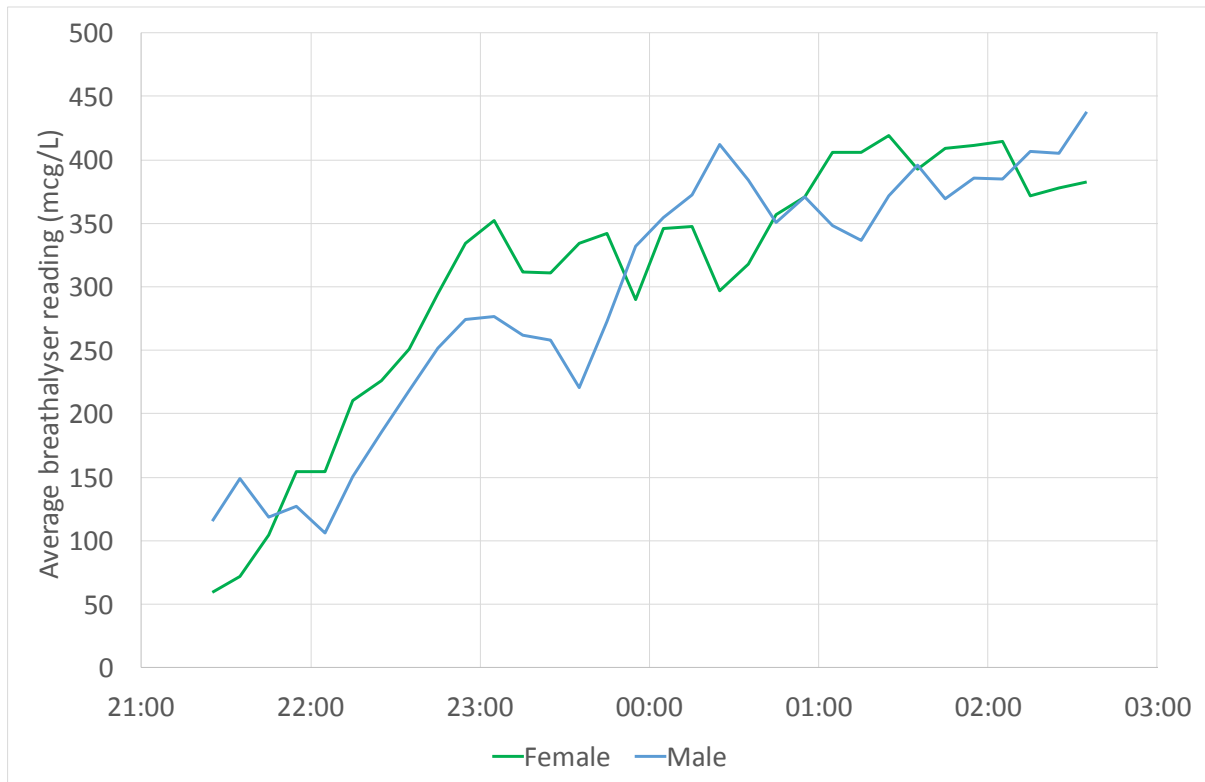
This result differs somewhat from Cameron et al. (2018c), who found that average breath alcohol concentration flattened out for women from Midnight, but continued to increase throughout the night for men. While the results here appear to be similar for women, men no longer appear to continue to increase in intoxication throughout the night, also levelling off from about Midnight.

Figure 5 over illustrates how intoxication levels change over time, separating the sample by pre-drinking status. The average intoxication level among pre-drinkers is unambiguously higher than non-pre-drinkers. It is both much higher early in the evening, and still higher after Midnight. Pre-drinkers active in the night-time economy before Midnight have a mean breath alcohol content of approximately 300-350 mcg/L, whereas those after Midnight have a mean breath alcohol content of approximately 400-450 mcg/L.

The pattern for non-pre-drinkers is less clear, and there is a lot more variation over time in the average intoxication level for this group. It is also clear from Figure 5 that the observed drop in breath alcohol concentration for the full sample in the period between 11 p.m. and Midnight is primarily driven by the trends among the non-pre-drinking group. Breath alcohol

concentration peaks in this group shortly after 11 p.m., then appears to fall thereafter.

This is consistent with an early drinking group that departs the CBD between 11 p.m. and Midnight, with other non-pre-drinkers in the night-time economy maintaining their level of intoxication and/or gradually sobering up through the evening. However, the specific reasons for this result requires further analysis and/or further qualitative research to uncover. It is worth noting that the average intoxication level for non-pre-drinkers after Midnight remains around 200 mcg/L, i.e. only slightly below the legal level for driving for people 20 years and over.

Figure 5: Measured Breath Alcohol Concentration over time, by pre-drinking status
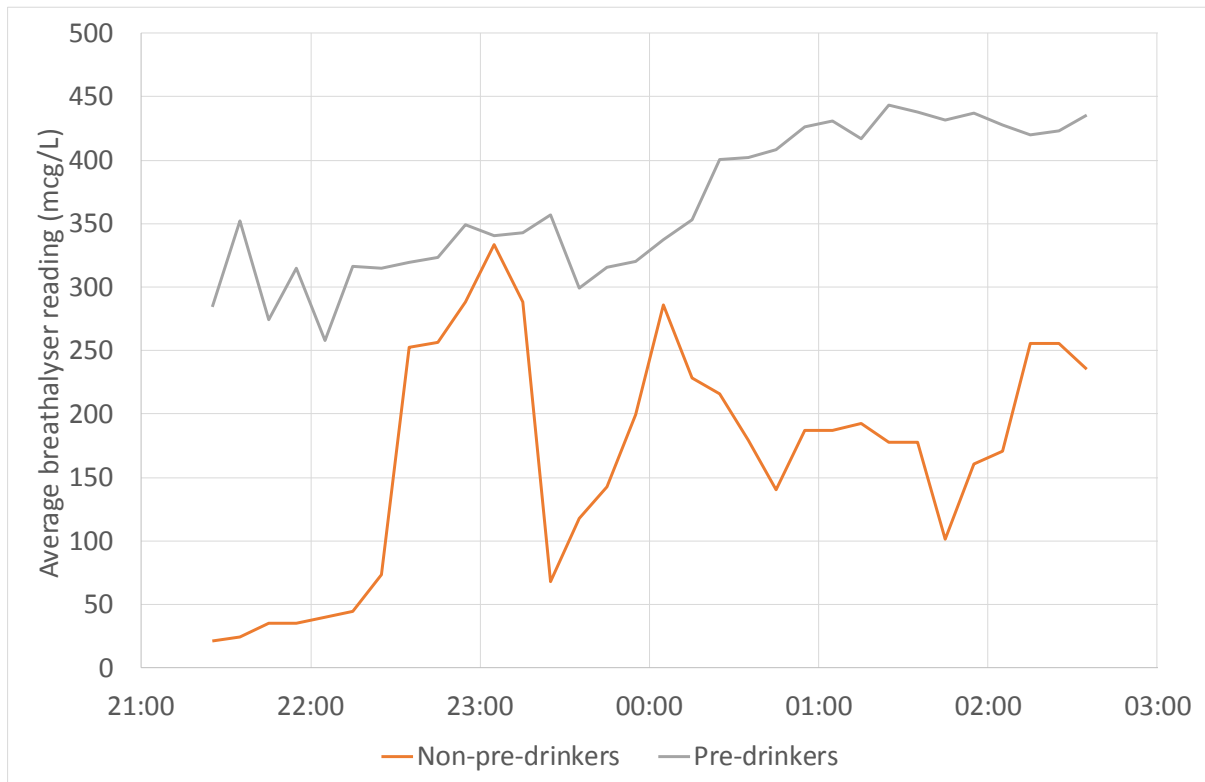
These results are somewhat similar to Cameron et al. (2018c), although that earlier research found much lower average intoxication levels among pre-drinkers earlier in the evening, and a steady increase in intoxication among non-pre-drinkers throughout the night.

3.3 Research question 3: Pre-drinking purchase behaviour and intoxication

Pre-drinking has a statistically significant and positive relationship with breath alcohol content. On average, and controlling for other variables, pre-drinkers have a breath alcohol content that is 259 mcg/L (95% CI: 206-313) higher than non-pre-drinkers (the full linear regression results are reported in Appendix C). This accords with the analysis in the previous section (see Figure 5), where pre-drinkers have a mean breath alcohol content that is higher than non-pre-drinkers throughout the night.

In additional analyses (reported in Appendix C), we show that pre-drinkers have statistically significantly higher breath alcohol content on Friday nights than on Thursday nights. In contrast, the differences between Saturday and Thursday nights is not statistically significant. We also find that the purchase location (bottle store or supermarket), purchase day (today, yesterday or earlier), and purchase time (when purchased on the day of the survey) are not statistically significantly associated with breath alcohol content among pre-drinkers.

3.4 Supplementary research question: Motivations for pre-drinking

The motivations for pre-drinking among pre-drinkers in our sample are reported in Table 4. Nearly half (48.9%) of pre-drinkers noted that price (or to save money) was a motivation for pre-drinking. Over one-third (34.5%) noted that the motivation was to get drunk before going out, and nearly one quarter (23.7%) noted that the motivation was to have fun. The question did not distinguish between having fun during the pre-drinking phase of the evening, or later. 'Other' motivations for pre-drinking included that it was part of a social function (a work function, birthday party, or other celebration), or peer pressure.

Women were significantly more likely than men to pre-drink because of price ($p = 0.048$), and significantly less likely to pre-drink to socialise ($p = 0.041$). Differences between students and non-students mostly were not statistically significant, although students were marginally significantly more likely to pre-drink because of convenience, and not wanting to go out too early.

Table 4: Motivations for pre-drinking[5]

Group	Price/save money	More convenient	Don't want to go out too early	Catch up with friends/ socialise	Get drunk before going out	For fun	Other
Full Sample	48.9%	12.7%	5.9%	21.8%	34.5%	23.7%	14.7%
Men	44.9%	13.2%	4.9%	25.1%	32.6%	24.2%	15.4%
Women	55.9%	11.8%	7.9%	15.8%	37.8%	22.8%	13.4%
p-value	0.048**	0.704	0.247	0.041**	0.324	0.767	0.604
Students	52.8%	9.2%	3.7%	19.0%	36.2%	23.9%	13.5%
Non-students	45.6%	15.7%	7.9%	24.1%	33.0%	23.6%	15.7%
p-value	0.176	0.067*	0.098*	0.250	0.526	0.936	0.558

Note: *** $p<0.01$; ** $p<0.05$; * $p<0.1$

3.5 Supplementary research question: Side-loading

There is no widely-accepted definition of side-loading in the research literature. Miller et al. (2012, p.183) define side-loading as "consuming pre-purchased alcohol while in licensed venues". We consider that side-loading refers to a broader range of activities during a night out, and therefore define side-loading as 'the consumption of alcohol during a night out or event, occurring at a location other than a licensed venue'. Side-loading may be an important component of a night out for some drinkers, but there is currently little evidence on its prevalence.

The extent of side-loading is summarised in Table 5. The first column summarises any pre-drinking behaviour, while the other columns summarise the locations of side-loading. Overall, 19.9% of respondents engaged in side-loading. Of those engaging in side-loading, the majority did so in a car (61.0%), with smaller proportions engaging in side-loading in the street (17.1%), a carpark (12.2%), or somewhere else (13.4%). 'Other' locations for side-loading included friends' homes, student halls of residence, and accommodation providers (hotels or backpacker hostels).

Men were significantly more likely to engage in side-loading behaviour ($p < 0.001$), and pre-drinkers were slightly significantly more likely to engage in side-loading than non-pre-drinkers ($p = 0.052$). Women were significantly more likely to engage in side-loading in a carpark ($p = 0.040$), while pre-drinkers were significantly less likely to engage in side-loading in a location other than a car, carpark, or the street ($p = 0.017$).

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[5] Percentages do not necessarily sum to 100%, because participants could provide more than one answer to this question. The results of chi-squared tests for the equality of proportions between the genders, and between students and non-students, are also reported (as *p*-values).

Table 5: Side-loading behaviour[6]

Group	Any side-loading	Side-loading location (proportions of side-loaders)			
		Car	Carpark	Street	Other
Full Sample	19.9%	61.0%	12.2%	17.1%	13.4%
Men	25.1%	60.3%	8.8%	16.2%	14.7%
Women	9.9%	64.3%	28.6%	21.4%	7.1%
p-value	<0.001***	0.780	0.040**	0.634	0.450
Students	20.0%	56.8%	13.5%	24.3%	16.2%
Non-students	19.7%	64.4%	11.1%	11.1%	011.1%
p-value	0.947	0.478	0.741	0.114	0.500
Pre-drinkers	21.5%	64.7%	12.0%	18.7%	10.7%
Non-pre-drinkers	10.9%	42.9%	14.3%	0.0%	42.9%
p-value	0.052*	0.304	0.860	0.209	0.017**

Note: *** $p<0.01$; ** $p<0.05$; * $p<0.1$.

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[6] P-values are based on the results of chi-squared tests for the equality of proportions between the genders, and between students and non-students. The proportions in the first column (Any side-loading) are proportions of the sample as a whole (or the group as a whole). The proportions in the other columns are proportions of those who engaged in side-loading.

4. Conclusions and policy implications

This report presents the results from a representative survey of pedestrians in the night-time economy of Hamilton, with a particular focus on pre-drinking behaviour (i.e. drinking before coming to the Hamilton CBD area).

We focused on three research questions:
1. Where and when do pre-drinkers obtain their alcohol?
2. What is the difference in the level of intoxication of pre-drinkers vs. non-pre-drinkers, and how does this difference vary over the course of a night?
3. Is the level of intoxication of pre-drinkers related to where and when they obtain their alcohol?

We also reported on two supplementary research questions on the motivations for pre-drinking, and on side-loading behaviour.

We found that most pre-drinkers obtain their alcohol by purchasing it themselves, and this was slightly more prevalent among men than women, but with no differences between students and non-students. Pre-drinkers who purchase their own alcohol for pre-drinking mostly purchase from bottle stores, rather than supermarkets, with students more likely than non-students to have purchased from a bottle store.

The majority of pre-drinkers purchase their alcohol for pre-drinking on the day that they consume it. Women were more likely than men to have purchased their alcohol for pre-drinking more than one day before they were surveyed. In contrast though, among pre-drinkers who purchased on the day they were surveyed, women tended to purchase later in the day than men. Overall, more than half of same-day purchasers made their purchase of alcohol for pre-drinking after 5 p.m.

These results are suggestive of policy implications for local authorities, in terms of planning their Local Alcohol Policies (LAPs). If pre-drinking is a concern, then it may be attractive to consider restrictions on trading hours for off-licenced outlets (bottle stores and supermarkets). However, given that roughly half of all same-day purchases of alcohol for pre-drinking occur before 6 p.m., restrictions on trading hours are unlikely to be greatly effective in reducing pre-drinking behaviour. At best, such an approach would reduce some pre-drinking and side-loading, although it is also possible that pre-drinkers would simply adjust their behaviour and purchase earlier.

Given that changes in trading hours were not observed in our study, these results cannot be used to explicitly determine the impact of a change in trading hours on pre-drinking purchase behaviour. However, it is worth noting that Hamilton has some features that limit how far we can extrapolate our results to other settings. At the time of this research, the Hamilton CBD contained no off-licence outlets, other than supermarkets at the far north and south ends, and two up-market wine stores that close relatively early in the evening. Other

cities with off-licence outlets located within their CBD area or nearby might experience differences in the purchase behaviour related to pre-drinking and especially side- loading (see below).

We found that pre-drinkers had significantly higher breath alcohol content than non-pre-drinkers throughout the night. The difference was greatest early in the evening, and later in the evening. Previous research has shown that higher breath alcohol content is associated with negative consequences including involvement in crime and violence, health and relationship impacts. Our results suggest that pre-drinkers will likely be more vulnerable to negative alcohol-related harms than non-pre-drinkers. This in itself may justify policy intervention to reduce pre-drinking.

However, identifying an appropriate policy intervention appears challenging. We found that where, and when, pre-drinkers had purchased their alcohol for pre-drinking was *not* associated with their breath alcohol concentration. In other words, there was no difference in breath alcohol concentration between pre-drinkers who purchased from bottle stores and those who purchased from supermarkets, no difference between those who purchased on the same day they were surveyed and those who purchased earlier, and no difference between those who purchased earlier or later on the same day they were surveyed. This again suggests that targeting particular outlet types, or regulations to restrict the trading hours of off-licenced alcohol outlets, may be ineffective in curbing the alcohol-related harm arising from pre-drinking.

We found that the main motivations for pre-drinking were price (or to save money), and to a lesser extent 'to get drunk' and 'to have fun'. Women were more likely than men to pre-drink because of price. This suggests that one policy intervention that may be effective in reducing pre-drinking may be to raise prices in off-licence outlets. There is a clear price differential between off-licence (bottle stores and supermarkets) and on-licence (bars and restaurants) outlets, which has previously been implicated in motivating pre-drinking (Miller et al., 2012; Labhart et al., 2017). Raising alcohol excise taxes or levies, or implementing minimum per-unit prices, have been mooted as potential solutions for low prices in off-licenced outlets that would act to curb pre-drinking (Babor et al., 2010; Law Commission, 2010; SHAAP, 2007). Higher prices can be expected to reduce consumption (Chaloupka et al., 2002), so higher prices at off-licenced outlets could reduce pre-drinking. Unfortunately, as a policy solution, this is not a policy that can be implemented by local authorities, as it is outside the remit of Local Alcohol Policies to regulate pricing. Such a change would require central government to amend the Sale and Supply of Alcohol Act 2012 to allow price regulation by local authorities, upward adjustments to the excise tax rates, or new legislation to implement minimum pricing. Moreover, higher prices may lead to unintended consequences, such as an increase in the use of other substances, particularly among young people.

Finally, side-loading behaviour was engaged in by nearly one in five people, and was notably more prevalent among men. This research did not collect detailed data on side-loading behaviour. Given that side-loading seemed quite prevalent, and was related to pre-drinking

(with pre-drinkers more likely to also engage in side-loading than non-pre-drinkers), future research could usefully explore this aspect of the night-time economy in more detail. In particular, it would be useful to identify when and where people engaging in side-loading are obtaining their alcohol for side-loading, including whether they are hiding alcohol within liquor ban areas, or returning to a car or private home to consume alcohol.

Pre-drinking is a common feature of the night-time economy in all cities in New Zealand. The harm associated with excessive drinking (including pre-drinking) is high. This report contributes to our understanding of pre-drinking in New Zealand, and suggests that a focus on alcohol pricing is a promising avenue for policy intervention.

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Appendix A

This appendix outlines in more detail the methods employed in the research. We begin by briefly outlining a theoretical framework for the research. We then describe the research site, followed by detailing the survey and analysis methods.

A.1 Theoretical framework

The theoretical framework for this research is briefly summarised in Figure A1. Pre-drinking status is expected to be related to evening-specific variables (night of the week, time of the night), and individual-specific variables (age, gender, etc.). Intoxication (as measured by breath alcohol concentration) is expected to be related to individual-specific variables and event-specific variables (number of hours spent drinking, whether food has been consumed), including pre-drinking status. Alcohol-related harm is expected to be related to intoxication and individual-specific variables, but may also be related to evening-specific and event-specific variables (e.g. Merrill et al., 2013, in the context of pre-drinking). The specific mechanisms that would underlie any direct relationships between evening-specific and event-specific variables and alcohol-related harm are unclear, or are likely to be highly context-specific, so they are not included in Figure A1.

Figure A1: Theoretical framework
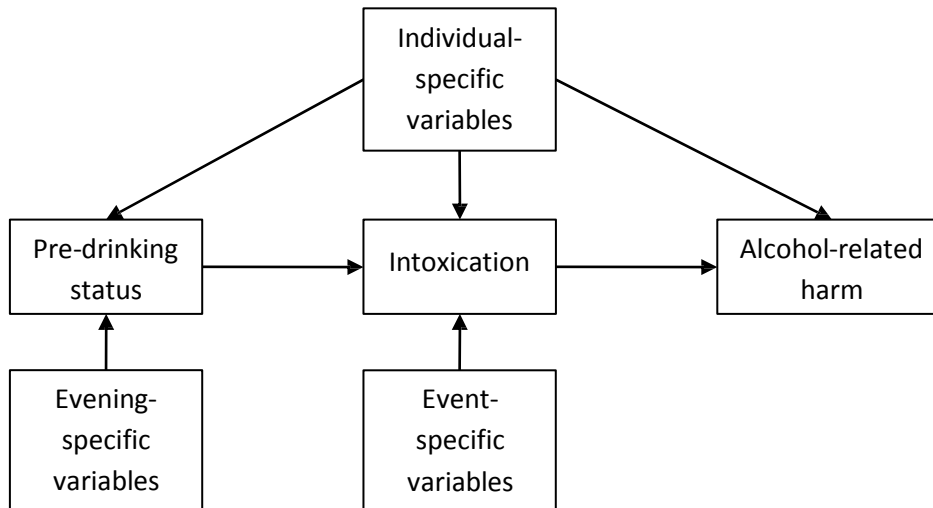
With respect to the specific research questions, pre-drinking status is expected to affect the level of intoxication (Research question 2). Where and when pre-drinkers obtained their alcohol (Research question 1) will not affect pre-drinking status *per se*, but are indicators of

the potential for policy intervention to reduce pre-drinking. However, we also test their effect as separate event-specific variables (Research question 3), in case pre-drinkers who purchase from different sources, or closer to the day or time of their evening in the night-time economy, are more intoxicated than other pre-drinkers.

A.2 Research site

Hamilton City was selected as the primary research site because of:
- convenience (proximity to the principal investigator [PI]);
- cost (proximity to the PI and availability of research assistant, and avoids travel costs);
- experience (the research team is already familiar with the CBD area, having undertaken previous research there); and
- comparability (this research can be compared with earlier research undertaken in the same location).

Hamilton can also be considered reasonably representative of other cities in New Zealand. It is moderately-sized, with an estimated 2018 population of 169,300.[7] The median age of the Hamilton city population is 32.2, comparable with Auckland region (35.1), Wellington city (33.9), as well as regional cities such as Palmerston North (33.8), but somewhat lower than other cities such as Christchurch (38.6) or Tauranga (41.0). The median income of Hamilton city is $27,700, comparable with the national median of $28,500. Approximately 20% of the population is Māori, slightly above the national average of 16%.

Hamilton has 292 on-licence alcohol outlets,[8] or approximately 17.2 outlets per 10,000 population, which is slightly lower than the national average of approximately 26.5 per 10,000 population in 2014 (Cameron et al., 2016).[9]

Like many cities in New Zealand, on-licence outlets (bars and restaurants) in Hamilton are concentrated within a single entertainment precinct in the CBD, with some smaller bars and taverns and many restaurants located in outer suburbs. The outlying on-licence outlets tend to have earlier closing times, and the CBD entertainment precinct is a significant attractor of people in the night-time economy.

A.3 Survey methods

The research protocol for the fieldwork is well-established, having been used in previous research in New Zealand (Cameron et al., 2018b; 2018c). The fieldwork team was comprised of two pairs of survey research assistants, and two research supervisors.

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[7] The data in this paragraph were obtained from Statistics New Zealand StatsMaps, for the 2013 Census, with the exception of the population estimate, which is from the Subnational Population Estimates.
[8] As of January 2019, per data from Hamilton City Council.
[9] However, at the national level, total licensed outlets have been declining over time, while the population has been increasing rapidly.

Following Miller et al. (2013) and Cameron et al. 2018b; 2018c, we used a street-intercept survey approach (described below) to capture a representative sample of pedestrians active during the night-time economy. During one week in March 2019 and a second week in April 2019, we conducted a field study in the CBD of Hamilton. The weeks were purposively chosen to avoid University and polytechnic orientation weeks, examination weeks for tertiary students, and the Easter holiday period, to avoid potential sources of bias in the types and number of people active in the night-time economy.[10] Data collection occurred between 9 p.m. and 2:30 a.m. across three consecutive nights in each of the selected weeks (Thursday, Friday, and Saturday). Data collection was suspended at a random point each night for the research team to have a rest break. That ensured that, combining the six nights, there was data collection at all times during the period from 9 p.m. and 2:30 a.m.

The data were collected on one of the main streets in the Hamilton CBD, close to the end of an alleyway that leads to the largest bar in the CBD. This location ensured a high level of pedestrian traffic, and was preferred over the location used in earlier research because of changes in the location of bars and changes in the relative patterns of pedestrian traffic since that time. The use of this area was supported by the New Zealand Police and Hamilton City Safe officers as it is well-monitored by police and security staff and has good lighting. While license conditions require most bars to close at 3 a.m., our sampling ended slightly earlier most nights. This is because as the bars close, pedestrians became very focused on returning home and reluctant to participate in a survey. This potentially placed the research team at heightened risk of conflict with intoxicated bar patrons, and so data collection was ended earlier than originally intended.

Data collection was undertaken by two teams of two survey assistants, overseen by a pair of senior researchers. The survey assistants administered the short (approximately five-minute) survey questionnaire, while senior researchers provided health and safety and coordination roles. If consent was given, a breathalyser test was administered at the conclusion of each interview.

Each survey team monitored pedestrian traffic moving in a different direction through the survey site, which allowed all pedestrians to potentially be invited to participate. Following Cameron et al., (2018b; 2018c), every seventh pedestrian was offered the opportunity to participate in the survey in one of two ways: (1) by inviting them either to 'guess their breath alcohol concentration'; or (2) inviting them to participate in a survey on alcohol and the night-time economy. The former invitation was extended when the survey team member making the approach judged it likely that the potential participant had been drinking. If a potential participant declined the offer, the declined offer was noted and the count restarted.

To be eligible for inclusion in the study, participants needed to be pedestrians passing through the selected intersection and aged 18 years or over. Participants who provided verbal consent for their participation were briefed on the purpose of the research, and were provided with a

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[10] However, there was a Chiefs home rugby game in Hamilton on the last night of fieldwork.

card that included the contact details of the lead researcher, and a web link to further information about the study.

The brief survey (included in Appendix B) asked: demographic questions; questions about pre-drinking, including when and where alcohol was purchased and consumed in the case of pre-drinkers, as well as motivations for pre-drinking; and other questions about the current night out (whether this is a 'typical' night out for them, intentions for the rest of the night, number of hours expected in the night-time economy, side-loading behaviour, self-evaluated level of intoxication, etc.).

Detailed questions on the quantity and type of drinks purchased were avoided due to the high potential for recall error or social desirability or other biases, particularly when these questions are answered by research participants who may be substantially impaired by alcohol. Moreover, such questions would have added substantially to the time required to complete the questionnaire, likely leading to a lower response rate. However, simple questions on when and where alcohol was purchased are less likely to be subject to recall error or social desirability bias.

Participants' breath alcohol concentration was measured by one of the senior researchers using a recently calibrated Andatech Precision+™ breathalyser (Andatech Pty Ltd., Melbourne, Australia; accuracy to ± 0.005). Participants were informed that this was not a legal test, and that they should avoid driving if they had consumed any alcohol that evening. As per the breathalyser operating instructions, no breath tests were undertaken within fifteen minutes of the participant's last drink.

Breathalyser readings were collected in order to measure the temporal gradient of intoxication (Cameron et al., 2018c) – that is, how the average level of intoxication (as measured by breath alcohol content) changes over the course of the night. Moreover, differences in the temporal gradient have previously been demonstrated between pre-drinkers and non-pre-drinkers (Cameron et al., 2018c), and a replication of that earlier work was desirable. The study methods and protocols was approved by the Waikato Management School Human Research Ethics Committee, as well as the local New Zealand Police alcohol harm reduction officer.

Following data collection, data were double-entered into an Excel spreadsheet by two different coders, and subject to cross-checking. Discrepancies were rectified by the senior researchers, by referring to the original survey questionnaire sheet.

In total, 1,133 people were selected and invited to participate in the research, and 477 interviews were undertaken, for a response rate of 42.1%. Most people who refused to participated in the research did so because they were too busy, or not interested in participating in a survey. One participant later requested that their data be removed from the analysis, as allowed under the Ethics regulations, and seven other incomplete records were

removed.[11]

Of the 469 remaining survey participants, 451 (96.2%) completed a breathalyser test. The final sample size included in the analysis differs by research question, as some questions were not answered, and pre-drinking status could not be identified for some research participants (see below). The sample sizes for specific research questions are noted in the Results section.

A.4 Measures

Pre-drinking was measured by the response to the question, "Did you consume any alcohol before going out tonight (e.g., in a private home or other private setting)?". Participants who answered "yes" to this question were recorded as pre-drinking, with a follow-up question asking participants where they had been pre-drinking. Analysis of pre-drinking location data revealed that some participants who answered this question in the affirmative had only drunk alcohol at an on-licensed alcohol outlet (e.g. a sports club or the rugby stadium). These participants were re-coded as non-pre-drinkers. The group of non-pre-drinkers includes those who had not drunk any alcohol at all. For 47 participants (i.e. 10.0% of the sample), pre-drinking status could not be inferred from responses to the survey.[12] These participants are not included in the analyses involving pre-drinking.

Pre-drinkers were asked "From where did you get the alcoholic beverages that you consumed before going out tonight?". Pre-coded responses included: "I bought them myself"; "My friend bought them for me"; "A member of my family bought them for me"; "I was given them"; and "Other". Participants who answered that they bought the pre-drinks themselves were then asked where they bought them (in which the specific outlet name was sought), and when they bought them (approximate date and time). Pre-drinking purchase day was re-coded into three categories for analysis: "today"; "yesterday"; and "earlier". Pre-drinking purchase time was only recorded for purchases on the day of the survey (i.e. those responses that were "today" for the pre-drinking purchase day). Where a range of purchase times was indicated, we took the mid-point.

Intoxication was measured both objectively and subjectively. The objective measure was the measured breath alcohol content from a breathalyser test (described in Section A.3, above). Following Cameron et al. (2018c), the subjective measure was based on the response to the question "Can you rate how intoxicated you feel right now, on a scale of 0 to 10?" (where 10 represented the highest level of intoxication).

Motivations for pre-drinking were obtained from responses to the question, "Why did you

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[11] Generally, this was where an interview was started, but not completed

[12] This is because some participants indicated that they had been pre-drinking, but when asked where they had been pre-drinking, they indicated a licensed venue (such as a sports club, bar, or the rugby stadium). Since we cannot tell for sure whether these participants had also been pre-drinking at other places, we cannot categorise them as pre-drinkers or not.

drink before going out tonight?". Pre-coded responses, based on the extant literature (see Section 2 above), included: "Price (or to save money)"; "More convenient"; "Don't want to go out too early"; "Chance to catch up with friends before"; "To get drunk before going out"; "For fun"; and "Other".

For side-loading, respondents were asked "Have you had a drink at any other place (e.g. in a public place, car, carpark, or park) since you came out tonight?". Participants who answered that they had side-loaded were then asked where.[13]

Participants were defined as local residents only if they lived within the Hamilton metropolitan area, and not otherwise.[14] Participants were defined as students if they were high school, polytechnic, or university students.[15]

The summary statistics for these and other measures used in this report are summarised in Table A1 over. Approximately two-thirds of the sample were men, slightly more than two-thirds were local residents, and the mean age was 23.8 years (with a range from 18-71 years). Only 44.1 percent of the sample were students, which highlights the importance of not limiting research in the night-time economy to student-only samples.

Approximately 90 percent of the research participants had consumed any alcohol, and the mean breath alcohol content (including those who were not drinking) was 330 mcg/L. The mean self-reported level of intoxication was 5.04 (range 0-10). A large majority (84.4%) of the research participants had engaged in pre-drinking, meaning that 93.8 percent of those who had consumed any alcohol that evening had been pre-drinking. On average the participants had been 'going' for nearly five hours (range 0.02-15 hours), and a majority (55.8%) noted that this was a typical night out for them.

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[13] Some participants indicated that they had been side-loading, but when asked where they had been side- loading, they indicated a licensed venue (such as a bar). In line with the pre-drinking analysis, we excluded these respondents from the side-loading analysis.

[14] This means that residents of nearby towns, including Cambridge, Ngaruawahia, and Te Awamutu, were coded as not local residents. The distinction in this variable is therefore between those people who could feasibly return home using public transport, taxis or rideshare services, and those who could not.

[15] Some high school students will be aged 18 years or over, and could therefore be included within the sample.

Table A1: Summary statistics

Variable	Mean/Percentage	S.D.	Maximum	Minimum
Dependent variables				
Breath alcohol content (mcg/L)	330	248	0	1170
Self-reported intoxication (0-10 scale)	5.04	2.48	0	10
Individual-specific variables				
Gender (1 = male)	66.3%			
Age	23.8	7.22	18	71
Local (1 = yes)	67.8%			
Student (1 = yes)	44.1%			
Evening-specific variables				
Week of survey – Week 1 (March)	51.6%			
Week of survey – Week 2 (April)	48.4%			
Night of survey - Thursday	10.5%			
Night of survey - Friday	36.5%			
Night of survey - Saturday	53.1%			
Time of survey	12:27 a.m.	N/A	9:15 p.m.	2:59 a.m.
Event-specific variables				
Consumed any alcohol (1 = yes)	90.0%			
Pre-drinker (1 = yes)	84.4%			
Number of hours drinking	4.86	3.18	0.02	15
Typical night out - Yes	55.8%			
Typical night out - No, usually smaller	30.7%			
Typical night out - No, usually bigger	13.5%			

A.5 Analysis methods

Data for Research question 1 (where and when do pre-drinkers obtain their alcohol?) were analysed using simple tabulations and cross-tabulations to summarise the data. Differences were also evaluated between students and non-students and between genders. Statistical significance was tested using Chi-square or two-tailed *t*-tests as appropriate.

Data for Research question 2 (what is the difference in the level of intoxication of pre-drinkers vs. non-pre-drinkers, and how does this difference vary over the course of a night?) were analysed by creating graphs of the average level of intoxication at each point in time over the course of the night. Specifically, data were first grouped into 'bins' of ten-minutes intervals, starting with the period from 9:00 p.m. to 9:10 p.m. The mean level of intoxication from the breathalyser readings conducted in each ten-minute period was calculated and plotted as a time series. A five-period (i.e. 50-minute) moving average of the bin-level means was also calculated and plotted, in order to smooth the time series

data.[16] Moving averages were then plotted separately by gender, and for pre-drinkers and non-pre-drinkers.

Data for Research question 3 (is the level of intoxication of pre-drinkers related to where and when they obtain their alcohol) were analysed using linear regression models. The dependent variable was the level of intoxication (as measured by breath alcohol content). Explanatory variables included individual-specific variables (age, age-squared,[17] gender, local resident), evening-specific variables (week, day, time of the night), and event-specific variables (pre-drinking status). In addition, a model that included as additional event-specific variables the day (or time) of purchase of alcohol for pre-drinking, and whether alcohol for pre-drinking was purchased from a supermarket or a bottle store, was estimated. The size and statistical significance of the coefficients on these latter variables were evaluated in relation to Research Question 3.

Finally, in supplementary analyses, we first tabulate the responses to a question on the motivations for pre-drinking among pre-drinkers. We then compare these responses between students and non-students, and between genders.

Also, results for side-loading were then analysed using simple tabulations and cross-tabulations to summarise the data. Differences were also evaluated between students and non-students, between genders, and between pre-drinkers and non-pre-drinkers. Statistical significance was tested using Chi-square or two-tailed t-tests as appropriate.

In all analyses, we report statistical significance at $p<0.1$, to reduce the chances of Type II errors, although we recognise that higher p-values within this range provide weaker evidence of statistical significance.

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[16] There are two main alternatives for the creation of this moving average. We opted to create the moving average as the average of five bin-level means. This treats each time period as having equal weighting within the calculated moving average, and therefore where there are many observations within the same ten-minute bin, each observation receives less weighting in the calculation of the moving average. The alternative is to calculate the moving average as the mean of all observed breathalyser readings within the five ten-minute bins. This would weight each observation equally within the moving average. However, our preferred approach implicitly recognises that breathalyser reading observations should be clustered by time, and treats them accordingly. In reality though, the two moving averages look very similar (results based on the alternative approach are available from the authors on request)

[17] Age-squared was included in order to capture any non-linear effects of age on breath alcohol content.

Appendix B

Interview Schedule

Survey ID Number:							

<table>
<tr><td colspan="2" style="text-align:center">SECTION 1: INTERVIEW/ PERSONAL DETAILS</td></tr>
</table>

1.1   **Date:**   /   /

1.2   **Time (24-hr):**

1.3   **Gender:**   Male   Female   Gender Diverse

1.4   **Agreed to be interviewed:**   Yes   No
> *If no, finish this record, complete Section 4, then recruit next participant*

1.5   **Student (university, polytech, or high school):**   Yes   No

1.6   **Town/Suburb where they usually live:**

1.7   **Year of birth:**
> *If after 2001, immediately stop this interview, complete Section 4, then recruit next participant*

<table>
<tr><td colspan="2" style="text-align:center">SECTION 2: CURRENT NIGHT OUT</td></tr>
</table>

We would now like to ask you some questions about where you have been and what you have been doing today/tonight.

2.1   **How many hours have you been 'going' for (i.e., how long ago did you first start your night out):**   **hours**

2.2   **What is your main reason for going out tonight** *(one response only)***:**

1 Catch-up with/socialise with friends		2 See a band/DJ/other performance	
3 Special event/celebration (e.g. birthday)		4 Work function	
5 Normal night out		6 To get drunk	
7 Pickup/find a partner		8 Other (specify)	

2.3   **Have you consumed any alcohol today/tonight?**   Yes   No
> *If no, SKIP to Question 3.1.*

2.4   Did you consume any alcohol before going out tonight (e.g., in a private home or other private setting)?

Yes			No	

If no, SKIP to Question 2.11.

2.5   Where did you consume alcohol before going out tonight?
(mark all that apply)

1 Own home

3 Private function (e.g. wedding or

      other event)

5 Car

2 Friend's home

4 Public location (e.g. park, street)

6 Other (specify)

2.6   Why did you drink before going out tonight? *(mark all that apply)***?**

1 Price (or to save money)

3 Don't want to go out too early

5 To get drunk before going out

7 Other (specify)

2 More convenient

4 Chance to catch up with friends before

6 For fun

2.7   Which of the following alcoholic beverages did you consume before going out tonight? *(mark all that apply)*

		Where did you consume it?	
1 Full-strength beer		Where did you consume it?	
2 Light beer		Where did you consume it?	
3 Craft beer		Where did you consume it?	
4 Home-brewed beer		Where did you consume it?	
5 Wine		Where did you consume it?	
6 Sparkling wine		Where did you consume it?	
7 Cider		Where did you consume it?	
8 Spirits		Where did you consume it?	
9 RTDs		Where did you consume it?	
10 Cocktails		Where did you consume it?	
11 Other (please specify)		Where did you consume it?	

Note location
(from Q2.5, or name of licensed premises)

2.8 **From where did you get the alcoholic beverages that you consumed before going out tonight?** *(mark all that apply)*

1 I bought them myself

2 My friend bought them for me

3 A member of my family bought them for me

4 I was given them

5 Other (specify)

If not 1, SKIP to Question 2.11.

2.9 **Where did you buy the alcoholic beverages from, that you consumed before going out tonight?**

Note specific outlet name

2.10 **Approximately when (day and time) did you buy the alcoholic beverages that you consumed before going out tonight?**

2.11 **What licenced premises (e.g. bars) have you had drinks at tonight?**

Note specific outlet name/s, or NONE

2.12 **Have you had a drink at any other place (e.g. in a public place, car, carpark, or park) since you came out tonight)?**

Yes

No

If no, SKIP to Question 2.14.

2.13 **Where else have you had a drink?**

Note all locations

2.14 **Can you rate how intoxicated you feel right now (on a scale of 0 to 10):**

SECTION 3: THE REST OF THE NIGHT

The following questions are about your intentions for the rest of the night.

3.1 **What other things are you planning to do tonight** *(mark all that apply)***?**

1 Socialise with friends		2 Meet new people	
3 Relax/chill out		4 Dance/listen to music	
5 Get drunk		6 Other (specify)	

3.2 **Would you say this is a typical night out for you** *(one response only)***?**

1 Yes		2 No, I usually have smaller nights	
3 No, I usually have bigger nights			

SECTION 4: INTERVIEWER NOTES

4.1 **Interviewer:**

4.2 **Interviewer rating of survey participant's intoxication Level (on a scale of 0 to 10):**

4.3 **Reason for not proceeding with interview/finishing early (if applicable):**

Appendix C

Linear regression results for the relationship between pre-drinking and intoxication (as measured by breath alcohol content) are reported in Table C1 on the following page. Four models are reported. In Model (1), the full sample is included. Model (2) reports the results with the sample restricted to pre-drinkers only. Model (3) reports the results for the restricted (pre-drinkers only) sample, but includes as additional variables the source of alcohol for pre-drinking (bottle store or supermarket), and the day of purchase (today, yesterday, or earlier). Model (4) reports the results for a sample of pre-drinkers who purchased on the day of the survey, and includes as additional variables (beyond those in Model (2)) the source of alcohol for pre-drinking (bottle store or supermarket), and the time of purchase.

As expected, in Model (1) pre-drinking has a statistically significant and positive relationship with breath alcohol content. On average, and controlling for other variables, pre-drinkers have a breath alcohol content that is 259 mcg/L higher than non-pre-drinkers. This accords with the analysis in Section 4.2 of the main text (see Figure 5), where pre-drinkers have a mean breath alcohol content that is higher than non-pre-drinkers throughout the night. Among the control variables, gender and student status are not statistically significantly associated with breath alcohol content (after controlling for other variables, including pre-drinking). Age has a significant and non-linear association with breath alcohol content,[18] while local participants had statistically significantly higher breath alcohol content than non- locals. There were no statistically significant differences between the two weeks, or by night of the week, but breath alcohol content was statistically significantly higher later in the evening. Every one hour later was associated with a higher breath alcohol content of 27.7 mcg/L, on average.

The results for Model (2), which includes only pre-drinkers, are similar to those in Model (1). However, pre-drinkers have statistically significantly higher breath alcohol content on Friday nights than on Thursday nights. In contrast, the difference between Saturday and Thursday nights is not statistically significant. In Model (3), we find that the purchase location (bottle store or supermarket) and purchase day (today, yesterday or earlier) are not statistically significantly associated with breath alcohol content among pre-drinkers. Other variables have similar effects to Models (1) and (2), although within this smaller sample, pre-drinkers have statistically significantly higher breath alcohol content on both Friday and Saturday nights than on Thursday nights. Finally, in Model (4), we find that the purchase time for pre-drinks is not statistically significantly associated with breath alcohol content among pre-drinkers. The purchase location (bottle store or supermarket) is also not statistically significant, and the coefficients on other variables are similar in magnitude and statistical significance to those in Model (3).

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[18] The coefficients imply that breath alcohol concentration increases to a peak at an age of 38 years in Model (1), 35 years in Model (2) and (3), and 32 years in Model (4).

Table C1: Linear regression results

Variables	Model (1)	Model (2)	Model (3)	Model (4)
Gender (male = 1)	22.470	22.683	16.022	33.254
	(21.085)	(23.864)	(26.404)	(31.821)
Age	22.215***	31.849**	32.858**	44.638***
	(7.260)	(12.709)	(13.585)	(14.351)
Age-squared	-0.295***	-0.459**	-0.471**	-0.698***
	(0.099)	(0.191)	(0.204)	(0.208)
Student (1 = yes)	-16.362	-5.161	-13.419	-23.068
	(20.692)	(25.387)	(29.189)	(33.113)
Local resident (1 = yes)	47.344**	49.426**	35.756	58.091*
	(21.365)	(24.672)	(27.312)	(31.257)
Friday night	51.550	103.388*	152.631***	168.547***
	(38.869)	(56.008)	(50.496)	(56.305)
Saturday night	17.817	60.921	114.242**	132.709**
	(36.895)	(52.991)	(47.688)	(54.770)
Week 2 (April)	-15.534	-32.002	-47.772*	-28.623
	(20.288)	(23.361)	(26.138)	(31.871)
Time of night	27.661***	21.948**	17.965*	17.997
	(7.221)	(9.298)	(9.995)	(12.420)
Pre-drinking status (1 = yes)	259.471***			
	(27.091)			
Predrinks from bottle store			53.899	77.372
			(38.480)	(48.366)
Predrinks from supermarket			0.803	-2.384
			(48.775)	(58.463)
Pre-drinks purchased today			-45.016	
			(38.379)	
Pre-drinks purchased yesterday			-44.290	
			(51.930)	
Pre-drinks purchase time				3.763
				(5.542)
Constant	-950.817***	-720.159***	-664.025**	-985.852***
	(203.325)	(276.453)	(290.616)	(332.166)
Observations	448	344	276	213
Adjusted R-squared	0.281	0.086	0.090	0.105

Note: Robust standard errors are reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1.