Alcohol use and depression from middle age to the oldest old: Gender is more important than age

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Running header: Alcohol and Depression

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Abstract

Background Alcohol use disorders are associated with other mental health disorders in young adults, but there are few data on alcohol use and mental health outcomes in older adults, particularly the oldest old. This study examines the relationship between alcohol consumption and depressive symptoms.

Methods Data were from the Dynamic Analyses to Optimise Ageing study, which has pooled nine Australian longitudinal studies. Alcohol consumption was classified using standard drinks (10g alcohol) / day as: abstinent, low risk (<0-≤2 standard drinks), long-term risk (>2-≤4) and short-term risk (>4). Probable depression was classified from harmonised scores on various standard instruments (e.g. Centre for Epidemiological Studies Depression scale).

Results Overall, 39104 (86 %) participants contributed data. Alcohol classification at baseline showed 7526 abstinent, 28112 low risk, 2271 long-term risk and 1195 short-term risk participants. Age ranged from 45 to 103 years (median 60). Using generalised estimating equations, there were significant gender by alcohol and gender by age interactions, so the analysis was split by gender. Among males, the abstinent and short-term risk groups had increased likelihood of depression: in females the abstinent, long- and short-term risk groups had increased odds of depression. Increased odds of depression was also associated with former and current smoking, younger age-group, not being partnered, leaving school before age 15 and increasing levels of health impaired walking, dressing or bathing.

Conclusions The impact of alcohol use differs by gender, nevertheless those using higher levels of alcohol or who smoke should be screened for depression and may benefit from interventions.

Keywords: Aged: oldest-old: longitudinal: DYNOPTA: risk-factors

Introduction

The pattern of alcohol consumption varies across the adult lifespan with those aged 60 or older being the most likely to drink alcohol on a daily basis. However young adults (<30 years) are most likely to engage in patterns of alcohol use that confer either long- or short-term risks (Australian Institute of Health and Welfare, 2008). Epidemiological data show that the presence of an alcohol use disorder increases the risk of a mental health disorder and *vice versa* (Kessler *et al.*, 1996). Cross-national data from over 29000 people aged 14-64 indicate that increasing levels of alcohol consumption (use, problem, dependence) are associated with an increased proportion with mood disorders (Merikangas *et al.*, 1998) with most people reporting that their alcohol use pre-dated their mood disorder (Merikangas *et al.*, 1998). However, the link between lower, 'non clinical', levels of alcohol use and mood is less certain in later life, with evidence that moderate consumption may be related to improved mood and quality of life (Byles *et al.*, 2006; Chan *et al.*, 2009). Furthermore, data from community samples suggest that men are more likely to use alcohol as a means of coping with depression than women, but that women may be more vulnerable to depressive symptoms associated with heavy alcohol use (Nolen-Hoeksema, 2004).

The burden of depression also varies across the adult life course. Based on scores of depressive symptomology, there appears to be a marked increase in depression from mid-life (>40 years) to later life (>70 years), but when assessed as the proportion exceeding the threshold score on a standard screening instrument, this increase appears less pronounced (Gatz *et al.*, 1993). In contrast, other reports have indicated either a U-shaped trajectory, with reduced levels of negative affect from mid-life, before negative affect increases in the oldest group (>80 years) (Teachman, 2006), no increase even in the oldest old (Haynie *et al.*, 2001),

or even reduced prevalence of affective disorders in those aged 75-85 years (Australian Bureau of Statistics, 2008). However, it should be noted that there are limited data from the oldest old (Stek *et al.*, 2004).

Increased levels of physical disability have been causally linked with depression (Gayman *et al.*, 2008), which may lead to increased depressive symptoms in advanced old age, however at least one recent study has shown that the association between disability and depression lessens in the oldest-old (Mehta *et al.*, 2008). These authors suggest that the risk and protective factors for depression in older adults may be age-specific.

The current study used data from the Dynamic Analyses to Optimise Ageing (DYNOPTA) project that has harmonised data from nine longitudinal Australian studies (Anstey *et al.*, 2010). We examined the association between the use of alcohol and depressive symptomatology in community dwelling adults aged from mid-life to the oldest old, using analyses that also controlled for smoking status and physical impairment. Given the inconsistencies among reports on the relationship of depression with age and with alcohol use, it was tentatively hypothesised that depression would increase with age and with alcohol use. The size of the DYNOPTA cohort allows exploration of these complex relationships separately for males and females (Nolen-Hoeksema, 2004).

Method

Details of the DYNOPTA cohort and the component studies have been previously reported (Anstey *et al.*, 2010). Six of the DYNOPTA studies collected the key variables used here. The contributing datasets and their baseline samples were: the Australian Longitudinal Study of Ageing (ALSA) (n=2087): Australian Longitudinal Study of Women's Health (ALSWH)

(n=26137): Australian Diabetes, Obesity and Lifestyle Study (AusDiab) (n=7296): Household Income and Labour Dynamics of Australia (HILDA) (n=6164): Melbourne Longitudinal Studies on Healthy Ageing (MELSHA) (n=1000) and the Personality and Total Health Through Life Study (PATH) (n=2550). Of these 45234 people, 39104 (86 %) had depression, alcohol consumption and disability data at baseline and were living in the community at each follow-up.

All the studies included questions on the frequency and quantity of alcohol typically consumed, similar to the format in the Alcohol Use Disorders Identification Test (Babor *et al.*, 1992). From these values, average daily consumption was estimated. The current Australian guidelines recommend no more than two standard drinks (total 20g of alcohol) per day for the general adult population to be at 'low risk'. Consuming between two and four drinks per day increases the risk of 'long-term' harms (e.g. cancer) and more than four drinks per day increases the risk of 'short-term' harms (e.g. accidents). Furthermore, those aged 60 and above are advised to consult a health professional to obtain individual direction on an appropriate level of alcohol consumption (National Health and Medical Research Council, 2009).

The studies used a range of established screening instruments to assess depression. ALSA used the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977): the Short-Form Health Survey-36 (Ware *et al.*, 1993) was used in ALSWH, AusDiab, and HILDA; the Mental Health Components Summary score from the SF-12 (Ware *et al.*, 1996) was used in PATH, and MELSHA used the Psychogeriatric Assessment Scales (PAS) (Jorm *et al.*, 1995). The method for standardising these scores and the creation of a binary 'probable depression' variable is described elsewhere (Burns *et al.*, 2011). In brief, it involved using the

cut points on each scale that have need validated against diagnostic measures. The recommended cut points on the SF-12 and SF-36 (60, 55 and 50 – reversed to reflect poor health with higher scores) equate to 1.0, 1.2 and 1.6 standard deviations (SD) above the mean on the harmonised variable. For the CES-D, cut-off values of 16, 18 and 20 equate to 1.0. 1.2 and 1.6 on the harmonised variable. For the PAS, scores of 4 and 5 correspond to 1.2 and 1.8 on the new variable. Therefore, a cut off of 1.5 SD above the mean was selected as an indicator of 'probable depression', with the resultant prevalence by age and gender validated against national Australian data. 'Impairment' was categorised by combining self-reported ability to walk 1km (yes/no) and impairment in dressing or bathing ('not at all limited', 'a little limited' or 'limited a lot') to form a four item scale (walk 1 km and not at all limited, not at all limited, a little limited or limited a lot).

Generalised Estimating Equations (GEE) were used to evaluate the relationship between the demographic and substance use predictors and probable depression. The GEE models were implemented in SPSS v.19 and specified an unstructured working correlation matrix. As the period between waves of data collection varies across the studies, time was included as years in the study since baseline. Other time-varying variables were the classification of alcohol use ('low risk', abstinent, 'long-term risk' and 'short-term risk') and smoking ('never', 'ex-smoker', 'current smoker'), partner status (partnered *versus* not partnered) and physical impairment category ('walk 1 km and not at all limited', 'not at all limited', 'a little limited' or 'limited a lot'). Time-invariant factors were education (left school aged 14 years or younger *versus* 15 years or older), gender and baseline age-group. Due to the small cell sizes in some older age groups, age was divided into 10 year periods from age 45.

Results

Table 1 shows demographic features, smoking status and alcohol consumption groups at baseline by 10 year age groups. Alcohol classification revealed 7526 (19%) abstinent, 28112 (72%) low risk, 2271 (6%) long-term risk and 1195 (3%) short-term risk participants. Age ranged from 45-103 years, with a median of 60 years. On each measure there were significant differences in the proportions by age group. In particular, the decline in current smoking, and the increase in the proportion that was abstinent from alcohol at age 85 or older (38%) compared with younger age groups was notable. The median length of follow-up was 4 years (inter-quartile range (IQR) 0-7.8) with the median number of interviews being three (IQR 1-3). Figures 1a (male) and 1b (female) show the prevalence of depression by age group and alcohol consumption, with a U shaped curve only clearly evident for males. The overall prevalence of probable depression, shown by the black bars, was highest in the extreme age groups i.e. 45-54 years 10.8%, 85 years or older 9.4%. It should be noted that at baseline there were no women aged 85 years and above in the short-term risk consumption group and only eight in the long-term risk group: none had depression. Among the males, there were four in the short-term risk group: none had depression.

Insert table 1 & figure 1a & 1b about here

The generalised estimating equation models showed a significant interaction between gender and alcohol category (Wald 10.7 (3) p=.014) and gender and age group (Wald 14.0 (4) p=.007). The interaction of alcohol by age group was not significant. To facilitate interpretation, the analyses were stratified by gender. There were significant main effects on all measures shown in table 2. With respect to alcohol, among females, the short-term risk (odds ratio (OR) 1.54), long-term risk (OR 1.22) and abstinence groups (OR 1.23) all had increased odds of probable depression compared with low risk drinking. Among males, both short-term risk drinking (OR 1.30) and abstinence (OR 1.47) had increased odds compared with low risk drinking. There was no evidence of increased odds of depression in the long-

term risk group. Both current and former smokers had increased likelihood of depression compared with never smokers. For male and female former smokers, the respective increases were 26% and 10%: for current smokers of either gender, the increase was over 70%.

For both males and females, each age group had a lower likelihood of (probable) depression compared to the 45-54 year group. Those without a partner, and those who left school before 15 years of age, also had increased likelihood of depression. Compared to those who could walk 1 km and who had no limitation of dressing/bathing, each of the other 'impairment' categories had increased likelihood of depression. In addition among females the odds of depression declined by 2% for each year post baseline.

Insert table 2 about here

A post hoc analysis was conducted to investigate if the relationship between abstinence and depression was due to changes in alcohol status (potentially due to declines in health). A new alcohol status variable was constructed identifying those with a minimum of two waves of data, who were abstinent at every wave and those who were at low-risk at every wave. There were 16319 'always low risk' and 4346 'always abstinent' participants, comprising 30% of the males (n=2345) and 58% of the females (n=18320). The new alcohol variable replaced the earlier alcohol variable in the GEE model. In both males and females, those who were always abstinent had increased odds of depression – males 60% and females 20% (table 3). Among females, the odds ratios on other measures were essentially unchanged in magnitude and direction from the first model. Among males, the effects were mixed, including declines in the magnitude of the impact of impairment on depression and increased magnitude of effect for smoking.

Insert table 3 about here

Discussion

The crude prevalence of depression showed the U-shape previously reported, with those aged 45-54 years having the highest prevalence of depression, which declined through the young-old and old before increasing among the oldest old (Teachman, 2006). However, after controlling for other factors, among those aged 85 years and above, there was a lower likelihood of depression than the youngest group. For both men and women, those with low risk alcohol consumption had lower odds of depression than those who abstained or who were short-term risk consumers. Among women, but not men, long-term risk alcohol use was also associated with probable depression.

A review reported that the prevalence of depression in those over 75 years living in the community varied between 5% and 25%, with a weighted prevalence of 11.3% (Stek *et al.*, 2004), congruent with the 7.6% and 9.4% reported here for the two oldest groups. Data from an elderly cohort (mean age 72 years) in the USA shows that occasional (<3 times / week) to moderate regular alcohol use ($\geq$ 3 days / week and $\geq$ 170g/week) compared with abstinence was associated with significantly lower depression scores for women (and non-significantly different for men) (Chan *et al.*, 2009). However, women in the current study using up to 140g per week had lower odds of depression than abstainers, but those in the 141-280g range had increased odds compared to the reference group.

There is a range of explanations that could underlie the relationship between low risk alcohol use and reduced odds of depression. As noted previously, continued use of alcohol may contribute to overall health with, for example, moderate alcohol use is causally related to lower heart disease via lipids and haemostatic factors (Rimm *et al.*, 1999). Further, abstainers are typically less socially integrated (Lucas *et al.*, 2010) and have less social support (Rodgers *et al.*, 2000), factors that are associated with poorer mental health. Alternatively,

those with better health may require fewer medications with contra-indications for alcohol and better well being may result in greater social support through the capacity to continue to participate in social networks where alcohol consumption is an incidental element. For this reason, our conclusions highlight alcohol use as a risk indicator, not a causal contributor, for poor mental health.

Over the life span, the net disability adjusted life years attributed to alcohol use, is 2.3% of the total burden of disease in Australia (Australian Institute of Health and Welfare, 2003) with the potential benefits from moderate use of alcohol, such as improved cardiovascular outcomes (Mukamal *et al.*, 2005) and mortality (Byles *et al.*, 2006) failing to fully offset the harms. However, among those aged 65 and above, the consumption of alcohol has a net effect of reducing the burden of disease by 2.8% (Australian Institute of Health and Welfare, 2003). In the current cohort, there was no evidence of low risk alcohol use increasing the burden of disease attributable to depression.

Across the majority of age groups for males and females, those who were abstinent had the highest prevalence of depression. Abstinence from alcohol is also associated with other adverse risk indicators, such as lower socioeconomic-status, lower levels of education and greater financial strain (Anstey *et al.*, 2005; Pattenden *et al.*, 2008). In the current data, we were able to control for some demographic factors that could account for the relationship between abstinence and mood, including the presence of physical impairment, but other factors may still account for the relationship. Furthermore, those who move from being alcohol consumers to abstainers, may do so due to declining health (Turvey *et al.*, 2006). Physical impairment was associated with probable depression and when it was included in the multivariate analysis, the increased depression in the oldest age group was no longer

apparent. The up-turn in depression in the oldest old may therefore be attributable to their increasing disability rather than to ageing *per se*.

A number of limitations should be noted in interpreting our findings. Alcohol consumption was estimated from categorical frequency and quantity questions concerning typical levels of alcohol consumption, which limits their precision. However, this method has been shown to have a similar level of reliability to diary methods in light drinkers, with both approaches performing less well with heavy drinkers (>32 drinks per week) (Webb *et al.*, 1991). The current analysis did not control for measures of health such as self-reported diagnosis of chronic conditions or self-rated health, as these measures were only available from a limited subset of DYNOPTA studies. The presence of major health problems could account for both depression and abstinence, and may explain the apparent relationship with depression. However, others have found moderate alcohol use to be associated with improved quality of life even after controlling for chronic conditions such as diabetes and cardio-vascular disease (Chan *et al.*, 2009). The sensitivity analysis of those who were 'abstainers' at each wave and those who were 'low risk' drinkers at each wave, supports the notion that differences in depression outcomes are not due to recent changes in alcohol consumption status, but does not eliminate the possibility that some people may have become abstainers before the start of the study, potentially due to declining health.

It should be noted that the very low prevalence of higher levels of drinking among people at the older end of the spectrum, especially women consuming greater than two drinks per day (i.e. only eight women in the age 85 plus group), means that any effects will be difficult to detect and limits the potential to generalise recommendations. Finally, our data did not include information on whether or not individuals had received advice on appropriate levels

of alcohol consumption, which may explain the low prevalence of long- and short-term risk patterns of alcohol use seen in the oldest groups.

Conclusions

The substantial sample size of the DYNOPTA cohort, and in particular, the inclusion of many at the oldest end of the age spectrum provides a unique opportunity of examining the relationship between alcohol consumption and depressive symptoms whilst controlling for a range of other factors. The increased likelihood of depression symptoms associated with long-term (women only) and short-term risk patterns of alcohol use did not vary with age, suggesting that these are not age specific risk factors for depression. Drinking more than two drinks per day, along with tobacco use, may provide markers that would enable targeted screening for depression and for interventions to reduce these life-style risk factors in mid to later life.

Conflict of interest declaration

None

Description of authors' roles

Tait conducted the initial analysis and wrote the initial draft. French and Burns developed the initial topic area and contributed to subsequent statistical analyses. Anstey initiated the DYNOPTA project and provided critical interpretation of the data. All the authors contributed to the final version of the manuscript and provided editorial input.

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Longitudinal Study of Women's Health (ALSWH), the Australian Diabetes, Obesity and Lifestyle Study (AusDiab), the Household, Income and Labour Dynamics in Australia study (HILDA), the Melbourne Longitudinal Studies on Healthy Ageing (MELSHA), and the Personality And Total Health Through Life Study (PATH). These studies were pooled and harmonized for the Dynamic Analyses to Optimise Ageing (DYNOPTA) project. DYNOPTA was funded by an NHMRC grant (# 410215). All studies would like to thank the participants for volunteering their time to be involved in the respective studies. Details of all studies contributing data to DYNOPTA, including individual study leaders and funding sources, are available on the DYNOPTA website (http://dynopta.anu.edu.au).The findings and views reported in this paper are those of the author(s) and not those of the original studies or their respective funding agencies." Work on this paper was supported by NHMRC Grant No. 410215 (for the second and third authors) and NHMRC Research Fellowship No. 1002560 (for the last author)

References

Anstey, K. J., *et al.* (2010). Cohort profile: The Dynamic Analyses to Optimise Ageing (DYNOPTA) Project. *International Journal of Epidemiology*, 39, 44-51.

Anstey, K. J., Windsor, T. D., Rodgers, B., Jorm, A. F. and Christensen, H. (2005). Lower cognitive test scores observed in alcohol abstainers are associated with demographic, personality, and biological factors: the PATH Through Life Project. *Addiction*, 100, 1291-1301.

Australian Bureau of Statistics (2008). National Survey of Mental Health and Wellbeing: Summary of Results. Catalogue No 4326.0: Australian Bureau of Statistics.

Australian Institute of Health and Welfare (2003). Summary attributable burden. Risk Factors Canberra: AIHW.

Australian Institute of Health and Welfare (2008). 2007 National Drug Strategy Household Survey: Detailed Findings. Drug statistics series no. 22 Cat. no. PHE 107 Canberra: AIHW.

Babor, T. F., de la Fuente, J. R., Saunders, J. B. and Grant, M. (1992). AUDIT The Alcohol Use Disorders Identification Test: Guidelines for use on primary health care. World Health Organization.

Burns, R. A., Butterworth, P., Windsor, T., Luszcz, M. A., Ross, L. A. and Anstey, K. J. (2011). Deriving prevalence estimates of depressive symptoms throughout middle and old age in those living in the community. *International Psychogeriatrics*, online 17 November 2011.

Byles, J., Young, A., Furuya, H. and Parkinson, L. (2006). A drink to healthy aging: The association between older women's use of alcohol and their health-related quality of life. *Journal of the American Geriatrics Society*, 54, 1341-1347.

Chan, A. M., von Mühlen, D., Kritz-Silverstein, D. and Barrett-Connor, E. (2009). Regular alcohol consumption is associated with increasing quality of life and mood in older men and women: the Rancho Bernardo Study. *Maturitas*, 62, 294-300.

Gatz, M., Johansson, B., Pedersen, N., Stig, B. and Reynolds, C. (1993). A cross-national self-report measure of depressive symptomatology. *International Psychogeriatrics*, 5, 147-156.

Gayman, M. D., Turner, R. J. and Cui, M. (2008). Physical limitations and depressive symptoms: exploring the nature of the association. *Journal of Gerontology, Series B, Psychological Sciences and Social Sciences*, 63B, S219-S228.

Haynie, D. A., Berg, S., Johansson, B., Gatz, M. and Zarit, S. H. (2001). Symptoms of depression in the oldest old. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 56, P111-P118.

Jorm, A. F., *et al.* (1995). The Psychogeriatric Assessment Scales: a multidimensional alternative to categorical diagnoses of dementia and depression in the elderly. *Psychological Medicine*, 25, 447-460.

Kessler, R. C., Nelson, C. B., McGonagle, K. A., Edlund, M. J., Frank, R. G. and Leaf, P. J. (1996). The epidemiology of co-occurring addictive and mental disorders: implications for prevention and service utilization. *American Journal of Orthopsychiatry*, 66, 17-31.

Lucas, N., Windsor, T. D., Caldwell, T. M. and Rodgers, B. (2010). Psychological distress in non-drinkers: Associations with previous heavy drinking and current social relationships. *Alcohol and Alcoholism*, 45, 95-102.

Mehta, M., *et al.* (2008). Depressive symptoms in late life: associations with apathy, resilience and disability vary between young-old and old-old. *International Journal of Geriatric Psychiatry*, 23, 238-243.

Merikangas, K. R., *et al.* (1998). Comorbidity of substance use disorders with mood and anxiety disorders: results of the International Consortium in Psychiatric Epidemiology. *Addictive Behaviors*, 23, 893-907.

Mukamal, K., *et al.* (2005). Alcohol use and risk of ischemic stroke among older adults: The cardiovascular health study. *Stroke*, 36, 1830-1836.

National Health and Medical Research Council (2009). Australian Guidelines to Reduce Health Risks from Drinking Alcohol. Canberra: NHMRC.

Nolen-Hoeksema, S. (2004). Gender differences in risk factors and consequences for alcohol use and problems. *Clinical Psychology Review*, 24, 981-1010.

Pattenden, S., Nanchahal, K., Primatesta, P. and Thom, B. (2008). Self-reported never-drinkers in England 1994 - 2003: Characteristics and trends in adults aged 18 - 54 years. *Alcohol and Alcoholism*, 43, 91-96.

Radloff, L. S. (1977). The CES-D Scale: a self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385-401.

Rimm, E. B., Williams, P., Fosher, K., Criqui, M. and Stampfer, M. J. (1999). Moderate alcohol intake and lower risk of coronary heart disease: meta-analysis of effects on lipids and haemostatic factors. *British Medical Journal*, 319, 1906-1912.

Rodgers, B., Korten, A. E., Jorm, A. F., Christensen, H., Henderson, S. and Jacomb, P. A. (2000). Risk factors for depression and anxiety in abstainers, moderate drinkers and heavy drinkers. *Addiction*, 95, 1833-1845.

Stek, M. L., Gussekloo, J., Beekman, A. T. F., van Tilburg, W. and Westendorp, R. G. J. (2004). Prevalence, correlates and recognition of depression in the oldest old: the Leiden 85-plus study. *Journal of Affective Disorders*, 78, 193-200.

Teachman, B. A. (2006). Aging and negative affect: The rise and fall and rise of anxiety and depression symptoms. *Psychology and Aging*, 21, 201-207.

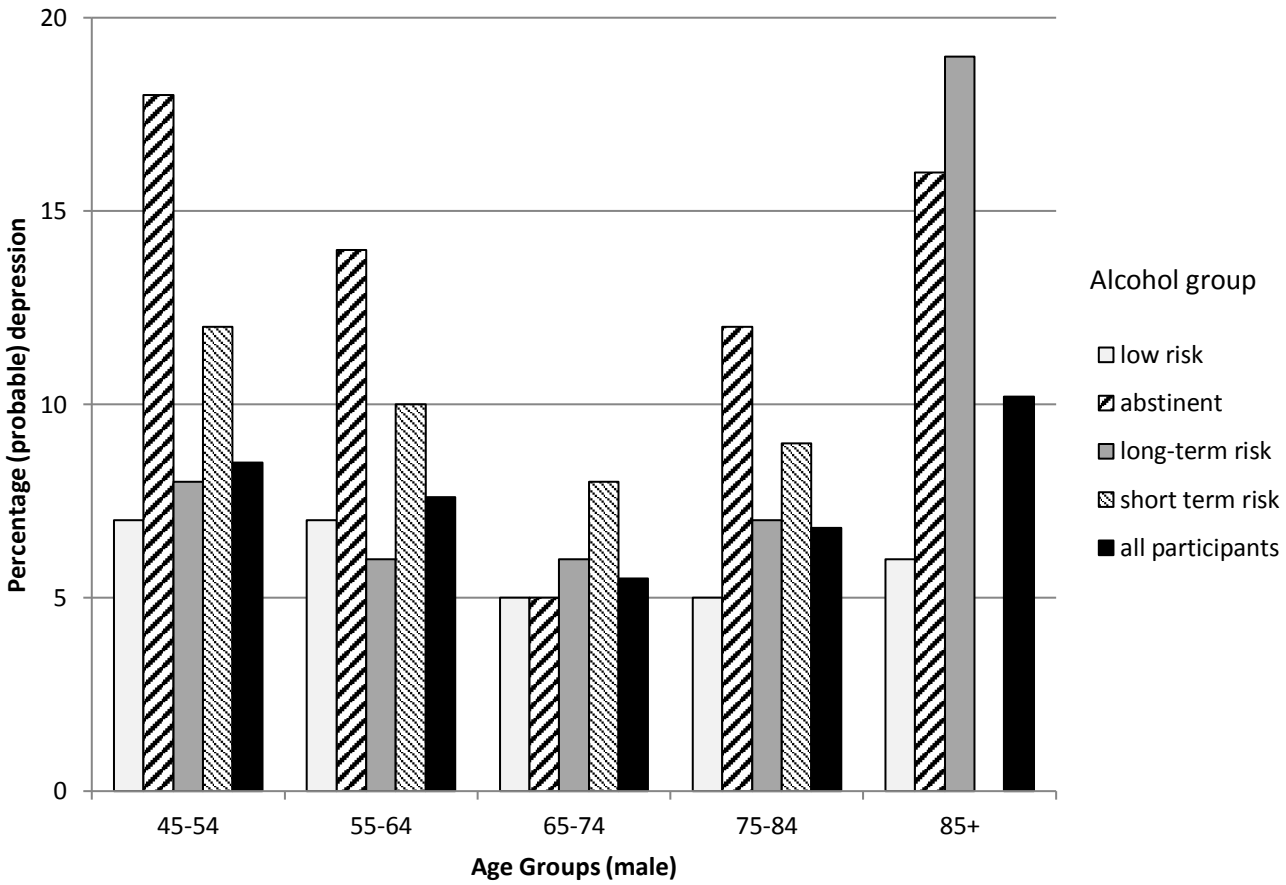
Turvey, C. L., Schultz, S. K. and Klein, D. M. (2006). Alcohol use and health outcomes in the oldest old. *Substance Abuse Treatment Prevention and Policy*, 1, 10.1186/1747-1597X-1181-1188.

Ware, J., Kosinski, M. and Keller, S. (1996). A 12-item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Medical Care*, 34, 220-233.

Ware, J., Snow, K., Kosinski, M. and Gandek, B. (1993). *SF-36 Health Survey Manual and Interpretation Guide*. Boston: The Health Institute, New England Medical Centre.

Webb, G. R., Redman, S., Gibberd, R. W. and Sanson-Fisher, R. W. (1991). The reliability and stability of a quantity-frequency method and a diary method of measuring alcohol consumption. *Drug and Alcohol Dependence*, 27, 223-231.

Figure 1a & 1b: Probable depression in males (upper) and females (lower) at baseline by age group and alcohol consumption group.


20
15
10
5
0
Percentage (probable) depression
45-54
55-64
65-74
75-84
85+
Age Groups (male)
Alcohol group
low risk
abstinent
long-term risk
short term risk
all participants

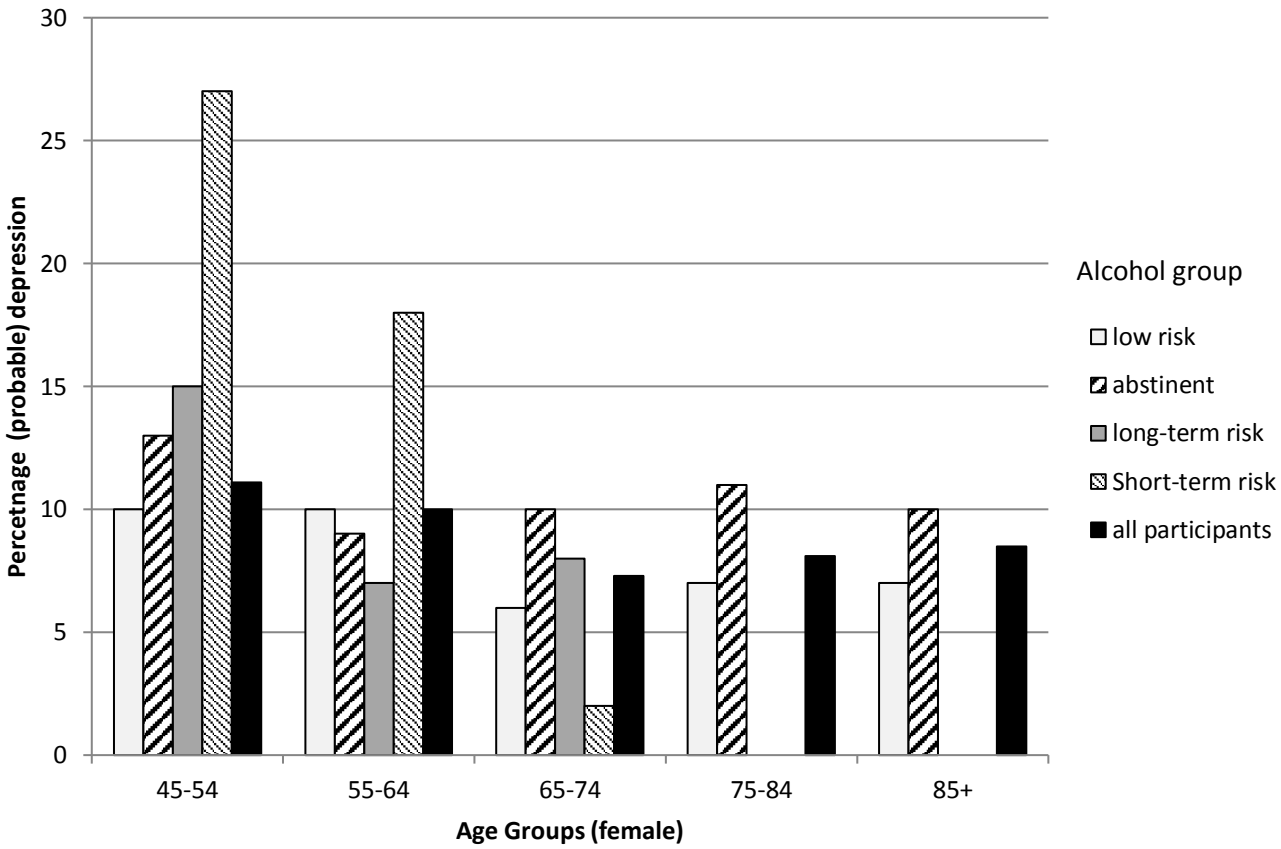

30
25
20
15
10
5
0
Percetnage (probable) depression
45-54
55-64
65-74
75-84
85+
Age Groups (female)
Alcohol group
low risk
abstinent
long-term risk
Short-term risk
all participants

Table 1 Demographic characteristics by age group at baseline

Variable		**Age Group**					**Statistic**
		45-54 (n=17668)	55-64 (n=5255)	65-74 (n=13060)	75-84 (n=2620)	85+ (n=501)	
Gender female	n (%)	15502 (87.7)	2599 (49.5)	11301 (86.5)	1565 (59.7)	235 (46.9)	5048 (4) *p* <.001
Left school <15 years	n (%)	1814 (10.3)	963 (18.3)	5302 (41.3)	1292 (49.7)	285 (57.0)	5106 (4) *p* <.001
Partnered	n (%)	14567 (82.7)	4163 (79.2)	8150 (62.5)	1531 (58.5)	199 (39.7)	2260 (4) *p* <.001
'Impairment'							
Walk 1km+not limited	n (%)	16180 (91.6)	4520 (86.0)	9698 (74.3)	1787 (68.2)	268 (53.5)	2569 (12) *p* <.001
Not limited	n (%)	582 (3.3)	311 (5.9)	1964 (15.0)	470 (17.9)	132 (26.3)	
Limited a little	n (%)	647 (3.7)	339 (6.5)	1057 (8.1)	287 (11.0)	82 (16.4)	
Limited a lot	n (%)	259 (1.5)	85 (1.6)	341 (2.6)	76 (2.9)	19 (3.8)	
Smoking status							
Never	n (%)	9150 (53.1)	2655 (50.6)	7470 (59.1)	1393 (54.1)	275 (54.9)	863 (8) *p* <.001
Ex-smoker	n (%)	5002 (29.0)	1923 (36.6)	4143 (32.8)	1009 (39.2)	199 (39.7)	
Current smoker	n (%)	3095 (17.9)	673 (12.8)	1021 (8.1)	173 (6.7)	27 (5.4)	
Alcohol status							
Low risk	n (%)	14031 (79.4)	3792 (72.2)	8315 (63.7)	1693 (64.6)	281 (56.1)	3076 (12) *p* <.001
Abstinent	n (%)	2305 (13.0)	406 (7.7)	3884 (29.7)	739 (28.2)	192 (38.3)	
Long-term risk	n (%)	931 (5.3)	647 (10.4)	629 (4.8)	140 (5.3)	24 (4.8)	
Short-term risk	n (%)	401 (2.3)	510 (9.7)	232 (1.8)	48 (1.8)	4 (0.8)	
Probable depression	n (%)	1910 (10.8)	463 (8.8)	922 (7.1)	199 (7.6)	47 (9.4)	136 (4) *p* <.001

Table 2 Generalised estimating equation results for predictors of (probable) depression

Variable (reference category)		Males			Female		
		B	Lower 95% CI	Upper 95% CI	B	Lower 95% CI	Upper 95% CI
Time in years from baseline		0.98	0.95	1.02	.98**	.97	.99
Age group	85+	0.56*	0.38	0.84	.29**	.19	.43
	75-84	0.47**	0.36	0.62	.35**	.29	.42
	65-74	0.52**	0.41	0.65	.36**	.33	.40
	55-64	0.82*	0.69	0.99	.72**	.64	.81
	(45-54)						
Partnered (yes)		1.58**	1.34	1.87	1.37**	1.27	1.46
Left school (aged ≥15 years)		1.29*	1.08	1.54	1.60**	1.48	1.74
"Impairment'	Limited a lot	3.47**	2.69	4.48	3.27**	2.81	3.81
	Limited a little	3.32**	2.78	3.96	3.36**	3.07	3.68
	Not limited	2.62**	2.15	3.20	2.16**	1.98	2.36
	(Walk 1km/not limited)						
Tobacco	Current smoker	1.72**	1.41	2.09	1.71**	1.57	1.86
	Former smoker	1.26*	1.07	1.48	1.10*	1.02	1.17
	(Never smoker)						

Alcohol	Short-term risk	1.30*	1.06	1.59	1.54**	1.22	1.95
	Long-term risk	0.99	0.82	1.19	1.22*	1.08	1.38
	Abstinent	1.47**	1.22	1.78	1.23**	1.14	1.32
	(Low risk)						

* $p<.05$: ** $p<.001$: CI = confidence interval

Table 3 Generalised estimating equation results for predictors of (probable) depression for those with longitudinally stable alcohol consumption either 'always abstinent' or 'always low risk'

Variable (reference category)		Males			Female		
		Beta	Lower 95% CI	Upper 95% CI	Beta	Lower 95% CI	Upper 95% CI
Time in years from baseline		1.01	.96	1.06	.99*	.98	.997
Age group	85+	.49*	.25	.95	.27**	.15	.50
	75-84	.50*	.32	.79	.37**	.29	.48
	65-74	.48*	.31	.73	.37**	.33	.42
	55-64	.91	.68	1.24	.71**	.61	.84
	(45-54)						
Partnered (yes)		1.67*	1.25	2.24	1.37**	1.25	1.49
Left school (aged ≥15 years)		1.48*	1.09	2.01	1.63**	1.47	1.81
"Impairment'	Limited a lot	2.45**	1.62	3.69	2.97**	2.41	3.67
	Limited a little	2.23**	1.66	3.01	3.12**	2.76	3.53
	Not limited	2.12**	1.54	2.90	2.13**	1.90	2.39
	(Walk 1km/not limited)						
Tobacco	Current smoker	1.91**	1.42	2.71	1.71**	1.53	1.90
	Former smoker	1.39*	1.15	1.81	1.14*	1.04	1.25
	(Never smoker)						

Alcohol	Always abstinent (Always low risk)	1.61*	.86	2.21	1.20*	1.08	1.34	

p<.05: * *p*<.001**: CI = confidence interval