Breath alcohol levels and alcohol use behaviours among the public in Courtenay Place, Wellington

Context: Courtenay Place, Wellington

The incidence of alcohol-related harm in Courtenay Place, Wellington, has been well-documented. Following occurrences of serious violent offending in 2021, the Wellington City Council established the 'Pōneke Promise' to bring organisations, including Police, together with the united purpose of increasing safety in Wellington City. This study was designed to support the work of this group, to inform strategies to reduce alcohol-related harm in the Wellington night-time economy.

Focus: Breath alcohol levels and alcohol use among persons in Courtenay Place

This study looked at intoxication levels and drinking behaviours of people out at night in Courtenay Place, for three weeks in September-October 2022. People entering or leaving the entertainment precinct were surveyed on their drinking behaviours and had their breath alcohol levels measured.

What was found?

- The average breath alcohol concentration among all persons was 1.4 times the legal limit to drive in New Zealand
- Breath alcohol concentrations increased over the course of the night and were significantly higher after midnight (when occurrences of serious violent offending are known to occur in the precinct)
- Pre-loaders[a] had significantly higher breath alcohol concentrations than non-pre-loaders
- Pre-loading behaviour was strongly motivated by cost and a desire to save money. Drinkers could purchase alcohol at much lower prices from off-licences when compared to on-licence bars/clubs.

What are the operational implications from the study?

- The study revealed the scale of pre-loading as a factor in intoxication, signalling the need to target the entire drinking event to minimise harm in the Wellington late-night precinct
- Reducing patron intoxication levels will require comprehensive approaches (including enforcement and policies) that address the off-licence and on-licence environment
- Improved collection of alcohol harm-related data and sharing of this data across agencies (including Police) can enhance the targeting and effectiveness of harm reduction approaches.

[a] Those who reported that they had been drinking in private settings prior to entering Courtenay Place

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Contents

Figures

Tables

Glossary

AUD	Alcohol Use Disorder
BAC	Blood Alcohol Concentration
BrAC	Breath Alcohol Concentration
CBD	Central Business District
DLC	District Licensing Committee
EBA	Evidential Breath Assessment
ED	Emergency Department
NTE	Night-time economy
RBS	Responsible Beverage Service
RTD	Ready-to-drink
SCAB	Speech, Coordination, Appearance, Behaviour
SD	Standard Deviation

Executive Summary

Study context and aims

Courtenay Place in Wellington has a high concentration of late-night on-licence venues and the prevalence of alcohol harm in this area has been well-documented. In response to concerns raised about safety in the central city, the 'Pōneke Promise' was established to take a partnership approach to making Wellington safer, more vibrant, and more welcoming. To inform this work, Wellington City Council, New Zealand Police, and the National Public Health Service | Te Ikaroa – Central Region collaborated to develop and implement a study to examine alcohol use behaviours and levels of intoxication among persons in the Courtenay Place precinct. Pre-loading (i.e., consumption of alcohol at private settings prior to entering night-life precincts) was of particular interest in this study given the wealth of evidence that this drinking behaviour compounds the risk of alcohol harm (e.g., abuse, physical and sexual assault, anti-social behaviour, property damage) in night-life settings.

Methods

Drawing on previous studies in New Zealand and Australia, a street intercept survey design was used, whereby persons entering or leaving the defined area were invited to participate. Research interviewers collected data on drinking behaviours and demographics via a structured questionnaire, with breathalysers used to objectively measure levels of intoxication.

Data collection occurred over three weeks in September and October 2022, commencing at 8:30pm and ending around 4:00am. Research interviewers were located on Courtenay Place, and two points on an adjoining street, on Wednesday, Friday, and Saturday nights.

Key findings

In total, 2,293 participants completed the questionnaire, of which 2,194 undertook a breathalyser test. The vast majority (91%) of participants reported that they had consumed alcohol on the same day or night of the interview. Almost two-thirds (66%) of all participants reported that they had already consumed alcohol in bars and restaurants in the Courtenay precinct prior to being interviewed.

Key findings in relation to breath alcohol concentrations (BrAC) are shown below:

- Among the total sample, BrACs ranged from 0 to 1,524 micrograms (mcg) of alcohol per litre;
- The mean BrAC was 355 mcg/L (standard deviation (SD) 253); equivalent to 0.07% Blood Alcohol Concentration (BAC) or 1.4 times the legal limit to drive in New Zealand (i.e., 250 mcg/L);
- When excluding participants with no alcohol detected in their breath, the mean BrAC was 410 mcg/L (SD 226);
- Each hour later in the night was associated with a 24 mcg/L higher BrAC, on average;
- The mean BrAC between midnight and 2am was 410 mcg/L (SD 237) or 0.08% BAC, and between 2am and 4am was 443 mcg/L (SD 230) or 0.09% BAC;
- Pre-loading, being interviewed after 11pm, and being male were the strongest predictors of high BrAC readings. Ethnicity was unrelated to BrACs.

Pre-loading was assessed among participants who reported alcohol use during the day/night of the survey, but not necessarily immediately preceding their entry to Courtenay Place. The pre-loading prevalence was 65%, increasing to 77% after midnight. Key pre-loading findings are shown below:

- Pre-loaders were more likely to be a student, male, aged 18 to 24 years, and be interviewed at a later time of the night and/or on a Saturday night;
- The mean BrAC among pre-loaders was 428 mcg/L or 0.09% BAC; male pre-loaders had a significantly higher mean BrAC than female pre-loaders (446 mcg/L vs 391 mcg/L);
- Price/to save money (44%), drinking to have fun (29%), and getting drunk before going out (22%) were the most cited reasons for pre-loading;
- The majority (83%) of pre-loaders reported buying their own pre-loading alcohol;

- One in five (22%) pre-loading purchases were made the day before the interview or earlier, 54% were made between 4pm and 10pm on the same day, and 3% between 10pm and midnight;
- Among pre-loaders that purchased alcohol after midday on the day of interview, purchase from a supermarket was associated with a significantly higher mean BrAC when compared to pre-loaders who did not purchase alcohol at the supermarket after midday (57 mcg/L higher);
- Among the entire sample (including those who had not consumed any alcohol on the same day/night), the pre-loading prevalence was 59%.

One in ten (10%) participants reported public drinking. Analyses found that public drinking was more common among males and pre-loaders and was associated with a higher BrAC.

Limitations of the study relate to sampling, which likely resulted in an under-sampling of persons with very heavy drinking patterns. Also, sober persons and older persons were perceived by researcher personnel to be harder to recruit. Whilst participant recall may be limited due to alcohol impairment, the effects of alcohol may have rendered more truthful answers. Further research is required to understand inequities in the frequency of pre-loading prevalence and/or experience of alcohol harm in night-life precincts as well as the prevalence of illicit drug use and combined use of alcohol and energy drinks.

Implications and conclusion

High BrACs among persons in the Courtenay Place precinct, particularly after midnight, places drinkers and others at risk of harm. Pre-loading behaviour was shown to be prevalent (65%) among drinkers in this study, typically occurring in private dwellings, commonly motivated by price, and strongly associated with higher BrAC readings throughout the night in Courtenay Place. These findings signal the importance of addressing pre-loading as a contributor to intoxication in late-night entertainment areas.

The role of price as a key motivator of pre-loading showcases the importance of alcohol pricing policies that effectively target the high affordability of off-licence alcohol products in New Zealand. Within the late-night licensed premises environment, effective interventions shown to minimise the potential for harm and instigators for violence (e.g., intoxication, fatigue) include on-licence trading hour restrictions and data-driven targeted enforcement of alcohol laws by agencies. To effectively reduce the risk of alcohol-related harm and contribute to long-term improvements in safety in late-night areas, evidence-based interventions need to be considered across the entire drinking event.

1. Introduction

This section presents the need for the study and relevant background literature.

1.1 Overview and need for study

New Zealand's city centre night-life precincts (hereon referred to as the night-time economy (NTE)) generate wealth, create jobs, and ensure city centres are exciting, vibrant places to be. At the same time, the concentration of late-night licensed premises in these areas increases the propensity for crime, disorder, and harm[b] to occur.[2,3] The communities living in proximity to late-night bars and clubs may also experience harm through reduced feelings of safety, damage to their property and civic amenities, and a level of light and noise pollution.[3,4] Central to this harm is the prior consumption of alcohol and illicit substances.

Courtenay Place and its surrounding streets are Wellington's premier entertainment precinct, attracting locals as well as domestic and international visitors. Alcohol-related offending and harm peaks on both Friday and Saturday nights, adding substantial personal (e.g., abuse) and resource burden to Police, ambulance, health, and council staff and resources that are deployed to meet the demand arising from the entertainment precinct.[5,6]

The area has a high concentration and clustering of licensed premises, many with late-night trading, and tertiary student accommodation halls of residence nearby.[7] Previous research in the Wellington City Centre has shown that alcohol-related harm increases as the night goes on, particularly from 1am onwards and is highest between the hours of 3am and 4am.[7] Those most at risk of harm are aged 18 to 24 years.[7]

In 2021, serious violent offending occurred in the Courtenay Place precinct resulting in wide media reports of the public feeling unsafe.[8–11] In response to concerns raised about safety in the central city, the 'Pōneke Promise' was established in May 2021 to take a partnership approach to making Wellington safer, more vibrant, and more welcoming.[12] To inform the work of the partnership, a Rapid Evidence Assessment was commissioned from the University of Queensland[13] to explore the following questions:

- Using enforcement as a last resort, what can be done by Wellington City Council, Police, National Public Health Service and their partners to reduce alcohol-related harm in the Courtenay Place entertainment precinct whilst continuing to support the Council's aim of having a thriving, vibrant night-time economy? Would any of those interventions suffer from a displacement effect?
- What are the key factors that night-time economy entertainment precincts that experience low levels of harm have in common? What lessons could be applied to Courtenay Place?
- Police has gradually increased its deployment to the area. Is there an alternative to such a significant investment of staffing resources, and how do we make the best use of the staff that are deployed?
- How can we make best use of other capable guardians present in Courtenay Place, for example door security staff, bar staff and licensees, local council staff, and Māori, Pasifika, and Ethnic Wardens?

However, further information was required to understand the level of intoxication and the patterns of alcohol use and harm in the Courtenay Place precinct. In addition to analysing administrative data held

[b] alcohol-related harm' is defined in the Sale and Supply of Alcohol Act 2012[1] and:

(a) Means the harm caused by the excessive or inappropriate consumption of alcohol; and
(b) includes –
(i) any crime, damage, death, disease, disorderly behaviour, illness or injury, directly or indirectly caused, or directly or indirectly contributed to, by the excessive or inappropriate consumption of alcohol; and
any harm to society generally or the community, directly or indirectly caused, or directly or indirectly contributed to, by any crime, damage, death, disease, disorderly behaviour, illness, or injury of a kind described in subparagraph (i).

by various public agencies, Wellington City Council, New Zealand Police and the National Public Health Service | Te Ikaroa - Central Region felt that a study was needed to better understand the nature of alcohol consumption by members of the public on different nights of the week and accounting for significant events taking place in the city, e.g., arts and sporting events. Information was needed on levels of intoxication, prevalence of pre-loading and public drinking (and where and when the pre-loading alcohol had been purchased), as well as consumption at on-licence premises, to inform decision-making concerning interventions to reduce harm. The research would test the hypothesis that intoxication levels of members of the public present in the Courtenay Place precinct increase as the night goes on, and that the most intoxicated people engage in pre-loading (i.e., drinking alcohol purchased from an off-licence premise prior to arrival in the Courtenay Place precinct).

Pre-loading was a particular behaviour of interest in the current study, in light of findings from prevalence studies conducted in New Zealand cities as well as global studies with national pre-loading estimates and international comparisons.[14–19] In 2017, an online convenience sample of 18 – 30 year olds collected via a Wellington Facebook free trading forum targeting students and young people found a pre-loading prevalence of 61% ('always' or 'most of the time' pre-loading before entering Wellington's entertainment precinct).[7] A further 16% reported pre-loading some of the time.[7] The high prevalence of pre-loading documented in the above studies warrants substantial concern given the high risk of intoxication and harm to drinkers and others. The current study was important to understand the role of pre-loading in intoxication among persons in Courtenay Place, Wellington, using a methodologically robust study design.

There was also a particular need to better understand patterns of intoxication among Māori, to inform and address long-standing inequities in alcohol use and harm. As outlined below, research shows that Māori are a greater risk of alcohol-related harm and are over-represented as both offenders and victims of offences in Courtenay Place, where alcohol is a contributing factor. In the year to April 2021, Māori comprised 14% of victims and 29% of offenders in Courtenay Place where alcohol was a contributing factor yet comprise 8.6% of the population (Newsome, E., personal communication, 10 May 2021). The current study was designed to provide useful information to discuss with local iwi and, where possible, co-design effective measures to prevent and reduce alcohol-related harm.

1.2 Background literature

a) Patterns of drinking

The vast majority (76% in 2022/23) of New Zealand adults report drinking alcohol in the past year, with men significantly more likely to drink than women.[20] Overall, New Zealand's drinking culture has been characterised as 'dry' rather than 'wet', exemplified by a tendency among drinkers to consume high amounts of alcohol in a single episode (typically in weekends), followed by days of abstinence.[21] In 2011, almost half (44%) of all alcohol sold in New Zealand was consumed in heavy drinking occasions (>8 standard (10g alcohol) drinks for males and >6 for females).

In 2022/23, the Ministry of Health New Zealand Health Survey found that almost one-quarter (23%) of New Zealand drinkers reported heavy episodic drinking (6+ standard drinks in an occasion) at least once in the past month (equating to 735,000 adults) and 21% were classified as hazardous drinkers (i.e., having an established pattern of drinking that carries a high risk of future damage to physical or mental health).[20] Young adults aged 18 to 24 years were the heaviest drinkers across all age groups – 35% of young adult drinkers reported heavy episodic drinking at least once a month and 13% at least weekly.[20] More positively, the prevalence of hazardous drinking has declined among young adults in recent years, and binge drinking (5+ drinks in an occasion) has declined among New Zealand secondary school students.[20,22] However, binge drinking remains a dominant style of drinking among this young age group.[22]

It is suggested that the pursuit of intoxication and the pleasurable features associated with it are universal among drinkers.[23,24] A host of factors are known to influence an individual's drinking pattern,

including personal, peer, environmental, and societal factors.[25] In New Zealand, heavy drinking is facilitated by long opening hours of licensed premises, high availability and accessibility of low-priced alcohol, and pervasive advertising and promotion of alcohol in outdoor and digital environments.[3,21]

b) Alcohol harm

Alcohol use, in particular heavy drinking, is associated with many direct and in-direct impacts on the health, social, and economic wellbeing of individuals, families, communities, and wider society. The Sale and Supply of Alcohol Act 2012 has a broad definition of harm from alcohol to individuals, communities, and/or society that includes "any crime, damage, death, disease, disorderly behaviour, illness or injury, directly or indirectly caused, or directly or indirectly contributed to, by the excessive or inappropriate consumption of alcohol".[1]

These harms include, but are not limited to, physical assaults, sexual harassment and assault, intimate partner and family harm, child neglect and maltreatment, homicide, driving offences, anti-social behaviours, intimidation, graffiti and vandalism, and urinating, excreting and vomiting in public places. Among New Zealanders aged 15 – 45 years, alcohol use is the leading cause of death and disability and lost productivity.[26,27]

New Zealand research published in 2023 found alcohol to be the most harmful (combining harm to the user and others) of all drugs available in society.[28] This is due, in part, to the extensive harms from alcohol to others in the family, community, and wider society. Surveys show that more New Zealanders report being harmed from the drinking of others, than from their own drinking.[29]

It is well-recognised that the burden of harm from heavy drinking adds substantial and avoidable strain and costs on Police, Corrections, Courts, and the wider Justice system. The impacts of chronic and acute alcohol use also fall on Emergency Departments, ambulance services and the wider hospital services as a result of alcohol use being causally linked to over 200 health conditions and injuries, including cardiovascular disease, cancer, Fetal Alcohol Spectrum Disorder, alcohol abuse and dependence, and poor mental health and suicide.[30] These harms contribute to the enormous annual societal costs of alcohol use, estimated in 2018 to be $7.85 billion.[31]

There are long-standing inequities in the prevalence of alcohol use and harm that are particularly experienced by Māori, Pacific people, and persons living in deprived communities. Hazardous drinking prevalence in 2022/23 was significantly higher among Māori and Pacific drinkers when compared to non-Māori and non-Pacific drinkers, respectively.[20] Between 2004 and 2007, Māori deaths from alcohol were two and half times greater than non-Māori.[32] Also, a greater proportion of Emergency Department presentations and cancer deaths among Māori are attributable to alcohol use.[33,34]

- *Alcohol use and harm in night-life precincts*

Thriving night-life precincts can bring valuable social, economic, and cultural vibrancy to city centres. They provide a source of entertainment, social interaction, shared experiences, and peer group identity. Bars and night clubs are a common feature in these areas, where alcohol use is common (especially among young adults) and heavy drinking often occurs.[35]

Drinking pattern norms are shown to vary by drinking location or context, with drinking in a pub/bar/club setting associated with heightened norms for heavier drinking.[36] New Zealand and international research shows that drinking at on-licence venues such as bars and pubs is associated with higher levels of alcohol use and an increased risk of alcohol-related problems, to both the drinker and others.[37,38] Research consistently shows that mean breath alcohol concentrations and the prevalence of highly intoxicated patrons increase over the course of the night in night-life precincts.[14,15,39,40]

A range of individual, interpersonal, location-specific, and wider societal factors and norms interact to facilitate heavy drinking and harm in night-life settings.[41] For example, consumption of alcohol at private settings prior to entering night-life precincts (i.e., pre-loading) is one known factor that compounds the risk of harm in these settings.[42] Other factors include patron characteristics (including age, gender,

personality traits, other drug use, fatigue), alcohol use in public places, management and clustering of licensed premises, licensed trading hours, lighting and surveillance in the area (including Police presence), transport availability, and presence of other physical spaces (e.g., fast food outlets) that are common flash points for harm.[43]

Heavy drinking is known to play a key role in violent incidents in NTEs due to its disinhibiting effects and resulting loss of emotional control that facilitates negative emotions, conflict with others, and aggression.[44] Suppressed anger and aggressive traits are implicated in the alcohol-violence relationship.[45] In NTEs, a host of factors are known to interact with alcohol use to increase the risk of sexual violence.[46]

In New Zealand, around half of all physical assaults and sexual assaults have been found to involve alcohol use by the perpetrator, with alcohol-related assault being more likely to involve strangers and to occur in public places.[47] One's own drinking can also influence the risk of victimisation.[47] In the Hamilton Central Business District (CBD), harm was found to cluster in close proximity to bars, where around 25% of all assaults took place within 10 metres of a bar and approximately half of all assaults took place within 50 metres.[48]

The combination of alcohol use with fatigue is particularly problematic in NTEs. In line with the I3 theory, or Perfect Storm, late-night trading hours combined with higher levels of alcohol use and fatigue can reduce one's ability to inhibit aggression.[49] Late trading instigates fatigue, that is believed to contribute to aggression via its effects on cognitive processing involved in managing social situations, especially potential conflicts. Mental fatigue may also contribute to aggression as a result of its effects on emotion, specifically, heightened irritability. Finally, fatigue may also contribute to aggression due to its effects on behaviour - specifically, decreased control over impulses.[50] In combination with alcohol use, which disinhibits an individual towards aggression, the risk of problems in NTEs increases.[51]

In 2017, an online convenience sample of young adults aged 18 – 30 years in Wellington found respondents reported the most serious harms in the city centre entertainment precinct to be violence/fighting, unwanted sexual advances, and drinking to the point of needing medical attention. Dropping rubbish (62%), verbal abuse (58%), and violence and fighting (53%), were the three alcohol-related harms most observed or experienced by the respondents.[7] These findings concur with studies of NTE patrons in Australian cities, which found that between one-half to almost two-thirds of patrons had witnessed violent encounters, with 10 – 17 percent having had a direct involvement in the violence.[52,53] Unwanted sexual attention was more likely to be reported by females and involvement in a physically aggressive incident was reported more by males. Most victims of sexual offences tended to be young, aged 34 years or less.[53]

Emergency Departments also shoulder the burden of alcohol harm associated with late-night drinking establishments. Studies of the Christchurch City Emergency Department (ED) found that 25% of all alcohol consumed by alcohol-affected patients had been purchased from an on-licence[54] and around 20% of ED presentations had an on-licence reported as the location of the last drink consumed.[55] Males comprised approximately two-thirds of alcohol-related presentations to Christchurch and Auckland EDs, with the majority aged 18 to 44 years.[55,56] The Wellington Regional Hospital ED staff have also been shown to be directly impacted by responding to alcohol harm, particularly that resulting from intoxication. A study published in 2011 found that one-half of ED staff interviewed had ever being verbally or physically assaulted by an intoxicated patient while at work, and nearly all of them acknowledged an increased workload from alcohol-related presentations. More than half of staff surveyed also reported that alcohol-related presentations negatively affected staff mood.[6]

Not all drinking in night-life precincts in city centres will result in acute and/or visible physical harms to the drinker and/or others. Whilst public safety within night-life environments has been a serious concern and has rightly received significant attention, there are also many hidden harms associated with heavy drinking episodes, with their severity also warranting significant concern. These harms apply to heavy drinking regardless of place of purchase (i.e., off-licence or on-licence). Heavy drinking episodes are

known to have negative effects on mental health, brain development among adolescents and young adults, sexual health (e.g., unplanned pregnancies), fetal health and disability (e.g., miscarriage and Fetal Alcohol Spectrum Disorder), as well as on the development of alcohol use disorders, including alcohol abuse and dependence.[57–60] A national population-level study found that 70% of cases of alcohol abuse and dependence in New Zealand were developed by the age of 25 years, highlighting the importance of prevention of heavy drinking and harm reduction irrespective of drinking context.[60] As such, improving safety (e.g., through reducing heavy drinking prevalence) in night-life precincts is likely to have many positive flow-on effects towards reducing the overall risk of alcohol-related harm to drinkers and others.

c) Drinking contexts and the night-time economy

In New Zealand, an increasing proportion of alcohol is purchased from off-licence outlets (e.g., supermarkets, grocery stores, bottle shops, online sellers) and consumed in private settings. In 2013/14, over 80% of all alcohol was purchased from off-licence premises[61], an increase from 59% in 1986 and 68% in 2007 (cited in [3]). Of all alcohol consumed in heavy drinking occasions in 2011, 74% was consumed in private homes and 14% was consumed at on-licence venues.[62]

The rising affordability of alcohol has undoubtedly contributed towards the shift from on-licence drinking to drinking in homes or other private settings.[63] Low-priced alcohol, typically available at off-licence premises, is disproportionately purchased by heavy and frequent drinkers in New Zealand, including young heavy drinkers.[64,65]

Four studies in New Zealand have examined BrACs among the public in NTEs or attending special events. Results of these studies are found in Table 1 below.

Table 1. Findings from NTE breath alcohol studies in New Zealand.

Location	Year	Hours of study	BrAC findings
Auckland[66]	2004	10pm – 4am	Among persons under the age of 25 years, the mean BrAC for men was 392 mcg/L, significantly higher than the mean (291 mcg/L) among women. BrACs increased over the night: 249mcg/L 9pm-11:59pm, 367 mcg/L 12am-1:59am and 414 mcg/L 2am-4am. One in seven (14%) participants had a BrAC of >600mcg/L.
Hamilton[15]	2016	7pm – 2:30am	Mean BrAC of 241.5 mcg/L.
Dunedin[17]	2016	7:30 – 10:30pm	Mean BrAC among university students attending Orientation events was 289 mcg/L. Between 9:30pm and 10:30pm, the mean BrAC was 482 mcg/L.
Hamilton[14]	2019	9pm – 2:30am	Mean BrAC of 330 mcg/L (SD 248; range 0 – 1170). Before 10pm the mean BrAC was 150 mcg/L, increasing to around 400 mcg/L by 1am. Each additional hour was associated with a higher BrAC of 27.7 mcg/L, on average.

Findings from these studies are comparable to those found in international studies, Table 2. Note: The BrACs presented below have been converted to mcg/L using the breath to blood alcohol conversion ratio used in each country (e.g., 1:2,100 in Australia and 1:2,300 in the four European cities).

Table 2. Findings from international NTE breath alcohol studies.

Location	Study details (year, days, sample)	BrAC findings, mcg/L
- ***Australia***		
Surfers Paradise[67]	2016 (Saturday nights only)	410 (median)
Fortitude Valley[67]	2016 (Saturday nights only)	367 (median)
Cairns[67]	2016 (Saturday nights only)	414 (median)
Melbourne[39]	2011-2012 (Friday, Saturday nights)	286 (mean)

Sydney[39]	2011-2012 (Friday, Saturday nights)	238 (mean)
Geelong[39]	2011-2012 (Friday, Saturday nights)	333 (mean)
Perth[39]	2011-2012 (Friday, Saturday nights)	333 (mean)
Wollongong[39]	2011-2012 (Friday, Saturday nights)	333 (mean)
Brisbane[68]	2015-2019 (young drinkers <26 years leaving the NTE on Thursday, Friday, or Saturday)	390 (mean) 448 (mean) among those with >0 BrAC
- ***Europe***		
Utrecht (the Netherlands)[69]	2010, 16 – 35-year-olds (Thursday, Friday, Saturday nights)	306 females, 394 males (median)
Ljubljana (Slovenia)[69]	2010, 16 – 35-year-olds (Thursday, Friday, Saturday nights)	219 females, 350 males (median)
Palma de Mallorca (Spain)[69]	2010, 16 – 35-year-olds (Thursday, Friday, Saturday nights)	263 females, 306 males (median)
Liverpool (UK)[69]	2010, 16 – 35-year-olds (Thursday, Friday, Saturday nights)	438 females, 569 males (median)

i. Differences in breath alcohol concentrations by gender

Mixed findings are evident in relation to differences in mean BrACs in NTEs by gender. Three New Zealand studies found BrACs were higher among males than females[15,17,66], whilst one study in Hamilton found no difference.[14] In Australia, men were found to be more intoxicated than women earlier in the night, but gender differences disappeared by 3am.[39] In all four European countries described above, BrACs were higher in males than in females, although differences were not always statistically significant.[69]

d) Pre-loading

Pre-loading (or pre-drinking, front-loading, pre-partying, pre-gaming) typically refers to alcohol use at a private residence (or non-licensed venue) prior to attending a licensed venue.[42] Suggested to be increasing in prevalence[70], it is particularly common among students and young adults.[19,71]

Five New Zealand studies have examined the prevalence of pre-loading, among the general population, young adult population, or tertiary students. Variability in pre-loading prevalence is demonstrated, likely reflecting the demographics of the population (especially age), drinking setting, proportion of drinkers in the sample (e.g., 76% in the 2018 Hamilton study[15] vs. 89% in the 2019 Hamilton study[14]), and definition used for pre-loading. A summary of the findings is described below.

- In Wellington, a 2017 online convenience sample of 18 – 30-year-olds collected via a Facebook forum found 61% of respondents either “always” or “almost always” pre-loaded before heading into Wellington’s entertainment precinct. A further 16% reported that they pre-loaded “some of the time”;[7]
- One study in Hamilton in March and April 2019 found a pre-loading prevalence among persons (mean age 23.8 years) in the CBD on Thursday, Friday or Saturday night of 84%, or 93.8% among those who had consumed any alcohol on the day of the study;[14]
- A similar study in Hamilton in November and December of 2018 of persons in the CBD (mean age 28.2 years) found a pre-loading (consumption of alcohol at any other location prior to coming to the CBD) prevalence of 49% across Wednesday, Thursday, and Friday nights;[15]
- In Palmerston North in March 2013, 77% of respondents reported pre-loading (“drink alcohol before going into town on a typical night”) on a Friday or Saturday night before travelling to town;[16] and
- In a study of University of Otago students (mean age 18.5 years) attending orientation events at the start of 2016, 89% reported pre-loading (having consumed alcohol before attending the event).[17]

Variability in pre-loading prevalence is also evident across international studies. Studies of young people in NTEs in Australia, United Kingdom, and Denmark, have found a pre-loading prevalence in the range of 58% to 88%.[67,72,73] Among a wider sample of NTE patrons, a pre-loading prevalence of 67% was found in two NTEs in Australia.[74]

The 2015 Global Drug Survey, utilising a non-probability sample of people who self-select to complete an online survey, found New Zealand males and females ranked in the top five of 25 countries for pre-loading, with a prevalence of almost 80%.[18] This was much higher than the average across all 25 countries of 63%.[18] Of note, whilst pre-loading prevalence was commonly shown across countries to increase then decrease with age (levelling out at ~30 years of age), the pattern in New Zealand (and a small selection of other countries) showed that the predicted probability of pre-loading actually increased after the age of 30 years.[19]

i. Characteristics of pre-loaders

Pre-loading prevalence has been shown to vary by age and gender, although the direction of findings is inconsistent across studies. In the 2015 Global Drug Survey, males and persons under the age of 21 years were more likely to pre-load.[19] In contrast, a study comparing pre-loading behaviours across four European countries found that females in the United Kingdom were significantly more likely to pre-load than males.[69] In a study of young adults attending pubs in North East England, no difference was found between males and females in the prevalence of pre-loading.[72] Across three NTEs in Queensland, two NTEs reported no differences by gender in pre-loading prevalence with the remaining NTE showing significantly higher levels of pre-loading among females.[67]

Other characteristics found to be associated with pre-loading include consumption of illicit substances, suggested to compound intoxication symptoms.[74] In relation to the night out, pre-loaders in Australia have been shown to enter NTEs later in the night than non-pre-loaders.[75] Whilst income was not found to predict pre-loading among young people aged 18 to 35 years in Denmark and England, young people's income level was related to their motives to pre-load and the quantity of alcohol they consumed.[71] Lower-earning males who pre-loaded to save money were found to consume larger quantities of alcohol in pre-loading occasions, and lower-earning females consumed larger amounts of alcohol either to get out of control or because they wanted to be social.[71]

There is a dearth of studies examining the quantity of alcohol consumed in pre-loading occasions, suggested to be due to these questions having a high potential for recall error or social desirability bias, especially when participants are impaired by alcohol.[76] In the United Kingdom, young males and females were found to drink an average of 9.8 units (12 New Zealand standard drinks) and 7.4 units (9 New Zealand standard drinks) of alcohol before a night out, respectively.[71] Among students attending orientation events at the University of Otago, pre-loaders were found to have consumed, on average, 6.9 standard drinks.[17] Undergraduate students who arrived later to the orientation week events reported consuming more alcohol and having longer pre-loading sessions than those who arrived earlier.[17] In Switzerland, tertiary students were found to consume greater amounts of alcohol on evenings with pre-loading (7.1 standard drinks on average) when compared to evenings with on-licence drinking only (4.2 standard drinks) and off-licence drinking only (4.3 standard drinks).[77] Of all alcohol consumed over a night by participants aged 18 to 35 years in an English study, over one-quarter (26.5%) of female and 15.4% of male alcohol consumption occurred prior to attending licensed venues.[72]

ii. Harm associated with pre-loading

Pre-loading has been consistently shown to increase the risk of alcohol-related harm, in part because of higher levels of intoxication when compared to non-pre-loaders.[14] In 2019, the Hamilton street-intercept study found that the mean BrAC among pre-loaders was 259 mcg/L, significantly higher than the mean among non-pre-loaders of 167 mcg/L.[14] The 2018 study in Hamilton found that pre-loaders had BrAC levels on average 142 mcg/L higher than non-pre-loaders and that the effect of pre-loading on BrAC was larger for women than for men.[15] In Canada, the breath alcohol concentrations were twice the mean found among non-pre-loaders.[78] Similar findings have been shown in Australia.[67] Of interest,

group dynamics have been found to influence BrAC among pre-loaders, with higher BrACs found among members of groups in which at least half of the group had been pre-loading.[78]

Barton and Husk[75] propose a number of mechanisms that enable heavy consumption of alcohol in pre-loading sessions. Heavy consumption is believed to be enabled by the absence of external controls (beyond peers) in private settings, the low price of off-licence alcohol that facilitates large purchases, the lack of ‘‘natural breaks’’ in consumption that usually occur when patrons queue for bar service, move bars, and queue for entry, the lack of standard measures when self-pouring alcohol or being poured by others, and the absence of sober people against which to gauge drunkenness.

Elevated harms evident among pre-loaders include increased signs of abuse and dependence, engagement in greater antisocial and other high-risk behaviours, and susceptibility to victimisation from physical and sexual assault.[42,70,72,74,77,79,80] A study of 18 to 35 year olds in England found that pre-loaders were 2.5 times more likely to have been involved in a fight in the NTE during the past year.[72] In a study of 17- to 30 year-olds arrested and placed into custody in an English city for alcohol-related incidents in 2010-11, 66% reported that they had pre-loaded.[75] Among these, the majority reported that alcohol had been bought the day of the drinking event in preparation for pre-loading, pointing to the planned nature of this drinking behaviour among these drinkers.[75]

However, it is proposed that the relationship between pre-loading and harm is not fully explained by higher consumption levels among pre-loaders over the course of the night.[72,78] One study in the United Kingdom found that total alcohol consumption was not associated with fighting, suggesting that pre-loading may play be implicated in violence via the style or pattern in which pre-loaders drink. It is thought that aggression and violence among pre-loaders may be due to reaching intoxication earlier and consequently spending a longer period in NTEs intoxicated and at risk of aggression.[72]

Similarly, a Canadian study found pre-loaders experienced more harm, over and above their higher BrAC recordings.[78] It was suggested that the act of pre-loading itself may be associated with heavier consumption and alcohol use disorders (AUD) via a quick rate of alcohol intake, which is a pharmacodynamic mechanism correlated with AUD symptoms in adolescents and adults.[80–84] It is proposed that frequent pre-loading confers unique risk compared to usual consumption patterns.[80]

Violence in NTEs commonly centres around arguments with friends/family and stranger-based incidents occurring outside a pub, club, or at other flash points such as taxi ranks or fast-food outlets where patrons compete for resources.[85,86] The potential for pre-loaders to be denied access to, or removed from, a pub or club for being too intoxicated or perceive insults when queuing may increase their risk of violence.[75] Given pre-loaders have had little to no contact with authority prior to entering the NTE, the contact made following pre-loading may be confrontational.[75] It is suggested that late-night trading hours potentially prolong the pre-loading session, increasing intoxication and the likelihood of confrontation.[75]

Questions arise whether pre-loading is a substitute for drinking at on-licensed premises, thus reducing revenue for late-night venues. Whilst there is a dearth of studies on this issue, the majority of studies have shown that pre-loaders consumed similar amounts in NTEs to non-pre-loaders.[72,75,77,78] In England, Barton and Husk found that pre-loaders spent more in the whole drinking event (both at home and in the NTE) than those that did not pre-load.[75] Home spend, on average among pre-loaders, ranged from £6 to £15 compared to £20-£80 in the night-time economy.[75] However, a study of young drinkers in Denmark and England found that pre-loaders consumed 3.4 and 3.1 units less alcohol on-premises than the non-pre-loaders[73] and in Palmerston North pre-loaders reported consuming less alcohol on licensed premises.[16] The application of the findings from these studies to the Wellington NTE context is unknown.

iii. Pre-loading purchase times and locations

The study by Cameron et al. in the Hamilton CBD in 2019 found that the majority of pre-loaders had purchased their pre-loading alcohol on the day of consumption.[14] Half of these same-day purchases were made before 6pm.[14] The majority of purchases of pre-loading alcohol were from bottle stores

(74%), with a much smaller proportion (12%) from supermarkets.[14] The median purchase time for pre-loading purchases was found to be 6pm, with 12% of purchases made after 9pm.[14] Similarly, bottle stores (79%) were the most common location for pre-loading purchases among respondents in the 2013 Palmerston North study, with supermarkets comprising one-third (35%) of pre-loading purchases.[16]

Cameron et al. found that the retail source (i.e. bottle store vs supermarket) of pre-loading alcohol or pre-loading purchase time was unrelated to the level of intoxication among pre-loaders.[14] Whilst other countries have examined pre-loading place of purchase, differences in off-licence categories limit comparisons between studies.

iv. Motivations for pre-loading

There is a consistent body of research showing that the price differential between alcohol products sold at on-licence venues versus off-licence outlets is a key motivator for pre-loading and purchasing decisions.[14,16,42,74,87,88] In Hamilton, 49% of respondents reported that they were motivated to pre-load due to 'price/to save money', followed by 'get drunk before going out' (35%), and to 'have fun' (24%).[14] In one Australian study, 52% of pre-loaders indicated price as a motivator for pre-drinking.[74]

It is suggested that pre-loading motives may help explain the differential risk of harm to pre-loaders, over and above the amounts of alcohol consumed in a night.[89] In a study of young adult pre-loaders in Switzerland, those predominantly motivated by 'fun/intoxication' were found to be at an increased risk for heavier drinking and consequences (via higher consumption), but not those who pre-load for conviviality or facilitation motives.[90]

Other reasons, particular to the structural realities of the night-life environment, have been found to relate to the preference to pre-load. This includes the large, noisy and less intimate environments of licensed venues that limits conversation and catching up with each other.[16,42,74,87] In addition, dance venues may not be viewed as appropriate settings to arrive sober and commence drinking, resulting in valuable dancing time spent drinking in an attempt to loosen inhibitions.[87] In Palmerston North, the most common reason cited to pre-load was to socialise with friends who were not heading into town.[16]

e) Side-loading in public places

The practice of side-loading, being the consumption of alcohol during a night out occurring outside of the licensed premises (e.g., street, car, carpark), has received less attention in the literature. Side-loading may include the purchase and consumption of alcohol from nearby off-licences and/or the consumption of alcohol hidden outside a licensed premises for drinking later. It excludes the consumption of alcohol smuggled into a licensed premises.[91]

Three studies have examined the practice of side-loading. In a small study of 32 young people in Scotland, no instances of side-loading had occurred in the past seven days.[87] An online survey of 2,008 adults (mean age 43 years) who had purchased off-licence alcohol in the past year in Victoria, Australia, found that 23% reported that they had engaged in side-loading at least once in the previous twelve months. Among side-loaders, 5% had also pre-loaded.[92] Side-loading was more common among younger people but was unrelated to an individual's drinking pattern.[92]

In a street-intercept study in Hamilton in 2019, 18% of all participants and 20% of drinkers reported side-loading behaviour. Most side-loading took place in a car (61%), followed by in the street (17%), carpark (12%), or somewhere else (13%). Side-loading was more prevalent among males and pre-loaders. Women were more likely than men to side-load in a carpark and pre-loaders were more likely than non-pre-loaders to side-load in a location other than a car, carpark, or the street. As side-loading was found to be unrelated to BrAC, the authors proposed that side-loading may be used as a practice to enable the maintenance of intoxication.[91] The differences in the prevalence and location of side-loading by gender (i.e., more males side-loading and in public areas) were suggested to relate differences in willingness to take risks with penalties in a liquor ban area.[91]

2. Methods

This section presents an overview of the research methods, including statistical analysis.

2.1 Research framework - overview

This research used a street-intercept survey design to investigate the nature and level of alcohol use by members of the public entering the entertainment district of Courtenay Place/Te Aro Park in Wellington City during high-alcohol hours.

Two main tools were used to collect data:

- A street-intercept quantitative survey; and
- An objective assessment of breath alcohol concentration utilising an electronic breathalyser.

Analysis of data was undertaken to identify:

- The prevalence and characteristics (e.g., time and place of purchase, motivations) of pre-loading;
- The prevalence of public drinking; and
- The level of intoxication among persons in the area, by demographic characteristics and pre-loading and public drinking behaviours.

The survey was supplemented by a focus group with the staff that had conducted the field work to gather their observations of implementing the methodology and of the NTE in the Courtenay Place precinct during data collection. The findings of the focus group have been used to contextualise findings from the quantitative survey and provide recommendations for further research in NTEs.

2.2 Sample

The entertainment district surrounding Courtenay Place was selected for the study due to the concentration of on-licence premises with late-night trading hours and associated alcohol-related incidents. Five locations in the area were selected for data collection, as shown in Figure 1. Previous research has demonstrated this area to be a hotspot for heavy alcohol use and related harm.[7]

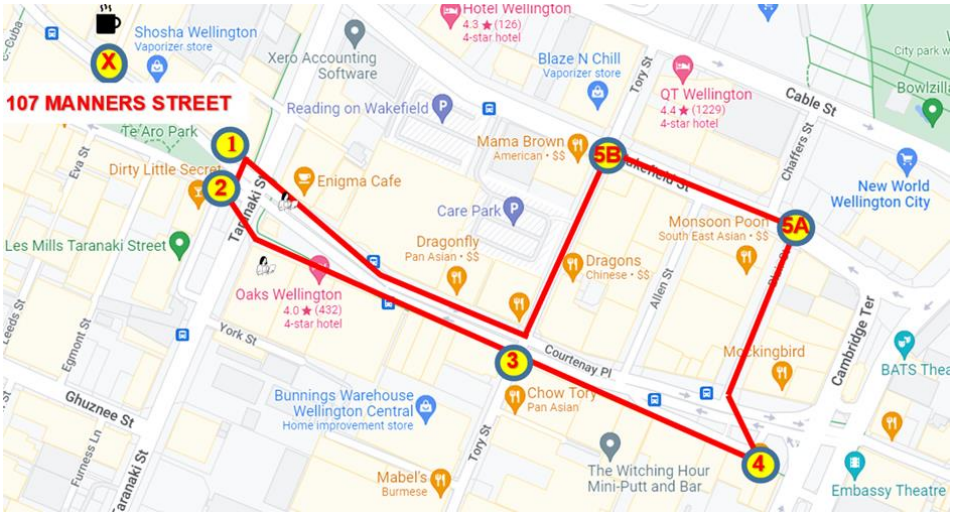

Figure 1. Survey area, showing the five points of data collection.

From 8:20pm to 4:00am on Wednesday/Thursday, Friday/Saturday, and Saturday/Sunday nights/mornings, two research interviewers and one supervisor were located at each of the five data collection points. The data collection period occurred on three separate weeks in 2022: 7 – 10 September, 21 – 24 September, and 28 September – 1 October. Two major public events occurred on nights of data collection: 1) World of Wearable Arts from 22 September to 8 October (in Wellington) and 2) All Blacks vs Australia Bledisloe Cup rugby match on 24 September (in Auckland).

The intention was to approach every seventh person entering the area and offer them the chance to gauge their level of intoxication by undergoing a breathalyser test. The rationale for this protocol is established elsewhere.[15] However, the presence of groups of people in the NTE presented difficulties with identifying every seventh person and so the protocol was amended to complete the interview with one participant before approaching the next person in the NTE to participate. No particular group of persons were targeted to be asked to participate in the survey nor was any reward or coercion directed to any potential participant.

Before undergoing the breathalyser, each participant was asked if they would agree to answer a survey on their drinking habits for that night. The staff member provided a pre-filled information card to the participant that contained advice on keeping safe, information about the study, and process to withdraw their consent for the study if they wished to. Ethical advice was obtained from the Ministry of Social Development Ethics Panel.

2.3 Measures

The street-intercept questionnaire used a branched design, with answers recorded via electronic tablets. The questionnaire can be found in Appendix 1.

a) Pre-loading

Each participant was asked about their alcohol use prior to coming to the Courtenay Place precinct, via the question *"Have you consumed any alcohol today/tonight?"*. Among those that answered 'Yes', the location(s) of drinking was sought. Participants that reported consuming alcohol at their own home, friend's home, outdoor public location (e.g., street, park), and/or vehicle were classified as pre-loaders. Further analysis was undertaken among the sample of participants that reported drinking at 'other location'. Drinkers who reported consuming alcohol at private settings (e.g., hotel, after-work drinks) were classified as pre-loaders but not those who had been a private function (e.g., wedding), bar/restaurant, music event, or social/sports club.

Among participants that reported pre-loading, data was collected on the motivation(s) for pre-loading, beverage type, source of pre-loading alcohol, place of pre-loading purchase, and day/time of pre-loading purchase.

b) Public drinking

Each participant was asked whether they had engaged in public drinking during the night, and if so, the location of drinking, their plans for further public drinking, and place of purchase of alcohol for public drinking. It is important to note that this reported behaviour may or may not include side-loading (i.e., consumption of alcohol between visits to licensed premises).

c) Drinking in bars in Courtenay Place

Each participant was asked whether they had been drinking in the bars in the Courtenay Place precinct, and if so, at which bars they had consumed alcohol. Findings of the latter are not included in this report.

d) Subjective and objective assessments of intoxication

Each participant was asked to rate their perceived level of intoxication as 1) sober, 2) under the influence, 3) intoxicated, or 4) unsure. The interviewer also rated the participant's intoxication using the same scale, by applying the training they received on the Speech, Coordination, Appearance, Behaviour (SCAB) assessment methodology.

A commercial breathalyser was used to objectively assess breath alcohol concentrations. The BACTrack S80ProTM breathalyser was used, which is a police-grade sensor utilising fuel cell technology and reports an accuracy range of +/- 0.004 at 0.050 %BAC. The frequency of tests taken across the nights, by ten-minute intervals, is shown in Appendix 2. BrAC results by ethnicity are shown in Appendix 3.

2.4 Analyses

All data were analysed in IBM SPSS Statistics and SAS Enterprise Guide 8.2 (SAS Institute Inc., Cary, NC, USA). Ethnicity was categorised as Māori (any report of Māori ethnicity) or non-Māori, and Pacific (any report of Pacific ethnicity) or non-Pacific. For all statistical analyses, age was categorised into three groups: 18 – 24 years, 25 – 34 years, and 35+ years (the reference category). Table 9 and Figure 5 further split the age group of 18 to 24 years into two groups to show differences in BrACs: 1) participants aged 18 to 20 years and 2) participants aged 21 to 24 years.

Differences in pre-loading and public drinking behaviours by demographic characteristics (i.e., gender and student status) were analysed using Chi-squared tests for the equality of proportions. Logistic regression (a statistical model that is used to examine/estimate the relationships between factors) was used to identify the demographic characteristics associated with pre-loading and related behaviours. P values are reported as $p<0.01$, $p<0.05$; and $p<0.1$. A value of 0.05 or lower is generally considered statistically significant and means that the result found is unlikely to be due to simple random chance.

Linear regression was used to examine the factors associated with breath alcohol concentrations. Ethnicity was found to be unrelated to breath alcohol levels and so was omitted in the analyses. Explanations of the models used in this study, as well as the regression results, can be found in the Appendix 4.

3. Results

This section presents the key findings that emerged from the data analysis.

3.1 Sample and demographic characteristics

Over the three-week period, 2,293 persons agreed to take part in the study. By day of week, 18% of the data were collected on Wednesday evening/Thursday early morning, 42% on Friday/Saturday, and 40% on Saturday/Sunday. The number of persons who declined to participate is unknown.

Participant characteristics are shown in Table 3. The median age was 23 years, although this is an approximation (year 2022 minus year of birth). Participants whose birthday had not yet occurred before the September/October interview may have been one year younger than that categorised below. The sample over-represented Māori (15%), given that 9% of Wellington City residents reported Māori ethnicity in 2018.[93] Feedback from interviewers submitted that it was harder to recruit older participants and that many younger participants were aware of the survey, having seen messages on social media.

Table 3. Demographic characteristics of participants.

	% of all participants
Age group	
18 – 24 years	60.6
25 – 34 years	26.6
35 – 44 years	5.6
45 – 54 years	4.0
55+ years	3.0
Gender	
Male	60.1
Female	38.2
Another/chose not to report	1.6
Student status[a]	
Student	35.7
Ethnicity[b]	
Māori	14.8
Pacific	5.9
Asian	7.7
New Zealand European	71.4
European other	5.6
Middle Eastern, Latin American or African	2.8
Other	2.4
Prefer not to say	0.4
Residential location	
Wellington City	68.3
Lower Hutt City	6.1
Porirua City	4.5
Upper Hutt City	2.4
Kapiti Coast District	1.6
South Wairarapa/Carterton//Masterton District	1.0
Tararua District	0.04
From outside the region	15.7
Prefer not to say	0.3

Students' may be high school- or tertiary-level.
As participants could report more than one ethnicity, the total presented exceeds 100%

Participant characteristics over the night

As shown in Table 4, almost three-quarters (72%) of the participants interviewed between 1:01am and 3:59am were aged 18 – 24 years. Analyses found a significantly greater proportion of Māori, Pacific people, young adults, and students interviewed in the later time periods, when compared to the first time period. Survey staff reported finding it hard to recruit older members of the public late at night, as this group was more prevalent in the earlier hours of the evening.

Table 4. Characteristics of participants interviewed, by time period.

	8:24-11:00pm %	11:01pm-1:00am %	1:01-3:59am %
Age group (years)			
18 – 24	46.7	66.3	72.2
25 – 34	31.9	23.7	23.1
35 – 44	8.6	5.2	2.4
45 – 54	6.8	2.5	2.1
55+	5.9	2.2	0.3
Ethnicity			
European	69.5	76.1	68.6
Māori	12.6	14.2	18.4
Pacific	4.7	5.5	7.8
Asian	9.6	5.7	7.4
MELAA	3.8	2.0	2.3
European - Other	7.1	4.2	5.0
Student			
Yes	22.9	44.1	39.2
No	74.1	55.9	60.8

MELAA = Middle Eastern, Latin American and African.

Location of interview

As shown in Table 5, the majority of data was collected from locations situated on Courtenay Place.

Table 5. Location of interview in Courtenay Place.

Location	% of all participants
Courtenay/Taranaki Street – North	23.5
Courtenay/Taranaki Street – South	18.1
Courtenay/Tory Street – South	24.2
Courtenay/Kent Street	16.3
Wakefield/Blair	6.8
Wakefield/Tory	7.7
Other	3.4

Direction of travel

Interviewers reported if the person being approached to participate was perceived to be heading towards or away from Courtenay Place. As shown in Table 6, an equal proportion were heading into or away from Courtenay Place.

Table 6. Interviewer-perceived direction of participant travel.

Direction of travel	% of all participants
Towards Courtenay Place	49.3
Away from Courtenay Place	45.7
Not applicable	4.9

3.2 Characteristics of the night out

Reason for going out

Almost one-half (44.5%) of participants reported that they were in the area to catch up or socialise with friends, Table 7. Almost one in every six (16%) participants were in town to attend a special event or celebration. Further analysis of the 'other' reason identified food-related (3% of total) and other work-related (2% of total) reasons as most common.

Table 7. Reasons for being in the Courtenay Place precinct.

Reason	% of all participants
Catch up / Socialise with friends	44.5
See a band / DJ / other performance	4.7
Special event/celebration	15.5
Work function	2.6
Normal night out	5.0
To get drunk	9.8
To pick up / find a partner	1.9
Clubbing/ dancing	5.4
Other	10.5

Consumption of any alcohol

The vast majority (91%) of participants reported that they had consumed alcohol on the same day or night. Examination of participants who reported having consumed no alcohol before the interview revealed a statistically greater proportion of this group in earlier time periods ($p<0.001$) and among older age groups (<0.001). No differences were found by gender and ethnicity.

Of all participants, 1,360 (66%) reported that they had already consumed alcohol in bars and restaurants in the Courtenay precinct prior to being interviewed.

Referral to support services due to intoxication was made for 37 (1.6%) participants. For one participant, this was to an ambulance. Four participants were referred to a safe place, 31 to friends/partner, and one to Take10 (a late-night 'safe zone').

Getting home

The most frequent response to planned mode of transport home was walking (49%). Almost one-third (32%) of participants reported a plan to use a rideshare mode (e.g., Uber). Many participants reported more than one planned mode of travel home. Around one in twenty (6%) participants were going to drive themselves home, Table 8.

Table 8. Planned mode of transport home after going out.

Mode of transport	% of all participants
Walk	48.7
Drive myself	5.5
Car (a lift from sober driver)	7.9
Getting picked up in a car	1.5
Taxi	3.5
Rideshare (e.g., Uber)	31.6
Bus	3.4
Train	1.4
Other (please specify)	1.1
Unsure/ No plan	1.1

3.3 Intoxication

Subjective assessment of intoxication

The majority of participants were 'under the influence', as self-reported by the participant (54%) or perceived by the interviewer (56%), Figure 2. Around one in five participants were assessed as 'intoxicated'.

The mean BrAC of participants self-assessed as sober was 115.2 mcg/L (SD 177) with 49% of these self-ratings recording zero BrAC readings. The mean BrAC of participants self-assessed as 'under the influence' was 382.7 mcg/L, and 536.2 mcg/L among those assessing themselves as 'intoxicated'.

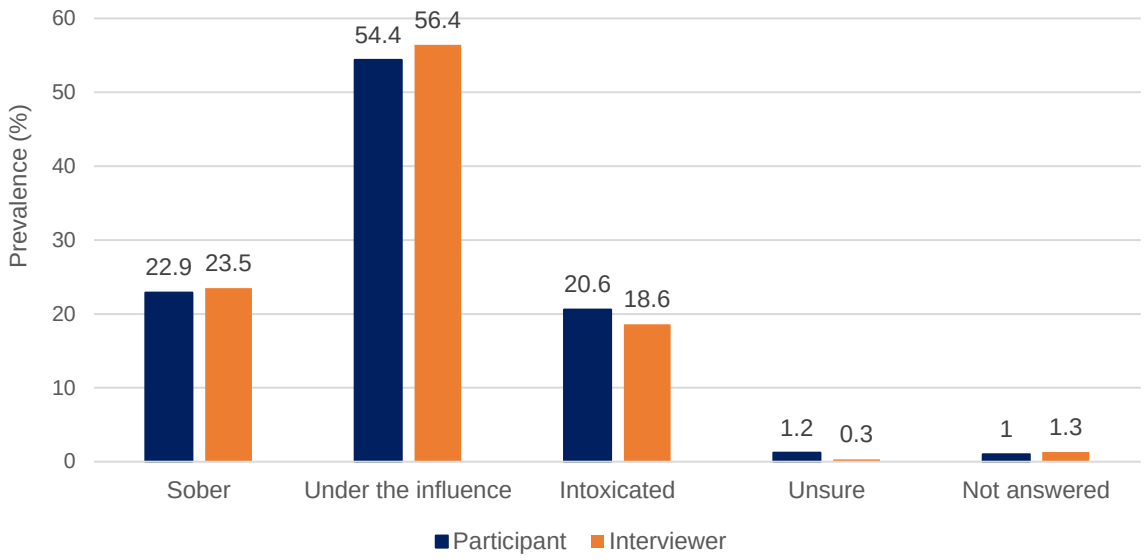

Figure 2. Self-assessment and interviewer assessment of participant's level of intoxication.

Objective breath alcohol concentrations

In total, 2,194 (96%) of the 2,293 participants undertook a breathalyser test. The number of tests taken across the ten-minute intervals of the study are shown in Appendix 2. Key findings of intoxication are shown below in Table 9.

Table 9. Key BrAC findings of study participants.

Measure	Breath Alcohol Concentration (mcg/L)	Comparison among subgroups
Total sample range	0 to 1524	
Total sample mean (SD), median	354.7 (252.6), 349	
- Among those with any alcohol detected	409.6 (226.2)	
Gender, mean (SD)		
Males	373.1 (256.5)	p<0.001
Females	320.9 (242.2)	
Age group, mean (SD)		
18 – 20 year olds	355.2 (237.0)	p<0.001
21 – 24 year olds	393.8 (246.1)	
25 – 34 year olds	354.4 (265.4)	
35+ years	257.9 (253.0)	
Ethnicity, mean (SD)		
Māori	378.0 (240.6)	*Participants can report >1 ethnicity,*
Pacific people	329.8 (238.6)	

European	366.0 (247.1)	*comparisons not possible*
Asian	244.7 (240.8)	
Day of week, mean (SD)		
Wednesday	301.0 (272.0)	p<0.001
Friday	371.5 (246.2)	
Saturday	361.2 (247.3)	
Day of week (after midnight), mean (SD)		
Wednesday	421.4 (276.9)	NS
Friday	427.0 (223.9)	
Saturday	414.5 (220.0)	
Time of night, mean (SD)		
Before midnight	282.2 (257.1)	p<0.001
After midnight	421.2 (229.2)	
Pre-loading		
Yes	427.7 (230.6)	p<0.001
No	303.8 (236.2)	

Analyses within each demographic characteristic or study variable showed that:

- Among 18 – 20 year olds, the mean BrAC was significantly lower than the mean BrAC among participants aged 21 – 24 years, no different to those aged 25 – 34 years, and significantly higher than the mean BrAC among those aged 35+ years;
- Among 21 – 24 year olds, the mean BrAC was significantly higher than the mean BrAC among participants aged 18 – 20 years, 25 – 34 year olds, and those aged 35+ years;
- Among 25 – 34 year olds, the mean BrAC was no different to those aged 18 – 20 years, significantly lower than the mean BrAC among participants aged 21 – 24 years, and signficantlty higher than those aged 35+ years;
- Among participants aged 35+ years, the mean BrAC was significantly lower than the mean BrAC among all other age groups;
- The mean BrAC on Wednesday was significantly lower than that on Friday and Saturday nights. There was no difference in the mean BrAC between Friday and Saturday nights;
- There were no significant differences in mean BrAC after midnight across the Wednesday, Friday, and Saturday nights;
- When participants were grouped into Māori/non-Māori ethnicity, no significant differences in mean BrACs between Māori (378.0 mcg/L) vs non-Māori (350.8 mcg/L) participants were found.
- When participants were grouped into Pacific/non-Pacific ethnicity, no significant differences in mean BrACs between Pacific (329.8 mcg/L) vs non-Pacific (356.2 mcg/L) participants were found.

a) Factors that predicted higher BrAC readings

All demographic factors, drinking behaviours, and study variables were entered into a model to identify the variables that predicted an increased likelihood of recording a higher BrAC reading. The following factors were found to be significantly associated with a higher BrAC (shown in order of strength):

- pre-loading (comparison = not pre-loading);
- being interviewed after 11pm (comparison = interviewed at 11pm or earlier);
- being male (comparison = female);
- being aged 25 – 34 years (comparison = 35+ years); and/or
- residing in Wellington City (comparison = not residing in Wellington City).

It was found that pre-loaders had a BrAC that was, on average, 96 mcg/L higher than non-pre-loaders (after adjusting for all other factors). It is important to note that, once all factors were taken into account, only the age group of 25 to 34 years showed significantly higher BrACs than older participants – this

was because the higher BrACs among those aged under 25 years was accounted for by the very high prevalence of pre-loading and being interviewed after 11pm.

Mean BrACs increased over the course of the night, Figure 3. For each one hour later in the night, the mean BrAC increased, on average, by 24mcg/L. The full results of the linear regression are shown in Appendix 4.

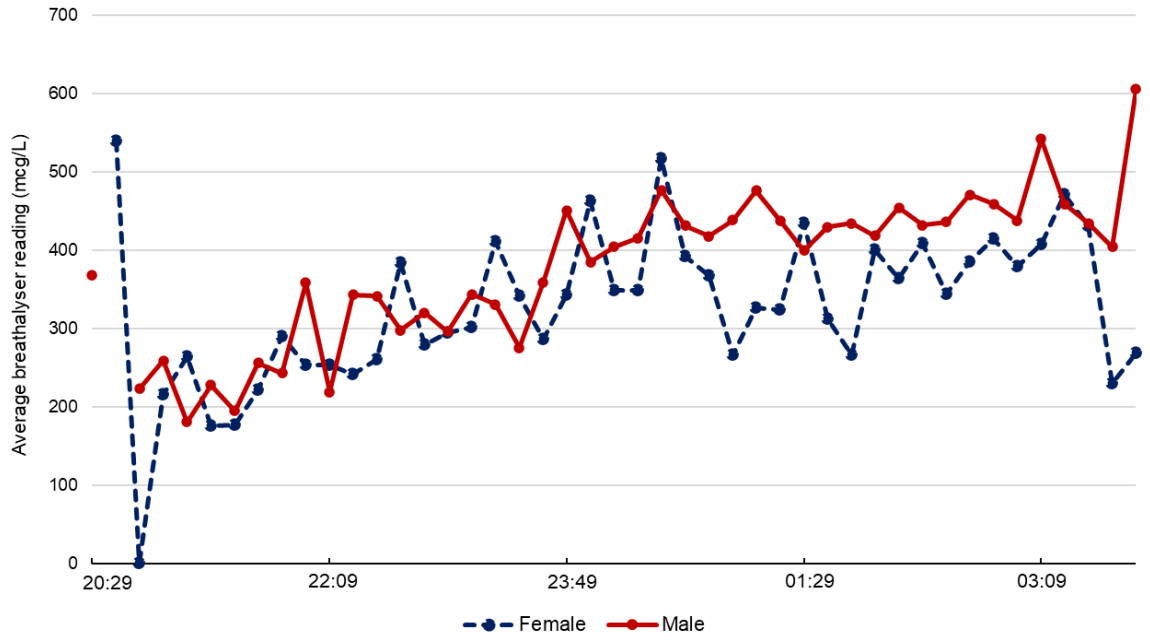

Figure 3. Measured Breath Alcohol Concentration over time, by gender.

As shown in Figure 4, the proportion of BrACs <250 mcg/L decreased over the course of the night, whilst the proportion of higher readings increased over time.

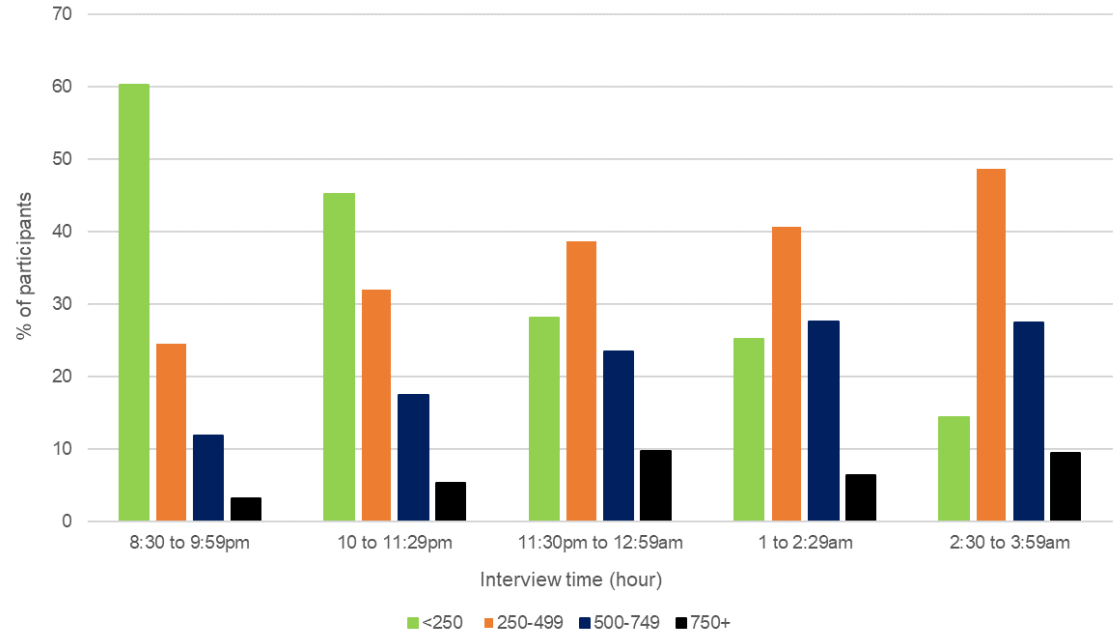

Figure 4. Percentage of participants within BrAC thresholds (mcg/L), by time interval.

Mean BrACs differed significantly by age group (p<0.001). Differences in mean BrACs over the night, by age group, are shown in Figure 5. The highest mean BrAC after midnight was among participants aged 21 to 24 years (447 mcg/L), followed by 25 to 34 year olds (437 mcg/L), 18 to 20 year olds (399 mcg/L), and participants aged 35+ years (365 mcg/L). Caution is required in the interpretation of BrAC readings in participants aged 35+ years after 2:30am due to the small sample size.

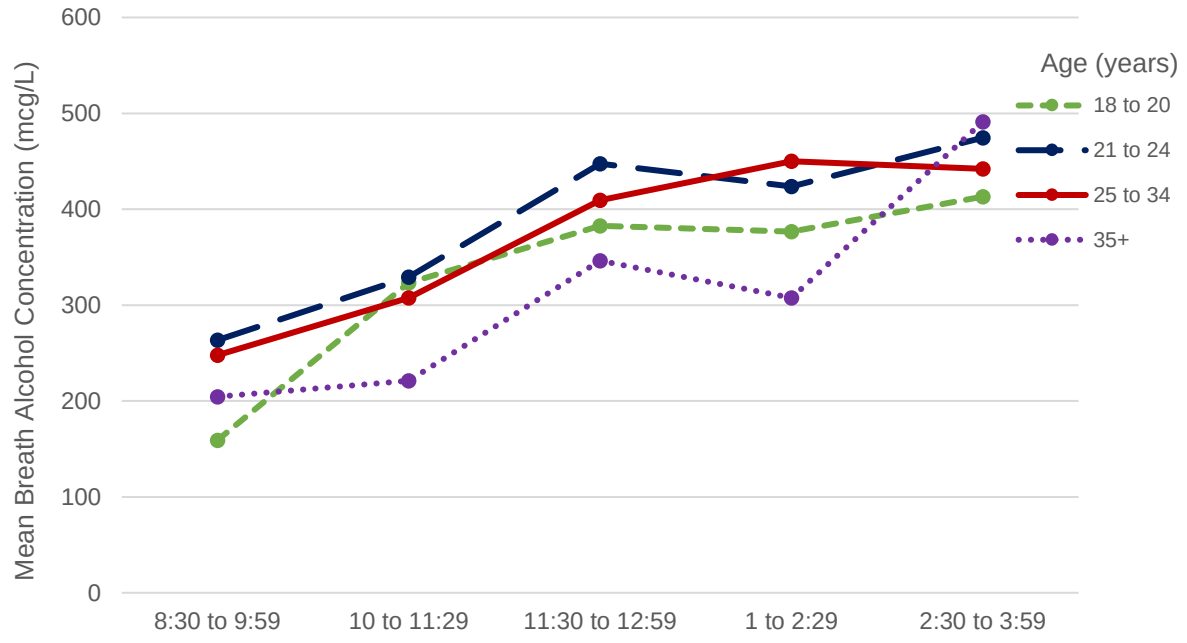

Figure 5. Mean Breath Alcohol Concentration, by time interval and age group.

The prevalence of zero BrACs decreased over the hours of the study, Figure 6. Overall, 13.4% of readings showed no alcohol present. Wednesday night's recordings comprised a significantly greater proportion (25%) of zero readings, when compared to those taken on Friday (11%) and Saturday (11%) nights (p<0.001).

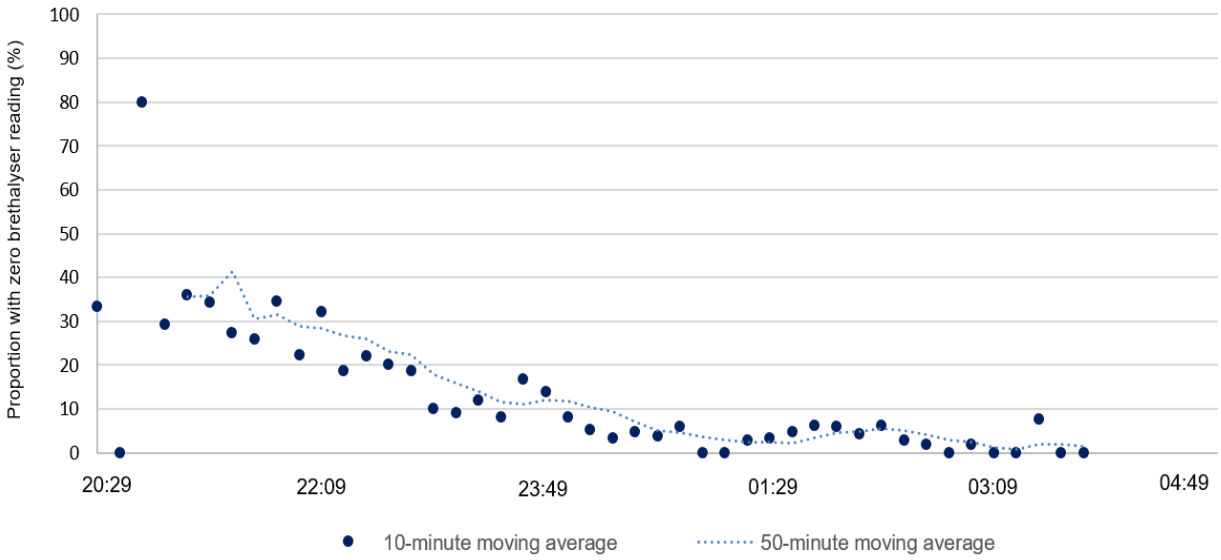

Figure 6. Proportion of zero Breath Alcohol Concentration readings over time.

3.4 Pre-loading

Any drinking before entering Courtenay precinct

The most common locations to drink prior to entering Courtenay Place were at the participant's own home or at their friend's home, Table 10.

Table 10. Location of drinking before entering Courtenay Place.

Location of drinking	% of total
Own home	39.7
Friend's home	20.4
Private function (e.g., wedding or other event)	1.7
Public location (e.g., park, street)	1.0
Vehicle	1.5
Bar/restaurant	12.6
Social/sports club	0.3
Other	5.8
No drinking prior to entering Courtenay Place	22.4

Pre-loading prevalence

As described previously, the branching of the survey questions resulted in pre-loading behaviour being assessed among participants who reported drinking on the same day/night of the survey. Drinking in a bar/restaurant, social/sports club and other (that there were non-private settings) were excluded from the pre-loading analyses.

Among participants who reported drinking on the same day/night, the prevalence of pre-loading was 65%. This increased to 77% among all participants interviewed after midnight. Less than one-half (45%) of participants interviewed before 11pm reported pre-loading. A sensitivity analysis of pre-loading prevalence among the total sample is presented in Appendix 4.

There were clear differences in pre-loading prevalence by age; 75% among 18 – 24-year-olds, 51% among 25 – 34-year-olds, 48% among 35 – 44-year-olds, and 31 – 35% among older age groups

Pre-loading prevalence also differed across the days of the study, being highest (70%) on Saturdays, followed by Fridays (65%), and Wednesdays (49%).

Results from statistical analyses found the following factors to be significantly associated with pre-loading:

- being a student (comparison = non-student);
- being male (comparison = female);
- being 18 – 24 years (comparison = 35+ years);
- interviewed in the later two time periods (i.e., after 11pm) (comparison = 11pm or before);
- interviewed in week two (comparison = week one); and/or
- interviewed on a Saturday night (comparison = Wednesday night).

Being interviewed in the last time period and being 18 – 24 years of age were the strongest predictors of pre-loading. Those interviewed between 11pm and 1am were 2.4 times more likely to pre-load and those interviewed after 1am were 3.5 times more likely to pre-load, when compared to participants interviewed before 11pm. Participants aged 18 – 24 years were 2.8 times more likely to pre-load than participants aged 35+ years. No differences were found by ethnicity or place of residence.

Source of alcohol for pre-loading

Four-fifths (83%) of pre-loaders reported buying the alcohol themselves, Table 11. Women were significantly less likely to have bought the drinks for pre-loading themselves and more likely to get the alcohol from a friend, while non-students were significantly less likely to purchase the drinks themselves and significantly more likely to have them given the drinks or receive the pre-loading drinks from 'other' sources.

Table 11. Sources of alcohol for pre-loading, among pre-loaders.

Group	Bought themselves	Bought by friend	Bought by Family	Given to them	Other
Full Sample	82.6%	14.2%	2.1%	5.2%	0.8%
Men	84.8%	12.7%	2.1%	5.0%	1.0%
Women	78.9%	17.4%	2.1%	5.2%	0.47
p-value	.007***	.022**	.986	.907	.259
Students	85.5%	12.6%	1.8%	3.7%	0.4%
Non-students	80.4%	15.5%	2.4%	6.4%	1.2%
p-value	.015***	.126	.432	.024*	.095*

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

Pre-loading place of purchase

Whilst, overall, more pre-loaders purchased their alcohol from bottle stores than supermarkets, this difference was not statistically significant. Student pre-loaders were statistically significantly more likely to purchase from a bottle store (p<.001) than non-students, but the difference in purchasing from supermarkets was not statistically significant, Table 12.

Table 12. Sources of drinks for pre-loaders who purchased their own alcohol for pre-loading.

Group	Bottle store	Supermarket
Total	40.7%	14.3%
Men	41.0%	14.4%
Women	41.4%	14.5%
p-value	.894	.941
Students	52.0%	12.8%
Non-students	31.8%	15.6%
p-value	.000***	.195

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

Pre-loading time of purchase

As shown in Figure 7, 54% of pre-loaders reported that they had purchased their alcohol between 4pm and 10pm on the same day as interview. One in five (22%) reported that their purchase was made the previous day or earlier and 5% of participants were unsure of the purchase time. Participants could report more than one time of purchase.

An ad hoc analysis was undertaken to identify any significant characteristics of the 163 pre-loaders who purchased their pre-loading alcohol after 8pm, controlling for the time period of interview. Results showed that age group, student status, ethnicity, place of residence, or location of pre-loading purchase were not associated with purchasing pre-loading alcohol in the later time period. Whilst the crude number of late-night off-licence purchases was greater among Friday and Saturday night survey participants, Wednesday night had a significantly greater proportion of late-night purchases.

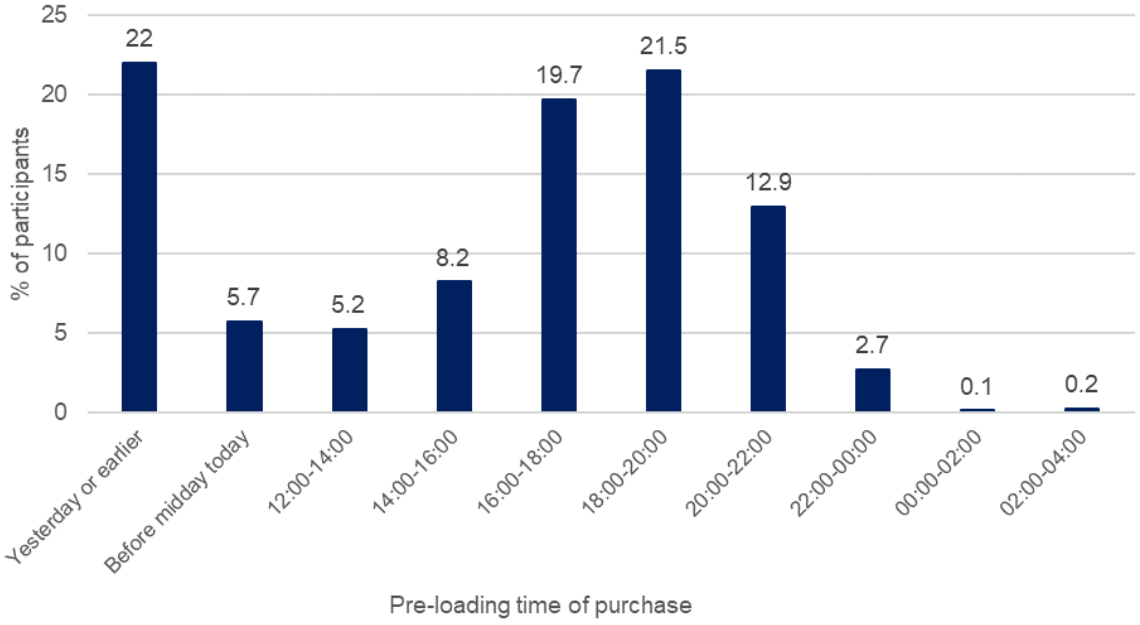

Figure 7. Time of purchase of alcohol consumed in the pre-loading occasion.

Chi-square analyses found that women were significantly more likely to purchase the pre-loading alcohol the day before or earlier and were less likely to purchase pre-loading alcohol after midday on the day, Table 13. Non-students were more likely to purchase the day before or earlier and before midday on the day, and less likely to purchase after midday on the day.

Table 13. Purchase day and time for pre-loading.

Group	Yesterday or earlier	Before midday today	After midday today
Total	22.2%	5.7%	68.8%
Men	20.3%	6.3%	70.3%
Women	26.6%	5.1%	65.6%
p-value	.021**	.459	.121*
Students	19.1%	3.8%	76.3%
Non-students	24.7%	7.3%	62.8%
p-value	.027**	.013**	.000***

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

Pre-loading motivation

Among the total sample of pre-loaders, just under one-half (44%) reported ‘price/save money’ as a reason for pre-loading, 29% reported the reason of ‘have fun’, and 22% reported ‘get drunk before going out’ as a reason, Table 14.

Men were significantly more likely than women to pre-load because it was ‘more convenient’ and to ‘get drunk before going out’ and significantly less likely to pre-load to ‘catch up with friends’. Students were significantly more likely than non-students to report ‘price/save money’ as a reason to pre-load.

Table 14. Motivations for pre-loading, among pre-loaders.

Group	Price/save money	More convenient	Didn't want to go out too early	Catch up with friends	Get drunk before going out	For fun	Other
Total	44.0%	14.8%	2.9%	20.5%	21.8%	28.9%	7.0%
Men	45.1%	16.9%	3.2%	18.7%	24.0%	28.6%	6.3%
Women	42.3%	11.8%	2.3%	23.2%	18.9%	29.5%	6.8%
p-value	.335	.014***	.337	.051*	.031**	.733	.690
Students	50.2%	13.3%	2.3%	21.6%	23.2%	28.1%	5.1%
Non-students	39.4%	16.0%	3.4%	19.6%	20.8%	29.6%	8.5%
p-value	.000***	.176	.216	.371	.297	.535	.017

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

Pre-loading beverage

Among all pre-loaders, 80% reported drinking one beverage type before coming to the Courtenay Place precinct, 15% reported two beverage types, 4% reported three beverage types, and around 1% reported consuming four or more beverage types.

As shown in Table 15, more than one-third (41%) of pre-loaders had consumed Ready-to-drinks (RTDs), followed by spirits, standard beer, and wine. Note: the total in Table 15 is more than 100%, due to participants being able to select more than one beverage they consumed in the pre-loading occasion.

Table 15. Type of beverage consumed in pre-loading occasion.

Beverage	% of pre-loaders
Standard beer	25.3
Craft beer	5.2
Wine	20.4
Cider	5.8
Spirits	25.6
RTDs	40.6
Cocktails	4.8
Other	1.0

Breath alcohol concentrations among pre-loaders

Among the 2,194 BrAC recordings, pre-loaders comprised more than one-half (59%). As shown in Figure 8, pre-loaders recorded higher BrACs than non-pre-loaders. Note: there were no non-pre-loaders who took breathalyser tests in the first and last 20 minutes of the data collection period. The mean BrAC among pre-loaders was 427.7 mcg/L (SD 230.6).

Comparisons limited to pre-loaders showed that the mean BrAC was higher among males (446.0 mcg/L) than females (391.4 mcg/L). Mean BrAC also differed significantly by age; pre-loaders aged 18 – 24 years (430.2 mcg/L) and between 25 and 34 years (443.0 mcg/L) had a higher mean BrAC than pre-loaders aged 35 years or over (357.1 mcg/L).

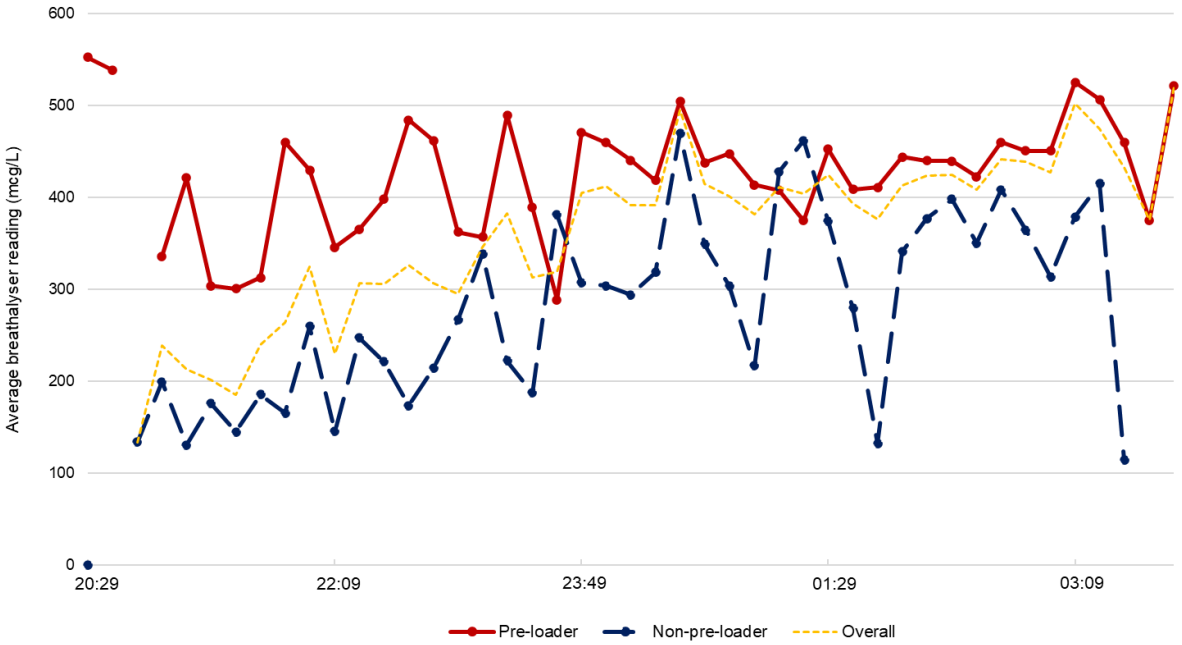

Figure 8. Measured Breath Alcohol Concentration over time, by pre-loading status.

All demographic factors, pre-loading purchasing patterns, and study variables were entered into statistical models to identify the variables that predicted an increased likelihood of recording a higher BrAC reading among pre-loaders. Results are shown below.

a) Factors that predicted higher BrACs among pre-loaders:

- Being male (comparison = female);
- Residing in Wellington City (comparison = residing outside Wellington City);
- Being aged 25 – 34 years (comparison = 35+ years); and/or
- Being interviewed after 11pm (comparison = interviewed at 11pm or earlier).

Being interviewed in Week One (compared to Week Three) was associated with a lower BrAC among pre-loaders.

b) Factors that predicted higher BrACs among pre-loaders who purchased their own alcohol to pre-drink:

The significant factors found above also predicted higher BrACs among pre-loaders who purchased their own alcohol. Time of purchase or purchasing location were not associated with higher BrACs among pre-loaders.

c) Factors that predicted higher BrACs among pre-loaders who purchased their own alcohol to pre-drink after midday on the day of interview:

The only demographic factor that predicted higher BrAC among pre-loaders who reported purchasing alcohol after midday on the day of interview was being male. Pre-loaders who purchased their alcohol from the supermarket had a BrAC that was, on average, 57 mcg/L higher than participants who did not report purchasing alcohol at the supermarket after midday.

3.5 Drinking in public places

Of the 2,063 responses to *'Have you consumed alcohol anywhere in the Courtenay precinct other than a bar or restaurant tonight? (i.e., a public place)'*, 207 (10%) answered 'Yes'. Of these, 73% were male and 74% were aged 18 – 24 years. Statistical analysis found that participants reporting public drinking had significantly higher BrAC recordings than non-public-drinkers, after adjusting for other variables associated with BrAC ($p<0.001$).

As the total number of females reporting public drinking was low (n=53), comparisons by gender across the locations of public drinking should be interpreted with caution. The location 'empty section/building site' was not included in Table 16 as only 0.5% of the sample of public drinkers reported this location.

As shown in Table 16, Chi-square analyses found that men were statistically more likely than women to do any public drinking and to drink on the waterfront, and significantly less likely to drink at any 'other' location. Students were significantly more likely than non-students to drink in public but were significantly less likely to drink at the waterfront. Comparison by student status requires caution, as there were fewer than 10 students or non-students in the comparisons for drinking in a car, at a park, at the waterfront, alleyway, and other location. Also, the higher prevalence of public drinking among students may be attributable to the higher prevalence of pre-loading. Chi-square analyses also found that Māori participants were more likely to report public drinking than non-Māori.

Analyses revealed that pre-loaders were significantly more likely than non-pre-loaders to report drinking in public (12% vs 6%), as well as drink at the waterfront. They were significantly less likely than non-pre-loaders to drink in public at 'other' locations. Again, comparisons across public drinking locations should be treated with caution given the low number of non-pre-loaders who reported public drinking across the locations examined.

Table 16. Public drinking behaviour.

		Public drinking location (% of public drinkers)						
Group	**Any public drinking**	**Car**	**Carpark**	**Park**	**Waterfront**	**Alleyway**	**Footpath**	**Other**
Full Sample	10.0%	13.6%	16.2%	6.6%	9.6%	8.6%	55.1%	11.1%
Men	11.7%	15.2%	17.4%	7.2%	11.6%	10.1%	51.4%	8.7%
Women	6.7%	8.0%	12.0%	4.0%	2.0%	4.0%	62.0%	18.0%
p-value	.000***	.198	.372	.421	.043**	.182	.199	.074*
Students	11.8%	11.6%	16.3%	3.5%	4.7%	10.5%	61.6%	8.1%
Non-students	9.1%	15.2%	16.1%	8.9%	13.4%	7.1%	50.0%	13.4%
p-value	.046**	.471	.969	.126	.038**	.408	.103	.244
Pre-loaders	12.1%	15.4%	17.9%	8.3%	6.4%	7.7%	57.1%	7.7%
Non-pre-loaders	6.0%	7.3%	9.8%	0%	21.9%	12.2%	46.2%	24.4%
p-value	.0001***	.181	.201	.056*	.003***	.361	.220	.002***

*** p<.01, ** p<.05, * p<0.1.

Among the total sample (n=2,255) of participants in the study, 130 (6%) planned to drink in public on their night out. Almost one-half (42%) of these participants planned to drink on the footpath, 31% reported 'other' locations and 9% reported a car park. Very few participants planned to drink in a car, at a park, on the waterfront, or at an empty section.

4. Discussion and recommendations

This section presents an interpretation of the research findings and summarises the range of approaches available to reduce the harms from intoxication and pre-loading. The limitations of the current research and recommendations for future research are presented.

Alcohol use, particularly intoxication, remains the driver of most harm in night-time economies.[86] The effects of intoxication (e.g., impairment in psychological and psychomotor functioning) often stem directly from an individual's blood alcohol concentration, that interact with a range of other factors, including an individual's experience with or tolerance to alcohol, the drinking environment, expectation of the effects of alcohol, and concomitant use of other drugs.[94] The relationship is clear and strong between intoxication and social harms such as violence, traffic casualties, and other injuries, and has been established as a cause of aggression.[94]

Preventing intoxication within night-time drinking environments is a central measure to reduce the pervasiveness of alcohol-related problems, many of which have substantial short- and long-term impacts on drinkers and others. Failing to address alcohol problems can also deter persons from choosing to visit or work within night-time areas, or limit their use of public spaces after dark.[95] In 2022, a Nielsen survey found that 52% of Wellington residents reported feeling a bit or very unsafe in the city centre after dark.[96] A study utilising a convenience sample collected via social media found that 73% of female respondents felt unsafe in Wellington City after dark, with the majority unwilling to walk alone at night.[97] As the Wellington City inner-city population is forecast to double in the next 10 years, creating safe places and maintaining amenity will also be important to many thousands of residents, home owners, and landlords.[98] Further, the police, ambulance, hospital, and court services and staff will accrue many benefits of reduced harm to drinkers and others.

This study found that the mean BrAC among the sample of 2,194 participants in the NTE of Courtenay Place, Wellington, was 354 mcg/L. Among drinkers, the mean BrAC was 410 mcg/L. Wednesday nights, on average, had significantly lower mean BrACs than Friday and Saturday nights, a significantly lower prevalence of pre-loading, and a significantly higher proportion of zero BrAC readings. After midnight, the mean BrAC across the total sample was 422 mcg/L (and 447 mcg/L among 21- to 24-year-olds) and did not differ significantly across the three days of the week in the study. This level of breath alcohol concentration after midnight may be associated with intoxication – showing signs of euphoria, fatigue, impairment in balance, speech, vision (particularly peripheral), reaction time, and impairment of hearing, judgment and self-control.[99]

The mean BrAC found in this study (354 mcg/L) is similar to the mean (330 mcg/L) found in Hamilton in 2019[14], but higher than that found in Hamilton in 2018 (241 mcg/L).[15] The current study found an hourly increase in average BrAC of 24 mcg/L, similar to that found in Hamilton of 28 mcg/L.[14]

The mean BrAC found in this study is lower than that found among students attending University of Otago Orientation events in 2016, who recorded a mean BrAC of 482 mcg/L between 9:30pm and 10:30pm.[17] Comparisons with Australian studies show that the mean (354 mcg/L) and median (349 mcg/L) BrAC in this Wellington study was similar to the median found in 2016 in Surfers Paradise, Fortitude Valley, Cairns (range 365 to 415 mcg/L) but higher than the mean found in 2011 and 2012 in Melbourne, Sydney, Geelong, Perth and Wollongong.[39] The median BrAC in this study was also similar to that found in a 2010 study among 16 – 35 year olds in Slovenia and Spain, but lower than that found in the United Kingdom and among young males in the Netherlands.[69]

The current study found that males had significantly higher mean BrACs than females (55 mcg/L higher). Studies in New Zealand, Australia, and Europe have found mixed results with regards to gender differences, with some finding no difference by gender, males more intoxicated, or mixed findings.[14,15,39,69] In an Australian study, men were more intoxicated than women earlier in the night, but gender differences disappeared by 3am.[39]

In this study, local residents showed higher BrACs when compared to non-local participants, although the difference showed weak statistical significance. The finding that local residents exhibited higher BrACs could perhaps be explained by them having different reasons to enter the NTE (e.g., drinking vs attending a special event) and/or easier access to inexpensive transport options home (compared to those who reside in the wider Wellington region) that may facilitate choices to drink more heavily. A post-hoc analysis found significant differences with regards to reasons for going out, with locals more likely to be catching up with friends or clubbing/dancing, whilst non-locals were more likely to be attending a special event or go into town to get drunk.

With regards to age, the findings from this study are consistent with those found by Miller et al[39], where 18 – 20-year-olds had lower mean BrACs after midnight than young adults aged 21 to 24 years. The authors suggested this finding may relate to levels of alcohol tolerance, lower income levels in younger drinkers, and/or legal drink driving requirements (0% BAC) resulting in lower levels of consumption.

The prevalence of pre-loading in this study was found to increase over the course of the night and vary across the three days of the study (range 49 – 70%), being significantly higher on Saturday night than other nights. The overall prevalence of 65% was substantially lower than the finding of 84% prevalence in Hamilton in 2019.[14] The difference in prevalence found between the Wellington and Hamilton studies may reflect the diversity of entertainment offered in each city, with the potential for a greater focus on drinking at licensed premises in smaller NTEs (e.g.. Hamilton) where pre-loading with cheap off-licence alcohol may be preferred. This is supported by the finding that 77% of participants interviewed after midnight in Courtenay Place (when attending licensed premises would be considered the main form of entertainment at that time) reported pre-loading. The finding that the prevalence of pre-loading increased over the course of night is likely to support findings from previous research that pre-loaders come into town later than non-pre-loaders.[68]

Results of the current study concur with a review of international studies and New Zealand research showing that pre-loaders record significantly higher BrACs than non-pre-loaders.[14,15,42] The higher BrACs support the suggestion that pre-loading is a supplementary form of drinking, rather than a replacement for drinking at licensed premises.[42]

Whilst reductions to off-licence trading hours have been suggested as a mechanism to address the prevalence of pre-loading and side-loading[100], this study found that off-licence purchase time among pre-loaders was unrelated to BrAC, supporting previous observational research in Hamilton.[14] Unfortunately, intervention studies that have measured the impacts of earlier off-licence closing hours have not examined their effects on pre-loading prevalence, precluding a stronger assessment of causality. Among pre-loaders that purchased alcohol after midday on the day of interview in the current study, supermarket purchasers recorded a BrAC that was, on average, 57 mcg/L higher than participants who did not report purchasing alcohol at the supermarket (controlling for covariates such as age group, time of interview, etc.). The reason for this finding is unknown, but could relate to the lower price of alcohol found in supermarkets than bottle stores in New Zealand, especially when sold on promotion.[101] This means that, for the same amount of money, pre-loaders can purchase a greater quantity of beer, wine, and cider from supermarkets than from bottle stores.

Consistent with national and international research[14,42], price was the most commonly cited motivator for pre-loading (by 44% of pre-loaders), followed by having fun and to get drunk. This motivator reflects the substantial price differential between alcohol products sold at off-licence and on-licence premises in New Zealand. Consumer Price Index data shows that price divergence between licence types has increased over time – in 2013 the CPI weighted average on-licence price of a 400ml glass of beer was 2.7 times the price of an off-licence 400ml beer bottle, increasing to 3.43 times the off-licence price in Quarter 1, 2023.[102] However, it is not uncommon to find greater price differentials in NTEs. Website prices for on-licence alcohol at the time of writing show a price differential in the magnitude of 5 to 8 times the price of off-licence beer. As such, $22 can buy 12x330ml bottles of a particular bottle of beer from a supermarket, or exactly two bottles of the same beer from bars in an entertainment district in New Zealand.

This study showed that pre-loading was not confined to young adults, as shown by others[42], but did decline with age. This contrasts with findings from the Global Drug Survey, which used a non-probability online sample and showed that pre-loading reduced around the age of 24 years in New Zealand and increased again at age 30.[19]

Few studies have examined the typical beverage consumed in pre-loading sessions. Comparisons across countries show mixed findings, likely reflecting the typical beverages consumed in each country and preferences that are driven by domestic taxation policies and structures. This study found RTDs, standard beer and spirits were preferred in pre-loading occasions, reflecting typical beverages consumed by young adults in New Zealand.[103] A study of pre-drinking in Palmerston North found that the preferred beverage was beer or cider (45%), spirits (45%) and RTDs (41%).[16] In contrast, European countries show a low prevalence of consuming RTDs in pre-loading sessions.[69] It has been suggested that spirits may be a preferred pre-loading beverage due to less smell and subsequent ability to detect at licensed premises.[42]

4.1 Reducing intoxication, pre-loading, and harm in the NTE

Understanding the current and preceding drinking behaviours of persons in NTEs can assist with identifying and targeting evidence-based interventions and policies to reduce alcohol-related harm to drinkers and others. For many patrons, attendance at late-night bars and night clubs is likely to constitute only one part of the wider drinking event. This signals the importance of focusing on the entire drinking event, addressing the role of drinking in private as well as public settings, to reduce intoxication and harm in NTEs.[72]

As this study has shown, individuals in NTEs vary by demographic characteristics and alcohol-related behaviours across the course of the night. In a study of 5,556 alcohol consumers in and around licensed venues in five Australian cities (Melbourne, Geelong, Sydney, Wollongong, Perth), four types or groupings of patrons were identified based on age and sex, BrAC, pre-loading, energy drink use, and illicit drug use during that night. The ‘general patron group’ was the largest group (33%), followed by the ‘intoxicated male pre-drinker group’ (31%), ‘young pre-drinker group’ (27%), and ‘intoxicated illicit drug male group’ (9%). Whilst the proportion of the ‘general patron group’ decreased over the night, the other groups increased in prevalence. After 1am, the ‘intoxicated male pre-drinker group’ comprised the majority of participants in the study. When compared to the ‘general patron group’, the other three groups had an increased odds of being involved in aggression and alcohol-related injuries in the past three months.[45] Identifying typologies of persons in NTEs can greatly assist with the development of targeted prevention initiatives.

The Core Aggression Cycle emphasises the importance of targeting interventions that lower the number of social instigators in the NTE as well as the amount of cognitive resource deprivation among patrons in night-life spaces.[104] Social instigators include long trading hours that increase the amount of time for aggression to take place, a lack of guardianship, and the clustering of late-night venues that results in diversification of venues and concentration of at-risk individuals as well as the perception of a permissive environment or expectations for violence. Factors that reduce the level of cognitive resource deprivation experienced by night-life patrons and increase the propensity for violence include fatigue and intoxication.

Comprehensive approaches will be required to prevent intoxication, reduce pre-loading and harm, and create healthy and safe late-night environments for all to enjoy. Broader policy and legislative change that positively impacts population levels of consumption (i.e. reducing average levels of consumption across the population) will strongly support inter-agency interventions that target multiple levels and settings, including individuals (e.g., pre-drinkers and/or heavy drinkers) and physical environments (e.g., licensed premises and surrounding areas).[78]

The following sections of this report summarise the available national and international evidence of approaches taken to prevent intoxication and/or reduce alcohol-related harm that may arise from drinking in NTEs. The approaches are grouped under the three components of alcohol and other drug

harm reduction (as outlined in New Zealand's National Drug Policy[105]): 1) reduce demand, 2) control supply, and 3) problem limitation. Whilst the impact of these interventions has not been specifically examined within the current study described in this report, the aim of this section is to inform evidence-based decision-making by summarising the effectiveness of different strategies designed to prevent intoxication and minimise alcohol-related harm to drinkers and others (particularly in NTEs).

a) Reduce demand

i. Pricing policies

The amount of alcohol purchased, stockpiled, and consumed prior to entering NTEs is strongly determined by the price, promotion, and affordability of alcohol in retail environments. Alcohol prices and affordability are shown to be key drivers of consumption in New Zealand, with heavy drinkers (including young heavy drinkers) and frequent drinkers more likely to purchase cheap alcohol.[64,65,106] New Zealand data shows that alcohol products have become more affordable over time, especially off-licence wine which has increased in affordability by more than 20% since 2012. [63,107] Systematic reviews and meta-analyses show that the price of alcohol in a country is inversely associated with levels of alcohol harm.[108,109]

In this study, more than one-half of participants had commenced their drinking in private settings, facilitated by access to large quantities of cheap alcohol products sold at off-licence premises. The price differential between on-licence and off-licence premises has likely played a role in off-licences now selling more than 80% of all alcohol in New Zealand.[61] A substantial proportion of this alcohol is sold on promotion, i.e., at a discounted price.[101] It is argued that pre-loading is structurally facilitated by a country's alcohol policy environment, whereby failure to implement effective alcohol pricing policies enables large quantities of cheap alcohol to be purchased from off-licences (e.g., supermarkets, grocery stores, bottle stores) for pre-loading occasions.[75,110]

Increasing alcohol excise tax rates on all alcohol sold in the domestic market, to increase the overall price of alcohol by 10% and address the rising affordability of alcohol, was recommended by the Law Commission in 2010.[3] As excise tax comprises a greater proportion of the price of low-priced alcohol sold at off-licences, this measure would raise off-licence prices the most and thereby assist to reduce the price differential that motivates pre-loading. Price increases can also assist to reduce the amount of alcohol that can be purchased and consumed in pre-loading occasions.[71]

Minimum unit pricing, which specifically targets the cheapest alcohol sold by setting the lowest price a standard drink could be sold, would also assist to reduce the price gap between licence types. The on-licence trade has been less opposed to a minimum price regime than excise tax increases due to its targeted focus on the cheapest alcohol sold (typically via off-licences).[3]

Modelling of the effectiveness of alcohol excise tax increases and minimum unit pricing policies by the Ministry of Justice in 2014 found the policies would result in substantial health, productivity and crime-related cost-savings.[111] Of all savings from reduced alcohol harm, reduced crime constituted 69% of all savings, driven by reductions in assaults and driving offences. The highest excise tax increase (133%) was estimated to generate crime savings that were five times greater than the highest minimum unit price examined in the study ($1.20 per standard drink).

It is important to also recognise the role that off-licence density plays in the availability of cheap alcohol. The clustering of outlets has been shown in New Zealand to result in price competition and outlets staying open for longer to compete for customers.[112]

ii. Education-based approaches, individual- and population-based

Individual-based educational interventions to reduce heavy drinking among young adults are typically carried out in school, tertiary, and/or community settings and utilise a range of intervention components such as information and skill-based sessions delivered in-person and/or via digital media (e.g., text message, internet), targeted media campaigns, drinking diaries, personalised feedback on drinking and

social norms, and motivational interviewing.[113] Population-wide educational interventions also target individual behaviour change, and typically include mass media or social marketing health campaigns delivered via traditional media channels and online media platforms.

Overall, education and persuasion-based approaches have been found to be ineffective or have lower effectiveness when compared to strategies that seek to change the drinking environment.[94,114] Whilst some educational interventions targeting young people aged 15 – 24 years have shown positive and short-term changes in alcohol-related behaviour changes, the methodological quality of the studies is variable and long-term impacts remain unknown.[113,115] Educational programmes, such as those implemented in tertiary settings, are often time-intensive and expensive to deliver in light of any small effects that may result.[113]

In relation to educational approaches to reduce pre-loading, an online intervention underpinned by psychological theory (autonomy support and intentions) was delivered to undergraduate students in Australia. The study found that pre-loading and alcohol-related harm reduced in both control and intervention groups, suggesting that intervention features common to both groups were responsible for behaviour change. However, the effect size was trivial. The common elements delivered to both groups included assessment of pre-loading alcohol consumption and alcohol-related harm, provision of national drinking guidelines, and sending of e-mail summary and SMS reminders.[116] The finding from one study that BrACs were higher when drinkers pre-loaded with many others in the group signals that educational initiatives would need to address group dynamics to be effective, such as social modelling, peer influence, and conformity to group norms.[77,78]

Population-wide educational interventions targeting individual behaviour change (e.g. mass media programmes) also require caution due to their limited effectiveness as well as their potential to have no impact on health inequalities and at worst, exacerbate them.[94,117,118] This is because the impact of education approaches is often greater among those who have more resources, such as those with higher levels of education.[117,118]

Mass media campaigns regarding alcohol use have been shown to result in high recall, but little change in alcohol consumption.[119] It is suggested that educational campaigns on alcohol may be more important when they are integrated into a longer-term, more comprehensive programme to improve knowledge in areas where it is currently low (for example, in relation to New Zealand's low level of awareness of the alcohol – cancer link[120]) or to build public support for alcohol policy change.[119]

The lack of effectiveness of alcohol mass media campaigns contrasts somewhat with that from tobacco control, whereby some anti-smoking campaigns have shown positive impacts. It is suggested that the context in which alcohol-related public education campaigns operate is particularly challenging due to the pervasiveness and power of alcohol marketing and pro-alcohol cultural norms in society. In contrast, tobacco control campaigns operate in a context where advertising is banned and social norms have moved towards being increasingly anti-tobacco.[119] These environmental characteristics are likely to enhance the ability for mass media messages to reach the audience and effect change in smoking rates.

iii. Other approaches to reduce the demand for alcohol

The acceptance, normalisation, and demand for alcohol is heavily influenced by the alcohol environment.[121] This includes the perceived availability of alcohol and exposure to alcohol marketing. In New Zealand, licensed premises density is high and alcohol advertising, sponsorship and promotions is pervasive in both physical and digital environments.[3,63,122] Alcohol products are now rapidly available, delivered to doors within minutes.[123]

Effective regulation that addresses permissive alcohol environments can reduce heavy drinking cultures and harm in the population, [124] Changes in the levels of drinking across the population can have substantial and sustainable flow-on effects in settings such as NTEs.

Increasing the legal purchase age (e.g., from 18 to 20 years) and implementing comprehensive legislative restrictions to alcohol advertising and sponsorship are recommended as effective policies to reduce the demand for alcohol and alcohol-related harm.[94]

Local controls on alcohol signs and advertising have been implemented to reduce the normalisation and promotion of alcohol. For example, the Auckland District Licensing Committee has issued a Practice Note for all off-licences requiring:

- External or external-facing advertising of prices of alcohol products, or promotion of a special price / discount of an alcohol product must not be displayed on the façade of the building;
- External advertising of alcohol products must not be displayed by way of flags, sandwich boards or bollard covers outside the premises; and
- Any alcohol-related lifestyle or branding images must not exceed 25% of the façade of the premises.[125]

b) Control supply

i. Addressing the clustering of licensed premises

Both the number of premises and the physical clustering of premises close together have been shown to impact alcohol harm. The clustering of alcohol outlets (including bars and pubs) together in small areas is particularly problematic, increasing the risk of late-night crime and violence.[126,127] One study in Canada found that crime rates were higher when bars and pubs were located close together and had large patron capacity.[126] Crime frequency significantly dropped when they were spaced greater than 300 metres apart. Extra capacity for 1,111 patrons in an area (across one or more extra bars) was shown to double the assault and disorder crime rate, if other environmental factors remained constant.[126]

Significant and positive associations have been found between on-licence density (particularly bars and night clubs) and a range of alcohol-related harms in New Zealand.[128–132] In one study, each additional bar and night club was associated with around 5.3 additional violent events per year.[133] Harm was found to cluster in close proximity to bars in the Hamilton CBD, where around 25% of all assaults took place within 10 metres of a bar and approximately half of all assaults took place within 50 metres.[48] Whilst at an aggregate level the density of other on-licences (e.g., restaurants, cafés, etc) has been shown to be significantly associated with both an increase[134] and decrease risk in types of alcohol-related harms[129], the relationship has been found to vary across areas in New Zealand, suggesting that local factors (particularly deprivation) moderate the effects of these licence types.[129,134]

Cumulative impact policies and legislative provisions have been implemented to address clustering in a number of jurisdictions, including Australia and the United Kingdom.[135] In New Zealand, licensing criteria and local alcohol policies include provisions to consider or control the clustering of premises in decision-making. For example, caps on the number of licences can be implemented for the six-year duration of local policy and minimum distance thresholds between licensed premises can be implemented. Within individual licensing applications, section 106 (1a(iii)) of the Sale and Supply of Alcohol Act 2012 enables District Licensing Committees (DLCs) to have regard to “the number of premises for which licences of the kind are already held” in the locality.

Challenges in addressing cumulative impact have been found in relation to defining a ‘cluster’ of premises, setting density limits, and obtaining data to support the assessment of cumulative impact.[135] Research in the United Kingdom has shown limited long-term success of cumulative impact policies on reducing the number and clustering of licences being granted, but may assist with reshaping or diversifying the local environment.[136–138] For example, in London, an increase in the number of licensed eateries was found in an area with a cumulative impact policy.[136]

ii. Limiting the trading hours of on-licence premises

A large body of evidence demonstrates an association between extended trading hours at on-licence premises and an increase in the incidence of assault, unintentional injury, or drink driving offences.[2,94] In contrast, restricting trading hours is associated with decreases in the incidence of assault and hospitalisation.[2]

The most comprehensive assessment of the impact of on-licence trading hours on alcohol harm examined eight cities in Norway where closing hours were extended and 15 cities where hours were restricted.[139] Among cities that extended the trading hours, an average 20% increase in assaults per additional hour of trading was found. Among the 15 cities where hours were restricted, there was an average 20% decrease in assaults per hour of restriction. Similarly, in Newcastle, Australia, early impacts of trading hour restrictions found a 22% decrease in assaults per hour restricted and an estimated 21% decrease per hour restricted at 3.5 years follow-up.[140] In New South Wales, Australia, restriction to the hours of late-night venues was found to be associated with a reduction in the rate of domestic violence assaults, whilst reported domestic violence assaults increased over time in the control sites.[141]

Research has shown that earlier closing hours reduce violent incidents overall, negating the possibility that earlier closing hours simply disperse violent incidents to an earlier time in the night. It is suggested that shifting drinking cultures to earlier in the evening reduces the presence of a wide range of instigators of violence.[86,142]

When 24-hour trading in New Zealand ended in 2012, a reduction in weekend hospitalised assaults (decline of 11%), especially among 15–29-year-olds (decline of 18%), was found.[143] Cross-sectional research has previously found that New Zealand drinkers who reported purchasing alcohol after 2am from on-licences were 2.9 times more likely to drink high amounts of alcohol and twice as likely to report drinking frequently compared to those who purchased before 2am.[64]

Whilst this current study did not assess the relationship between late-night trading and alcohol use behaviours and BrACs among members of the public in the Courtenay Place precinct, the high levels of intoxication found among drinkers after midnight (especially after 2am) highlights the risk of harm for drinkers and others. The strongest, evidence-based approach to reducing levels of harm in NTEs is through closing venues earlier across the board.[86] Legislative levers to reduce trading hours include amendments to the legislated default national maximum trading hours in the Sale and Supply of Alcohol Act 2012 (i.e. 7am to 11pm for off-licences, 8am to 4am the following day for on-licences) and local trading hour controls in Council Local Alcohol Policies.

Councils have utilised provisions provided in District/Unitary Plans to limit the impact of activities (e.g., selling alcohol) permitted within designated zones. For example, bars and taverns are 'restricted discretionary activities' in the Auckland Unitary Plan if they are located within 30m of a residential zone.[144] This permits consideration of issues such as the night-time noise effects of their activities. Zoning changes have been used in the United States to address the saturation of off-licences in residential areas.[145,146]

Also, on a licence-by-licence basis, DLCs can limit trading hours for on-licences (subject to Section 110(2)(a) of the Sale and Supply of Alcohol Act 2012). This is usually based on recommendations made by Police Alcohol Harm Prevention Officers, Liquor Licensing Inspectors and/or Public Health Alcohol Regulatory Officers at new or renewal liquor licence application hearings.

- *Queensland Government legislative reforms to tackle NTE violence*

In 2016, the Queensland Government enacted the Tackling Alcohol-Fuelled Violence Legislation Amendment Act to respond to community concerns about the level of harm from alcohol in the State's night-time entertainment precincts.[147] Components of the legislation included trading hour restrictions (maximum 3am cease of trading in 15 'Safe Night Precincts' and 2am elsewhere), temporary permits for extended trading hours to trade until 5am, a ban on the sale of rapid intoxication drinks after midnight,

targeted policing, increased monitoring and compliance activity by licensing officers, increased licence fees for high-risk venues, community education, and mandatory networked ID scanners in Safe Night Precincts. A one-way door was originally included in the legislation but was later withdrawn.

A comprehensive evaluation utilising more than 40 datasets was undertaken to examine the impact of the legislation. Key findings of impact included:[67]

- Across the state, the rate of serious assaults from 3am – 6am fell by 29% per month on average. Serious assaults increased by 19% from 8pm to midnight. In Fortitude Valley, the busiest entertainment precinct in Queensland, a 40% reduction in serious assaults was recorded between 3am and 6am;
- No change in alcohol-related Emergency Department presentations or hospital admissions;
- Alcohol-related ambulance call-outs reduced 28% on average per month during 3am to 6am in all safe night precincts combined (36% reduction in Fortitude Valley between 3am and 6am);
- Tourism and the number of liquor licences continued to grow in many areas;
- No displacement of issues to areas outside the Safe Night Precincts;
- At least one serious crime solved (such as rape and grievous bodily harm) per week using ID scanner data;
- An overall net economic benefit of A$16 million to the Queensland community (through reduced crime and health costs). The returns on every dollar spent by the Government on implementation were A$1.96 - $6.80.

Of particular relevance to the current study in the Wellington context, there was no significant change in the prevalence of pre-loading in the Queensland safe night precincts following the legislative changes. However, results were unadjusted for possible seasonality or other mitigating factors.[67] Hospitality staff and researchers suggested that the failure of the legislation to address the low price of alcohol at off-licences played a key role in maintaining the high prevalence of pre-loading in the NTE.

The evaluation highlighted a number of barriers to success, including: the use of extended trading hour permits that maintained alcohol sales at some venues until 5am, casinos being exempt from trading hour restrictions, and the ability for licensed venues to remain open after 3am to serve food, non-alcoholic beverages and provide entertainment. This meant that patrons may have stopped drinking at 3am but remained in the NTE intoxicated and/or fatigued which contributed to aggression and poor decision-making. As such, researchers recommended a number of changes to the legislation to not undermine the potential benefit of reduced trading hours, including requiring casino venues to be included in the legislation and for all venues in a Safe Night Precinct to shut at 3.30am (without allowing patrons to remain on premises).[67]

iii. Limiting the trading hours of off-licence premises

The current study found no relationship between off-licence purchase time and the prevalence of pre-loading. As such, restrictions to off-licence closing hours may have limited impact on the prevalence of pre-loading and subsequent harm associated with pre-loading in NTEs. Further research would be beneficial to explore if earlier off-licence closing hours reduce the prevalence of side-loading and/or public drinking.

Whilst restrictions to off-licence closing hours in the NTE may not be an avenue to effectively reduce pre-loading, it is likely that the measure will reduce harm among persons who drink at private settings in and around the Courtenay Place entertainment precinct, especially young people that party only at their own home, at the home of friends in the local area, or at tourist accommodation.

One New Zealand study found that drinkers who reported purchasing alcohol from off-licences after 10pm were twice as likely to be heavy drinkers compared to those who purchased alcohol from an off-licence before 10pm.[64] In Wellington, an intercept study of persons who were purchasing alcohol from off-licensed premises on weekend evenings found that later purchasers reported higher levels of harm.[148]

Restrictions to off-licence trading hours have been shown to be associated with reduced health harms, particularly among young people.[2,149,150] The implementation of reduced off-licence trading hours in Lithuania was shown to be associated with significant reductions in alcohol poisoning-related ED presentations among men, but significant increases across all ED presentations.[151] It is unknown if substitution effects explained this unexpected finding, whereby a reduction in more serious presentations results in healthcare services being able to better attend to those presenting with more minor injuries.[151]

In New Zealand, Councils can limit trading hours for off-licences in and nearby NTEs through the adoption of a Local Alcohol Policy. Also, on a licence-by-licence basis, DLCs can limit trading hours for off-licences (subject to Section 116(2)(a) of the Sale and Supply of Alcohol Act 2012). This is usually based on recommendations made by Police Alcohol Harm Prevention Officers, Liquor Licensing Inspectors and/or Public Health Alcohol Regulatory Officers at new or renewal liquor licence application hearings.

iv. Licence conditions to control supply

The supply of alcohol can be managed through other discretionary conditions on individual licences. In New Zealand, Councils can apply discretionary conditions or impose one-way door restrictions through the adoption of a Local Alcohol Policy. Also, on a licence-by-licence basis, DLCs can impose other discretionary conditions (subject to Section 117 of the Sale and Supply of Alcohol Act 2012). This is usually based on recommendations made by Police Alcohol Harm Prevention Officers, Liquor Licensing Inspectors and/or Public Health Alcohol Regulatory Officers at new or renewal liquor licence application hearings.

- *Conditions regarding single sales at off-licences*

Restricting the sale of single alcohol containers in NTEs may assist to address the prevalence of public drinking, side-loading, and enhance compliance with alcohol control bylaws in NTEs. Single sales of beers and RTDs are highly affordable (e.g., under $2 per container), and are often sold chilled and ready for consumption. They can be used by drinkers to 'top-up' their alcohol use.[152] International research has documented the association between single sales (particularly high-strength beers) and alcohol-related violence and crime.[153] Furthermore, an intervention to reduce single sales was found to reduce rates of alcohol-related ambulance attendances among 15 to 24 year olds.[154]

Territorial Authorities have sought to utilise measures within their local alcohol policies to prevent harm from single sales in their districts. In 2019, Whanganui District Council adopted their LAP, containing provisions to restrict single sales.[155] This was followed in 2020 by the Gore District Council, whose policy also enabled DLCs to restrict single sales as a discretionary licence condition.[156]

In June 2021, the Ministry of Justice Alcohol Regulatory and Licensing Authority stated[157]:

> The Authority notes that applicants for licences (both new and renewed), are increasingly accepting that single sales of beer, cider and RTDs are unlikely to be viewed favourably. The Authority is seeing more applicants willing to have conditions imposed on their licences to the effect that single sales of beer, cider and RTDs (with the exception of craft beer) cannot occur (p.6.).

Later in 2021, the Ministry of Justice Alcohol Regulatory and Licensing Authority (ARLA) issued a decision [2021 NZARLA123] in relation to an appeal of the granting of a new bottle store licence, requiring the licence to have a single sales condition.[158] The Authority believed that such a condition was appropriate to help ensure the amenity and good order of the locality and that alcohol harm was minimised, insofar as the condition will do so. The condition reads:

> No single sales of beer, cider, or RTDs priced at, or less than, $6.00 per unit are to be sold.

As ARLA notes, a number of DLCs around the country are now granting bottle store off-licences subject to single sale conditions. An assessment of decisions by the Auckland DLC in 2022-2023 regarding bottle store licence applications reveals that most decisions contain a single sales condition.[159] In contrast, some DLCs have been more reluctant to impose these conditions, when considering each application on its merits.

- *On-licence conditions, including one-way door policies*

In relation to on-licence conditions, a range of factors or practices have been shown to increase alcohol use and/or harm in licensed environments. A systematic review of studies examining the physical, staffing, and social factors associated with increased alcohol use and/or alcohol-related harm found (albeit inconsistently) the following factors to increase risk: a permissive environment to intoxication, cheap alcohol availability, poor cleanliness, crowding, loud music, a focus on dancing, and poor staff practice.[160] In Norway, the risk of over-serving was increased by poor lighting, loud music and high intoxication levels among patrons.[161] Across 60 bars in four European cities in The Netherlands, Slovenia, Spain and the United Kingdom, intoxication among patrons was associated with use of plastic glassware, promotion of non-alcoholic drinks (often energy drinks), permissive drinking environments, poor washroom facilities, the presence of a dance floor, customer sexual activity/competitiveness and later observational time.[162]

Common on-licence conditions in New Zealand include security presence, number of duty managers required at busy times, restrictions on serving size and type of beverage sold at certain times, CCTV, seating requirements, etc. Analysis of the ban of high alcohol shots after midnight in Queensland in 2016 found no significant impact on monthly police-recorded serious assaults.[163] As such, as a standalone intervention it may be ineffective but could be useful when included within a more comprehensive approach to tackling alcohol-related violence.

One-way door or 'lockout' conditions have also been implemented, designed to reduce the concentration of patrons on streets and areas surrounding licensed premises by spreading their departure times over a longer period. A systematic review of eight studies implementing one-way door policies as a stand-alone intervention found mixed effects.[164] However, the included studies had significant methodological limitations.

Since the publication of the systematic review, two further studies have been published. One study examined the implementation of a one-way door policy in Whangārei, finding that the policy was associated with a reduction in perceived alcohol-related harm, but not measures of harm.[165] The other study, a retrospective analysis of a lockout policy in South Australia, showed favourable reductions in facial fracture presentations (particularly resulting from assaults), especially among men.[166] Higher-quality studies are required to inform decisions regarding the implementation of one-way door policies.

c) Problem limitation

i. Monitoring and enforcement of alcohol legislation

A range of enforcement approaches have been used to reduce alcohol-related harm in NTEs, including proactive policing, enhanced enforcement, targeted policing, licensing accords, and other regulatory or voluntary measures. Studies of proactive policing (i.e., regular visits to licensed premises) have shown mixed results, and any positive findings have generally been short-term.[94] Targeted policing, using a public health cross-agency approach, has shown more positive impacts and has consequently been implemented across many international jurisdictions.

One targeted policing approach is the Cardiff Model, first implemented and empirically assessed in Wales to reduce alcohol-related violence in NTEs.[167,168] The approach utilises partnerships between police and health services to collect and analyse data on Emergency Department presentations for violence-related injuries, in recognition that most assaults are not reported to the Police and therefore omitted in intelligence gathering.

The data collected at ED triage includes location of the incident (name of bar, nightclub, school, park, street, etc.), date and time, type of weapon (if applicable), relationship between the victim and alleged attacker(s), and number of attackers. In London, data showed that injuries involving more than one attacker was a signal of gang violence, and this in turn enabled the Police Gang Unit to target gang activity to at-risk locations.[169,170] In smaller EDs, where presentations for violence-related injuries are less frequent, data collection has been restricted to 2000hrs to 0600hrs on Friday and Saturday nights, otherwise known as 'high alcohol hours'.[171]

The health data is then de-identified and regularly combined with police intelligence to produce maps of violence "hotspots", with summaries of weapon use and violence type (e.g., stranger, acquaintance, domestic). This data informs the targeting and development of violence prevention activities. For example, across jurisdictions data has been used to:

- Adjust the routes of police patrols;
- Move police resources from the suburbs to the city centre and specific locations;
- Publish (quarterly) the top five licensed venues for violence, with associated media releases and communication to licensees (see [172]);
- Adjust traffic flow and late-night public transport arrangements, including pedestrianising sections of streets to reduce the concentration of patrons on footpaths ;
- Mandate plastic glassware at selected licensed premises; and
- Restrict the closing hours of problematic venues, cancel licences, and/or impose licence conditions on major event days.[169]

Systematic reviews and meta-analyses of the Cardiff Model have shown the approach to be both effective and cost-effective.[173,174] A three-year randomised controlled trial of the Cardiff Model has been funded in Australia (Melbourne, Sydney, Canberra, and regional centres Geelong and Warrnambool), with results forthcoming.[175] Implementation of the Cardiff Model at a rural ED in Australia found modest reductions in the rate of injury presentations compared with all ED presentations.[171] The more limited impact in the rural ED was suggested to relate to the majority (77%) of violence-related presentations occurring outside the high alcohol hours.[171] Similarly, in Bristol, examination of patients presenting intoxicated to the ED found that 27% of patients had done most of their drinking at home, 36% in a pub and 16% in a nightclub.[176] This points to the importance of data collection and interventions targeting both the on-licence and off-licence environment. The United States Center for Disease Control and Prevention has published a toolkit on the Cardiff Model for its use.[177]

Other targeted enforcement strategies include 'hotspot' policing, whereby Police focus patrols in high-risk areas for a dedicated period of time. Whilst research shows that this approach is associated with a reduction in crime in general or liquor law violations, two evaluations focused specifically on drinking venues found no reduction in violence.[178,179]

A controlled study in the United States of combined targeted enforcement, responsible beverage service (RBS) training, and corrective actions by law enforcement to a random sample of identified problem bars found mixed effects across intervention sites and outcomes.[180] Some positive findings were evident in relation to a decline in the percentage of bar patrons who were intoxicated, a decrease in the average blood alcohol concentration of patrons, and an increase in the percentage of pseudo-intoxicated patrons denied service.[180] However, adverse effects were also noted in relation to driving after drinking and being intoxicated in bars/restaurants before driving. Some positive effects were found to be short-term and not sustained whilst others did not show up until after a year after intervention, suggesting that training needs to be embedded before change is observed.

ii. Screening and brief interventions

In health care settings such as primary care and EDs, screening and brief interventions have been shown to result in small but significant impacts on alcohol consumption among hazardous or harmful drinkers.[181] Effects appear to be greater when undertaken in primary care settings when compared to emergency care settings.[181] It is also suggested that screening and brief intervention may be useful in

targeting drinkers with pre-loading motives relating to higher fun/intoxication, however the effectiveness of this approach is yet to be tested.[90]

In 2011, a partnership between Northland Police and Northland District Health Board resulted in the development of the Traffic Alcohol Group Alcohol and Drug Helpline Project.[182] Following an evidential breath assessment (EBA), persons who tested positive were given an Alcohol and Drug Helpline Card, a "Drink Check" pamphlet, and offered the opportunity to be referred to the Helpline. A similar initiative was developed for all offenders in EBA suites or watch-houses in the Northland District who reported consuming alcohol prior to offending. No evaluations of these initiatives have been identified.

Alcohol brief interventions have also been implemented in criminal justice settings such as custody, courts, probation, and prison. Systematic reviews of primary studies have found studies to vary in methodological quality with no consistent effects observed on alcohol consumption measures. A few studies have found positive effects in relation to reductions in injuries and convictions.[183,184]

iii. Alcohol intoxication management services (AIMS) and sobering up units

Temporary health services have also been placed in NTEs in an effort to reduce the impact of alcohol-related presentations on local EDs and staff. Alcohol intoxication management services, or AIMS, are fixed or mobile facilities typically located in NTEs that experience high rates of alcohol intoxication.[185] Often delivered in partnership with Police, they are staffed by health care professionals or volunteers to treat people with either uncomplicated intoxication or intoxication associated with minor injury or ailment.[185] Referrals are often made via the ambulance service, police, or other services operating in NTEs. A natural controlled experiment of AIMS implementation in England across eight intervention and six control sites found no evidence of a consistent effect on ED attendances. Only the more expensive configuration of service, led by nurse practitioners and with the support of ED, yielded a consistent effect.[185]

In the NTE of Cairns, a single street first aid care service was implemented to examine its effects on police-recorded assaults, emergency department injury presentations and ambulance service utilisation during high-alcohol hours. Time series analysis found no significant impact on common assaults, emergency department injury presentations or ambulance attendances.[186] However, there was a significant decline in serious assaults, occurring one-month after implementation. The lack of overall impact and cost intensiveness of these approaches necessitates strong caution with regards to future implementation.

In the Wellington context, two initiatives to provide a rapid medical response in the NTE have been implemented. In 2011, an eight-week pilot of a triage centre was implemented on Courtenay Place on Friday nights. At 9.30pm, eight medics would gather for a briefing and be sent to patrol in pairs. Minor incidents could be attended to, with the ambulance called for more serious harms.[187] More recently, the Wellington City Council has funded (as part of the Pōneke Promise) a 12-month trial of Wellington Free Ambulance (WFA) paramedics being deployed alongside with Police on Friday and Saturday nights to the Courtenay Place precinct. The trial commenced in December 2022 and is suggested to be making a noticeable difference, addressing low level injuries or medical issues immediately and often de-escalating volatile situations.[188]

Similarly, sobering up units or safe places have been implemented internationally and in New Zealand.[189–191] A range of service models have been used, including permanent facilities, services at one-off large events (e.g., safe zones at concerts), services within custody settings, and mobile units. Sobering centres present opportunities to work with individuals to provide support and make referrals to health and social services, and may reduce the burden of intoxication-related presentations to Emergency Departments and custodial settings.[192,193]

iv. Public drinking bylaws

Section 174 of the Local Government Act 2002 empowers Territorial Authorities to adopt alcohol control bylaws to restrict alcohol consumption and possession in public places. For example, the Wellington

City Council has an alcohol ban that includes Wellington Central (and Courtenay Place) and is in force 24 hours a day, seven days a week.

Among all participants in this study, 10% reported drinking in public. Most public drinkers were males aged 18 – 24 years, and on average, recorded higher BrACs than persons who did not drink in public.

Whilst alcohol control bylaws have the potential to prevent or reduce side-loading between licensed premises, no studies have sought to examine this. A literature review of alcohol bans (also known as liquor bans, alcohol control bylaws, and alcohol-free zones) examined 16 evaluations across 13 locations (including New Zealand), finding no evidence that they reduced alcohol-related harm or benefitted the community beyond perceptions of safety and improvement to amenity.[194] In general, bans were strongly supported by residents, licensees, and police. Studies included in the review had methodological limitations, warranting further research that is more robust. Future research should also examine the potential for bans to negatively impact socio-economically marginalised street drinkers, as cautioned by others.[4,195,196] However, it is clear that signage and enforcement of alcohol bans is an essential component to their effectiveness.[196]

v. Responsible beverage service training

Interventions to reduce intoxication inside licensed premises have centred on strengthening RBS training for staff and implementation of host responsibility policies. Research shows that these approaches may have small, short-term effects but are inadequate as a standalone approach to reduce the over-service of alcohol to intoxicated persons.[94,197] It is suggested that RBS training and policies should not be used as a replacement of more effective programmes, and if used, should comprise one component of a more comprehensive approach.[94] Recommendations for reducing over-serving include:

- applying validated and widely accepted criteria for defining when a person is ‘intoxicated’;
- adopting a structure of enforceable consequences for violations;
- implementing procedures of unbiased enforcement;
- using publicity to ensure that there is a perceived high risk of being caught and punished;
- and developing the political will to support ongoing enforcement.[198]

vi. Breathalysers, ID scanners, and barring notices at licensed premises

Responses to preventing entry of intoxicated persons into licensed premises have also been studied. The use of breathalysers by door staff to prevent entry by intoxicated persons found subsequent reductions in alcohol-related crime and injuries, although temporal fluctuations may have explained this.[199] Qualitative interviews with door staff following a voluntary scheme in the United Kingdom showed both positive and negative views of breathalyser use. Positive aspects included depersonalising the judgement about who was too intoxicated to enter the venue and disrupting a violent event at a known flashpoint for conflict. Negative aspects included it being viewed as a challenge to their authority and expertise and a perception that it transferred responsibility for policing to the licensed setting.[110]

Other approaches in the on-licence environment include ID scanners, barring notices, and prohibition orders. ID scanners to co-ordinate patron banning with the police and other venues has been suggested to assist with identifying banned patrons and assist in the enforcement of bans.[200] Their mandatory use has been recommended in other jurisdictions.[67] Positive impacts of ID scanners have been reported by owners of bars in Courtenay Place.[201] Patron bans have shown a generally positive effect on subsequent behaviours, but are likely to be less effective for repeat offenders.[202] The introduction of Police-imposed barring notices in Western Australia was found to be associated with significant reductions in non-family assault offences marked with an alcohol flag, assault offences recorded occurring on pathways (which includes areas around licensed premises), and common assault offences marked with an alcohol flag.[203]

vii. Alcohol Accords

Other non-regulatory, voluntary interventions in the licensed premises environment typically include the establishment of alcohol accords, where stakeholders meet on a regular basis to discuss common alcohol-related issues. Some Territorial Authority local alcohol policies mandate the involvement by licensees in accords. Membership typically includes the police, local government, public health bodies, representatives of both on- and off-licensed premises, and other interested community organisations.[204] Whilst these forums are often judged successful in terms of information sharing and community building, any evidence that they reduce rates of alcohol-related harm remains elusive.[205] Other concerns around accords is the voluntary nature can result in non-participation by more problematic venues.[206] In the Wellington area, the Pōneke Promise[12] is a collaborative, community-driven partnership to improve safety in Central Wellington. In relation to the current study, the group was responsible for setting up the community hub that was used as the base for the survey work.

viii. Transport-related interventions

Interventions have also been implemented to reduce the likelihood of harm when patrons leave venues in the NTE. This includes supervised taxi queues, extending public transit hours, as well as increasing lighting and availability of public toilets (to reduce public urination). In Melbourne, the Victorian Government invested more than $300 million to introduce 24-hour public transport on Friday and Saturday nights, known as 'Homesafe'. An evaluation of the initiative at 12 months post-implementation found no change in the number of police-recorded assaults, ambulance attendances, or road crashes across the entirety of the night. A significant increase was found in the number of people out in the city later in the evening, and more people using trains and trams during 1am – 5am.[207] An examination of patron behaviour suggested that the initiative increased the amount of time people spent in night-life settings and thereby increased the potential for patron intoxication.[208] The applicability of transport-related interventions to the Wellington context warrants consideration, in light of the findings from the current study that 78% of participants stated that they would either walk home or use Uber.

ix. Sexual violence prevention in NTEs

Despite the wealth of evidence detailing the prevalence and factors associated with sexual violence in NTEs, few prevention strategies (e.g. ' Ask for Angela) have been rigorously evaluated.[46] Pre-post study designs of bystander interventions to reduce the incidence of sexual assault at licensed premises have found positive changes in knowledge of rape myths, attitudes, and willingness to intervene.[209–211] However, interventions have not been evaluated to determine their effectiveness of reducing sexual assault incidence.

An example of an alcohol-related sexual violence prevention programme in Wellington is the 'Don't Guess The Yes' campaign, launched in December 2017 and targeted to 18 to 30 year olds.[212] Partners in this campaign include Wellington City Council, Hospitality New Zealand, RespectEd Aotearoa, Victoria University of Wellington Students' Association, Massey Wellington Students' Association, Massey University, and Victoria University of Wellington. The campaign utilises a range of strategies, including hospitality staff training, university student education, and social media and mainstream media (e.g., posters, billboards, t-shirts). No evaluation of this initiative has been identified.

4.2 Limitations of current study

Whilst this study demonstrates the utility of a street-intercept design to assess intoxication and drinking behaviours among persons in NTEs, the plan to approach every 7th person was too difficult to undertake in the presence of large groups of revellers. A change in approach resulted in every person invited to participate, once the interviewer was available. As the response rate was unknown and overly-intoxicated participants were not approached, the generalisability of the findings to all people who visit the NTE requires caution.[86] The study has likely under-sampled persons with very harmful drinking patterns and those who were sober, as the latter were often found to be less interested in participating. In addition, older people were perceived to be harder to recruit.

Participant recall of pre-loading characteristics may also be limited due to alcohol impairment.[86] It is suggested that alcohol consumption may render answers that are subject to greater data error or the inhibiting effects of alcohol could mean answers more closely reflect the truth.[91] Whilst the study found no ethnic differences in BrACs or pre-loading prevalence, further research is required to understand inequities in the frequency of pre-loading prevalence and/or experience of alcohol harm in the NTE.

Finally, the study did not assess concurrent illicit drug use, which has been shown to present significantly higher BrAC readings and is considered within the typologies of pre-loading.[70] Interviewers reported that participants had freely volunteered information about other drug use (Appendix 5), but there was nowhere to record it in the questionnaire. Similarly, energy drink use was not ascertained in this study, which has implications for alcohol use and harm in NTEs.[68]

4.3 Recommendations for future night-life research

Future studies could seek to explore the experience of, and inequities in, alcohol-related harms among persons in the NTE. Understanding the prevalence of energy drink consumption and other drug use may also be useful. Side-loading that involves consumption of alcohol between visits to licensed premises should be examined more closely, to distinguish it from participation in public drinking. Whilst typologies of persons in the NTE could be identified to inform the targeting of interventions, the most effective approach would be to implement and evaluate evidence-based interventions to understand their impact on types of alcohol harms and their inequities in the Wellington NTE.

5. Conclusion

The disproportionate prevalence of alcohol-related harm to drinkers and others in NTEs warrants significant concern. This study found that pre-loaders, males, young adults, and patrons out late at night recorded higher breath alcohol concentrations in the Courtenay Place entertainment precinct of Wellington City.

The drinking culture in the NTE and wider society is strongly determined by a country's alcohol policy environment. Late closing hours and the increasing affordability of alcohol maintain New Zealand's high levels of alcohol harm as well as risk behaviours such as pre-loading. Restrictions to trading hours (via changes to legislation or local alcohol policies) and increases in alcohol prices are shown to be the most effective tools to reduce the short- and long-term physical, health, social and economic harms from alcohol. In addition, regular sharing of data across regulatory agencies offers significant potential to target interventions and raise awareness of issues and enforcement action across the wider community.

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Appendix 1: Questionnaire

Name of interviewer _____

LOCATION

Select interview location

- Courtenay/Taranaki Street - North
- Courtenay/Taranaki Street - South
- Courtenay/Tory Street - South
- Courtenay/Kent Street
- Wakefield/Blair
- Wakefield/Tory
- Other (please specify)

DIRECTION_OF_TRAVEL

Note if person you are approaching is heading towards or away from Courtenay Place

- Towards Courtenay Place
- Away from Courtenay Place
- N/A

PARTICIPATE_YES_NO

Are you interested in participating?

- Yes
- No (why?)

We have a few basic questions to get through before the main survey. Firstly, have you participated in this survey already tonight?

- Yes
- No

DOB

What is your YEAR of birth? note: if after 2004, survey will automatically screen out

- _____

DOB_CHECK

Are you 18?

- Yes
- No

STUDENT

Are you a student?

- Yes
- No
- Prefer not to say

REGION_WLG

Which of the areas in the Wellington region best describes where you live? or are you from outside of the region?

- Select an answer...

INTRO

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

TIME_ARRIVE_IN_CITY

Approximately, what time did you arrive in Courtenay precinct tonight?

- _____
- Unsure

REASON_FOR_GOING_OUT

What is your main reason for going out tonight?

- Catch up / Socialise with friends
- See a band/DJ/other performance
- Special event/celebration
- Work function
- Normal night out
- To get drunk
- To pick up/find a partner
- Clubbing/ dancing
- Other (please specify)

CONSUMED_ALCOHOL

Have you consumed any alcohol today/tonight?

- Yes
- No

PRE_DRINKING_LOCATION

Where, if anywhere, did you consume alcohol before coming to Courtenay precinct tonight?

- Own home
- Friends home
- Private function (e.g. wedding or other event)
- Public location (e.g. park, street)
- Vehicle
- Bar/restaurant (please specify)
- Social/sports club (please specify)
- Other (specify)
- I did not consume any alcohol before coming to Courtenay precinct tonight

PRE_DRINKING_REASONS

Why did you consume alcohol before coming to the Courtenay precinct tonight?

- Price (or to save money)
- More convenient
- Didn't want to go out too early
- Chance to catch up with friends before going out
- To get drunk before going out
- For fun
- Other (please specify)

ALC_TYPE

What type of alcoholic drink(s) did you consume before coming to the Courtenay precinct tonight? (Select all that apply)

- Standard beer

- Craft beer
- Wine
- Cider
- Spirits
- RTDS
- Cocktails
- Other (specify)

ALC_SOURCE

Where did you get the alcohol that you consumed before coming to the Courtenay precinct tonight? (Select all that apply)

- I purchased them myself
- My friend purchased them for me
- A member of my family purchased them for me
- I was given them
- Other (please specify)

OFF_LICENCE_PURCHASE_TIME

Approximately when did you buy the alcohol you consumed before coming to the Courtenay precinct tonight? (Multiple selections allowed if applicable)

- Yesterday or earlier
- Before midday today
- Midday to 2:00pm
- 2:00pm to 4:00pm
- 4:00pm to 6:00pm
- 6:00pm to 8:00pm
- 8:00pm to 10:00pm
- 10:00pm to Midnight
- Midnight to 2am
- 2am to 4am
- Unsure

OFF_LICENCE_PURCHASE_LOCATION

Where did you buy the alcohol from, that you consumed before coming to Courtenay precinct tonight? (Multiple selections allowed if applicable)

- Aro Valley Mini Mart (103 Aro St)
- Big Barrel Kent Terrace (26 Kent Terrace)
- Bottle O Cambridge Terrace (63 Cambridge Terrace)
- Compass Liquor (203 Willis St)
- Countdown Cable Car Lane (280-284 Lambton Quay)
- Cuba Liquor World (145 Cuba St)
- Cuba Street Superette Ltd (303 Cuba Street)
- Discount Liquor Centre (94 Dixon St)
- Liquorland Victoria Street (233 Victoria Street)
- Montys Cuba Food Market (140-142 Cuba Street)
- Moore Wilson Liquor (33 Lorne Street)
- New World Metro (70 Willis Street)
- New World Metro (Wellington Railway Station)
- New World Wellington Central (Chaffers) - (279 Wakefield St)
- S & S Patel Superette (235 Cuba Street)
- Shalimar Mini Market (310 Willis Street)

- Te Aro Wine (8 Ebor Street)
- Willis Street Foodmarket (294 Willis Street)
- Willis Street Superette (219 Willis Street)
- Supermarket (not specified)
- Bottle Store (not specified)
- Hotel off licence (not specified)
- At bar/restaurant (on-licence, not specified)
- At a social club (e.g. rugby club, bowling club) (not specified)
- Other (please specify)
- Unsure

LICENCE_PREMISE_YES_NO

Have you consumed any alcohol in bars or restaurants in Courtenay precinct tonight?

- Yes
- No

LICENCE_PREMISE_VISITS

Which bars or restaurants have you had drinks in tonight?

- Apartment Bar
- Bettys Pop Up
- Black Dog Brewery
- CGR Merchants
- Chow
- D4 on Allen
- Dakota Bar
- Dirty Little Secret
- Dragonfly
- El Horno
- Fox glove Bar and Kitchen
- Fringe Bar
- Library (The)
- Los Banditos
- Love Not Lost
- Lulu
- Macs Brewery
- Mishmosh
- Mockingbird
- Red Square
- Sassy Loves Cash
- Tasting Room
- Vinyl and Shady Lady
- Wellington Sports Cafe
- Winner Winner
- Other (please specify)
- A premise outside of Courtenay precinct

PUBLIC_DRINKING

Have you consumed alcohol anywhere in the Courtenay precinct other than a bar or restaurant tonight? (i.e., a public place)

- Yes
- No

PUBLIC_DRINKING_LOCATION

What locations other than a bar or restaurant have you drunk tonight?

- Car park
- In a vehicle
- Park
- Waterfront
- Empty section/building site
- Alleyway
- Footpath
- Other (please specify)

PUBLIC_DRINKING_PLAN

Do you plan to drink anywhere in the Courtenay precinct other than a bar or restaurant tonight? (i.e., a public place)

- Yes
- No

PUBLIC_DRINKING_PLAN_SPECIFIC

What other places do you plan to drink? (Select all that apply)

- Car park
- In a vehicle
- Park
- Waterfront
- Empty section/building site
- Alleyway
- Footpath
- Other (please specify)

PUBLIC_DRINK_ALC_PURCHASE

Thinking about the drinking you plan to do in these other places, where did you or will you purchase alcoholic beverages from?

- _____

NIGHT_END

Approximately - What time are you intending to stay out until tonight?

- Select an answer _____

GETTING_HOME

How are you intending to get home tonight? (Multiple selections allowed if applicable)

- Walk
- Drive myself
- Car (a lift from sober driver)
- Getting picked up in a car
- Taxi
- Rideshare (e.g. Uber)
- Bus
- Train
- Other (please specify)
- Unsure/ No plan

GENDER_IDENTITY

Which gender or genders do you identify with?

- Male
- Female
- Another gender (please specify)
- Gender diverse
- Prefer not to say

ETHNICITY

Which ethnic group or groups do you identify with? (please select all that apply).

- NZ European
- Māori (could you tell us your iwi? [option])
- Pacific Peoples
- Asian
- European Other
- Middle Eastern/Latin American/African
- Other (please specify)
- Prefer not to say

INTOXICATION_LEVEL

First are you able to tell me how drunk you feel?

Participant personal assessment

- Sober
- Under the influence
- Intoxicated
- Unsure

Interviewer assessment

- Sober
- Under the influence
- Intoxicated
- Unsure

BREATHALYSER_READING

- _____ (reading)
- No reading

REFERRAL

Did the subject require transfer to support services due to intoxication levels or safety concerns which placed them at risk if left unattended?

- Yes
- No

REFERRAL_LOCATION

Which service were they referred to?

- Ambulance
- Safe place
- Friends/partner etc
- Take10

Appendix 2: Counts of breathalyser tests over time

Each shift commenced at 8pm, with a staff briefing. Once staff were at their allocated data collection location, participants were then approached.

As shown in Figure 9, there was substantial variation in the number of breathalyser tests across the ten-minute intervals of the study. Very few tests were conducted at the very beginning and very end of the data collection period. Safety concerns often resulted in staff ceasing data collection around 3:30am.

The lower number of tests in some periods is likely to coincide with the two 30-minute breaks provided to each staff member. Also, issues were experienced with the breathalysers malfunctioning (i.e., condensation building up) due to overuse which impacted on the number of tests conducted in the later time periods.

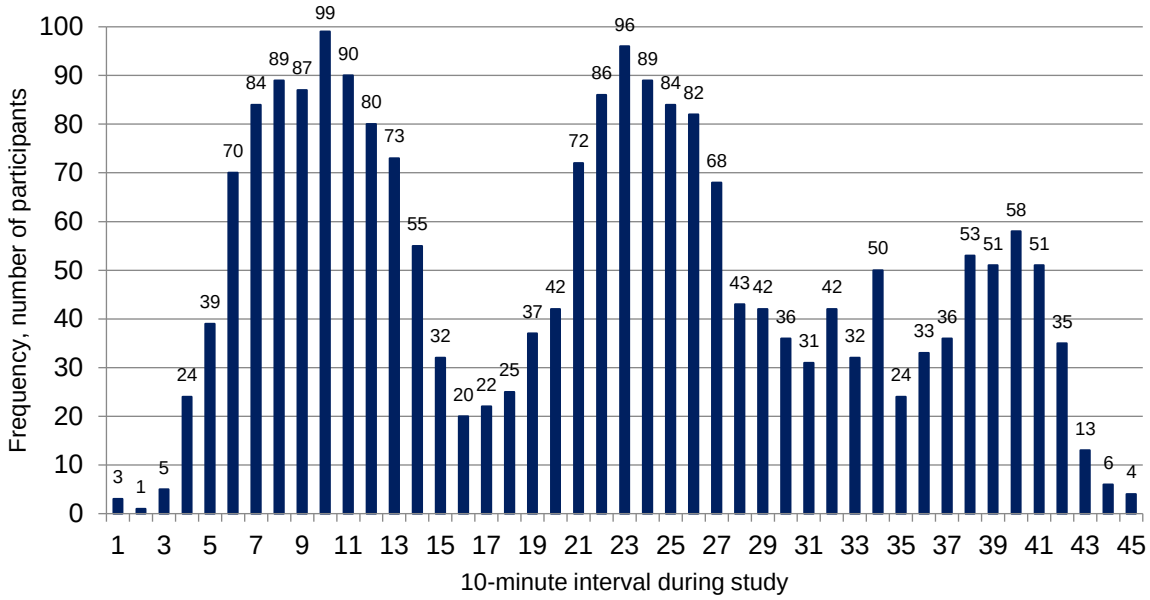

Figure 9. Number of breathalyser tests, by 10-minute intervals.

Appendix 3: Breath alcohol concentrations readings, by ethnicity

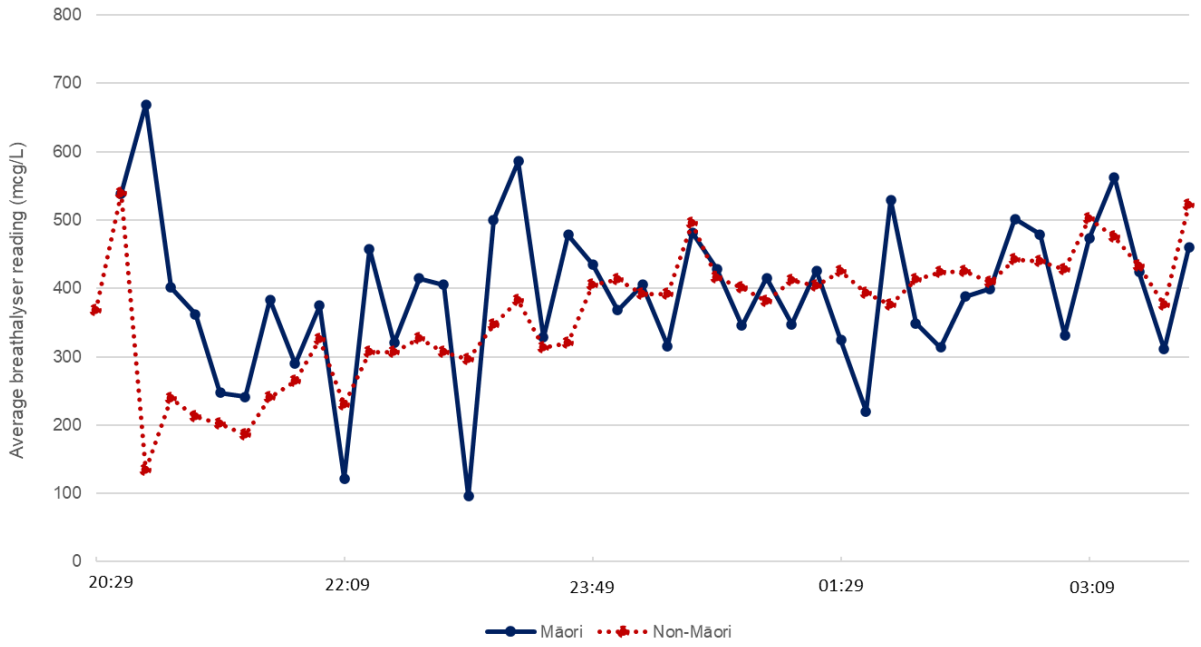

Figure 10. Measured Breath Alcohol Concentration over time, Māori compared to non-Māori.

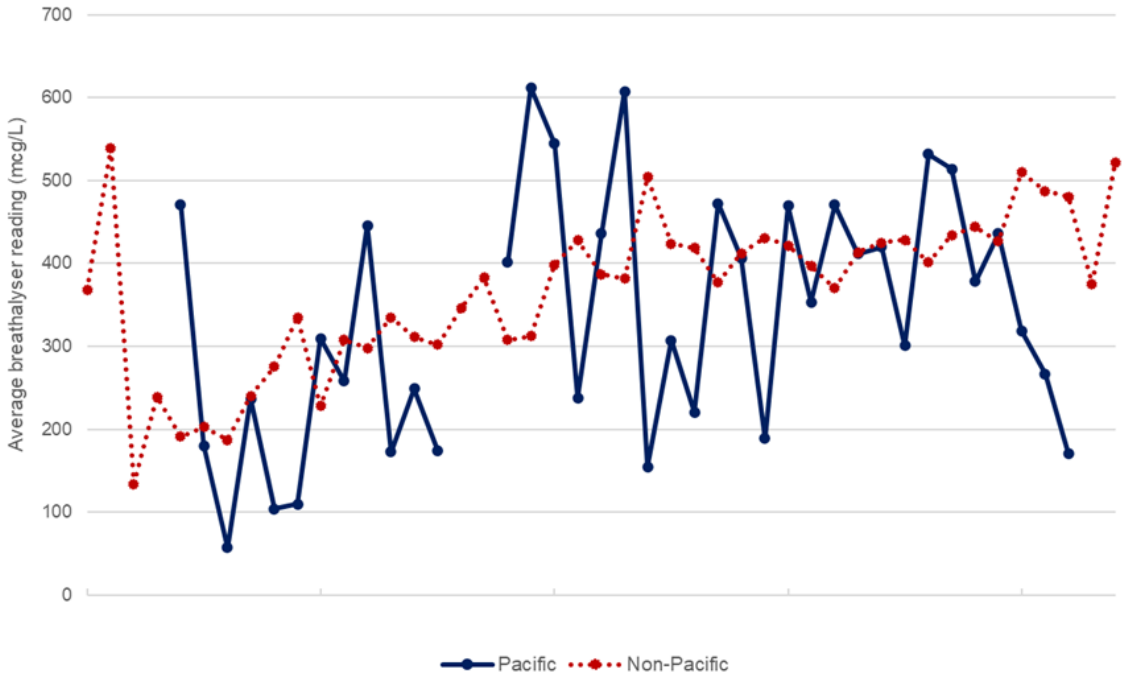

Figure 11. Measured Breath Alcohol Concentration over time, Pacific people compared to non-Pacific people.

Appendix 4: Details and results of regression models

Linear regression was used to explore the predictors of high BrAC readings, among the total sample and among pre-loaders only.

In Model 1, the relationship between pre-loading and BrAC was examined, adjusting for a range of other explanatory variables (gender, time of evening, day and week of study, age group, student status, and location of residence). The full sample (i.e., drinkers, non-drinkers, those with zero BrAC readings) was utilised in this regression model to understand the predictors of BrAC among the total population in the NTE, as recommended by others.[213] This is because the policy and practice implications are likely to be the same for someone who returns a zero BrAC but still feels the effects of intoxication after consuming five drinks over five hours and someone who has consumed five drinks and returns a small but non-zero BrAC.[213]

Sensitivity analyses were conducted on Model 1, by imputing participants as non-pre-loaders if they reported that they had not consumed any alcohol on the same day/night as the survey. This added 206 participants to the non-pre-loading group for the analyses.

Models 2, 3 and 4 are restricted to pre-loaders only. Model 2 was used to examine the relationships between the above explanatory variables and BrACs among pre-loaders. Model 3 added the time of day and location of purchases of pre-loading as explanatory variables in the regression.

Finally, Model 4 was restricted to pre-loaders who reported that they purchased their pre-loading alcohol on the same day as the survey. Location of purchase is included as an explanatory variable, in addition to the variables included in Model 2.

Table 17. Linear regression of factors associated with breath alcohol concentrations.

Variables	Model 1	Model 2	Model 3	Model 4
Gender (male)	55.216***	58.256***	56.263***	57.409***
	(10.728)	(13.492)	(15.375)	(18.081)
Age group (18-24yrs vs 35+ yrs)	8.475	40.413	34.302	9.239
	(18.800)	(27.985)	(32.493)	(45.141)
Age group (25-34yrs vs 35+ yrs)	40.440	69.504	63.287	-10.561
	(18.931)**	(29.152)**	(33.977)*	(46.484)
Student (yes)	15.413	16.802	9.898	29.977
	(12.583)	(14.908)	(17.138)	(19.511)
Local resident	22.286*	31.584**	36.555**	23.458
	(11.544)	(14.570)	(16.682)	(19.686)
Friday night	6.594	-0.609	12.819	5.625
	(15.775)	(21.640)	(24.383)	(28.320)
Saturday night	-6.692	-6.241	4.979	-22.441
	(15.827)	(21.388)	(23.968)	(27.783)
Week 1	-14.226	-34.633**	-32.718*	-28.616
	(12.333)	(15.439)	(17.318)	(20.253)
Week 2	-2.700	-15.706	-25.378	-22.663
	(13.021)	(16.262)	(18.559)	(21.864)
Time period (11:01pm-1am)	76.237***	44.625***	44.655**	12.274
	(12.929)	(17.074)	(19.632)	(23.914)
Time period (1:01-3:59am)	82.981***	48.239***	46.813**	21.436
	(13.802)	(17.462)	(19.982)	(24.336)
Pre-loader	96.162***	-	-	-
	(11.753)			
Pre-loading purchase from bottle store	-	-	1.664	19.616
			(16.272)	(18.642)
Pre-loading purchase from supermarket	-	-	26.228	56.700
			(22.028)	(27.224)**
Pre-loading purchase yesterday or earlier	-	-	-26.360	-
			(26.413)	
Pre-loading purchase on the day, after midday	-	-	7.453	-
			(24.086)	
Constant	204.414***	301.570***	304.126***	366.540***
	(23.101)	(34.396)	(44.091)	(52.609)
Observations	1,948	1,251	993	688
Adjusted R-squared	.104	.038	.041	.041

Note: Unstandardised Coefficients are reported for the relationship between independent variables and dependent variable; Standard errors are reported in parentheses; *** p<.01, ** p<.05, * p<0.1.

a) Sensitivity analyses

Sensitivity analyses revealed no major differences in results, except being a local resident was no longer predictive of a higher BrAC. Compared to the relevant reference groups, average BrACs were 42 mcg/L higher among males, 54 mcg/L higher among persons aged 25 – 34 years, 90 mcg/L higher among interviewees between 11:01pm and 1am, 99mcg/L higher among interviewees after 1am, and 142 mcg/L higher among pre-loaders.

Examination of the pre-loading prevalence among the total sample found the following:

- 58.8% prevalence of pre-loading, 75% among all participants interviewed after midnight;
- 70% prevalence among 18 – 24-year-olds, 46% among 25 – 34-year-olds, 38% among 35 – 44-year-olds, and 26 – 29% among older age groups;
- 37% prevalence among participants interviewed before 11:00pm, 67% among those interviewed between 11:01pm and 1:00am, and 78% between 1:01 and 3:59am; and
- 39% prevalence on Wednesdays, 61% on Fridays and 66% on Saturdays.

There were no differences in the factors significantly associated with pre-loading in the total sample versus the sample described in Section 3.4.

Appendix 5: Lessons learned to inform future night-life research

A focus group with five fieldworkers/research interviewers as well as reflections by the research team have provided valuable lessons learned to inform future studies in other NTEs. The lessons learned relate to the organisation, co-ordination, and operational aspects of the field work for this study.

a) Preparing for data collection

Each night of data collection, a full briefing was given to attending staff. The briefing re-iterated that staff safety was paramount. The briefing emphasised not to approach anyone displaying aggressive language and/or behaviours, to obey road rules when crossing roads, that there may be impaired drivers (there were a few drivers located by uniformed police that blew over the legal limit whilst the teams were working), and to be wary of distracted drivers and speeding vehicles.

The following comments were made about preparation before the night out:

- it would be useful to have a PDF script in advance so fieldworkers can get familiar with it ahead of data collection and run the survey in a more conversational style;
- communicate to fieldworkers the rationale behind each question so that they know what to do when the participant answers in an unexpected manner;
- it is essential to establish a nearby 'base' as the deployment area for staff, that provides a place for meals, coffee, rest, etc. In this study, the Wellington City Council building was used as the base as it was located within a 3- to 8-minute walk of where the fieldworkers and other staff were located;
- a 'glow vest' or similar is recommended – in this study a bright blue vest was used which included an insert where the person's name could be placed, and on the back indicated whether they were a fieldworker or supervisor; and
- only display the person's first name on the vest.

b) Fieldworker and supervisor team

Two fieldworkers and one supervisor were located at each data collection point. It was important that Police staff were aware of areas that present increased risk when collecting data in the NTE.

Two to three uniformed police staff from Wellington District were assigned to each night of data collection. These staff were used in a 'roving' capacity to ensure the safety of those conducting the survey and were available for incidents where extra police staff were required.

The fieldworkers reported valuing:

- the friendliness of the team;
- the high level of organisation of the data collection process and training provided;
- the perception that they were safe on the night, especially having police officers present;
- the setup of breaks; and
- the provision of food (although noted to not be substantial in nature).

Fieldworkers perceived many benefits of having a supervisor present, including:

- being able to check the process was being completed correctly;
- being able to help engage potential participants whilst the fieldworker was already busy in a participant interview;
- being able to perceive when something is going wrong that may risk the safety of the fieldworkers and require de-escalation; and
- reducing the likelihood that participants would assume the interviewer was a person collecting money for charity.

c) Survey instrument

A range of comments were made about the survey instrument:

- the use of the electronic tablets was essential;
- tablets need to be connected to either the mobile network or Wi-Fi;
- tablets should be checked prior to the first night of deployment to check that each has a current active SIM card installed;
- important to check if SIM cards are still valid or have expired;
- the SIM card requires a minimum of 1GB of data;
- no 'Txt' or 'Calls' ability is needed for the tablet;
- if the tablets connect via a 'hotspot' from a mobile phone, and the tablet and phone get too far apart (e.g., 5 – 6 metres), then the connection will be lost;
- the local Free City Wi-Fi is too slow and intermittent and so it is not recommended for use;
- the tablets need to be charged overnight – however, none of them ran flat after being used the whole night;
- some tablets would freeze occasionally, rectified by turning the power off and back on;
- having a wrist band on the back of the tablet could assist with entering data more easily and also operate the breathalyser with two free hands;
- a hand-held counter should be considered for data collectors to track the number of people who were approached but refused to take part in the survey (as the alternative of entering the information in the tablet was impractical and stalled the recruitment of the next participant);
- if 'repeats' are important to know/manage, it is important that participants are asked whether they have already completed the survey (e.g., on previous nights);
- include an option to ask about 'other substances' – some people offered this information willingly and it may be good to capture when people are intoxicated on other substances in the NTE;
- if you can, get the survey to pre-populate some of the fields to save time; especially the fieldworker's name and location;
- consider grouping the names of off-licences and on-licences, as the list was too long;
- the question on iwi affiliation was a challenge to complete using the questionnaire design and would need to be redesigned for easy completion; and
- include a comment box at the end to note any important extra context from the participant.

d) Recruiting participants

Many lessons were learned in the recruitment of participants, including:

- whilst the intention was to select a random sample comprising every 7th person in the area, this proved too problematic in an operational sense, especially when groups of people presented;
- staff were requested to try to track the number of persons passing and then approach a potential participant once at least seven people had passed;
- have a good opening line:
    - earlier in the night, the focus could be on asking for their help to complete a health study;
    - later in the night, the breathalyser can be used as a drawcard because people were attracted to knowing their result (but not a draw card for sober persons);
- over time, it becomes easier to ask questions in a conversational manner to elicit the information and this reduces the time taken to complete the survey with the participant;
- be prepared to keep members of a group occupied while one member of the group is participating. If the group gets impatient and moves on, the person may move on with them and not complete the survey;
- have some phrasing to move groups on if you only want to survey one person from the group;

- the best time for getting participation was between 11pm – 2am. The worst time for getting participation was 8:30pm – 10pm, and after 3am when safety became an issue;
- keep an eye out for dangerous circumstances and stop early if required;
- at the end of each shift, during the debrief, share some facts around completions and interesting moments. This will help people to know how they did, and have a bit of fun;
- be ready to handle intoxicated passers-by who are not participating but wish to try to pick fights with or intimidate fieldworkers;
- be ready to handle attention from large groups of intoxicated people;
- be ready to say 'no' to people who just want to be breathalysed, but don't want to complete the survey;
- it was a challenge to recruit sober people as well as people over 50 years old, which may cause the data to be skewed;
- questions regarding public drinking and gender identity were viewed as sensitive questions by some participants, therefore care is always needed;
- don't face people when they are blowing into the mouthpiece, or they will blow saliva your way;
- you may want to have a belt for carrying several items or it may be best to divide things up with the supervisor;
- instead of Wednesday, it may be better to collect data on Thursday, Friday, and Saturday nights as this could be easier for the fieldworkers' body clocks; and
- on slow nights, choose everyone. On busy nights, choose who you can.

e) Breathalysers

The following comments were made regarding the breathalyser used in the study:

- the breathalyser drew attention and interest from a large number of eventual participants, especially young adults;
- it was possible to operate one group (2 x surveyors and 1 x supervisor) with one breathalyser, with the supervisor assisting in the timing of when the device was used between the two fieldworkers;
- the breathalyser requires a strong breath/blow to get a reading and can take a while to reload;
- saliva can build up in the breathalyser, causing it to jam or cause error messages;
- moisture build up can be dislodged by shaking the breathalyser towards the ground;
- care is required about the last smaller number in the BrAC recording – a decimal point was often added when recording the number, but this is incorrect, so required data cleaning to fix;
- when placing the mouthpiece into the breathalyser, it is important to use the plastic wrap to ensure that fingers do not touch the mouthpiece and remains clean for the person taking the test;
- it is important to keep the plastic wrap and use this to safely remove and dispose of the mouthpiece;
- to dispose of the mouthpieces, consider using a cardboard box or similar if there is no public rubbish bin available;
- have a sufficient supply of AA batteries for the breathalysers, with each device requiring two batteries; and
- breathalysers need to dry out and reset overnight.

f) End of the night

At the end of each night, a debrief was held and any recommendations to improve practice were put forward and adopted, where possible, for data collection on the following nights. Staff were asked if they had a safe route back to their transport and for those walking alone (especially female members) a staff escort was provided to ensure they safely got to where they were going.

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