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**Associations between alcohol, smoking, socioeconomic status, and co-morbidities:**

**Evidence from the 45 and Up Study**

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## **ABSTRACT**

**Introduction/Aims.** Understanding how tobacco, alcohol and mental health are related is important for developing population-level policies and individual-level treatments that target co-morbidities. The current study aimed to examine the socio-demographic characteristics and mental health co-morbidities associated with the odds of using tobacco and harmful levels of alcohol concurrently.

**Design/Methods.** Data were drawn from the 45-and-Up Study, a large cohort study with 267,151 adults aged 45 years and over in New South Wales, Australia. Participants completed a survey assessing alcohol, smoking, psychological distress, treatment for depression and anxiety, and a range of socioeconomic status indicators. Univariate analyses and three multiple-logistic regression models were used to determine associations with a) tobacco but not alcohol use; b) alcohol but not tobacco use; c) concurrent tobacco and risky levels of alcohol use.

**Results.** Being female, younger, lower individual and area-level SES and depression and psychological distress were associated with tobacco use alone. Factors associated with alcohol use alone were older age, male gender, higher SES, and lower psychological distress and no recent treatment for depression. Factors associated with concurrent risky alcohol consumption and tobacco use included: being 45-64, being male, less education, earning <\$30,000, being employed, and living in lower SES areas, treatment for depression, and high distress on the K-10.

**Discussion/Conclusions.** Results suggest strong links between SES, treatment for depression, psychological distress, and concurrent tobacco and alcohol use. This has implications for public health policies and clinical treatment for tobacco and alcohol use, suggesting greater emphasis on addressing multiple health and social concerns.



Tobacco smoking and harmful alcohol consumption are widely prevalent with one-in-six Australians being current smokers and one-in-four consuming alcohol at harmful levels [1]. Both smoking and alcohol use have been linked to premature death and disability through increased risk for cancers, cardiovascular disease (CVD) and many other chronic conditions [2]. Much of the burden of smoking and harmful alcohol consumption is preventable [3]. Importantly, smoking and alcohol consumption show a high degree of co-occurrence and share common risk factors; 60% of adults consuming alcohol to harmful levels are also smokers [4]. Concurrent use of alcohol with cigarettes has known synergistic effects which increase the health risks of tobacco products, particularly mouth and throat cancer [5-7]. In 2009 the incidence of mouth and throat cancer was, respectively, 2.3 and 2.6 new cases per 100,000 people, whereas the mortality rate for mouth and throat cancer was 0.5 and 1.1 deaths per 100,000 people, respectively [6]. Given the approximate relative risks for developing mouth and throat cancer are seven times greater for those who use tobacco, six times greater for those who use alcohol, and 38 times greater for those who use both tobacco and alcohol [8], greater understanding of the patterns of concurrent smoking and alcohol consumption may help to reduce the burden of these cancers in the future. Although both alcohol consumption and tobacco smoking are each associated with socioeconomic status (SES), the directions of the associations differ. There is clear evidence of a social gradient with tobacco use whereby smoking rates rise as SES lowers [9]. In the case of alcohol use, the evidence is mixed with some studies pointing to a link between harmful alcohol use and lower SES [10] and other studies suggest higher alcohol consumption is not associated with lower SES [11]. There is little population research which has examined the relationship of SES with concurrent smoking and harmful alcohol consumption.

Large scale surveys have shown relationships between smoking and mental illness [12, 13] and a recent Australian study has described the co-existence of social disadvantage,

psychosis and smoking [14]. Similarly, Grant et al. [15] reported that 13.7% of respondents with an alcohol use disorder also met DSM-IV criteria for major depression, and 17.05% met the criteria for an anxiety disorder. A review by Boden and Fergusson [16] suggested that a causal link existed between alcohol misuse and the increased likelihood of depression, although the potential mechanisms underlying this link (e.g., environmental and socioeconomic factors, genetic, metabolic) were not clear.

Although existing research suggests there may be associations between socio-demographic characteristics and concurrent alcohol and tobacco use and mental health, only one comprehensive study of these associations was found. Using a representative population sample, Degenhardt and Hall [12] found associations between low SES factors, alcohol use disorder, mental illness and tobacco use. An update to that study (conducted prior to 2001) is warranted given that an understanding of how each of tobacco, alcohol use and mental health are related is important for developing population-level policies and individual-level treatments that target co-morbidities. For example, at the population level, there is Australian evidence that there are socioeconomic disparities in tobacco and alcohol retail outlet densities with outlets clustered in the most disadvantaged neighbourhoods [17, 18]. Similarly, it has also been estimated that up to 35% of regular tobacco users with alcohol dependence have sought or received mental health treatment [19], which has significant implications for the success of treatments they may receive [20]. The aim of the current study was to examine the socio-demographic characteristics and mental health co-morbidities associated with the odds of using tobacco and harmful levels of alcohol concurrently.

## **METHODS**

## Data

This study used data drawn from the 45 and Up Study, a large cohort study with 266,848 adults aged 45 years and over in New South Wales, Australia. [21]. Participants were randomly sampled from the Medicare Australia database and recruited using a mailed self-administered health survey. In total, 267,151 participants were recruited in a baseline health survey between February 2006 and February 2010, representing an 18% response rate. The 45 and Up Study gained ethics approval from the University of New South Wales Human Research Ethics Committee, and this sub-study obtained approval from the University of Newcastle Human Research Ethics Committee.

## Survey Instrument

The 45 and Up Study baseline surveys (for males and females) contained 58 items on health, lifestyle and socio-demographic variables and are available in full at [www.45andup.org.au](http://www.45andup.org.au).

Items of interest in this sub-study are:

***Alcohol consumption:*** Participants were asked “About how many alcoholic drinks do you have each week?” and “On how many days each week do you usually drink alcohol?” These variables were used to calculate the approximate number of alcohol drinks consumed per day. Responses were then categorised into drinks per day: 0, 1-2, or more than 2. Using the National Health and Medical Research Council definitions [22], those reporting more than two drinks per day were defined as consuming ‘risky’ levels of alcohol.

***Smoking status and cigarette consumption:*** Using the questions “Have you ever been a regular smoker?” (if yes), “How old were you when you started smoking

regularly?”, “Are you a regular smoker now?” and (if no) “How old were you when you stopped smoking regularly?”, participants were classified into three groups, current smoker, never smoker and ex-smoker. Current smokers were asked to indicate the number of cigarettes they smoked daily.

***Socioeconomic status (SES):*** Two forms of SES measures were used; area-level and individual. The area-level SES measure used was the Australian Bureau of Statistics (ABS) Socio Economic Index For Areas (SEIFA). A participant’s SEIFA is determined using the postcode they provided in the baseline survey. The SEIFA consists of four separate indexes which measure different aspects of the social and economic conditions in an area based on information from the 2006 National Census (Australian Bureau of Statistics, 2008). The one used for this study is the Index of Relative Socio-economic Disadvantage (IRSD), which was categorized into quintiles, with quintile 5 indicating highest SES and quintile 1 indicating lowest SES. To assess individual measures of SES, highest level of education achieved (none, school certificate, higher school certificate/trade/diploma, university degree), total household income (AUD < \$30,000, \$30,000-49,999, \$50,000-69,999, and \$70,000 or more), paid hours of work per week (nil, < 5 hours, 6-10 hours, 11-15 hours, 16-20 hours, >20 hours), private health insurance status (yes, no) and health care concession card holder for those receiving welfare benefits (yes, no) were used.

***Mental Health Co-morbidities:*** Two measures of mental health were used. A single item required participants to answer Yes or No as to whether they had been treated for anxiety or depression in the month prior to survey. Participants also completed the Kessler-10 scale (K-10) [23], a 10-item questionnaire that provides a global measure of psychological distress based on anxiety and depressive symptoms experienced in the last month. Scores range from 10 to 50, with the following likely categories: <20



‘well’; 20-24 ‘mild distress’; 25-29 ‘moderate distress’; and a score of 30 and over indicating ‘severe distress’ [24].

In addition, data on age, gender, location of residence (regional, rural or metropolitan), and marital status were used.

### **Statistical Analysis**

Associations between socio-demographic characteristics (including SES, age, gender, marital status, place of residence, country of birth), smoking status, and alcohol use (none, 1-2 drinks per day, more than 2 drinks per day) were explored initially using Chi-square tests.

Due to the large sample size, all univariate analyses were highly statistically significant.

Therefore, the variables with the strongest associations with alcohol consumption (those with noticeable change in proportions for each sub-category) including gender, age, housing status, marital status, location and the SES variables, were included in the subsequent regression models as explanatory variables. Three multivariate logistic regression models were created to separate the effects of different smoking and alcohol use indicators. The first model was created based on current smoking status as the main outcome of interest (no alcohol use). The second model was created based on current alcohol use (any) as the main outcome of interest (non-smokers only). The third model was based on the main outcome of interest with all current smokers who reported drinking more than 2 units of alcohol per day (n = 6838). Odds ratios associated with the outcomes with 95% confidence limits are provided, with the lowest category of the explanatory variable as the reference (where pertinent).

All statistical analyses were carried out using the SAS statistical analysis computer package [25].

## **RESULTS**

All participants (n = 267,151) were retained for the current analyses. Table 1 shows the variables of interest and socio-demographic variables.

Table 1 about here.

### **Model 1: Factors associated with current smoking**

The results of the multivariate logistic regressions (see Table 2) show that participants who were more likely to be smokers and abstinent from alcohol were: aged less than 85 (ORs ranged from 3.15 to 10.94), female (OR = 1.25, 95% CI = 1.18, 1.33,  $p < .0001$ ), less educated (ORs ranged from 1.63 to 3.37), earning less than \$30,000 per year (OR = 1.50, 95% CI = 1.38, 1.63,  $p < .0001$ ), and from lower SES areas (ORs ranged from 1.63 to 2.26). In terms of mental health, those who reported having received treatment for depression (OR = 1.49, 95% CI = 1.37, 1.61,  $p < .0001$ ), and those who reported high distress (scores of 30 or more) on the K-10 (ORs ranged from 1.28 to 2.50), were also more likely to report being a non-drinking smoker.

### **Model 2: Factors associated with any alcohol consumption**

Table 2 shows that participants who were more likely to be non-smoking drinkers were: aged less than 85 (ORs ranged from 1.46 to 1.50), male (OR = 2.11, 95% CI = 2.07, 2.15,  $p < .0001$ ), more educated (ORs ranged from 1.51 to 1.71), earning more than \$30,000 per year (ORs ranged from 1.07 to 1.69), being employed (OR = 1.04, 95% CI = 1.02, 1.08,  $p < .0001$ ), from higher SES areas (ORs ranged from 1.28 to 1.49). In terms of mental health those who reported never having received treatment for depression (OR = 1.09, 95% CI = 1.05, 1.12,  $p < .0001$ ), and those who reported mild to moderate distress (scores of less than 30) on the K-10 (ORs ranged from 1.30 to 1.94), were more likely to be non-smoking drinkers.

### **Model 3: Factors associated with smoking and risky levels of alcohol consumption**

Table 2 shows that the characteristics associated with concurrent risky alcohol consumption and tobacco use include: being 45-64 (OR = 19.10, 95% CI = 9.89, 36.89,  $p < .0001$ ), being male (OR = 2.61, 95% CI = 2.47, 2.76,  $p < .0001$ ), being less educated (ORs ranged from 1.83 to 2.52), earning less than \$50,000 (ORs ranged from 1.21 to 1.50), being employed (OR = 1.35, 95% CI = 1.27, 1.45,  $p < .0001$ ), and living in lower SES areas (ORs ranged from 1.23 to 1.76). In terms of mental health, participants who been treated for depression (OR = 1.28, 95% CI = 1.18, 1.39,  $p < .0001$ ), and those who reported high distress (scores of 30 or more) on the K-10 (ORs ranged from 1.16 to 1.47), were more likely to be concurrently using both risky levels of alcohol and tobacco.

Table 2 here

## **DISCUSSION**

Using a large population sample of adults aged 45 years and over, the results suggested that the characteristics of adults who smoke tobacco and consumed alcohol were likely to be different to non-smokers who consumed alcohol. In line with previous research [9], it appeared that adults who smoked tobacco are from lower socioeconomic backgrounds, displayed lower levels of education, and exhibited higher rates of psychological distress and depression, regardless of whether they consumed alcohol or not. Smokers in this study were also at the lower age range (45-65 years), possibly reflecting earlier mortality. Concurrent tobacco and risky alcohol use was associated with male gender and employment.

Alternatively, compared to their 'smoker' counterparts, non-smokers who consumed any amount of alcohol are more likely to be older (65-85 years), male, from higher socioeconomic positions and exhibited lower rates of psychological distress and depression. The concentration of multiple health risks in the more disadvantaged groups suggests that redressing health inequalities requires preventive action on a number of risky health behaviour fronts.

### **Implications for public health policy**

The current results have implications for public health policy. As two of the most common and damaging substances of dependency, alcohol and tobacco have led to the development of intensive but separate public health policies in most countries including Australia. However, a separate focus on each behaviour may be diluting the potential effect of policy, particularly amongst those from lower SES backgrounds. A recent retrospective cohort study in Sweden

with 28,198 adults aged 18-80 years found that economic stress was a strong predictor of current smoking and that mobility from less economically stressful to more stressful environments during the life-course leads to smoking uptake [26]. The current study builds on the Lindstrom et al. [26] results and may suggest that rather than focussing on a single health risk behaviour, if public health policy were to take into account the common social determinants of multiple health risk behaviours it may be a more effective and economical approach [27]. For example, public health campaigns could include both anti- smoking and anti-drinking imagery and messages perhaps in the social contexts that people of lower SES engage in [28]. Similarly, the public health messages against concurrent smoking and drinking could be delivered in settings that are used by people with mental health concerns or in low SES areas. Consideration of cross-behaviour effects is also important. For example, studies have shown that raising the drinking age in the US resulted in reductions in smoking rates, and increasing tobacco taxes reduced drinking levels [29, 30]. Using population-level strategies for multiple health and social risk factors is a dramatic shift from the current approach of targeting single health issues. Therefore, further research is necessary to delineate factors that co-occur, shared social determinants that can be modified for health promotion, and the effectiveness of population-level strategies addressing multiple health risk behaviours and factors. Exploration of whether any cost savings result from this approach would also be useful.

The association between alcohol misuse and older age and higher SES suggests that policy makers should address problem drinking among retirees. High levels of alcohol consumption among this group may be associated with accidents such as falls, with consequent long hospital stays and expenses, in addition to known associations with cardiovascular risk and dementia. That higher SES is also associated with drinking suggests that policy makers might

consider how to make reduced alcohol or alcohol free lifestyles more attractive to older people.

### **Implications for treatments targeting the individual**

The current results also present a number of implications for treatment of tobacco or alcohol misuse. One possible question arising from this research is whether people in treatment for alcohol misuse should also target smoking cessation as part of that treatment. Similarly, does restricting smoking reduce the risk of developing alcohol dependence? Currently, in most developed countries including Australia, tobacco dependence is not routinely addressed as part of alcohol and other drug treatment [31, 32]. There is growing evidence that addressing smoking cessation in the context of treatment for alcohol misuse does not undermine, and even strengthens likelihood of abstinence from alcohol [33]. Furthermore, the finding that concurrent smoking and alcohol misuse was associated with employment suggests that the workplace may be a setting in which to address this comorbidity.

In addition, smoking cessation support is not routinely provided in mental health facilities in many countries. Yet, these results show a strong link between smoking and psychological distress. Although this study cannot show causation between smoking and psychological distress, it would seem important within the mental health treatment setting to address tobacco smoking. The lack of combined effort in these settings to address tobacco and alcohol use seems catastrophically inopportune, especially since smoking and alcohol use have an established synergistic effect on many disease risks and the high rates of premature mortality among mental health and alcohol and other drug service users [34]. This is despite

evidence that interventions for smoking cessation [35] and alcohol misuse [36] are effective among people with comorbid mental health problems. The silo approach to addressing tobacco, alcohol and mental illness has failed to reduce extremely high smoking prevalence rates amongst people seeking treatment for alcohol and other drug problems and mental illness and people experiencing socioeconomic disadvantage [37]. The bulk of evidence suggests that a more comprehensive and holistic approach to assisting people with these health and social concerns is needed. Some research has recently commenced within the non-government community service sectors in countries like the US [38] and Australia [39] which aim to combine consideration of low SES, mental health and tobacco use. Further research is necessary to explore the potential of these settings for treating multiple health and social concerns.

This study provided the opportunity to examine risk factors amongst older Australians. Alcohol misuse was associated with older age and higher SES. As the population ages, aged care facilities will need to be equipped to intervene accordingly, providing or referring to appropriate services for alcohol misuse and helping people to identify alcohol free leisure activities.

### **Limitations of the current study**

The main limitations of the study relate to the sample and measures. Although the sample size in this study is large (and represents 11% of the population of NSW) the sample does not represent younger Australians (aged under 45 years) and highly socially disadvantaged people who are more likely to report mental illness, tobacco and alcohol use. The 45 and Up

Study response rate was 18% which limits external validity and ability to generalise to the population in general. Other 45 and Up Study research has found that the relative risk estimates are comparable to a representative population survey [40]. This study utilises a cross-sectional design which does not allow for causal inferences to be made. However, longitudinal analyses using the follow-up waves of data collection from the study will enable testing of the robustness of the associations found in this paper. Tobacco and alcohol use are entirely based on participant self-report and the measures used were not standard or validated scales, therefore there is uncertainty regarding the accuracy of the data obtained. While some research suggests that social desirability bias for report of smoking status is not a major factor in these types of samples [41], tobacco and alcohol use are likely to be under-reported.

## **Conclusions**

This is one of the most comprehensive examinations of the associations between smoking, harmful alcohol use, mental health and SES based on a large community sample of older adults. The results suggest strong links between low SES, recent treatment for depression, psychological distress, and concurrent smoking tobacco and alcohol misuse. Employment was associated with concurrent alcohol misuse and smoking. Smokers, whether or not they use alcohol, are over-represented in low SES groups and exhibit mental illness. This has major implications for the treatment of tobacco addiction and comorbidity. Alternatively, alcohol misuse by non-smokers was associated with older age and higher SES but not mental health variables. Interventions for older people and in the workplace are recommended. Implications for public health policy and individual treatment of dependencies are discussed and recommendations for a shift from silo to holistic approaches that consider multiple determinants of health are made.





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## **Conflicts of Interest**

Nil

## **Contributions**

BB, ALB and CP conceived the study. AB conducted the statistical analyses and all authors contributed to drafting and finalising the manuscript.

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**Table 1. Primary characteristics of the sample by alcohol consumption (n=267,151)**

Characteristic	Drinking habits			
	None (n=86580)	2 or less per day (n=108295)	More than 2 per day (n=63382)	Total (N=267151)
Age				
45-64	49579 (30%)	67980 (42%)	45889 (28%)	167680 (63%)
65-84	32655 (38%)	36865 (43%)	16784 (19%)	90246 (34%)
85 and over	4334 (51%)	3434 (41%)	693 (8.2%)	9173 (3.4%)
Gender				
Male	28702 (24%)	46890 (39%)	44593 (37%)	123920 (46%)
Education				
No school cert	14516 (49%)	9201 (31%)	5864 (20%)	31322 (12%)
HSC	30298 (37%)	32801 (40%)	18811 (23%)	84900 (32%)
Trade/diploma	25106 (30%)	35077 (42%)	22376 (27%)	84889 (32%)
University	14967 (25%)	29789 (49%)	15588 (26%)	61570 (23%)
Housing type				
House	64416 (33%)	83314 (42%)	49308 (25%)	203304 (77%)
Flat, unit, apartment	10117 (37%)	10820 (39%)	6723 (24%)	28956 (11%)
House on farm	6261 (31%)	8843 (44%)	4835 (24%)	20467 (7.7%)
Retirement village, self care unit	2412 (43%)	2561 (45%)	696 (12%)	5946 (2.2%)
Nursing home	211 (69%)	72 (24%)	23 (7.5%)	329 (0.1%)
Hostel for the aged	503 (60%)	238 (29%)	91 (11%)	912 (0.3%)
Mobile home	825 (38%)	734 (34%)	609 (28%)	2271 (0.9%)
Other	1011 (43%)	804 (34%)	561 (24%)	2500 (0.9%)
Income				
Less than 30,000	33497 (45%)	26987 (36%)	14402 (19%)	78184 (31%)
30-49,999	11983 (30%)	17164 (43%)	10327 (26%)	40403 (16%)
50-69,999	7126 (26%)	12293 (45%)	7889 (29%)	27869 (11%)
70,000 or more	11755 (19%)	29153 (47%)	20938 (34%)	62809 (25%)
Prefer not to answer	16460 (39%)	18072 (43%)	7690 (18%)	43927 (17%)
Employment status				
Not employed	53615 (40%)	54831 (41%)	26901 (20%)	141463 (53%)
Employed	32965 (27%)	53464 (43%)	36481 (30%)	125688 (47%)
Socioeconomic status*				
1 – lowest SES	20583 (40%)	18753 (36%)	12456 (24%)	53997 (20%)
2	17209 (34%)	20196 (40%)	12638 (25%)	51746 (19%)
3	18773 (34%)	22492 (41%)	13466 (25%)	56610 (21%)
4	16844 (33%)	21709 (43%)	11914 (24%)	52105 (20%)
5 – highest SES	13150 (26%)	25120 (49%)	12887 (25%)	52623 (20%)
Smoking status				
Never smoked	57530 (39%)	65020 (44%)	24223 (17%)	152557 (57%)
Exsmoker	22312 (24%)	37551 (41%)	31935 (35%)	94119 (35%)
Smoker	6301 (33%)	5175 (27%)	6838 (36%)	18996 (7.1%)
Treatment in last month (Yes)				
Depression	12841 (38%)	12696 (38%)	8062 (24%)	34639 (13%)
Anxiety	8319 (38%)	8379 (39%)	5040 (23%)	22408 (8.4%)
Psychological distress (K10)				
No distress	64003 (31%)	89626 (43%)	52786 (26%)	211511 (89%)
Mild	5663 (39%)	5364 (37%)	3535 (24%)	15071 (6.3%)
Moderate	2591 (43%)	1985 (33%)	1420 (24%)	6224 (2.6%)

	<b>Drinking habits</b>			
<b>Characteristic</b>	<b>None (n=86580)</b>	<b>2 or less per day (n=108295)</b>	<b>More than 2 per day (n=63382)</b>	<b>Total (N=267151)</b>
High	2600 (51%)	1376 (27%)	1116 (22%)	5415 (2.3%)

\* Based on the ABS Rank for SEIFA (IRSD) where 1 = lowest SES and 5 = highest SES.

**Table 2. Results of logistic regression with 3 models: smoke but do not drink, drink but do not smoke, risky drinker and smoker**

Sub group	Model 1:Smoke but do not drink		Model 2:Drink but not current smoker		Model 3: Current risky drinker and smoker	
	Odds ratios	p-val	Odds ratios	p-val	Odds ratios	p-val
Age						
85 and over	ref	.	ref	.	ref	.
45-64	10.94 (7.06, 16.95)	<.0001	1.46 (1.36, 1.56)	<.0001	19.10 (9.89, 36.89)	<.0001
65-84	3.15 (2.03, 4.88)		1.50 (1.40, 1.60)		5.35 (2.77, 10.35)	
Gender						
Female	ref	.	ref	.	ref	.
Male	0.80 (0.75, 0.85)	<.0001	2.11 (2.07, 2.15)	<.0001	2.61 (2.47, 2.76)	<.0001
Education						
University	ref	.	ref	.	ref	.
No school cert	3.37 (3.01, 3.76)	<.0001	0.59 (0.56, 0.61)	<.0001	2.52 (2.26, 2.80)	<.0001
HSC	1.91 (1.73, 2.11)		0.88 (0.86, 0.91)		2.10 (1.93, 2.29)	
Trade/diploma	1.63 (1.48, 1.80)		0.93 (0.90, 0.95)		1.83 (1.68, 1.99)	
Housing						
Other	ref	.	ref	.	ref	.
House	0.61 (0.49, 0.75)	<.0001	1.18 (1.06, 1.30)	<.0001	0.51 (0.42, 0.62)	<.0001
Flat, unit, apartment	0.99 (0.80, 1.24)		1.06 (0.95, 1.18)		0.84 (0.69, 1.03)	
House on farm	0.48 (0.38, 0.61)		1.29 (1.16, 1.44)		0.43 (0.35, 0.53)	
Retirement village, self care unit	0.39 (0.25, 0.59)		1.13 (1.00, 1.28)		0.32 (0.21, 0.50)	
Nursing home	1.01 (0.40, 2.57)		0.45 (0.32, 0.64)		0.00 (0.00, 958E66)	
Hostel for the aged	0.84 (0.43, 1.65)		0.70 (0.56, 0.88)		0.60 (0.30, 1.21)	
Mobile home	0.87 (0.64, 1.19)		1.34 (1.16, 1.56)		0.85 (0.63, 1.14)	
Income						
I would prefer not to answer question	ref	.	ref	.	ref	.
Less than 30,000	1.50 (1.38, 1.63)	<.0001	0.74 (0.72, 0.76)	<.0001	1.50 (1.37, 1.64)	<.0001



Sub group	Model 1:Smoke but do not drink		Model 2:Drink but not current smoker		Model 3: Current risky drinker and smoker	
	Odds ratios	p-val	Odds ratios	p-val	Odds ratios	p-val
30-49,999	0.97 (0.88, 1.07)		1.19 (1.15, 1.23)		1.21 (1.10, 1.33)	
50-69,999	0.79 (0.70, 0.89)		1.41 (1.35, 1.46)		1.00 (0.90, 1.12)	
70,000 or more	0.48 (0.43, 0.54)		1.95 (1.88, 2.02)		0.89 (0.80, 0.98)	
Employment status						
FT/PT/self employed	ref	.	ref	.	ref	.
No	0.98 (0.91, 1.05)	0.5360	0.96 (0.93, 0.98)	0.0007	0.74 (0.69, 0.79)	<.0001
Socioeconomic status*						
5	ref	.	ref	.	ref	.
1	2.26 (2.02, 2.53)	<.0001	0.67 (0.65, 0.69)	<.0001	1.76 (1.60, 1.93)	<.0001
2	2.00 (1.79, 2.25)		0.79 (0.77, 0.82)		1.79 (1.63, 1.97)	
3	1.77 (1.58, 1.98)		0.78 (0.75, 0.80)		1.41 (1.28, 1.55)	
4	1.63 (1.45, 1.83)		0.78 (0.75, 0.80)		1.23 (1.11, 1.36)	
Depression						
Yes	ref	.	ref	.	ref	.
No	0.67 (0.62, 0.73)	<.0001	1.09 (1.05, 1.12)	<.0001	0.78 (0.72, 0.85)	<.0001
Anxiety						
Yes	ref	.	ref	.	ref	.
No	1.02 (0.92, 1.11)	0.7490	1.01 (0.97, 1.05)	0.6519	1.02 (0.92, 1.12)	0.7419
Psychological distress (K10)						
30 and over	ref	.	ref	.	ref	.
Less than 20	0.40 (0.35, 0.45)	<.0001	1.94 (1.81, 2.09)	<.0001	0.68 (0.59, 0.79)	<.0001
20 to 24	0.65 (0.57, 0.74)		1.52 (1.41, 1.64)		0.86 (0.74, 1.00)	
25 to 29	0.78 (0.67, 0.90)		1.30 (1.18, 1.42)		0.99 (0.84, 1.17)	

\* Based on the ABS Rank for SEIFA (IRSD) where 1 = lowest SES and 5 = highest SES.