

# Trends in non-drinking among Australian adolescents

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## ABSTRACT

**Background and Aims** Recent evidence suggests that there has been a sharp increase in non-drinking among Australian adolescents. This study aimed to explore the socio-demographic patterns of this increase to identify the potential causal factors. **Design** Two waves (2001 and 2010) of cross-sectional data from the National Drug Strategy Household Survey, a large-scale population survey. Logistic regression analyses were used to identify significant changes over time, with interaction terms used to test whether trends varied by respondent characteristics. **Setting** Australia. **Participants** Respondents aged 14–17 years ( $n = 1477$  in 2001 and 1075 in 2010). **Measurements** The key outcome measure was 12-month abstinence from alcohol. Socio-demographic variables including sex, age, income, socio-economic status, state and rurality were examined. **Findings** Rates of abstinence increased overall from 32.9% [95% confidence interval (CI) = 30.0–35.7%] to 50.2% (95% CI = 46.7–53.6%) ( $P < 0.01$ ). Abstinence increased significantly across all population subgroups examined. **Conclusions** A broad change in drinking behaviour has occurred among Australian adolescents in the last decade, with rates of abstinence among 14–17-year-olds increasing markedly. Increases in abstinence have occurred consistently across a wide range of population subgroups defined by demographic, socio-economic and regional factors.

**Keywords** Abstaining, adolescents, alcohol, Australia, non-drinking, trends.

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Submitted 11 November 2013; initial review completed 19 January 2014; final version accepted 13 February 2014

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## INTRODUCTION

The consumption of alcohol by young people is an issue of major public health concern in Australia and internationally [1,2]. Alcohol is a key risk factor for injury among young people, with one in five drinkers aged 16–17 years reporting alcohol-related injuries and one in 10 a regretted sexual experience linked to their drinking [3]. Similarly, there is consistent evidence that early initiation of alcohol consumption and frequency of teenage drinking are associated with a range of future negative outcomes, particularly alcohol disorders [4–6].

In recent years, there has been a sharp decline in teenage drinking in many countries. In the United States, for example, the prevalence of alcohol use among 8th graders (typically aged 13–14 years) has fallen from 54% in 1991 to 24% in 2012 [7]. In England, the proportion of 10–15-year-olds who had consumed alcohol at least once has fallen from 61% in 2003 to 45% in 2010 [8], while adolescent drinking has also fallen sharply in

Sweden, Finland, Iceland, Norway and Russia over the past decade [9]. The Australian Secondary Students' Alcohol and Drug Survey (ASSAD) highlighted a similar trend in Australia, with past-week prevalence of drinking among 12–15-year-olds falling from a peak of 29% in 2002 to 11% in 2011, and from 48 to 33% for 16–17-year-olds [10]. This is consistent with data from the National Drug Strategy Household Survey, with rates of abstaining among 12–15-year-olds growing from 67.6 in 2004 [11] to 77.2 in 2010 [12].

There has been little research that has attempted to explain these recent declines. There is a substantial literature highlighting the individual, family and community-level factors associated with adolescent alcohol consumption the effectiveness of policy measures on drinking by teenagers which may provide some insight. For example, we know that a range of personality traits (e.g. negative affect, impulsivity) are linked to adolescent initiation of alcohol consumption and that parental approval and modelling of alcohol consumption

are key predictors of initiation, as is peer drinking behaviour [13]. There are also studies that highlight the potential role of policy in reducing adolescent drinking, with studies linking advertising exposure, lower prices, higher densities of alcohol outlets and lower legal purchase ages with adolescent drinking [14–16].

Few of these factors are likely to have changed dramatically in the last decade. Indeed, in Australia alcohol has become more affordable and available and advertising restrictions remain minimal [17–19]. The one major policy shift in Australia in this area has been the introduction of laws prohibiting the supply of alcohol to adolescents by adults other than their parents [20], which were implemented in half the states over the study period (New South Wales in 2007, Queensland and South Australia in 2009). Another potential factor influencing teenage drinking was the shift in the 2009 Low Risk Drinking Guidelines to an explicit recommendation that people aged 15 or less should abstain from alcohol [2].

There are unlikely to have been dramatic changes in rates of impulsivity or other personality traits in the population, and rates of drinking among adults have been steady [21]. There is some evidence that attitudes towards alcohol have been shifting. For example, a steadily increasing proportion of the adult population considers excessive drinking to be the drug problem of most concern in Australian society [12,22], and media coverage of alcohol issues has been focused increasingly on health and social problems associated with drinking [23]. However, there have been no studies examining whether these changes are reflected in parental attitudes to adolescent alcohol consumption in Australia.

Indeed, there has been no detailed attempt to explore the factors behind increasing adolescent abstinence from alcohol in Australia (or elsewhere). Studies have not identified whether these increases in abstinence from drinking among teenagers have been uniform across socio-economic, demographic and geographic subgroups. This is the first step in identifying potential causal mechanisms. If, for example, rates of abstinence had increased more dramatically among 14–15-year-olds than among 16–17-year-olds, then the explicit focus on drinking by those aged 15 or under in the revised Australian drinking guidelines may be implicated. Similarly, if secondary supply laws were driving changes in teen drinking then abstinence rates will have increased more quickly in the states that implemented those laws.

The current study aims to begin to address this gap in the literature by systematically examining the demographic, socio-economic and geographic trends in abstinence from alcohol among Australians aged 14–17 between 2001 and 2010.

## METHODS

### Data

This study uses two waves of the National Drug Strategy Household Survey, a large Australian survey that collects data on self-reported alcohol and drug use every 3 years. We use data from the 2001 and 2010 waves, limiting our sample to respondents aged between 14 and 17 years (the 2010 sample includes 12- and 13-year-olds, but these respondents were excluded for the sake of comparability). These two waves include responses from 2522 young people (1477 in 2001 and 1075 in 2010). For the sake of simplicity, the analyses focused on just these two waves of data, although changes in abstinence were steady across the four survey waves spanning the decade (see Results).

Data were collected primarily using a drop-and-collect approach, in which sampled households are approached and a respondent selected and then the questionnaire is left to be completed, with fieldwork staff collecting the completed survey at a later date. This method was used for all respondents in 2010, while in 2001 a small proportion were surveyed using either face-to-face interviews (8.2%) or computer-assisted telephone interviews (8.6%). The overall response rates for the two waves are similar (50% in 2001 and 51% in 2010). It is worth noting that, while age-specific response rates are not available, the response rate for 14–17-year-olds is likely to be substantially lower. This is reflected by the fact that 2.9% of the unweighted 2010 sample are 14–17-year-olds compared with 6.1% in national population estimates [24]. The use of weighted data partly offsets this issue, with 6.3% of the weighted sample aged 14–17 years.

Sampling for the NDSHS is stratified by geographic area (capital city and rest of state for each of the six Australian states and the Northern Territory plus a single strata for the Australian Capital Territory). Within strata, multi-stage sampling was undertaken, with smaller regions sampled first (with probability proportional to household numbers), then households within these regions and finally a respondent within each household. The data were weighted based on the large geographical strata, age group and sex to population benchmarks provided by the Australian Bureau of Statistics. All analyses presented here use the weighted data to ensure that the samples are as representative (and comparable) as possible. Full technical details on the sampling, interview and weighting procedures are available in the official survey reports [12,25].

The primary dependent variable for this study is drinking status. Respondents were classified as abstainers if they reported consuming no alcohol in the 12 months prior to the survey. A number of independent variables

were examined, including the simple age, sex and state of residence. The socio-economic status of the respondents' neighbourhoods was examined via quintiles of the Australian Bureau of Statistics Index of Relative Socio-Economic Disadvantage [26], and rurality was measured using a three-category (major cities, inner regional, outer regional and remote) collapsed version of the five-category ASGC measure [27]. A simple binary variable was included to measure whether or not the respondent was a student.

Detailed data on cultural background are not provided in the unit record file for the 2010 NDSHS, so a simplified measure was used. This measure divided respondents into two groups based on whether or not a language other than English was spoken in their home. If so, they were treated as coming from a non-English-speaking background. In the 2001 data, these respondents came from households speaking a mix of European languages (51%) (particularly Greek and Italian), Asian languages (38%, mainly Vietnamese, Cantonese, Mandarin) and Arabic (11%).

To resolve the complication of varied income categories across the two questionnaires, a simple measure of household income was derived by inflating the 2001 income categories to 2011 dollars. The most appropriate cut-off was then selected by comparing the inflated categories with those from the 2010 questionnaire and the sample distribution. This led to a simple measure of high income (>\$53 493 on the 2001 data and >\$52 000 on the 2010 data), low income (up to these thresholds) and a category for 'don't know'.

## Analyses

The prevalence of abstaining (and 95% confidence intervals) in the specified socio-demographic groups were estimated using Stata's complex survey design module to ensure that appropriate weights were applied and the correct standard errors were calculated.

To test whether trends in abstention varied across subgroups of the population, logistic regression models with all predictors included were developed and then each independent variable was included in an interaction term with year. As these models included region, sex and age, the unweighted data were used to avoid double weighting.

## RESULTS

The basic demographic structure of the two samples is provided in Table 1.

Overall abstention rates among 14–17-year-olds increased from 32.9% [95% confidence interval (CI) = 30.0–35.7%] in 2001 to 50.2% (46.7–53.6%) in 2010.

**Table 1** Demographics of 14–17-year-old samples, 2001 and 2010, National Drug Strategy Household Survey.

	2001 (n = 1477)	2010 (n = 1075)
Gender		
Male	51.5%	51.4%
Female	48.5%	48.6%
Age (years)		
14	20.8%	23.1%
15	23.2%	26.4%
16	27.3%	23.5%
17	28.7%	27.0%
Household income		
High	56.0%	60.9%
Low	16.8%	13.6%
Not stated/don't know	27.2%	25.5%
Life situation		
Studying	82.5%	80.8%
Not studying (working, unemployed, etc.)	17.5%	19.2%
Cultural background		
Only English spoken at home	79.6%	80.3%
Language other than English spoken at home	20.4%	19.8%
Remoteness of residence		
Major city	62.2%	64.9%
Inner regional	18.4%	23.6%
Outer regional/remote	19.4%	11.5%
Socio-economic quintile of neighbourhood		
1 (most disadvantaged)	18.0%	17.1%
2	27.5%	21.0%
3	18.0%	17.4%
4	13.7%	20.5%
5 (least disadvantaged)	22.8%	24.1%
State		
New South Wales	32.9%	32.1%
Victoria	24.2%	24.1%
Queensland	19.7%	21.1%
Western Australia	11.0%	10.5%
South Australia	7.2%	7.2%
Tasmania	2.4%	2.4%
Australian Capital Territory	1.6%	1.5%
Northern Territory	1.1%	1.1%

This increase was steady, with abstention rates in this age group of 39.4% (36.6–42.1%) in 2004 and 40.7% (37.4–44.1%) in 2007. Abstention rates by individual demographic factors in 2001 and 2010 are presented in Table 2. Rates of abstention were broadly similar for males and females and declined steadily with age. There were large increases in rates of abstention across all age groups and for both males and females between 2001 and 2010 (Table 2).

Abstention was at roughly similar levels across income groups and increased sharply in all groups. Young people who were studying had higher abstention

**Table 2** Twelve-month abstinence from alcohol by individual socio-demographic factors, 2001 and 2010, National Drug Strategy Household Survey.

	2001		2010	
	Unweighted n	Weighted prevalence of abstinence (95% CI)	Unweighted n	Weighted prevalence of abstinence (95% CI)
Gender				
Male	501	35.7% (31.5–39.9%)	718	51.4% (46.3–56.5%)
Female	574	29.9% (26.0–33.8%)	759	48.8% (44.2–53.4%)
Age (years)				
14	252	56.6% (49.9–63.3%)	311	73.0% (67.0–79.0%)
15	275	39.0% (33.0–45.0%)	366	61.3% (54.5–68.2%)
16	264	25.8% (20.6–31.0%)	404	39.6% (32.8–46.5%)
17	294	18.0% (13.4–22.7%)	396	28.6% (22.4–34.7%)
Household income				
High	652	28.9% (23.4–34.3%)	812	42.7% (35.9–49.4%)
Low	149	35.1% (28.1–42.1%)	259	60.4% (51.5–69.3%)
Not stated/don't know	274	34.1% (30.2–38.0%)	406	51.0% (46.5–55.5%)
Life situation				
Studying	786	34.9% (31.7–38.2%)	1179	54.6% (50.7–58.6%)
Not studying (working, unemployed, etc.)	190	20.0% (13.9–26.2%)	236	26.1% (18.9–33.2%)
Cultural background				
Language other than English spoken at home	833	45.9% (38.9–53.0%)	1198	64.6% (56.1–73.2%)
Only English spoken at home	174	29.2% (26.0–32.3%)	270	45.2% (41.3–49.1%)

CI = confidence interval.

rates than those who were working, unemployed or on home duties, and abstinence rates in both groups increased over the study period. Similarly, young people living in households where a second language was spoken had higher abstinence rates than those in only English-speaking households, but the abstinence rate for both groups increased over the study period.

Abstinence rates based on geographically determined factors are presented in Table 3.

Across both survey waves, abstinence rates were broadly similar across socio-economic quintiles. There was some large variation in prevalence estimates by state, but sample sizes were low and confidence intervals very large. Young people in outer regional and remote areas had lower abstaining rates than those living in major cities. Abstinence rates increased in all remoteness and socio-economic disadvantage categories and in all states except South Australia.

The results of the overarching logistic regression model incorporating all predictor variables are presented in Table 4. Respondents were approximately twice as likely to report abstinence from alcohol in 2010 as 2001 once other factors were controlled for. The relationships between abstinence and the socio-demographic variables were consistent with the descriptive statistics presented above. Abstinence was slightly higher among males and declined significantly with age. Young people who were no longer studying were less likely to abstain from alcohol, as were young people from households where

only English was spoken. Household income was not associated significantly with abstinence. Abstinence rates were significantly lower in outer regional and remote areas (compared to major cities), but there were no significant differences at the state level or across socio-economic quintiles.

Additional interaction terms between each of the independent variables and year were included in further models, to assess whether the change over time in abstinence varied between population subgroups. These are presented in Table 5. None of these interaction terms were statistically significant, suggesting that changes in abstinence rates took place across all demographic groups in the population.

## DISCUSSION

The results presented here confirm that there has been a sharp increase in non-drinking among adolescents in Australia, with abstainers making up 50.2% of 14–17-year-olds in 2010 compared with 32.9% in 2001. This increase has been distributed across all subsections of the population examined. Thus while, for example, young people living in remote areas are less likely than city dwellers to abstain, abstinence in both groups has increased at roughly the same rate. These findings point towards broad cultural factors that span the population as the key drivers of the shift in drinking behaviour taking place among young people in Australia.

**Table 3** Twelve-month abstinence from alcohol by geographic socio-demographic factors, 2001 and 2010, National Drug Strategy Household Survey.

	2001		2010	
	Unweighted n	Weighted prevalence of abstinence (95% CI)	Unweighted n	Weighted prevalence of abstinence (95% CI)
Remoteness of residence				
Major city	676	35.6% (32.0–39.3%)	992	52.6% (48.4–56.9%)
Inner regional	233	30.1% (23.1–37.0%)	211	47.4% (39.8–55.0%)
Outer regional/remote	166	26.7% (20.4–32.9%)	274	41.9% (32.7–51.2%)
Socio-economic quintile of neighbourhood				
1 (most disadvantaged)	171	34.8% (27.7–41.9%)	246	48.9% (39.5–58.4%)
2	236	35.2% (29.3–41.0%)	345	43.3% (36.0–50.6%)
3	185	32.9% (25.9–40.0%)	234	48.7% (40.4–57.1%)
4	226	35.2% (27.7–42.6%)	228	59.7% (52.5–66.8%)
5 (least disadvantaged)	257	27.1% (21.8–32.4%)	424	50.0% (43.1–56.8%)
State				
New South Wales	294	36.4% (30.8–42.0%)	332	54.3% (47.9–60.6%)
Victoria	210	33.3% (27.5–39.0%)	312	48.3% (40.6–56.05)
Queensland	253	28.0% (20.8–35.2%)	191	50.2% (43.6–56.7%)
Western Australia	103	29.6% (23.6–35.6%)	332	50.1% (39.3–60.9%)
South Australia	83	40.1% (30.1–50.0%)	106	40.6% (27.7–53.5%)
Tasmania	46	24.0% (12.4–35.6%)	68	45.8% (28.6–63.1%)
Australian Capital Territory	40	20.8% (11.6–30.0%)	79	42.0% (23.0–60.9%)
Northern Territory	46	27.3% (13.4–40.6%)	57	54.9% (38.0–71.7%)

CI = confidence interval.

The similarity of the Australian trends with those found in the Nordic countries and the United States raises the question of common underlying factors across these countries. Interestingly, all countries have strong temperance traditions and have had roughly parallel consumption patterns over the last century, with long waves of increasing and decreasing consumption at similar historical points [28]. These long waves have been theorized as being a delayed social reaction to changes in consumption [29]. Thus, increases in alcohol consumption or alcohol-related harm are followed by increasing social concerns about alcohol and subsequent reductions in consumption (driven as much by cultural shifts as policy changes) [30]. Social concerns around alcohol typically focus heavily on the drinking of young people, and shifts in parental and social norms about teenage drinking may be the first sign of a shift in broader population drinking. Thus, these findings may represent a turning point in these long waves and may herald a period of declining consumption in Australia. The idea that a broad social shift is going on regarding alcohol in Australia is supported by ongoing changes in public attitudes, with sharp increases in concern about alcohol [12] and in attitudes to restrictive alcohol policies [31].

For example, increased social concern about alcohol may have led to more restrictive parental attitudes about supply of alcohol or supervision of their adolescent chil-

dren. Indeed, while this study found no evidence that the secondary supply laws discussed earlier were related directly to abstinence rates, they could be seen as a manifestation of this increased public concern about teenage drinking which may have resulted in greater informal control of access to alcohol for underage drinkers. Another potential explanation relates to the broad shifts in leisure activities that have occurred in the past decade. Recent Australian evidence estimates that 14–17-year-olds use the internet more than 3 h per day on average [32]. This form of entertainment may have displaced other leisure activities in young people's lives, including those involving alcohol consumption. Some early evidence from Sweden supports this explanation, finding lower rates of drinking among young people with higher engagement in social media and online gaming [33]. Finally, the Australian population is increasingly multicultural, with a steady increase in residents from typically lighter drinking cultures [34]. This gradual cultural shift is likely to have played a part in the increasing rates of abstinence among adolescents. Future research, including in-depth qualitative work, needs to examine these and other potential causes of the sharp changes in drinking behaviour reported here.

The reductions in drinking among Australian adolescents have not been offset by increases in illicit drug use or smoking, with steady falls in the prevalence of these

**Table 4** Logistic regression model of 12-month abstinence from alcohol by socio-demographic factors and year, National Drug Strategy Household Survey.

	OR (95% CI)	P-value
Year		
2001 (ref)	1	NA
2010	2.14 (1.76–2.60)	< 0.01
Gender		
Male (ref)	1	NA
Female	0.83 (0.68–1.00)	0.05
Age (years)		
14 (ref)	1	NA
15	0.57 (0.44–0.73)	< 0.01
16	0.25 (0.19–0.32)	< 0.01
17	0.14 (0.11–0.19)	< 0.01
Household income		
High (ref)	1	NA
Low	1.15 (0.89–1.50)	0.29
Not stated/don't know	0.89 (0.72–1.11)	0.32
Life situation		
Studying (ref)	1	NA
Not studying (working, unemployed, etc.)	0.63 (0.48–0.83)	< 0.01
Cultural background		
Only English spoken at home (ref)	1	NA
Language other than English spoken at home	2.20 (1.72–2.81)	< 0.01
Remoteness of residence		
Major city (ref)	1	NA
Inner regional	0.80 (0.60–1.05)	0.11
Outer regional/remote	0.69 (0.52–0.93)	0.02
Socio-economic quintile of neighbourhood		
1 (most disadvantaged) (ref)	1	NA
2	0.84 (0.62–1.13)	0.26
3	0.85 (0.61–1.18)	0.34
4	0.99 (0.71–1.38)	0.95
5 (least disadvantaged)	0.70 (0.51–0.97)	0.03
State		
New South Wales (ref)	1	NA
Victoria	0.78 (0.59–1.04)	0.09
Queensland	0.92 (0.68–1.24)	0.59
Western Australia	0.80 (0.59–1.08)	0.14
South Australia	0.81 (0.55–1.19)	0.29
Tasmania	0.68 (0.41–1.11)	0.12
Australian Capital Territory	0.62 (0.37–1.02)	0.06
Northern Territory	1.10 (0.65–1.86)	0.73

CI = confidence interval; OR = odds ratio; NA = not applicable.

behaviours over the same period [10]. This is in contrast to some of the international data, with significant increases in cannabis use over the first decade of the 2000s in Finland and the United States and stable rates in Sweden [7,9].

It is also worth noting the limitations of the data underpinning this study—the NDSHS has a relatively

**Table 5** Interactions between socio-demographic variables and year in fully adjusted logistic regression models of 12-month abstinence, National Drug Strategy Household Survey.

	OR (95% CI)	P-value
	1	NA
Year × gender (female)	1.38 (0.95–2.02)	0.09
Year × age (15)	1.25 (0.74–2.11)	0.40
Year × age (16)	1.16 (0.68–1.98)	0.58
Year × age (17)	1.09 (0.62–1.93)	0.76
Year × household income (low)	1.34 (0.78–2.29)	0.29
Year × household income (don't know)	0.88 (0.65–1.18)	0.40
Year × life situation (not studying)	0.88 (0.52–1.50)	0.64
Year × cultural background (non-English-speaking)	1.13 (0.69–1.84)	0.63
Year × remoteness (inner regional)	0.91 (0.55–1.51)	0.72
Year × remoteness (outer regional/remote)	1.34 (0.79–2.30)	0.28
Year × socio-economic quintile (2)	0.72 (0.39–1.32)	0.29
Year × socio-economic quintile (3)	1.09 (0.56–2.11)	0.80
Year × socio-economic quintile (4)	1.10 (0.58–2.10)	0.76
Year × socio-economic quintile (5 least disadvantaged)	1.16 (0.64–2.10)	0.63
Year × state (Victoria)	1.21 (0.69–2.13)	0.50
Year × state (Queensland)	1.70 (0.94–3.10)	0.08
Year × state (Western Australia)	1.18 (0.62–2.26)	0.61
Year × state (South Australia)	0.83 (0.39–1.80)	0.65
Year × state (Tasmania)	1.84 (0.69–4.91)	0.22
Year × state (Australian Capital Territory)	1.36 (0.49–3.76)	0.55
Year × state (Northern Territory)	2.44 (0.88–6.74)	0.09

These interaction terms are adjusted for all variables in the full regression model presented in Table 4. CI = confidence interval; OR = odds ratio; NA = not applicable.

low response rate (~50%) and this raises some concerns about the validity of population estimates based on it. However, previous studies find that non-response bias for alcohol use is typically small or non-significant [35–37]. There is also the potential that young people's responses to questions about their alcohol use will be influenced by their norms about the acceptability of drinking. This could mean that the reductions observed here are overstated, but even in this scenario, such a dramatic shift in norms around drinking by teenagers is noteworthy and worthy of further investigation. There is some evidence that rates of alcohol-related harm have increased even among adolescents over the last decade [38], adding to the increasing evidence that harm and consumption trends are diverging. Exploring whether this divergence is due to biases in harms data, survey data or changes in the distribution of drinking is a key area for future research.

The significance of the trends identified in this study will only be understood fully in future years as this cohort ages. There are already some indications that drinking

rates are falling among young adults [12], although these vary across surveys [39] and are not consistent with register data showing steadily increasing rates of harm [40]. Given previous work highlighting the importance of early initiation of drinking [41], the findings of this study suggest that we should expect declines in problems related to alcohol in young adulthood and beyond as this cohort ages. Future work is critical to try to pin down the causal processes behind these changes so that they can be best supported via appropriate policy and practice.

### Declaration of interests

None.

### Acknowledgements

Michael Livingston is supported by an NHMRC Early Career Fellowship. The Centre for Alcohol Policy Research is funded by the Foundation for Alcohol Research and Education, an independent, charitable organization working to prevent the harmful use of alcohol in Australia <http://www.fare.org.au>. The funders had no role in study design, analysis or interpretation or in the decision to submit this paper for publication. The Australian Institute of Health and Welfare manage the data collection and dissemination of the National Drug Strategy Household Survey and we are grateful to them for facilitating access to the data. Robin Room provided extremely helpful comments on an early draft of this manuscript.

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