Alcohol home delivery usage and its relationship to alcohol consumption in New South Wales during COVID-19

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Abstract

Background: Rapid growth in the use of alcohol home delivery services, combined with increases in home drinking during COVID-19, raised potential concerns around increased consumption. This paper aims to assess the relationship between alcohol home delivery use and consumption across levels of COVID-19 restrictions in New South Wales (NSW), Australia.

Methods: A five-wave longitudinal survey of 586 NSW residents (M_{age} = 35; 65.3% female) conveniently sampled across 2020. Home delivery usage and the number of daily standard drinks consumed during a typical week were assessed with a survey. Logistic regression models were estimated within each wave to identify predictors of home delivery usage, and hierarchical logistic mixed effects models were estimated to predict purchase source (home delivery vs other) at the occasion level.

Results: From baseline, alcohol home delivery use rose significantly during lockdown (20% to 34%), with respondents using home delivery during lockdown and the partial re-opening wave, consuming significantly more than those who were not. Use of home delivery was significantly higher during lockdown and the partial re-opening amongst people who drank more heavily, with respondents aged 36 or older more likely to use delivery services in all waves except lockdown.

Conclusions: Alcohol home delivery usage increased during lockdown suggesting that restrictions impeding on-premise consumption coincided with an increase in home delivery. Associations between persons who drank more heavily and use of home delivery during lockdown and the partial re-opening point to a subset of the population that may be at increased risk of harmful consumption when accessing alcohol delivery services.

Introduction

Home delivery of alcohol is becoming increasingly popular in Australia. In 2019, over a third of Australians reported using alcohol delivery services at least monthly over a 12-month period, with 34% indicating use for over half their takeaway alcohol (Mojica-Perez et al., 2019). A recent Australian study assessing the use of online alcohol delivery services during 2021 identified that such use was associated with six times higher odds of engaging in hazardous drinking, with one-in-five participants using delivery services to extend a home drinking session (Colbert et al., 2023). Beyond this, minimal research has assessed the influence of alcohol delivery services across different COVID-19 restriction periods on consumption and changes in service usage prior to the pandemic.

The emergence of COVID-19 in early 2020 saw an array of policy responses introduced in an attempt to contain the virus, including lockdowns, with most invoking 'stay-at-home' orders and non-essential business closures (Phillips et al., 2021). In most Western countries, alcohol was deemed 'essential', with bottle shops permitted to stay open (Neufeld et al., 2020). This was the case in Australia, with government regulations authorising the continued sale of alcohol during lockdowns. Online alcohol sales and delivery subsequently increased, a market that was growing rapidly prior to COVID-19 (InsideRetail, 2015).

Within Australia, state governments imposed restrictions authorising the closure of licensed venues such as bars and restaurants (Reynolds & Wilkinson, 2020). Closure of on-premise drinking and 'stay-at-home' orders led to increases

in home delivery usage, with online retailers reporting 50% to 5000% sales increases during March 2020 compared to March 2019 (Colbert et al., 2020). These increases may have been assisted by government decisions to relax alcohol policies enabling selected on-premise businesses (e.g., restaurants) in all Australian jurisdictions, except the Northern Territory, to temporarily provide home delivery (Colbert et al., 2020). Types of alcohol (e.g., beer, wine), quantity limits (e.g., one bottle, 6-pack), and the condition that a meal be sold in conjunction with alcohol, varied across each jurisdiction (Miller et al., 2021). Sudden policy relaxations, increases in premises providing home delivery, and rapid growth in these services driven by COVID-19 highlights concerns surrounding adequate legislation with regard to responsible service and delivery. At the time that temporary home delivery policies were introduced, legislation regulating responsible service of alcohol training and age verification were not required for delivery drivers, despite being mandatory for anyone involved in the service of alcohol in on- and off-premise stores (*Liquor Act 2007* [NSW]).

Literature exploring the relationship between alcohol delivery services and consumption during COVID-19 is scarce. A recent New Zealand study examining use of home delivery during their first lockdown (March to May 2020), found that 40% of respondents used home delivery during this period (Huckle et al., 2021). Those using these services had a 24% higher typical quantity consumption in the past week compared to those not using home delivery, with men having 98% higher odds of engaging in heavy drinking compared to women. Similar research in Canada identified a smaller percentage of respondents (17.2%) reporting alcohol delivery during the same period (March – May 2020; MacNabb et al., 2021). Reports of home delivery use amongst women and those aged 35 and older were less likely compared to men and younger respondents. Moreover, consumption patterns during the survey period and before COVID-19 revealed that respondents reporting increased consumption during lockdown were almost twice as likely to use home delivery compared to those reporting decreased or stable consumption (MacNabb et al., 2021).

Few Australian studies have explored the relationship between alcohol home delivery and consumption during COVID-19 and how this compares to before the pandemic. Callinan et al. (2021) found no significant association between delivery usage and alcohol consumption during lockdown restrictions in April 2020 when compared to 2019. Clare et al. (2021) instead observed a decrease in online alcohol service use between May and June 2020 compared to February 2020. However, as restrictions implemented during the first COVID-19 wave ended during mid-May 2020 in most Australian jurisdictions (Miller et al., 2021), these results do not accurately reflect delivery use during lockdown conditions. Despite these findings, research identifying associations between use of home delivery and prolonged drinking sessions (Mojica-Perez et al., 2019) highlights the importance of a greater understanding as to whether home delivery purchases are associated with increased consumption during a reported drinking session (i.e., occasion-level consumption).

With the growth of alcohol home delivery prior to and accelerated by COVID-19, alongside relaxations of Australian alcohol policies and increases in outlets providing these services, there is a need to understand the relationship between home delivery use and reported consumption patterns. Therefore, the current study aims to explore within NSW, (1) the impact of COVID-19 restrictions on alcohol home delivery use; (2) the relationship between home delivery use and average alcohol consumption across differing restriction periods; and (3) the relationship between use of home delivery and occasion-level consumption. In line with previous research by Huckle et al. (2021) and MacNabb et al. (2021), the following hypotheses were tested:

- Firstly, alcohol home delivery use will increase during lockdown from pre-lockdown levels;

- Secondly, respondents who use alcohol home delivery will report consuming more than those who did not use home delivery during the COVID-19 survey periods;

- Thirdly, being male, aged 35 and younger, and consuming more alcohol will be a positive predictor of reported use of alcohol home delivery during COVID-19;

- Finally, at the occasion-level, those who consume more during daily drinking sessions will be more likely to report that the purchase source was home delivery.

Method

Study Design

The study employed a longitudinal design with four survey waves to collect data online across five time periods between 23 March 2020 and 30 November 2020 (see Table 1). A self-generated unique alphanumeric identifier was used to match participant responses across each wave. Further details of the study design have been published previously (Ritter et al., 2020). Ethical approval was granted by the University of New South Wales Ethics Committee (#HC200305).

Participants

The analytic sample consisted of 586 participants who completed a minimum of 2 surveys and were recruited through convenience sampling via advertisements on social media, noticeboards, and emails. Prospective participants were required to be 18 years or older, reside in NSW during the study period, and to have consumed alcohol in the 12 months prior to the baseline survey. Of these 586 participants, the majority were female (65.3%), with a mean age of 35 (95% CI [34.1, 36.5]). A total of 1,454 survey responses were collected across the four surveys. Some respondents did not complete the identifier at Wave 0 or could not be matched, and as such, 102 survey responses were excluded ($n = 1,352$). Given the high rates of attrition, examination of any significant differences in demographic, home delivery, and alcohol consumption variables among study completers vs non-completers were conducted (see Supplementary Table 1). Overall, there were no significant

differences in home delivery usage, however completers were significantly more likely to be aged 36 and over.

At each survey wave participants completed a weekly drinking dairy. In total, out of a possible 20,510 days, data was available for 13,558 days (missing = 6,952, 33.9%), with a subsequent 8,238 days excluded due to non-drinking (60.8%; see Supplementary Table 2 for a breakdown by

survey wave). A total of 9,464 daily diary responses across the five waves were obtained with analyses conducted on a sub-sample of 5,320 drinking occasions (i.e., days where daily standard drinks > 0) from 553 participants (M_{age} = 37; 62.1% female) who reported their sex, age, daily number of standard drinks, and purchase location (n = 33 participants excluded).

Table 1

Survey Waves, Reference Periods, COVID-19 Policies and Participant Completion and Attrition

Survey Wave	Survey Reference Period	Survey Completion Period	NSW COVID-19 Policy Changes	n Surveys Completed (% Response Rate)
Wave 0: Baseline (Pre-lockdown)	February 2020	6–18 May 2020	Restrictions on international arrivals	586 (100)
Wave 1: NSW Lockdown	23 March – 14 May 2020	6–18 May 2020	Licenced and other venues required to close, with gatherings of 2+ people banned	586 (100)
Wave 2: Partial re-opening	'The last month'	10–25 June 2020	Easing of some social restrictions, businesses permitted to reopen with venue caps and social distancing	319 (54.4)
Wave 3: Open and shut	July 2020	26 July – 11 August 2020	Removal of venue caps start of July, reintroduction of venue caps mid-July	225 (38.4)
Wave 4: COVID-normal	'The last month'	15–30 November 2020	Licensed venues operating with limited restrictions, further easing of existing restrictions (e.g., booking sizes)	222 (37.9)

Measures

The surveys were conducted using Qualtrics Survey Software. The first survey took 18 minutes to complete on average, with the subsequent surveys taking approximately 10 minutes. Questions assessed general demographics, alcohol consumption in the past month, drinking motives, alcohol purchasing, and restrictions on movement. Participants were also asked to complete a weekly drinking diary, reporting retrospectively on typical patterns of drinking and alcohol purchasing during each survey reference period.

Alcohol Consumption – Total Volume

Total volume was assessed via responses each participant gave in their weekly drinking diary. Participants were asked to think of their current typical pattern of drinking for each day of the week and state the number of standard drinks consumed for the days they typically have a drink. In order to present the total volume figure in an interpretable fashion, and align with previous studies (Barbosa et al., 2021; Callinan et al., 2021), we divided the typical week's total

consumption by seven as an approximate of average drinks per day.

Purchase Source – Home Delivery vs Other

The weekly drinking diary was used to gain information about drinking occasions where alcohol was purchased utilising home delivery services. The question; 'Where was the alcohol purchased/sourced?' was used to determine the source of alcohol for a daily-reported drinking session. Based on this question, a dichotomous variable was created (i.e., 'purchased online' [home delivery] vs. any other purchase source).

Home Delivery Frequency

Frequency of alcohol home delivery use was measured via the question; 'How often do you purchase home delivery alcohol?'. The question assessed monthly use of home delivery and gave participants five response options ranging from 'never' to 'more than once a week' which were dichotomised ('never'; 'any delivery') for analysis.

Demographics

Age was collected in years and dichotomised for analyses (18-35; 36+) to allow for roughly equally sized groups based on inspection of the mean participant age. Gender was a multiple-choice format with four response options ('male', 'female', 'non-binary', and 'other'). Due to small percentages of respondents selecting 'non-binary' and 'other', and concerns about misleading results from small sample sizes, respondents who selected these options were excluded from analyses that included gender.

Statistical Analyses

All data were analysed using STATA (v.15; StataCorp, 2017), with analyses being exploratory. Descriptive statistics were conducted across each survey wave to calculate the percentage of participants reporting use of alcohol home delivery services as well as 95% confidence intervals (CI) and *t*-tests, where appropriate.

Predicting Home Delivery Usage at the 'Wave' Level

First, we considered the predictors of monthly home delivery frequency for each survey wave. To examine the first hypothesis, a hierarchical logistic mixed effects model was conducted to determine the association between use of home delivery services and survey wave with observations nested within participants. Paired *t*-tests were conducted to examine the second hypothesis; persons reporting home delivery consumed more alcohol during lockdown than those not using home delivery.

To examine the third hypothesis, bivariate and multiple logistic regression models were used to predict the use of any alcohol home delivery in each survey wave.

Predicting Home Delivery Usage at the Occasion-Level

Given we also had daily reports concerning the number of drinks consumed and purchase source, occasion-level analysis using data derived from the weekly drinking diaries was conducted. Hierarchical logistic mixed effects regression models were estimated to examine predictors for the fourth hypothesis, i.e., those who consumed more at the occasion-level were more likely to report home delivery than those reporting other purchase sources.

Results

Table 2 summarises the percentage of participants who reported use of alcohol home delivery across each wave. Overall, usage rose significantly during lockdown compared to pre-lockdown from 20% to 34% and remained significantly above pre-lockdown levels in Waves 2 and 3. However, use of home delivery returned to below baseline levels by Wave 4 (18.5%).

Table 2

Use of Alcohol Home Delivery Services by Survey Wave

		Pre-Lockdown (Baseline)	NSW Lockdown (Wave 1)	Partial Re-Opening (Wave 2)	Open And Shut (Wave 3)	COVID-Normal (Wave 4)
n		584	579	315	220	211
Any Delivery (Past Month)	**% [95% CI]**	19.9 [16.6, 23.1]	34.0 [30.2, 37.9]	28.3 [23.2, 33.3]	25.5 [19.7, 31.3]	18.5 [13.2, 23.8]
	OR [95% CIs]	1 (Ref)	2.02*** [1.47, 2.79]	1.97** [1.34, 2.90]	1.62* [1.04, 2.51]	0.88 [0.54, 1.43]

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. *n* = number of survey responses. OR = Odds Ratio. Hierarchical logistic mixed effects model used to determine ORs. Ref = 1.

Analysis of differences between the total volume consumed by participants who either reported or did not report using alcohol home delivery services during each wave is detailed in Table 3. Results suggest that at baseline, Wave 3 and Wave 4, there were no significant differences in total volume between people who had their alcohol home-delivered and those who did not. However, under restrictions (Waves 1 and 2), respondents who reported use of home delivery consumed a significantly higher total volume.

Table 3

Mean Total Volume Consumed by People Who Did or Did Not Use Home Delivery Services, by Survey Wave

	Pre-Lockdown (Baseline) M (95% CI)	NSW Lockdown (Wave 1) M (95% CI)	Partial Re-Opening (Wave 2) M (95% CI)	Open and Shut (Wave 3) M (95% CI)	COVID-Normal (Wave 4) M (95% CI)
n	584	579	315	220	211
No delivery	2.17 [1.94, 2.41]	2.11 [1.79, 2.42]	1.57 [1.31, 1.83]	1.70 [1.34, 2.05]	1.72 [1.38, 2.06]
Delivery	2.55 [2.10, 3.00]	2.71 [2.29, 3.13]	2.56 [2.01, 3.10]	2.00 [1.57, 2.43]	2.22 [1.66, 2.78]
t-value	1.42	2.22*	3.64**	0.91	1.29

Note. * $p < .05$, ** $p < .01$. *n* = number of survey responses.

Table 4 details bivariate and multivariable logistic regression models predicting use of any alcohol home delivery within each wave. People aged 36 and over were significantly more likely to report having alcohol delivered compared to people aged under 36 across all waves except

Wave 1. Gender was not a significant predictor in either of the models. A significant, positive association was detected between total volume and the likelihood of having alcohol delivered, specifically during Wave 1 and Wave 2. This association was not observed during any other waves.

Table 4

Bivariate and Multiple Logistic Regression Predicting Use of Home Delivery, by Survey Wave

	Pre-Lockdown (Baseline)		NSW Lockdown (Wave 1)		Partial Re-Opening (Wave 2)		Open And Shut (Wave 3)		COVID-Normal (Wave 4)	
	OR (95% CI)		OR (95% CI)		OR (95% CI)		OR (95% CI)		OR (95% CI)	
	B	M	B	M	B	M	B	M	B	M
Age										
18-35	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	1.78**	1.75**	1.06	1.01	1.89*	1.90*	2.13*	2.04*	2.14*	2.19*
36+	(1.18, 2.69)	(1.15, 2.66)	(0.75, 1.50)	(0.71, 1.44)	(1.15, 3.10)	(1.13, 3.17)	(1.14, 3.97)	(1.09, 3.83)	(1.03, 4.45)	(1.03, 4.65)
Gender										
Women	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	1.21	1.16	0.96	0.89	1.45	1.29	1.13	1.10	1.35	1.18
Men	(0.79, 1.86)	(0.75, 1.80)	(0.67, 1.39)	(0.61, 1.30)	(0.87, 2.44)	(0.75, 2.23)	(0.60, 2.14)	(0.56, 2.17)	(0.65, 2.79)	(0.55, 2.54)
Total Volume Consumed	1.05	1.04	1.06*	1.07*	1.22**	1.19*	1.06	1.05	1.09	1.08
	(0.98, 1.13)	(0.97, 1.12)	(1.01, 1.12)	(1.01, 1.13)	(1.08, 1.37)	(1.06, 1.35)	(0.93, 1.21)	(0.91, 1.20)	(0.95, 1.26)	(0.94, 1.26)
n	574		569		309		217		207	

Note. * $p < .05$, ** $p < .01$. Ref = 1. B = Bivariate, M = Multiple. N = Number of survey responses.

Bivariate and multiple mixed effects logistic regressions were conducted to examine predictors of any home delivery purchases (Table 5). Those who consumed more during daily-reported drinking sessions were significantly more likely to report home delivery as the purchase source in the bivariate model, with this effect becoming non-significant after accounting for age, gender, and survey wave. However, this effect is weak and should be interpreted with caution. The odds of reporting home delivery as the purchase source were significantly higher during the lockdown, Wave 2, and Wave 4, compared to baseline. No significant differences by age or gender were found.

Discussion

This study aimed to explore the relationship between use of alcohol home delivery services and patterns of consumption during COVID-19 restrictions in NSW. As hypothesised, home delivery use rose significantly during the NSW lockdown period compared to pre-lockdown. These findings align with those observed during the first lockdown in both New Zealand and Canada, where similar public health restrictions to Australia were implemented (Huckle et al., 2021; MacNabb et al., 2021). Due to COVID-19 restrictions mandating people to stay home, it is expected that home delivery usage would rise as the number of people required to stay home increased. Moreover, closure of on-premise

venues and subsequent policy changes enabling selected businesses to begin selling takeaway alcohol, resulted in an increase of outlets offering delivery (Colbert et al., 2020). Despite this initial increase, delivery use was shown to decline back to pre-lockdown levels during COVID-normal. This potentially comprised persons who usually consume most of their alcohol at licensed premises, who then chose to engage in home delivery during on-premise business closures. Therefore, the ability for people to leave the house and resume consuming alcohol at on-premise venues may have reduced the need to use home delivery services. However, the decline in response rate across waves may have also influenced these findings.

The finding that the average number of drinks consumed per day was significantly higher amongst respondents reporting use of home delivery compared to those who did not report use of home delivery during lockdown, supports the second hypothesis and aligns with findings by Huckle et al. (2021). Interestingly, the amount of alcohol consumed was also significantly higher during partial re-opening conditions amongst those reporting home delivery usage. It may be that increased levels of anxiety in relation to being infected with COVID-19 post-lockdown (Khubchandani et al., 2021) alongside moderate to high perceived health-related COVID-19 risks, increased engagement in alcohol home delivery (MacNabb et al., 2021). Therefore, it is possible that

people with increased fears regarding COVID-19 infection were more inclined to use delivery services rather than leave the house and drink at on-premise venues. However, whether home delivery facilitated these increases or those who were going to drink more anyway, is unknown.

Table 5

Bivariate and Multiple Logistic Mixed Effects Models Predicting Reporting of Any Home Delivery as Purchase Source

	Reported home delivery as purchase source of alcohol	
	OR [95% CI] B	OR [95% CI] M
Individual level predictors		
Age		
<35	1 (Ref)	1 (Ref)
36+	1.17	1.21
	[0.45, 3.03]	[0.43, 3.36]
Gender		
Women	1 (Ref)	1 (Ref)
Men	1.55	1.60
	[0.61, 3.98]	[0.58, 4.40]
Occasion level predictors		
Mean number of daily reported standard drinks	1.08* [1.02, 1.15]	1.06 [1.00, 1.14]
Survey wave		
Baseline	1 (Ref)	1 (Ref)
Wave 1	7.40***	7.34***
	[4.48, 12.43]	[4.43, 12.15]
Wave 2	3.03***	3.02***
	[1.68, 5.46]	[1.67, 5.45]
Wave 3	1.11	1.13
	[0.56, 2.20]	[0.57, 2.24]
Wave 4	2.72**	2.80**
	[1.34, 5.51]	[1.37, 5.70]
***n* participants (*n* days)**	553 (5,320)	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Ref = 1. B = Bivariate, M = Multiple.

Contrary to the third hypothesis, men were not significantly more likely to report alcohol home delivery than women during lockdown. This is in contrast to MacNabb et al. (2021) who identified that use of delivery services during lockdown was greater amongst men than women. However, previous Australian research found no differences between gender and using home delivery during the first lockdown compared to pre-lockdown (Clare et al., 2021). Further, persons aged 35 and under were not significantly more likely to use home delivery during the lockdown period than older respondents (36+), further refuting the third hypothesis. Interestingly, respondents aged 36 and older had significantly higher odds of reporting home delivery than those aged 35 and under across all other survey waves (baseline, Waves 2, 3 and 4). Prior to this study, there appears only one study assessing differences across age and alcohol home delivery use (MacNabb et al., 2021), thereby making a theoretical point of comparison difficult. However, research identifying consumption reductions amongst young people both pre- and during COVID-19 (Livingston et al., 2021; Neill et al., 2020) may explain this difference. Moreover, identification of a positive association between reporting higher levels of consumption and use of home delivery partially supports the third hypothesis. These results concur with those in New Zealand (Huckle et al., 2021) and Canada (MacNabb et al., 2021) which determined that higher consumption quantity during lockdown was a predictor of alcohol home delivery use.

Further, while those who consumed greater levels of alcohol during daily-reported drinking sessions (i.e., occasion-level) were significantly more likely to report home delivery as the purchase source, this did not hold after accounting for confounders, contrary to the fourth hypothesis. This finding was surprising given that research in New Zealand, a country with similar consumption patterns (Chaiyasong et al., 2018) and COVID-19 restrictions to Australia, determined that delivery usage during lockdown was associated with higher typical occasion consumption (Huckle et al., 2021). However, our study only assessed whether home delivery was the source of daily consumed alcohol, and not when or where the purchase occurred, and we recommend future research makes this distinction. Further, due to occasion level analyses in the current study focusing on the amount of alcohol consumed on a given occasion, analysis exploring potential differences in the frequency of drinking occasions was not congruent, and we suggest this be explored in future research. Moreover, the finding that the odds of reporting home delivery as the purchase source were significantly higher during lockdown and Waves 2 and 4 when compared to baseline, indicates that use of these services during lockdown conditions continued after the easing of restrictions. This may be due to changes in the convenience of obtaining alcohol, which has been identified as the most common reason for engaging in home delivery (Mojica-Perez et al., 2019), thereby becoming a standard practice for some despite restrictions regarding on-premise venues easing. With takeaway liquor policy relaxations becoming permanent in some jurisdictions (Marshall & Chapman, 2020; Restaurant & Catering Australia [R&CA], 2021), policymakers should consider the influence new permanent legislation may have on home delivery use and consumption.

Strengths and Limitations

Among the limitations of this study is the use of convenience sampling meaning that the results are not representative of the population of NSW. Moreover, the decline in participant

numbers across the survey waves make it difficult to identify whether observed changes were the result of decreased COVID-19 restrictions, or participants comprised of online purchasers who dropped out. However, with the sudden onset of the pandemic, the manner in which the sample was recruited is often the only way to ask people about their COVID-specific experiences during the period it is happening, thereby minimising recall bias. However, it is important to note that due to differing levels of recall required from participants (last month vs. three months ago), the accuracy of the findings may be impacted. Another strength of the study is the adoption of a longitudinal design that allowed for reduced variability and for the effect of differing COVID-19 restrictions to be observed across reported consumption patterns and use of home delivery services. Moreover, use of a weekly drinking diary has been shown to have increased accuracy, capturing higher drinking frequency than other alcohol consumption recall methodology (Heeb & Gmel, 2005).

Conclusions

The current study, to our knowledge, is the first to longitudinally explore the influence of alcohol home delivery service usage on consumption behaviour during COVID-19 lockdown restrictions within NSW. Increased use of home delivery during lockdown suggests that restrictions hindering drinking at on-premise venues led people to engage in adaptive behaviour, obtaining alcohol through alternative yet convenient avenues. Despite a non-significant decrease in home delivery use to pre-lockdown levels, it appears that when presented with the opportunity to resume on-premise consumption, people reduced this way of purchase. Moreover, results revealing that persons aged 36 and over were more likely to use alcohol home delivery than those 35 and under, highlights a subset of the population that might be at increased risk of harmful drinking behaviour. Further, findings determining no significant association between alcohol consumption at the occasion-level (once accounting for confounders) and reporting home delivery as the purchase source, is encouraging in that current alcohol regulations do not appear to require immediate change. Future research should aim to analyse the impact home delivery has on risky consumption (five or more standard drinks), alongside the influence that increased outlet density may have on drinking patterns and related harms.

Acknowledgements

References

Barbosa, C., Cowell, A. J., & Dowd, W. N. (2021). Alcohol consumption in response to the COVID-19 pandemic in the United States. *Journal of Addiction Medicine*, *15*(4), 341. https://doi.org/10.1097/ADM.0000000000000767

Callinan, S., Mojica-Perez, Y., Wright, C. J., Livingston, M., Kuntsche, S., Laslett, A. M., Room, R., & Kuntsche, E. (2021). Purchasing, consumption, demographic and socioeconomic variables associated with shifts in alcohol consumption during the COVID-19 pandemic. *Drug and Alcohol Review*, *40*(2), 183–191. https://doi.org/10.1111/dar.13200

Chaiyasong, S., Huckle, T., Mackintosh, A. M., Meier, P., Parry, C. D., Callinan, S., Viet Cuong, P., Kazantseva, E., Gray-Phillip, G., & Parker, K. (2018). Drinking patterns vary by gender, age and country-level income: Cross-country analysis of the International Alcohol Control Study. *Drug and Alcohol Review*, *37*(S2), S53–S62. https://doi.org/10.1111/dar.12820

Clare, P. J., Aiken, A., Yuen, W. S., Upton, E., Kypri, K., Degenhardt, L., Bruno, R., McCambridge, J., McBride, N., & Hutchinson, D. (2021). Alcohol use among young Australian adults in May-June 2020 during the COVID-19 pandemic: A prospective cohort study. *Addiction*. *116*(12), 3398–3407. https://doi.org/10.1111/add.15599

Colbert, S., Wilkinson, C., Thornton, L., Feng, X., Campain, A., & Richmond, R. (2023). Cross-sectional survey of a convenience sample of Australians who use alcohol home delivery services. *Drug and Alcohol Review*. *42*(5), 986–995. https://doi.org/10.1111/dar.13627

Colbert, S., Wilkinson, C., Thornton, L., & Richmond, R. (2020). COVID-19 and alcohol in Australia: industry changes and public health impacts. *Drug and Alcohol Review*. *42*(5), 986–995. https://doi.org/10.1111/dar.13627

Heeb, J.-L., & Gmel, G. (2005). Measuring alcohol consumption: a comparison of graduated frequency, quantity frequency, and weekly recall diary methods in a general population survey. *Addictive Behaviors*, *30*(3), 403–413. https://doi.org/10.1016/j.addbeh.2004.04.022

Huckle, T., Parker, K., Romeo, J. S., & Casswell, S. (2021). Online alcohol delivery is associated with heavier drinking during the first New Zealand COVID-19 pandemic restrictions. *Drug and Alcohol Review*, *40*(5), 826–834. https://doi.org/10.1111/dar.13222

InsideRetail. (2015, March 26). *Demand for online alcohol surges*. Inside Retail. Retrieved October 20 from https://insideretail.com.au/news/demand-for-online-alcohol-surges-201503

Khubchandani, J., Sharma, S., Webb, F. J., Wiblishauser, M. J., & Bowman, S. L. (2021). Post-lockdown depression and anxiety in the USA during the COVID-19 pandemic. *Journal of Public Health*, *43*(2), 246–253. https://doi.org/10.1093/pubmed/fdaa250

Liquor Act 2007 (NSW), § 114. https://classic.austlii.edu.au/au/legis/nsw/consol_act/la2007107/s114.html#:~:text=other%20communication%20media-,114%20Sale%20of%20liquor%20through%20internet%20or%20by%20other%20communication,in%20connection%20with%20such%20sales

Livingston, M., Callinan, S., Vashishtha, R., Yuen, W. S., & Dietze, P. (2021). Tracking the decline in Australian adolescent drinking into adulthood. *Addiction*. *117*(5), 1273–1281. https://doi.org/10.1111/add.15720

MacNabb, K., Blades, S., Thompson, K., Dutton, D. J., Liu, T., & Asbridge, M. (2021). Alcohol access and purchasing behaviour during COVID-19 pandemic restrictions: An exploration of sociodemographic, health and psychosocial correlates in two Canadian provinces. *Drug and Alcohol Review*. https://doi.org/10.1111/dar.13423

Marshall, S., & Chapman, V. (2020, November 24). *Pandemic's positive takeaway helping to back small buisness*

Miller, M., Mojica-Perez, Y., Livingston, M., & Callinan, S. (2021). *A timeline of alcohol-related restrictions during the COVID-19 pandemic (Version 5)*. https://www.latrobe.edu.au/news/announcements/2020/a-timeline-of-alcohol-relevant-restrictions-during-the-covid-19-pandemic

Mojica-Perez. Y., Callinan, S., &,Livingston, M. (2019, November). *Alcohol Home Delivery Services: An Investigation of Use and Risk*. FARE & CAPR. https://fare.org.au/wp-content/uploads/Alcohol-home-delivery-services.pdf

Neill, E., Meyer, D., Toh, W. L., van Rheenen, T. E., Phillipou, A., Tan, E. J., & Rossell, S. L. (2020). Alcohol use in Australia during the early days of the COVID-19 pandemic: Initial results from the COLLATE project. *Psychiatry and Clinical Neurosciences*, *74*(10), 542–549. https://doi.org/10.1111/pcn.13099

Neufeld, M., Lachenmeier, D. W., Ferreira-Borges, C., & Rehm, J. (2020). Is alcohol an "essential good" during COVID-19? Yes, but only as a disinfectant! *Alcoholism: Clinical and Experimental Research*, *44*(9), 1906–1909. https://doi.org/10.1111/acer.14417

Phillips, T., Zhang, Y., & Petherick, A. (2021). A year of living distantly: global trends in the use of stay-at-home orders over the first 12 months of the COVID-19 pandemic. *Interface Focus*, *11*(6), 20210041. https://doi.org/10.1098/rsfs.2021.0041

Restaurant & Catering Australia (R&CA). (2021, 9 December 2021). *NSW hospitality industry welcomes takeaway alcohol announcement*.

Reynolds, J., & Wilkinson, C. (2020). Accessibility of 'essential'alcohol in the time of COVID-19: Casting light on the blind spots of licensing? *Drug and Alcohol Review*, *39*(4), 305–308. https://doi.org/10.1111/dar.13076

Ritter, A., Wilkinson, C., Vuong, T., Kowalski, M., Barrett, L., Mellor, R., & Sommerville, K. (2020). *Distilling our changing relationship with alcohol during COVID-19*. Sydney: UNSW Social Policy Research Centre. http://doi.org/10.26190/5f84c1dba9f36

StataCorp. (2017). *Stata Statistical Software: Release 15*. In StataCorp LLC