

Do rates of depression vary by level of alcohol misuse in Australian general practice?

Breanne Hobden^{A,B,E}, Jamie Bryant^{A,B}, Rob Sanson-Fisher^{A,B}, Christopher Oldmeadow^{C,D} and Mariko Carey^{A,B}

^AHealth Behaviour Research Group, HMRI Building, University of Newcastle, NSW 208, Australia.

^BPriority Research Centre in Health Behaviour and Hunter Medical Research Institute, HMRI Building, University of Newcastle, NSW 2308, Australia.

^CPublic Health Stream, Hunter Medical Research Institute, HMRI Building, NSW 2308, Australia.

^DCentre for Clinical Epidemiology and Biostatistics, University of Newcastle, HMRI Building, University of Newcastle, NSW 2308, Australia.

^ECorresponding author. Email: bree.hobden@newcastle.edu.au

Abstract. Limited data exist regarding co-occurring alcohol misuse and depression among general practice patients. This study examined the prevalence of depression by level of alcohol misuse, and the sociodemographic factors associated with depression and increased alcohol misuse severity. A cross-sectional survey was administered to 3559 Australian general practice patients. Patients completed their demographic details, the Patient Health Questionnaire (9-item) and the Alcohol Use Disorder Identification Test (Consumption items). The prevalence of alcohol misuse and depression was 6.7%, and depression prevalence varied significantly according to level of alcohol misuse ($P < 0.001$). Age, gender, Aboriginality and number of chronic diseases were associated with depression and higher levels of alcohol misuse. These findings may assist General Practitioners in identifying those at risk of experiencing co-morbid depression and alcohol use, and aid in effective treatment and referral.

Additional keywords: epidemiologic factors, mental health, primary health care.

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Introduction

There is a large burden caused by alcohol misuse and depression

Alcohol misuse^A and depression commonly co-occur. An Australian population survey found that individuals with an alcohol misuse disorder are 3.6-fold more likely to experience depression than those without this disorder (Burns and Teesson 2002). Co-occurrence is associated with greater individual burden (Burns and Teesson 2002). As a consequence, healthcare utilisation, including use of primary care, is high among this group (Grothues *et al.* 2008a). In Australia, ~85% of individuals consult with a General Practitioner (GP) at least once a year (Britt *et al.* 2014) and GPs commonly provide treatment for mood and substance use disorders (Australian Bureau of Statistics 2010). Information about the prevalence of co-occurrence of these conditions in primary care is therefore needed to inform service delivery.

There are limited data available regarding the prevalence and characteristics of depression with regard to alcohol misuse levels in general practice

Despite a push towards greater understanding and management of co-occurring conditions in healthcare settings over the past decade, there remain large gaps in the epidemiological evidence base. Several studies have demonstrated that rates of depression by level of alcohol misuse varies, with greater prevalence among those with severe alcohol misuse (Kinder *et al.* 2009). However, there is little research examining the prevalence of depression by level of alcohol misuse among Australian general practice patients. Data regarding the prevalence of co-occurring depression by severity of alcohol misuse can be used to develop specific guideline recommendations for GP detection of co-occurrence. Providing this information and improving detection is an important step for enhancing treatment pathways and outcomes.

^AAlcohol misuse is a term used to describe risky drinking or DSM-IV alcohol use disorders (Bradley *et al.* 2007). For the current paper, all alcohol-related disorders, including excessive consumption, will be referred to as alcohol misuse.

What is known about the topic?

- Depression and alcohol misuse commonly co-occur, with prior research suggesting that depression prevalence increases with greater alcohol misuse.

What does this paper add?

- This paper provides the rates of depression by level of alcohol misuse, as well as important sociodemographic factors associated with this co-occurring condition in a general practice setting.

Although a large proportion of the Australian population regularly consult with a GP, there are differences in the characteristics of this sample when compared with the general population, such as an over representation of women and older people (Britt *et al.* 2014). Furthermore, while the overall rate at which men and women consult with GPs for psychological conditions is similar, males are more likely to consult about substance use disorders and females more likely to consult about depression or anxiety. Identification of co-occurring depression and alcohol misuse by GPs has been demonstrated to be low (Hobden *et al.* 2016). Understanding the characteristics associated with this comorbidity can assist GPs in identifying the individuals most vulnerable for these conditions. It may also have important implications for ensuring appropriate services are available to meet the needs of different patient subgroups. This research therefore aims to determine, in a sample of Australian general practice patients, the: (1) prevalence of depression among individuals who: (i) do not consume alcohol; (ii) consume alcohol but screen negative for misuse; (iii) screen positive for mild alcohol misuse; (iv) screen positive for moderate alcohol misuse; or (v) screen positive for severe or very severe alcohol misuse; and (2) sociodemographic factors associated with increased alcohol misuse severity among those with depression.

Methods*Design and setting*

A cross-sectional survey was administered in 12 urban general practices from June 2010 to November 2011 within New South Wales and Victoria, Australia. Practices were randomly selected from a list of postcodes, generated through the Australasian Medical Publishing Co. Medical Directory of Australia, and approached until a sample of 12 practices was reached. The full procedure has been described elsewhere (Yoong *et al.* 2012).

Participant recruitment

Patients attending appointments with participating GPs were recruited to the study. Eligible patients were proficient in English, over 18 years of age and able to provide informed consent. Those attending a nursing or allied health appointment were ineligible.

Procedures

Patients were approached by a research assistant before their scheduled appointment. Gender of non-consenters was recorded

to examine consent bias. Consenting participants completed a touchscreen survey on a computer tablet, which took an average of 12 min. The survey assessed multiple health factors, such as smoking and cancer screening (Yoong *et al.* 2012). Only results relating to depression and alcohol use are presented here.

*Measures**Demographics*

Patients self-reported their: age, gender, highest level of education, Aboriginal or Torres Strait Islander origin, health insurance status and possession of a healthcare concession card. Number of GP visits in the last 12 months, whether the patient had attended the clinic before and number of chronic diseases were also collected to gauge resources used by particular subgroups.

Depression

The Patient Health Questionnaire (PHQ-9) was used to assess depression. It is a psychometrically robust tool that has appropriate accuracy and reliability for use in primary care (Kroenke *et al.* 2001).

Alcohol use

The 3-item Alcohol Use Disorder Identification Test of Consumption (AUDIT-C) questionnaire measured alcohol consumption, which is commonly utilised for identifying risky alcohol use in general practice (Bradley *et al.* 2007). The third question of the AUDIT-C was modified to align with Australian alcohol-related guidelines (National Health and Medical Research Council 2001). The guidelines state that four standard drinks doubles the relative risk of an injury, so the question was altered from 'How often do you have 6 or more drinks on one occasion?' to 'How often do you have 4 or more drinks on one occasion?'

Data analysis

Each question for the PHQ-9 was scored from 0 to 3, with a total possible score of 27. A cut-off score of 10 has shown a sensitivity of 88% and a specificity of 88% compared to assessment by mental health professionals (Kroenke *et al.* 2001) and was used to identify depression. Similarly, a cut-off score of four on the AUDIT-C has shown high sensitivity and specificity for alcohol misuse (males: 86, 89%; females: 73, 91% respectively) (Bradley *et al.* 2007). Each question for the AUDIT-C is scored on a scale of 0–4, with a maximum possible score of 12. Australian guidelines do not specify consumption levels by gender, therefore the same cut-off scores were used for the entire sample. The following scores were used to assign participations to risk groups: 0, no alcohol consumption; 1–3, screen negative for alcohol misuse (participants who scored 0 on questions 2 and 3 were also categorised in to this group); 4–5, positive screen for mild misuse; 6–7, positive screen for moderate misuse; and 8–12, positive screen for severe or very severe misuse (Kinder *et al.* 2009). Typically scores of 8–9 indicate severe misuse and 10+ indicate very severe misuse, but owing to expected low counts and prior evidence of similar characteristics (Kinder *et al.* 2009), these two groups were collapsed. Postcodes were used to calculate the Socio-Economic Indexes for Areas (SEIFA), with a score of

6 or less indicating economic disadvantage and a score of more than 6 indicating economic advantage.

Counts and percentages (with 95% robust confidence intervals) are presented for the cross-tabulation of alcohol use and depression. Differences in the prevalence of depression by alcohol misuse categories were assessed by using the cluster-design adjusted (Rao–Scott) Chi-Square test. We investigated among patients with depression the characteristics associated with being in a higher risk-category of alcohol misuse by fitting a series of ordinal mixed-effects logistic regression models. Between-practice variability was modelled with a random intercept for each practice. The outcome levels were: 0, 'No alcohol'; 1, 'No alcohol misuse'; 2, 'Mild alcohol misuse'; 3, 'Moderate alcohol misuse'; 4, 'Severe/very severe alcohol misuse'. For the bivariate associations, crude odds ratios with 95% confidence intervals and *P*-values are presented. A multivariable model including all patient characteristics was also estimated and the adjusted odds ratios with 95% confidence intervals are also presented. All statistical analyses were conducted using SAS ver. 9.4 (SAS Institute, Cary, NC, USA).

Results

Consent rate and characteristics of patients

In total, 12 of the 48 approached practices participated (25%). A total of 5667 patients were assessed for eligibility of which 4705 were eligible and 4058 (86%) consented to participate. No significant difference by gender was found between consenters and non-consenters ($\chi^2=0.13$; degrees of freedom (d.f.)=1; *P*=0.253). Surveys with incomplete or missing PHQ-9 and AUDIT-C data were removed, leaving 3559 (88%) patients who were included in analyses. Patient characteristics are reported in Table 1.

Prevalence of depression by alcohol misuse

The prevalence of alcohol misuse and depression was 6.7% (*n*=239). Depression prevalence varied by level of alcohol misuse (*P*<0.001). Table 2 provides the depression prevalence by level of alcohol misuse. The highest depression rate was among those who screened positive for severe/very severe alcohol misuse (26%).

Predictors of depression and higher levels of alcohol consumption

Results of the ordinal regression model are provided in Table 3. Those at risk of depression with a higher level of alcohol misuse were: younger patients (*P*<0.0001); males (*P*<0.0001); those of Aboriginal or Torres Strait Islander origin (*P*=0.019); and those with two or fewer chronic diseases (*P*=0.0069).

Discussion

This study is the first to examine the prevalence of and factors associated with depression and different levels of alcohol misuse in a large sample of Australian general practice patients. Findings indicate a significant association between depression and alcohol misuse. The lowest rate of depression was amongst individuals who consume alcohol but do not misuse it (8%), and the highest amongst individuals who screened positive for severe/very severe alcohol misuse (26%).

Table 1. Patient demographic and medical history characteristics (*n*=3559)

All counts may not add up to 3559 owing to missing data. GP, general practitioner

Variable	Sub-group	Total <i>n</i> (%)
Gender	Male	1373 (39)
	Female	2186 (61)
Age group (years)	18–29	466 (13)
	30–44	775 (22)
	45–64	1248 (35)
	65+	1070 (30)
Highest level of education	High school and below	1327 (37)
	Technical Certificate/Diploma	546 (15)
	University/Post-graduate	1244 (35)
	Other	90 (2.5)
Aboriginal or Torres Strait Islander origin	Yes	22 (0.6)
	No	3537 (99)
Private health insurance	Yes	1987 (56)
	No	1572 (44)
Concession card	Yes	1329 (37)
	No	2230 (63)
Number of GP visits in the last 12 months	0–3	1104 (31)
	4–6	1162 (33)
	7–10	497 (14)
	10+	532 (15)
Previously attended clinic	Yes	3051 (86)
	No	190 (5.3)
Number of chronic disease	None	2684 (75)
	1–2	837 (24)
	3+	38 (1.1)

Table 2. Prevalence of depression occurrence grouped by alcohol misuse (*n*=3559)

Alcohol misuse category	Not depressed <i>n</i> (%) (95% CI)	Depressed <i>n</i> (%) (95% CI)	Total
Non-consumer	1355 (86) (82–90%)	224 (14) (10–18%)	1579
No misuse	440 (92) (89–94%)	40 (8) (6–10%)	480
Mild misuse	778 (87) (84–90%)	115 (13) (9–16%)	893
Moderate misuse	368 (82) (75–88%)	83 (18) (12–24%)	451
Severe/very severe misuse	115 (74) (68–79%)	41 (26) (21–31%)	156
Total	3056	503	3559

Similar to research in other settings, depression among individuals who did not consume alcohol was comparable to those who screened positive for mild alcohol misuse (Kinder *et al.* 2009). Skogen *et al.* (2009) found abstainers, defined as those who quit drinking because it was a problem, had significantly higher rates of depression than other non-consumers of alcohol. Although abstainers were not identified in the current study, the proportion of abstainers may have contributed to high depression prevalence among the non-consumer group. Alternatively, low-level alcohol consumption may provide a protective mechanism for depression (Rodgers *et al.* 2000).

The highest rates of depression were found among those who screened positive for moderate and or severe/very severe alcohol misuse. Males were almost four-fold as likely as females to have depression with higher levels of alcohol misuse.

Table 3. Demographics associated with increasing levels of alcohol misuse for depressed patients (*n* = 503)
 COR, Crude odds ratio; OR, Odds ratio; ref, reference group; SEIFA, Socio-Economic Indexes for Areas

Variable	Subgroup	Odds of a higher level of alcohol misuse			
		Crude odds		Adjusted odds	
		COR (95% CI)	<i>P</i> -value	OR (95% CI)	<i>P</i> -value
Age group (years)	18–29	9.31 (4.94, 17.57)	<0.0001	12.86 (5.82, 28.43)	<0.0001
	30–44	4.94 (2.72, 8.96)		5.62 (2.66, 11.84)	
	45–64	2.89 (1.63, 5.13)		3.45 (1.68, 7.10)	
	65+	ref		ref	
Gender	Male	3.03 (2.14, 4.27)	<0.0001	3.56 (2.36, 5.38)	<0.0001
	Female	ref		ref	
Highest level of education	High school and below	3.28 (0.98, 10.90)	0.1068	1.59 (0.41, 6.12)	0.6568
	TAFE/Diploma	4.33 (1.27, 14.81)		1.98 (0.50, 7.87)	
	University/Post-graduate	3.76 (1.11, 12.67)		1.87 (0.48, 7.35)	
	Other	ref		ref	
Aboriginal or Torres Strait Islander origin	Yes	5.62 (1.31, 24.15)	0.0208	6.24 (1.36, 28.60)	0.0189
	No	ref		ref	
Previously attended clinic?	Yes	1.18 (0.57, 2.47)	0.6540	1.17 (0.48, 2.87)	0.7242
	No	ref		ref	
Number of GP visits in the last 12 months	0 to 3	2.35 (1.47, 3.76)	0.0003	1.32 (0.76, 2.27)	0.1490
	4 to 6	2.43 (1.56, 3.78)		1.64 (0.98, 2.73)	
	7 to 10	2.08 (1.23, 3.53)		1.85 (1.01, 3.37)	
	Over 10	ref		ref	
Number of chronic diseases	None	5.28 (1.74, 16.04)	<0.0001	4.39 (0.93, 20.62)	0.0069
	1–2	1.73 (0.56, 5.38)		2.21 (0.47, 10.28)	
	3+	ref		ref	
SEIFA	6 or less	0.86 (0.57, 1.29)	0.4631	1.02 (0.63, 1.64)	0.9422
	Over 6	ref		ref	

Additionally, groups in the lower age brackets showed increased odds of these conditions, with 18- to 29-year-olds almost 13-fold as likely as the 65-years-or-older group to be at risk for these conditions. This finding is contrary to research performed with a sample of alcoholics, which found depression to be higher among females (Karpyak *et al.* 2016). However, our finding coincides with data from the Australian National Survey of Mental Health and Well Being, which found that males and younger people are at higher risk for alcohol misuse with a comorbid condition (Burns *et al.* 2001). This highlights the importance of examining prevalence rates within specific settings. Australian GPs should be aware that younger and male patients have a much greater likelihood of depression with high levels of alcohol misuse.

Aboriginal and Torres Strait Islanders were approximately six-fold more likely to screen positively for higher alcohol misuse with depression. Little research has examined co-occurring depression and alcohol misuse among this group. As those of Aboriginal or Torres Strait Islander descent are particularly vulnerable to mental health problems (Hunter 2007) and are at a greater risk of harm from alcohol (National Indigenous Drug and Alcohol Committee 2014), further research on co-occurring depression and alcohol misuse is needed. This finding highlights the importance of GPs assessing Aboriginal or Torres Strait Islanders for these conditions, particularly if one or the other is present.

Compared to those with three or more chronic conditions, those with no chronic diseases were found to be four-fold more likely and those with one to two chronic diseases were found to be more than twice as likely to have depression with higher alcohol misuse. This may be due the adverse effects alcohol can

have on the health or medication use of those with chronic conditions (Aira *et al.* 2005). Additionally, the risk of multiple chronic diseases increases with age, whereas alcohol misuse and depression are more common among younger age groups.

Strengths and limitations

The current study is one of the largest general practice studies conducted in Australia, to date. The strengths of the study include the large and representative patient population group, as well as the involvement of multiple practices. Although the consent rate of general practices was low, the characteristics of the patients in this sample were similar to the National Bettering the Evaluation and Care of Health study (Britt *et al.* 2014), indicating that it is likely to be a representative sample. The use of self-reported data for alcohol consumption and depressive symptoms may have affected the study's findings. Additionally, the AUDIT-C is a measure of consumption and should not be interpreted as a clinical diagnosis of alcohol abuse or dependence. Despite these limitations, GPs are reliant on brief screening tools when detecting alcohol misuse or depression, as structured psychiatric diagnostic interviews cannot feasibly be conducted by GPs. Therefore, the data provided align with GPs' role to screen and provide appropriate support for patients who misuse alcohol.

Future recommendations

Whereas brief intervention by GPs for both alcohol and depression is recommended (Kaner *et al.* 2007), there is some evidence suggesting that such interventions are ineffective in the context of comorbidity (Grothues *et al.* 2008b). Australian

guideline recommendations are based on studies with psychiatric patients and are likely to include only those at the severe end of the spectrum (Department of Health and Ageing 2008). These approaches have not been tested for efficacy in general practice settings or among those with less severe conditions. Future research should determine the efficacy of GP interventions in treating co-occurring conditions and this information should be used to develop guidelines that provide specific management techniques that can be easily integrated into general practice.

Conclusion

This study provides unique data about rates of depression by level of alcohol consumption in general practice, as well as the characteristics associated with the presence of these conditions. These findings demonstrate that depression prevalence increases with increased alcohol misuse. GPs should be aware that these two conditions are likely to co-occur and influence one another. This study is an important step towards building the knowledge base to inform future intervention strategies. Ongoing research is needed to reduce both the personal and economic encumbrance resulting from this comorbidity.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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