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A protocol for the extension of the Australian Parental
Supply of Alcohol Longitudinal Study (APSALS)

NDARC Technical Report No. 340

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EXECUTIVE SUMMARY

Background: Alcohol is the main risk factor for incident disability-adjusted-life-years in 10-24-year-olds. Exposure to alcohol is associated with a significant lifelong burden of disease. Parents are the most common source of alcohol for children/adolescents under 18-years-of-age. Parental supply of alcohol to children has been implicated to increase risk of harm. However, previous studies have been poorly controlled for critical variables such as follow-up duration, age range, other sources of supply, and other known confounders.

Aims: We aim to examine two main hypotheses in our existing longitudinal cohort of young people, that:

1. Parental supply of alcohol before 18-years-of-age will have unadjusted associations with early adult adverse outcomes at 20-23-years (bingeing, alcohol use disorders (AUDs), harms, aggression);
2. Once confounders (parental, familial, child, and peer variables) are adjusted for, exposure to parental supply before 18-years-of-age will continue to have a strong association and dose-response relationship with these four early adult adverse outcomes.

Methods: We will utilize our established cohort of 1,927 parent-child dyads recruited during 2010-2011 from government, independent and Catholic schools in New South Wales (NSW), Western Australia (WA), and Tasmania (TAS). Our cohort's distribution of sex, household composition, and socioeconomic status, etc., is similar to that of this age group in the Australian population. The cohort was assessed via annual surveys from 2011 to 2017. Both young people and their parents were surveyed in Waves 1-6. From Wave 7 (2017), parents are no longer assessed, but are now secondary contacts points for our participants. The eighth wave of follow-up is in progress at the time of publication of this report. As retention is becoming an issue in young adulthood, we also are revising our strategies to keep participants engaged with the study.

Discussion: Given the pivotal role of parents in their children's lives, and their capacity/willingness to prevent alcohol problems, it is crucial that we understand the long-term associations and possible impact of parental supply of alcohol. Advising parents of these impacts can be highly salient and directly helpful to their parenting behaviours, and in turn improve health outcomes and the global public health burden arising from alcohol use among young people. If parental supply is associated with increased consumption, the implications are clear. Results from the study will be highly relevant to public health policy and practice.

1. INTRODUCTION

Alcohol use is currently the leading cause of preventable disease burden for young people, both in Australia and internationally (1, 2). In 2016, 10% of 12- to 15-year-old Australians had consumed a full serve of alcohol in the past year, increasing to 45% of 16- to 17-year-olds (3). Cross-sectional and prospective studies suggest that early age of initiation is associated with later drinking problems (4-6); yet other research has shown that these impacts are limited to adolescence (7), or that the relationship disappears once genetic (8) or child, parent and contextual factors are considered (9).

One of the main suppliers of alcohol to adolescents are their parents, with 32% of 12- to 17-year-olds reporting that their parents were their usual alcohol supplier in 2016 (3). Parental supply of alcohol is second only to peer supply and has been associated with heavier drinking in adolescents even when taking into account the prevalence of peer supply (10). Despite the aforementioned risks of early introduction to alcohol, the associations between parental alcohol supply in early-mid adolescent years and early adult drinking remain poorly researched.

1.1 Aims and Rationale

With our current cohort of 1,927 parent-child dyads, we have examined the early years of parental supply from 13- to 20-years of age (eight waves of data collected as of July 2018). Using 5 waves of data, we have found parental supply, peer, and other factors to be associated with increased risk of drinking and harms (11). Analyses of six waves of data have confirmed that parental provision of alcohol does not have a protective effect on their children, but is indeed associated with subsequent alcohol-related harms and symptoms of alcohol-use disorders (12).

Our current aim is to extend our observation of this cohort for an additional three waves, from 21- to 23-years-of-age when risky drinking behaviours and alcohol-related harms are likely to become manifest (3). Of interest is the association between parental supply and the development of alcohol use disorders (AUDs) in young adulthood. This research will be the most comprehensive and longest epidemiological study on this topic and allows us to fully understand the impacts of parental supply from early teen years until after the legal age of purchasing alcohol in Australia. Notably, it will utilise our large cohort of young people, spanning the development of drinking behaviours across the teen and adult years. The important covariates and confounders in both parents and their children will be comprehensively assessed. Such a design will allow the use of multilevel modelling and marginal structural modelling analyses to understand the associations with heavy drinking and harms in early adulthood, and any harmful or protective effects which may come from parents either providing or else minimising alcohol availability.

The below overviews the study design, identifying aspects which will alter with the extension of the duration of monitoring for the cohort. Particular emphasis is placed on cohort retention, with a review of new retention strategies to be implemented for additional waves of data collection.

2. OVERVIEW OF STUDY DESIGN

2.1 Study Design

Our study utilises a prospective cohort with a recent extension from the current seven waves (covering the ages 13-19 years, 2011-2017) to four new waves of annual data collection (covering the ages 20-23 years, 2018-2021).

2.2 Recruitment

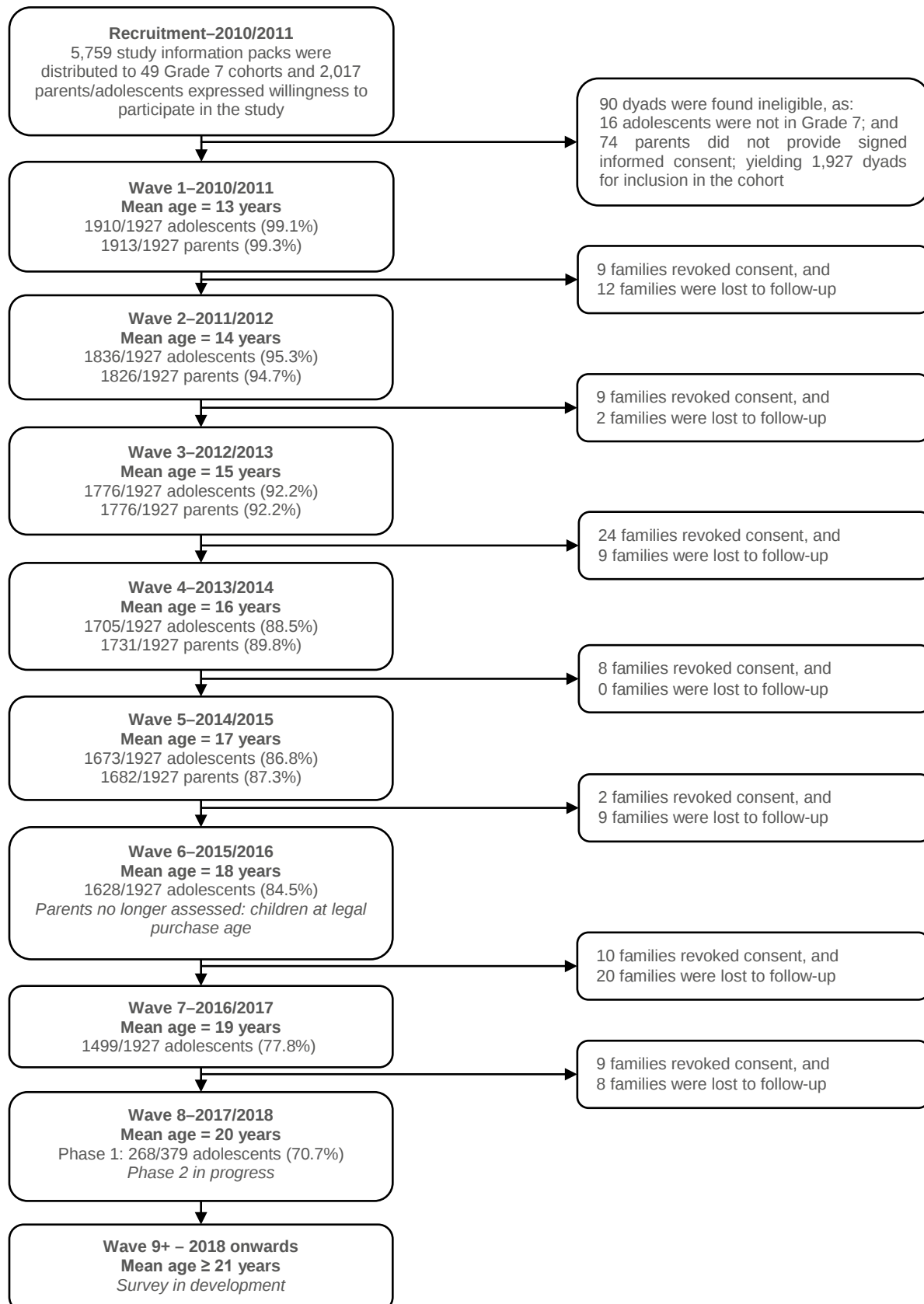
Recruitment commenced in September 2010, with secondary schools across New South Wales (NSW), Western Australia (WA), and Tasmania (TAS) being approached to assist. Of the 107 schools approached, 49 (45.8%) agreed to participate (with 57% of government, 29% of Catholic and 47% of independent schools approached agreeing to participate). The participating Grade 7 cohorts were from government (39%), Catholic (12%) and independent (49%) schools in NSW (24%), WA (27%) and TAS (49%). Schools elected to either: (i) distribute information packs by mail to parents directly; or (ii) have members of the research team provide a brief presentation to students, distributing study information packs. The first option was selected by 65.3% of schools, with a return rate of 39.3%, and the second option by 35.0% of schools, with a return rate of 22.1%. Return rates for individual schools ranged between 9.0% and 55.0%. Overall, 5,759 study information packs were distributed, with an overall return rate of 35.0%. These rates are comparable to expectation in the context of the active informed consent (versus passive consent) method of school-based recruitment.

After opting to receive information about the study, informed consent forms were sent to parents, and the parent-child dyads were sent separate Wave 1 and follow-up questionnaires to be completed independently of each other, either online or by mail (61.0% online at Wave 1). This separate independent reporting aimed to minimize reporting bias, especially by the children. Participants were eligible for inclusion if the adolescent was in Grade 7 at recruitment, and if active parental signed informed consent was provided. Of 1,977 families, there were 38 families with twins and one family with triplets. The parents of the twins and triplets were asked to complete a separate survey about each child, and each child completed their own survey. This resulted in an additional 40 dyads, taking the total number of dyads opting into the study to 2,017. Of the 2,017 dyads expressing willingness to opt into the

study, 16 (0.8%) proved ineligible as the child was not in Grade 7, and 74 parents (3.7%) did not provide signed informed consent. These dyads were not included, resulting in a cohort of 1,927 dyads at the conclusion of recruitment in June 2011 (Figure 1).

The final cohort consisted of 1,927 Australian adolescents born from 1996–1999 (mean age at Wave 1 = 12.9 years), and a parent or guardian (the mother in 86.3% of dyads; mean age at Wave 1 = 43.9 years). Comparison with Australian population data from national data collections suggests that the cohort was comparable with, although somewhat more advantaged than, the general population. Parents reported higher levels of education and employment compared with the general population, though the median weekly income was similar. TAS and WA, along with independent and Catholic schools are overrepresented in the cohort. The predominance of students from non-government (independent or Catholic) schools may have biased the cohort towards higher levels of advantage compared with the general population. Despite this, the similarity of the cohort to the Australian population on a range of demographic variables suggests such potential biases are not large.

Figure 1: Study Flowchart with Participation Rates from the APSALS Cohort Since Recruitment



2.3 Follow-up

Follow-up occurs annually in two phases; phase 1 (379 participants) occurs from August to December, and phase 2 (1548 participants) occurs in the following year from March to July. To date, 7 years of data collection have been completed, with the eighth year currently in progress (Figure 1). Wave 1 questionnaire response rates were 99.3% for parents and 99.1% for adolescents; 1,913 parents (mean age (M) = 43.9 years, standard deviation (SD) = 5.3) and 1,910 adolescents (M= 12.9 years, SD = 0.5) completed Wave 1 surveys. This resulted in 1,896 complete parent-child dyads and 31 dyads where only one member completed the Wave 1 survey. The 31 dyads where only one member completed the Wave 1 survey were included, resulting in a cohort of 1,927 dyads. The parents or adolescents in these dyads who did not complete Wave 1 were invited to complete follow-up surveys. From Wave 6 onwards, parents were no longer assessed due to limited funding to support data collection for both members of the dyads.

The extension of this cohort will see the addition of three further waves of data collection (Waves 9, 10, and 11).

2.4 Measures

Measures included at each survey wave are shown in Tables 1 and 2 for young people and their parents, respectively. Most measures are taken or modified from pre-existing measures. A subsample of parents (65.8% of the cohort) also consented to researchers accessing their child's Grade 7 and Grade 9 (Wave 1 and Wave 3, respectively) National Assessment Program – Literacy and Numeracy (NAPLAN) results, a national standardized literacy and numeracy test for students conducted in schools across Australia.

Core measures included in the survey of young people will be retained for the additional three waves of data collection, as outlined in Table 1.

Table 1. Measures Obtained from Young People

	Data Collected 2010/11-2017/18								Data Collected 2018/19-2021/22 (Extension)		
Measures	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7	Wave 8	Wave 9	Wave 10	Wave 11
Demographics											
Birth date, sex, household composition	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
School grade	✓	✓	✓	✓	✓	✓	✓				
Occupation							✓	✓	✓	✓	✓
Highest level of education								✓	✓	✓	✓
Personal annual income								✓	✓	✓	✓
Available discretionary money	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Family alcohol problems							✓				
Alcohol use											
Age of first alcohol use (13)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Source of first alcohol (13)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Parental supply: Q/F, supervision (14)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Alcohol use: Q/F (13)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Heavy episodic alcohol use: Q/F (13)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Source and quantity of alcohol supplied (14)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Context of alcohol supply and consumption (14)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Types of alcohol consumed (13)			✓	✓	✓	✓	✓	✓	✓	✓	✓
Alcohol and energy drinks (15)			✓	✓	✓	✓	✓	✓	✓	✓	✓
Effects of alcohol (9)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Alcohol-related harms (14)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Motivations for alcohol use (16)		✓	✓	✓							
Symptoms of DSM-IV alcohol use (17)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Intentions to use alcohol (18)		✓	✓	✓	✓	✓	✓				
Alcohol use norms (19)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Being influenced to drink (20)									✓	✓	✓
Report of parenting practices											
Consequences for drinking alcohol (21)	✓	✓	✓	✓							
Discussion of binge-drinking							✓				
Parental alcohol-specific rules (22)	✓	✓	✓	✓	✓	✓	✓				
Parent responsiveness/demandingness (23)	✓										
Parental monitoring of activities (24)	✓	✓	✓	✓	✓	✓	✓				
Sexual health											
Discussion with parents							✓				
Safe-sex practices							✓				
HPV vaccine status and knowledge							✓				

Table 1. Measures Obtained from Young People (Continued)

	Data Collected 2010/11-2017/18								Data Collected 2018/19-2021/22 (Extension)		
Measures	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7	Wave 8	Wave 9	Wave 10	Wave 11
Peer influences											
Peer substance use (25)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peer disapproval of substance use (25)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Partner alcohol use											
Problems due to alcohol use (20)									✓	✓	✓
Intimate partner violence (20)									✓	✓	✓
Substance use											
Tobacco (13)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
E-cigarettes					✓	✓	✓	✓	✓	✓	✓
Illicit substances (13)			✓	✓	✓	✓	✓	✓	✓	✓	✓
Energy drinks: Q/F (15)			✓	✓	✓	✓	✓	✓	✓	✓	✓
Behaviours											
Behavioural disinhibition and impulsivity (26)							✓	✓			
Externalizing and internalising behaviours and social problems (27)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Impact of life events							✓	✓			
NAPLAN scores (for consenting families)	✓		✓	N/A							

Table 2. Measures Obtained from Parents

Measures	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
Parent & household demographics					
Birth date, sex, employment, income, SEIFA	✓	✓	✓	✓	✓
Education, family size, older siblings, country of birth	✓				
Religiosity (21)	✓	✓	✓	✓	✓
Parental alcohol use					
Age of first alcohol use (13)	✓	✓	✓		
Quantity/frequency (Q/F) (13)	✓	✓	✓	✓	✓
Heavy episodic alcohol use: Q/F (13)	✓	✓	✓	✓	✓
Consumption of alcohol in front of child	✓	✓	✓	✓	✓
Alcohol harm minimization (13)			✓	✓	
Partner alcohol use: Q/F, heavy episodic alcohol use: Q/F (13)		✓	✓	✓	✓
Family alcohol problems	✓				✓
Supply of alcohol to child					
Parental: Q/F, context/supervision (14)	✓	✓	✓	✓	✓
Non-parental: Q/F (14)	✓	✓	✓	✓	✓
Home access to alcohol (18)	✓	✓	✓	✓	✓
Parenting practices					
Consequences for child if they drink alcohol (21)	✓	✓	✓	✓	
Positive family relations and conflict (28)	✓	✓	✓	✓	✓
Parental enforcement/consistency of rules (29)	✓	✓	✓		
Alcohol-related rules (22)				✓	✓
Parental monitoring of activities (24)	✓	✓	✓	✓	✓
Supervision of child's activities (30)	✓	✓	✓	✓	
Parents' alcohol norms (19)		✓	✓	✓	✓
Alcohol communication (31)		✓	✓	✓	
Parental substance use					
Tobacco use (13)		✓	✓	✓	✓
E-cigarettes					✓
Illicit substance(s) (13)			✓	✓	✓
Energy drinks: Q/F, perception (15)			✓		
Child behaviours					
Parent perception of child's externalizing and internalizing behaviours and social problems (27)			✓	✓	
Parent perception of child's intention to use alcohol (18)		✓	✓	✓	
Peer influences					
Parent perception of peer alcohol use (25)	✓	✓	✓	✓	✓

3. RETENTION

Participant retention in longitudinal studies is important for maintaining statistical power, minimising bias, and maximising generalisability (32). Attrition is an inevitable aspect of longitudinal research, of which the current study is no exception. Attrition has been low over the first three waves of data collection (Figure 1); 32 dyads withdrew or were lost to follow-up by the end of the second wave (21 after Wave 1, 11 after Wave 2), such that 1,895 dyads (98.3% of the original cohort of 1927) remained involved in the study at the beginning of third follow-up wave. Completion rates for both members of the dyads dropped below 90% in Wave 4, with 1,705 adolescents (88.5%) and 1731 parents (89.8%) returning completed surveys. By the end of Wave 7, completion rates had dropped below 80%, with 1,494 adolescents (77.5%) returning completed surveys. Data collection for Wave 8 is ongoing at the time of publication of this report.

A potential explanation for the sudden drop-out rate in Wave 7 is the transition of our participants from adolescence to early adulthood. The median age of first leaving home is 20.9 and 19.8 years for Australian men and women, respectively (33). As of Wave 7, participants in our cohort had a mean age of 19 years, with 232 out of 1,499 respondents (15.5%) indicating that they no longer lived with their parents. Non-responders may have moved out of home or undertaken extended overseas travel, and thus been lost to follow-up due to changed contact details.

3.1 Retention Strategies Waves 1-8

As of the first phase of Wave 8 data collection (August – December 2017), retention strategies included providing participants with different survey formats (paper and online), a \$20 cash reimbursement, a \$500 prize draw, an annual newsletter, an end-of-year greeting card with a token gift, and regular telephone, email, and mobile phone text message reminders to complete the survey and update their contact details. If participants are non-contactable, secondary contacts (parents and other guardians) also receive the same reminders and are encouraged to update participant contact information. Since participants receive their cash reimbursement in the mail, this further encourages participants to provide their most up to date contact information.

3.1.1 Survey Format

To facilitate ease of survey completion, participants are offered two options for the survey: paper or online. The paper version of the survey is mailed to participants along with a letter (Appendix A), a change-of-details contact slip (Appendix B), and a reply-paid envelope. The online version of the survey is hosted by SurveyMonkey (<https://www.surveymonkey.net/>) and emailed to participants using the email

collection function on the SurveyMonkey website. If participants do not complete the survey in their chosen format within ten weeks of the initial distribution, where details are provided (email addresses), we send follow-up surveys in the opposite format i.e. paper to online and vice versa.

3.1.2 Reimbursement

From the Waves 1 to 4, participants were provided with a choice of either \$10 in cash or an iTunes gift card worth the equivalent amount as reimbursement for completing the survey. Their parents were reimbursed with a Coles Myer gift card worth \$10 for completing the parent survey. From Wave 5 onwards, participants were reimbursed \$20 in cash for completing the survey. All reimbursements are mailed to participants once the survey has been received by the research team.

3.1.3 Prize Draw

The prize draw has been in effect since Wave 6 and consists of 10 JB Hi-Fi vouchers worth \$500 each. Participants have a chance of winning one voucher if they return their completed survey before a certain date (31st October for phase 1, 31st August for phase 2). As the second phase of survey distribution consists of the majority of our participants, two of the vouchers are drawn for phase 1 participants, and the remaining eight are drawn for phase 2 participants. Information regarding the prize draw is emphasised in all correspondence to participants before the cut-off date.

3.1.4 Annual Newsletters

The annual newsletter (Appendix C) is a double-sided A4 page sent out with participant reimbursements which thanks them for their contribution to the study. The newsletter includes a summary of data from previous follow-up waves, and contact details for more information about the study and its findings.

3.1.5 Greeting Cards

Greeting cards are mailed to all participants in December of each year, regardless of their survey completion status. The card contains a message which wishes participants and their families a happy holiday season and thanks them for their continued support of the project. Contact details for the project team are included on the back of the card. A small token of appreciation, such as chocolate, is also contained within the envelope.

3.1.6 Social Media

A Facebook account and official page for the study was created to encourage participants to remain engaged with the study outside of the survey distribution period. Updates about upcoming waves and

other information about the study was posted on the official page, but the page has not been active in recent years.

3.1.7 Survey Reminders

Weekly reminders are sent to participants who have not completed their survey. The format varies from week to week (Table 3) and consists of email, mail, text message, and phone call reminders (Appendix E). Parents and other known family members are a secondary point of contact if the research team cannot contact the participant directly.

Table 3. Contact Protocol for Participant Reminders

Weeks After Initial Contact	Reminder
1	Email reminder via SurveyMonkey to online participants
2	Email reminder via SurveyMonkey to online participants
3	Text message reminder
4	Phone call reminder
5	Mail another copy of survey to paper participants Email another link to survey via SurveyMonkey to online participants
7	Text message reminder
8	Phone call reminder
9	Mail reminder letter to paper participants Email another link to survey via SurveyMonkey to online participants
10	Email link to online survey via SurveyMonkey to paper participants Mail paper survey to online participants
11+	Repeat text, phone call, and mail/email reminders as needed

3.2 Proposed Additional Retention Strategies Waves 9 Onwards

Due to the recent increase in participant attrition, retention strategies used by other longitudinal studies were reviewed in February 2018 for potential inclusion into the study protocol in preparation for the ninth wave of data collection starting in August. Google Scholar, EMBASE, PubMed, and ScienceDirect were searched for reviews of retention strategies and longitudinal cohort protocols. Additionally, research staff who were currently working on or have previously worked with longitudinal cohorts at the National Drug and Alcohol Research Centre (NDARC) were consulted. Strategies which were geared towards adolescent and young adult cohorts were of particular interest.

3.2.1 Additional Monetary Incentives

Monetary incentives have been well-established to be an effective method of increasing and retaining participation (34-36). Given that many participants are completing tertiary studies and/or in the workforce, our current rate of reimbursement may be insufficient considering the amount of time to complete the interview and the equivalent wage that they would earn for that time if undertaking paid employment. To adequately compensate participants for their time, the reimbursement amount will be increased from \$20 to \$50 from Wave 9 onwards.

3.2.2 Alternate Contact Information

Studies utilising cohorts of young people have requested participants to also provide the contact details of family members or friends who would have knowledge of the participants' most recent contact information (36, 37). Although our study originally obtained contact information for both members of the parent-child dyads, there are an increasing number of participants who now live with a partner, friends, and/or housemates. Therefore, we will provide participants with the opportunity to provide alternate means of contact in order to anticipate future changes to their contact information. An updated change-of-details slip (Appendix B) was created to replace the old version starting from May 2018. The online survey was also updated to reflect this change.

3.2.3 Annual Newsletter

Other longitudinal studies have sent annual newsletters to all participants to provide up-to-date information about the study and to provide ways for them to contact the research team (34, 36). The current study deviates from this slightly as previously we only send our annual newsletter to participants when they complete the survey each year. We intend on revising our newsletter distribution protocol to reach all participants regardless of whether they respond to the survey from Wave 9 onwards. This updated strategy will allow us to use the newsletter as reminder to all participants that the study is still ongoing. A change-of-details-slip will be sent with the newsletter in the event that participants change their contact details between waves.

3.2.4 Electoral Roll

Participants who have not withdrawn from the study but have been lost to follow-up due to changed contact details have been, and are expected to be, an issue, given that they are now in early adulthood and no longer living with their parents. Given that all Australians are required to enrol to vote, and that enrolment also includes consent to have their own address information publicly available, participant addresses will be able to be obtained from the Australian electoral roll.

A list of participants who were previously lost to follow-up or did not complete waves 7 or 8 will be generated. Additionally, searches will also be performed for the parents of the aforementioned group of participants in the event that the parent and participant have separate addresses. Research staff will visit an Australian Electoral Commission office to access address information via public access terminals. Searches will be performed using participants' full names, including middle names where available. For participants whose names result in multiple matches across Australia with no exact match to the address we have on file, all possible addresses will be recorded, provided that the number of matches does not exceed ten. For participants and parents with multiple matches, generic letters (Appendix F) will be sent to all matches.

3.2.5 Holiday and Birthday Cards

Previous studies have sent cards on special occasions, such as birthdays and public holidays, to participants as a method of maintaining a positive relationship (34, 36). Currently, we send a holiday greeting card in December as it is during a period when survey distribution temporarily ceases and there are a relatively small number of survey reminders to be sent. The end-of-year holiday card will continue to be sent to all participants. Birthday cards were considered as an additional retention strategy, but we concluded that the time investment required to keep track of birthdays for 1,927 participants would hinder the running of the study and create an unnecessary burden for research staff.

3.2.6 Social Media

As social media use is highest among young adults aged 18 to 25 years (38), we considered using our study Facebook account to find participants who have been lost to follow-up. Identity could be verified by publicly accessible information in profiles such as birth date, location, and by matching known parent/guardian names to people in their friends list. However, direct contact via Facebook was deemed to be too invasive of a retention strategy to implement as participants may feel uncomfortable with research staff finding their personal profiles. A link and a QR code to our study Facebook page was added to the annual newsletter (Appendix D) and change of details slip (Appendix B) to provide participants with an alternate means of initiating contact with the study team. As our Facebook page has not been updated in recent years, monthly Facebook posts with news relevant to the study is currently being considered to keep participants engaged with the study and our findings.

4. DATA ANALYSIS

This longitudinal parent- and child-report dataset will utilise sophisticated statistical techniques to gain maximum impact and benefit from the data. We will address associations between being supplied sips versus whole standard drinks and supervised versus unsupervised supply. We will include the influence of peer and sibling supply. We will adjust for a large range of potential confounders (listed in Table 4), including child, parent, family and peer factors. We will work on models progressively from year 1, using all available data, so that there is a long period of model development, and of developing understanding of these data. The effect of clustering (participants within their original school) will be examined and adjusted for using standard methods (multi-level models).

Table 4. Variables/Confounders Assessed in Cohorts on Parental Supply & in APSALS Cohort

Cohort reference list no.:	(39)	(40)	(41)	(42)	(43)	(44)	(45)	APSALS (46)
Ages observed (age-in-years)	13-15	10-12	11-13	18-19	12-14	12-13	13-16	12-18
Number of years followed-up	2	2	2	1	2	1	2	6 years
Number of participants (N)	1222	488	1388	449	1888	2128	428	1927
– Sources of supply of alcohol assessed –								
Parental supply of alcohol	✓	✓	✓	✓	✓	✓	✓	✓
Sibling/family members supply								✓
Peer/other sources of supply								✓
– Parental predictors assessed –								
Parental drinking (yes/no)		✓		✓		✓	✓	✓
Parental alcohol problems					✓			✓
Home access to alcohol			✓					✓
Parental home alcohol rules				✓	✓		✓	✓
Parental monitoring of child	✓	✓	✓	✓	✓		✓	✓
Parental consistency					✓			✓
Parental demandingness		✓						✓
– Familial predictors assessed –								
Family conflict								✓
Family positive relationships	✓		✓			✓		✓
Older sibling(s) in household							✓	✓
Family/household composition		✓	✓			✓		✓
Parental SES/employment								✓
Country of birth/culture/race		✓	✓			✓		✓
Parental educational attainment						✓		✓

Table 4. Variables/Confounders Assessed in Cohorts on Parental Supply & in APSALS Cohort (Continued)

Cohort reference list no.:	(39)	(40)	(41)	(42)	(43)	(44)	(45)	APSALS (46)
Ages observed (age-in-years)	13-15	10-12	11-13	18-19	12-14	12-13	13-16	12-18
Number of years followed-up	2	2	2	1	2	1	2	6 years
Number of participants (N)	1222	488	1388	449	1888	2128	428	1927
– Child predictors assessed –								
Child sex		✓	✓				✓	✓
Child age			✓					✓
Child has money to purchase	✓							✓
Age of first drinking	✓	✓	✓					✓
Externalising problems	✓					✓		✓
Internalising problems						✓		✓
Social problems						✓		✓
Tobacco use/illicit drug use	✓							✓
– Peer predictors assessed –								
Peer substance use	✓		✓	✓			✓	✓
Peer disapproval of subst. use								✓

4.1 Multi-level modelling

We will continue to use multi-level modelling to account for the longitudinal nature of the data. Patterns of missing data will be examined, and we will use methods such as maximum-likelihood or multiple imputation to account for missing responses.

4.2 Marginal structural modelling

We will implement a marginal structural modelling (MSM) approach to: (a) adjust for time-varying confounders; (b) better address causality; and (c) minimise bias due to over-adjustment of confounders, some of which may also be mediators. MSM analyses of cohort data have been used to estimate causal effects of time-varying exposures to treatment in areas of clinical medicine (47, 48). Robins et al. (47) note that in observational studies with exposures that vary over time, the usual approaches for adjustment of confounding are biased in the presence of time-dependent confounders that are themselves also affected by previous exposures. This problem is arguably the case in parental supply. For example, parental supply may increase the risk of socialising with peers who drink, which then increases risk of peer approval of drinking and of further externalising behaviour in the adolescent, which may in turn lead to more parental supply to control drinking behaviours, and potentially more risky drinking and harms. Such relationships can be accounted for using MSM.

4.3 Latent Class/Trajectory Analysis

We will examine latent classes and trajectories of consumption, supply and the development of alcohol-related harms over the course of adolescents and early adulthood using latent variable methods like structural equation modelling (SEM). These methods will be integrated with other analyses, to assess the relationships with the latent classes/trajectories with baseline and time-varying factors.

5. DISCUSSION

In 2014, the World Health Organization (WHO) called for a strong focus on adolescent health as an international priority, including the prevention of alcohol use and misuse (49). Prominent commentators in leading journals such as *The Lancet* also identify early alcohol use as a major threat to adolescent health (50-53). Whether parents should, or should not, supply alcohol remains a matter debated by media, parents, communities, healthcare professionals, and governments (54, 55). However, parental supply continues unabated (56-60).

There is no convincing research on the associations between *parental supply* of alcohol and early adult drinking (61, 62). What research does exist considers *parental supply* in isolation from the complex array of known risk and protective factors for harmful drinking (63-68). Our systematic review (67) confirms a lack of evidence about the associations with such supply. *Parental supply* occurs within immediate (e.g., quantity of alcohol provided, location of provision) and broader (e.g., parent-child relationship, sibling and peer use, parental rule-setting) contexts, all of which may be influenced by the individual characteristics of the parent (e.g., drinking, modelling) and child (e.g., internalising, externalising/delinquency), and peers.

It is therefore crucial to address all parental, familial, child, peer, and contextual time-varying factors at play, and their relation to the range of long-term drinking outcomes when considering *parental supply*. As this parental practice may be associated with adverse outcomes, if we demonstrate these associations, we will have a strong platform to bring these issues to parental/community attention. This opportunity represents the only long-term investigation of the associations between parental supply of alcohol and early adult alcohol use and related problems.

We also will produce the first long-term dataset on: a) potential differences in impact between supply of sips vs. whole drinks; b) potential differences in impact between parental supervised supply compared to ad libitum (unsupervised) parental supply; c) the impact of other secondary sources of alcohol supply (e.g., peers, siblings) upon early adult outcomes; d) potential dose-response relationships between extent of parental supply and these late-adolescent outcomes. Our detailed assessment of alcohol use in early

adolescence also allows us to examine the extent to which (i) early exposure to alcohol and (ii) age at first drink (64, 65), predict early adult alcohol use.

Parents seem to believe the evidence is in favour of such supply, when in reality the evidence is quite poor. Our current research is of great significance to Australia, where there is considerable pressure on parents to allow young people to drink, and where adolescent alcohol use is the norm. Drinking culture in Australia is particularly concerning, with young Australians aged 18- 24 being most likely to drink more than 11 standard drinks on a single drinking occasion compared to all other age groups (3). Given the emphasis on early alcohol use and adolescent/early adult well-being, this work is also of great importance to human health in other developed countries. Additionally, our research is highly relevant to informing health practices in low- middle-income countries, where aspiring and growing middle classes are embracing Western habits, including increasing alcohol use.

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7. APPENDICES

7.1 Appendix A: Paper Survey Letter



Dear [NAME],

Thank you for your continued involvement in **the drinking and teens project**! Your ongoing support has made such a valuable contribution to this important study.

As you may remember, this study was originally funded for 2010-2014. Due to the significance of this research, we have received further funding from Australian Rotary Health and the National Health and Medical Research Centre. This extends this research into 2018 and beyond, when young people in our study (like you!) will be entering early adulthood.

We know that most of you have reached 18 years, moved out of home, finished school, started working, further study or even travelling. Your continued input is still vital for us to understand this public health issue.

Please find the latest survey, and a reply-paid envelope to return it to our team, for which you will be reimbursed with **\$20 cash**. When you return your survey, you will also go into a draw to **win 1 of 10 \$500 JB HiFi vouchers** – be sure to return your survey by the 31st of August to be in the running.



If any of your contact details have changed, you would prefer to do the survey online, or have any questions, please get in touch on the details below.

Kind regards,

Prof Richard Mattick, Dr Amy Peacock, Ms Alexandra Aiken, Ms Veronica Boland, Mr Joel Tibbetts, Ms Wing See Yuen, & Ms Tiarani Dixon

drinkingandteens@unsw.edu.au

P: (02) 9385 0111 / M: 0481 070 169

the drinking and teens project

National Drug & Alcohol Research Centre
The University of New South Wales
Sydney NSW 2052



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA



UNSW
AUSTRALIA



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Curtin
University of Technology

7.2 Appendix B: Change-of-Details Slip (Previous, Updated)

 the drinking and teens project Have your details changed?	 the drinking and teens project Have your details changed?
If your details have changed, please let us know so we can stay in touch with you! You can text or email your updated details to: 0481 070 169 / drinkingandteens@unsw.edu.au	If your details have changed, please let us know so we can stay in touch with you! You can also text or email your updated details to: 0481 070 169 / drinkingandteens@unsw.edu.au
Name: _____	Name: _____
Address: _____ _____ _____	Address: _____ _____ _____
Phone: _____	Mobile: _____
Mobile: _____	Email: _____
Email: _____	 Facebook Name: _____
	If we have trouble finding you, are there family members, friends, or a partner who we can contact you through? Contact 1 Name: _____ Relationship: _____ Mobile: _____ Email: _____ Contact 2 Name: _____ Relationship: _____ Mobile: _____ Email: _____
    	  follow us @drinkingandteens     

7.3 Appendix C: Annual Newsletter

the drinking & teens project

THE UNIVERSITIES OF NEW SOUTH WALES, QUEENSLAND, NEWCASTLE, & TASMANIA AND CURTIN UNIVERSITY

The Drinking and Teens Project is now in its 8th year and is one of the longest running studies of youth alcohol behaviours in the world. This would not have been possible without the commitment and support of all of our participants – Thank you!

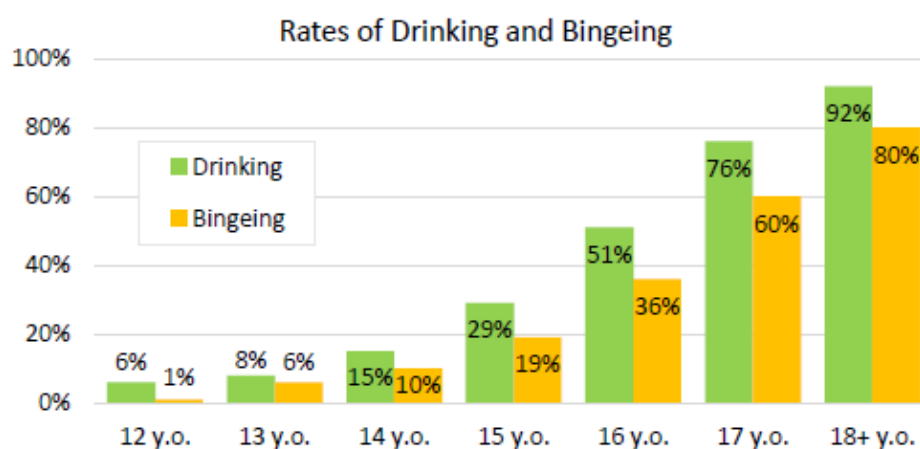
Your experiences in early adulthood are vital for us to understand the factors which influence the way that you and your friends use alcohol and how your early experiences with alcohol influence you as adults.

You may have completed a telephone interview with our team, or be invited to do so over the coming years. We are collecting some more in-depth information about your alcohol use in this interview. You will be reimbursed an additional \$10 for completing this interview. If your contact details have changed, please let us know.



Rates of alcohol use in early adulthood

The graph below shows the percentage people in the study who reported drinking and bingeing each year through from 12 years old to 18 years old and beyond. The majority of drinkers reported drinking between 1 and 4 standard drinks on a drinking occasion. However, binge drinking has increased over time, with around 80% of you reporting drinking 4 or more standard drinks on at least one occasion

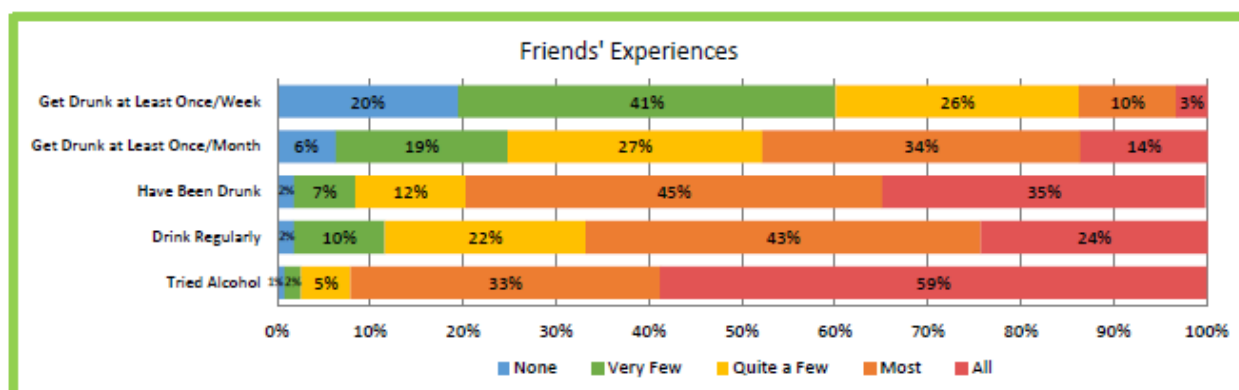


in the past year. We have included some information about early initiation of drinking and how it is related to later binge drinking on the next page. You also reported that the majority of your friends have tried alcohol and drink alcohol regularly.

National Drug & Alcohol Research Centre, University of New South Wales, Sydney NSW 2052

Phone: (02) 9385 0111 Mobile: 0481 070 169

E-mail: drinkingandteens@unsw.edu.au Web: <http://www.ndarc.med.unsw.edu.au>

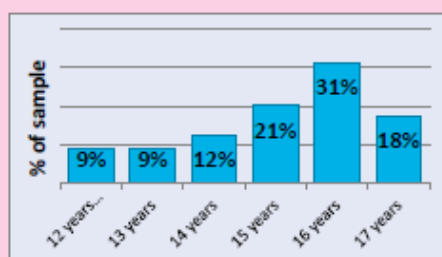


Does drinking alcohol early increase later binge drinking?

Results from the 5 years of data from this study showed that starting to drink alcohol earlier in adolescence increased the risk of binge drinking later in adolescence.

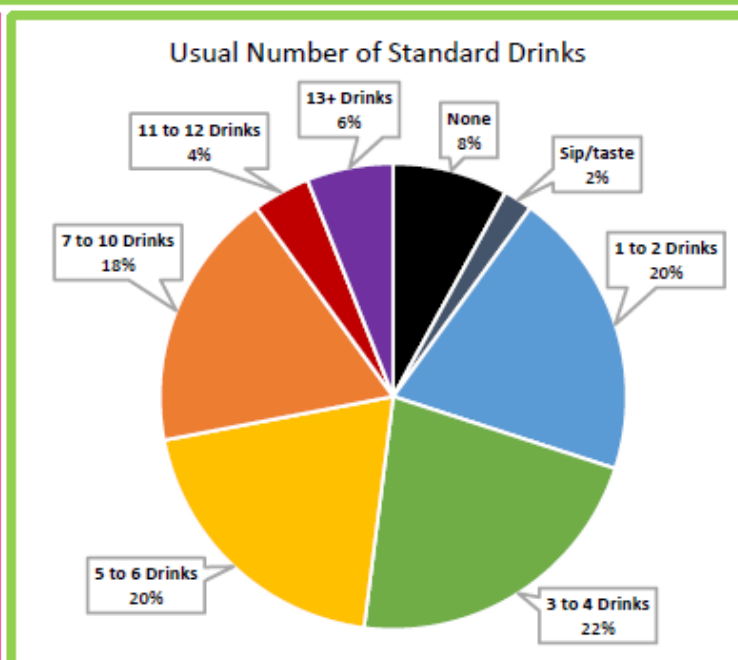
Half of adolescents reported alcohol use and 36% reported bingeing at wave 5/Year 11 (average age 16.9 years). This was similar for males and females.

Percent of drinkers initiating at each age



After considering other important variables, including individual, family and peer factors, we found that earlier age of initiation was significantly related to binge drinking in Year 11.

Initiating alcohol use earlier in adolescence was associated with an increased risk of binge drinking in late secondary school, supporting an argument for delaying alcohol initiation for as long as possible to reduce the risk for problematic use in later adolescence and the alcohol-related harms including injuries and accidents.



JB HiFi Vouchers!

Congratulations to all of the winners! For the 7th wave of data collection we offered you a chance to win one of ten \$500 JB HiFi vouchers to say thanks for your help. By completing your Wave 8 survey before the closing date, you will also be in the running to win a voucher this year – Good Luck!

Updating Contact Details

So that we can keep in contact with you, please let us know if you have new emails, phone numbers and addresses.

If you have been receiving a paper survey and would like to change to online, please let us know. Some of you have been receiving the online survey to your family or parents email address, so that we can be sure it gets to you, let us know your direct email address.

7.4 Appendix D: Updated Annual Newsletter

the drinking & teens project

THE UNIVERSITIES OF NEW SOUTH WALES, QUEENSLAND, NEWCASTLE, & TASMANIA AND CURTIN UNIVERSITY

The Drinking and Teens Project is now in its 8th year and is one of the longest running studies of youth alcohol behaviours in the world. This would not have been possible without the commitment and support of all of our participants – Thank you!

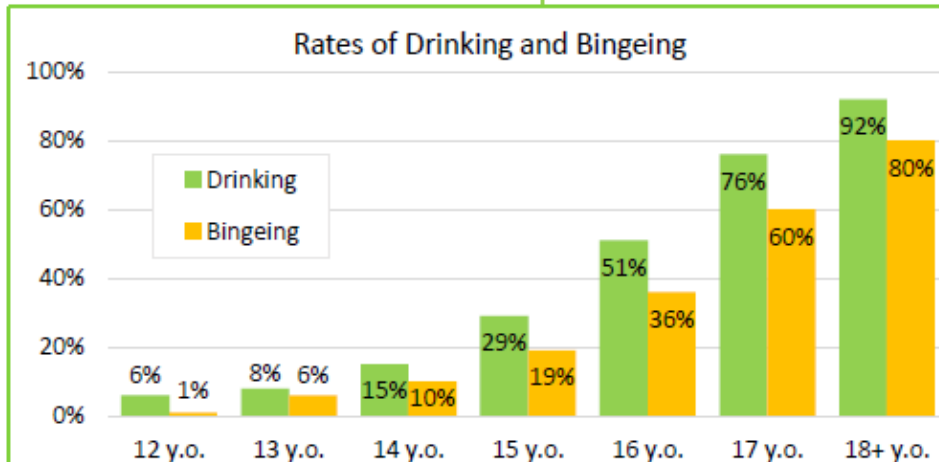
Your experiences in early adulthood are vital for us to understand the factors which influence the way that you and your friends use alcohol and how your early experiences with alcohol influence you as adults.

You may have been contacted for a telephone interview with our team, or be invited to do so over the coming years. We are collecting some more in-depth information about your alcohol use in this interview. You will be reimbursed for completing this interview with us. If your contact details have changed, please let us know.



Rates of alcohol use in early adulthood

The graph below shows the percentage people in the study who reported drinking and bingeing each year through from 12 years old to 18 years old and beyond. The majority of drinkers reported drinking between 1 and 4 standard drinks on a drinking occasion. However, binge drinking has increased over time, with around 80% of you reporting drinking 4 or more standard drinks on at least one occasion

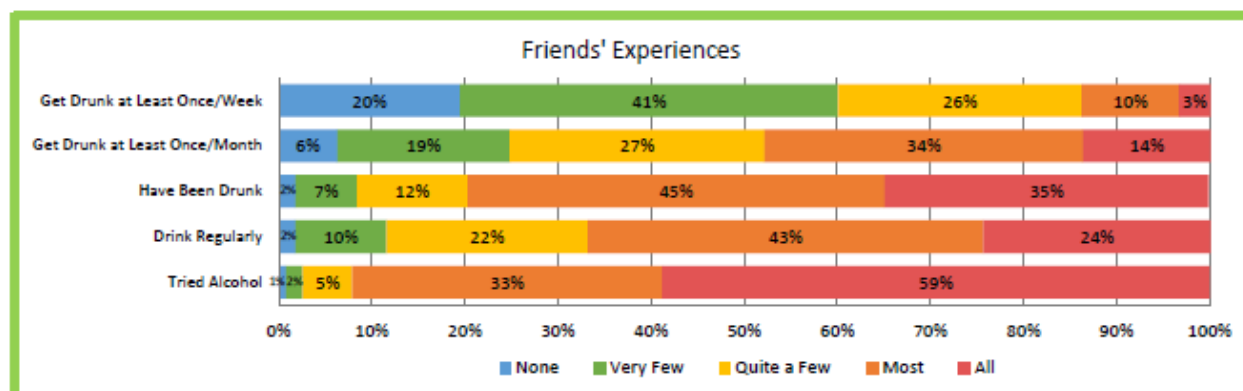


in the past year. We have included some information about early initiation of drinking and how it is related to later binge drinking on the next page. You also reported that the majority of your friends have tried alcohol and drink alcohol regularly.

National Drug & Alcohol Research Centre, University of New South Wales, Sydney NSW 2052

Phone: (02) 9385 0111 Mobile: 0481 070 169

E-mail: drinkingandteens@unsw.edu.au Web: <http://www.ndarc.med.unsw.edu.au>

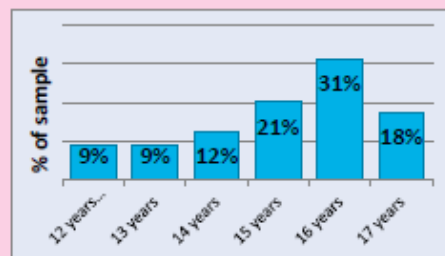


Does drinking alcohol early increase later binge drinking?

Results from the 5 years of data from this study showed that starting to drink alcohol earlier in adolescence increased the risk of binge drinking later in adolescence.

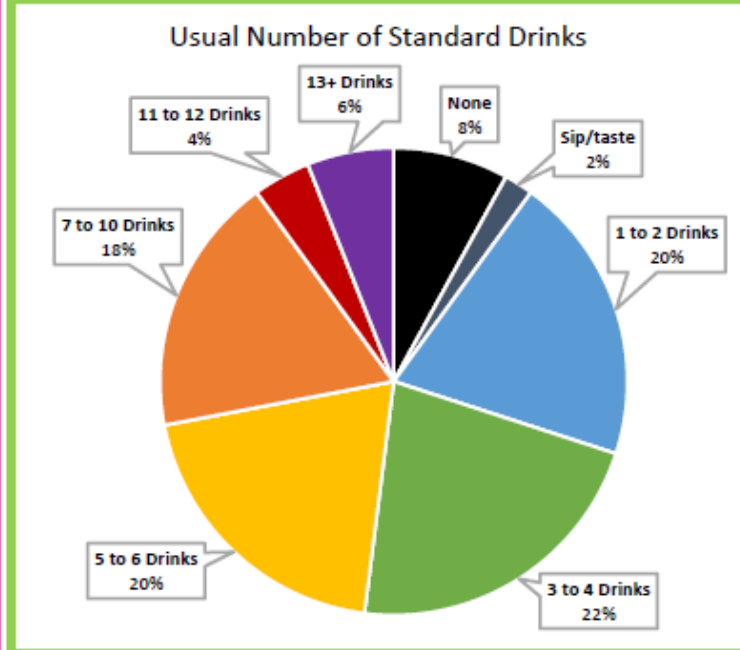
Half of adolescents reported alcohol use and 36% reported bingeing at wave 5/Year 11 (average age 16.9 years). This was similar for males and females.

Percent of drinkers initiating at each age



After considering other important variables, including individual, family and peer factors, we found that earlier age of initiation was significantly related to binge drinking in Year 11.

Initiating alcohol use earlier in adolescence was associated with an increased risk of binge drinking in late secondary school, supporting an argument for delaying alcohol initiation for as long as possible to reduce the risk for problematic use in later adolescence and the alcohol-related harms including injuries and accidents.



JB HiFi Vouchers!

Congratulations to all of the winners! For the 7th wave of data collection we offered you a chance to win one of ten \$500 JB HiFi vouchers to say thanks for your help. By completing your Wave 8 survey before the closing date, you will also be in the running to win a voucher this year – Good Luck!

Updating Contact Details

So that we can keep in contact with you, please let us know if you have new emails, phone numbers and addresses. If you have been receiving a paper survey and would like to change to online, please let us know. Some of you have been receiving the online survey to your family or parents email address, so that we can be sure it gets to you, let us know your direct email address.

If you have any relatives, friends, or a partner we can reach you through, please also let us know.

7.5 Appendix E: Phone Reminder Script

A. Leaving a voicemail:

Hello, this is _____ from the drinking & teens project at the University of NSW. This is just a really quick reminder about our latest survey which we recently sent out to you.

If you have received the survey and can find some time to complete it over the next week or so, that would be great.

We also have a separate telephone interview component which you may have completed with our team, or be invited to do so over the coming months. This collects some more in-depth information in addition to our survey.

If you have not received the survey, please let us know. You can call us on 02 9385 0145, text at 0481 070 169 or email us at drinkingandteens@unsw.edu.au.

Thanks very much, bye.

B. Speaking to child or parent:

Hello, this is _____ from the drinking & teens project at the University of NSW. How are you? Have I caught you at an ok time?

This is just a really quick reminder call about the latest drinking and teens survey that **(name)** is completing for us. I just wanted to check whether you/they have received the survey.

Notify participants of the interview component during the call:

We also have a separate telephone interview component which you may have completed with our team, or be invited to do so over the coming months. This collects some more in-depth information in addition to our survey.

7.6 Appendix F: Generic Electoral Roll Letter



Dear

We are writing with regards to your participation in a study we're running at the University of New South Wales.

The contact details we had for you have been changed or updated and we have not been able to get in touch.

You have been a longstanding participant in our study and we would like to contact you for our annual follow-up survey. The study will be continuing for several more years, and your input is important and very highly-valued. This survey should only take around 20-30min to complete and we will be reimbursing you \$50 for your time.

To contact us, please text us at **0481 070 169**, call us at **(02) 9385 0145**, or send an email to either of the contacts listed below.

Please also find enclosed a change-of-details form along with a reply-paid envelope, should you wish to post this information to us.

If you have any questions regarding the study, please do not hesitate to contact us.

If this does not apply to you, please disregard this letter.

Kind regards,

Prof Richard Mattick, Dr Amy Peacock, Ms Alexandra Aiken, Ms Veronica Boland, Mr Joel Tibbetts, Ms Wing See Yuen, & Ms Tiarani Dixon

The University of New South Wales
Sydney NSW 2052

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