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# Reducing alcohol use during pregnancy: listening to women who drink as an intervention starting point

Nyanda McBride<sup>1</sup>, Susan Carruthers<sup>1</sup> and Delyse Hutchinson<sup>1</sup>

**Abstract: Objectives.** This study assesses factors that contribute to alcohol consumption during pregnancy and identifies potential intervention strategies to reduce consumption. **Methods.** The study sample includes 142 pregnant women who attended a public hospital for prenatal health care in Perth, Western Australia. All participants returned a self-completion survey. **Results.** Women who discontinued drinking during pregnancy were significantly more likely to be engaged in full time home duties and had completed less formal education. Women who continued to drink were more likely to have drunk in previous pregnancies and during the preconception period. Nearly 40% of high risk women reported a negative comment in response to their drinking. One-third of women in the risky group were advised by a health professional not to drink alcohol. Women were most likely to drink in their own home or at the home of a friend. **Conclusions.** Participatory research with women who drink while pregnant can assist in identifying potential intervention strategies that have resonance with this group and therefore more potential for creating behaviour change. **Implications.** The World Health Organization recognises, and has done for over 10 years, that alcohol use during pregnancy which results in Foetal Alcohol Spectrum Disorder is the leading cause of environmental-related birth defects and mental retardation in the Western world. (Global Health Promotion, 2012; 19(2): 6–18)

**Keywords:** Health promotion, prevention, maternal, alcohol, foetal, pregnancy, programme development

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## Introduction

The effects of maternal alcohol consumption on the developing foetus have been documented since recorded history; however, it is only during the last four decades that scientific evidence has confirmed that alcohol is directly associated with physical and neurodevelopmental disorders (1). Concerns about alcohol use during pregnancy relate to Foetal Alcohol Spectrum Disorder (FASD), a disorder that describes a range of adverse effects which can have a high impact on quality of life (2-5). FASD incorporates Foetal Alcohol Syndrome (FAS), a serious condition associated with heavy alcohol use, particularly in early pregnancy. Infants born with

this condition display structural brain abnormalities, deficits in growth and neurological development resulting in a range of lifelong disabilities (2).

Interest in possible foetal health effects associated with lower level of alcohol use during pregnancy has resulted in policy changes in Australia and internationally. A review of international alcohol policies indicates that several countries have updated policies that relate to pregnant women within the last few years, including Australia (6-8). There is, however, a divergence of policy advice with some countries and organisations, including the World Health Organization (9), stating that pregnant women should not drink, while others state that not drinking is the safest option but that one or two

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drinks per week is considered low risk. The revised Australian guidelines adopt the second approach. This divergence in policy illustrates variation in interpretation of the limited number of studies providing information on the impact of low level use of alcohol during pregnancy (10).

As guidelines for the consumption of alcohol use during pregnancy become more supportive of low level and non-use, there is an increasing need for programmes to assist those women who may find it difficult to stop or reduce consumption. Evidence-based interventions need to include information from the target group in the early stages of development to ensure that strategies and methods are appropriate, useful and resonate with the target audience (11).

## Objectives

This paper reports on an explorative, descriptive study designed to assess factors that contribute to alcohol consumption during pregnancy, and to identify potential intervention points, methods and strategies to reduce consumption. The paper discusses the differences between pregnant women who drink at risky levels, those who drink at low risk levels and those who discontinued drinking early in pregnancy.

## Method

This study was approved by several ethics committees including: Curtin University of Technology Human Ethics Committee; King Edward Memorial Hospital for Women Ethics Committee (and associated Scientific Advisory Sub-Committee); Southern Metropolitan Area Health Service Human Research Ethics Committee; Northern Metropolitan Area Health Service Human Research Ethics Committee; and Joondalup Health Campus Human Research Ethics Committee. Over a 14 month period between October 2006 and December 2007, 144 anonymous self-completion surveys were returned to the researchers from pregnant women attending antenatal care in one of six public hospitals in Perth, in Western Australia. Two of these returned surveys were deleted from subsequent analysis as they did not meet inclusion criteria (inclusion criteria: consumed alcohol at some stage during their pregnancy; over 19 years of age; English primary language; non-indigenous; metropolitan antenatal attendance).

The study is based on the Social Learning Theory (cognitive) (12,13), which in addition to focusing on individual behaviour, and in particular the interplay between three individual-oriented concepts, observational learning, expectancies and self efficacy (14), also identifies the impact of environmental influences. Environmental influences include the physical environment and the situation of use, and the individual's perception of these. Based on this theory the survey was designed to assess: the demographics of women who consume alcohol during pregnancy (age, income, education, marital status, living arrangements, socio-economic factors, employment); individual factors including pregnancy history/ies (number of full term pregnancies, age of living children, alcohol consumption in past pregnancies); past and current alcohol consumption (alcohol quantity and frequency questions were based on those used in the Australian National Drug Household Survey (15) – see immediately below for more detail on these variables); benefits and detriments to alcohol consumption (both open ended questions); the use of other drugs; and environmental influences including setting and situation of alcohol consumption (where and with whom consumption takes place, motivation for consumption, impact of important others on consumption, health professional's advice on alcohol use while pregnant). An open ended question was also included to elicit any other issues that may impact on alcohol use during pregnancy. The survey underwent external expert review and was piloted with a group of pregnant women to assess face and content validity.

Alcohol consumption was defined using combined frequency and quantity variables for each alcohol beverage type. Frequency was defined by questions asking 'how often did you usually have a drink of (beer, wine, spirits, other)?' Response options included: 'every day or nearly every day', 'three or four times a week', 'once or twice a week', 'one to three times a month', 'seven to 11 times in the 12 month period', 'three to six times in the 12 month period', 'twice in the 12 month period', 'once in the 12 month period' or 'never in the 12 month period' for each beverage type. Quantity was defined by asking 'On those days that you drank (beer, wine, spirits, other) how many standard drinks did you usually have per day?' Respondents were asked to refer to a standard drinks diagram to answer these questions.

Recruitment of women was conducted by hospital-based staff who asked new clients about their current alcohol consumption as part of the admission process. New clients who responded that they consumed alcohol were invited to complete a survey. Surveys were also available in antenatal waiting rooms. Information and Facts Sheets were attached to surveys along with a reply-paid envelope. Participants were self-selected and were able to withdraw from involvement during any stage of the research. All participants who decided to withdraw from the study were offered information about alcohol use during pregnancy which included contacts for health practitioners, counsellors and other support services. This information was also attached to the end of each survey.

A liaison person from each hospital was identified to facilitate and coordinate the study. Half hour training sessions were held for antenatal staff with additional information provided in staff areas. The antenatal clinic from each participating hospital was offered \$250 as a reimbursement for staff time.

## Statistical analysis

### *Sample size*

Sample size calculation (provided by ABS online at <http://www.nss.gov.au/>) indicates that based on the overall population of 12,203 live births in Perth, Western Australia during 2004 (16) (this figure excludes teens, Aboriginal, non-English speaking and non-metropolitan births as per study entry criteria), a final sample of 118 respondents would be sufficient to meet accepted levels of statistical power (95% confidence level with confidence interval  $\pm 0.09$ ) (17).

### *Analysis*

The Shapiro–Wilk *W* Test was used to test the normality of dependent variables for each risk group (18). Results showed that at least one risk group had a significant non-normal distribution for each dependant variable (except age). Normal distribution is a required assumption for the ANOVA test. As this assumption was not met, the non-parametric equivalent Kruskal–Wallis *H* Test was used to assess differences in the three risk groups. Descriptive data have been presented to illustrate the differences and similarities between groups.

### *Risk groups*

Three risk groups were identified and formed the basis of comparison for the statistical analysis in this paper. All 142 pregnant women included in the study noted that they consumed alcohol at some stage during their pregnancy. The first risk level group, however, discontinued consumption (no risk – now non-drinker) once they realized they were pregnant, the second risk level group consumed at low risk levels and the third group consumed at risky levels. Risk level is defined by the Australian Guidelines to reduce risk from drinking alcohol (8). Introduced in March 2009, Guideline 4, which pertains to pregnant and breastfeeding women, states that:

pregnant and breastfeeding women should note that not drinking is the safest option for the developing foetus and young babies who are breastfed. However, the level of risk is likely to be low if a woman has consumed only small amounts of alcohol (such as one or two drinks per week) before she knew she was pregnant or during pregnancy (8).

Therefore, risky consumption is defined as more than two drinks per week, and low risk consumption is defined as one or two drinks per week. The proportion of women from the study who were defined as having no risk (now non-drinkers) was (33.1%), low risk (45.8%) and risky (21.1%).

## Results

### *Demographics*

Two demographic variables were significantly different between groups: level of education ( $p = 0.022$ ) and current employment status ( $p = 0.042$ ) (Table 1). Descriptive data (Table 2) indicate that women in the low risk group were more likely to have a higher education than women in the no current or risky groups. A third of the women in the low risk group (33.9%) had a university degree compared with 14.5% on the no current risk group and 20% in the risky group. A similar proportion of women in each group had completed education to TAFE level (no current risk: 19.1%; low risk: 21.5%; risky: 16.7%).

**Table 1.** Statistically significant variables by risk level group

	<i>Risk level group</i>	<i>N</i>	<i>Mean rank</i>	<i>Chi-square</i>	<i>Df</i>	<i>Asymp. sig.*</i>
<b>Demographics</b>						
Education	No current risk	47	58.46	7.601	2	0.022
	Low risk	65	79.34			
	High risk	30	74.95			
	<b>Total</b>	<b>142</b>				
Employ	No current risk	47	83.31	6.351	2	0.042
	Low risk	65	65.52			
	High risk	30	65.97			
	<b>Total</b>	<b>142</b>				
<b>Pregnancy histories</b>						
Drink during previous pregnancies	No current risk	46	71.88	6.237	2	0.044
	Low risk	63	74.82			
	High risk	29	54.17			
	<b>Total</b>	<b>138</b>				
Did you drink before pregnancy / pre-conception?	No current risk	45	75.70	12.870	2	0.002
	Low risk	64	66.50			
	High risk	29	66.50			
	<b>Total</b>	<b>138</b>				
<b>Preferred type of alcohol</b>						
Type most often drunk – beer	No current risk	37	82.61	13.437	2	0.001
	Low risk	64	60.20			
	High risk	30	57.88			
	<b>Total</b>	<b>131</b>				
<b>Alcohol use in the 12 months prior to pregnancy</b>						
Beer how often in 12 months prior to pregnancy	No current risk	36	76.53	15.015	2	0.001
	Low risk	56	53.13			
	High risk	25	46.92			
	<b>Total</b>	<b>117</b>				
Wine how often in 12 months prior to pregnancy	No current risk	38	80.76	16.387	2	0.000
	Low risk	60	51.64			
	High risk	25	58.34			
	<b>Total</b>	<b>123</b>				
Spirits how often in 12 months prior to pregnancy	No current risk	36	70.13	9.546	2	0.008
	Low risk	56	61.38			
	High risk	27	43.63			
	<b>Total</b>	<b>119</b>				
<b>Situation of alcohol use</b>						
<b>Benefits and concerns</b>						
Benefits	No current risk	34	72.09	15.088	2	0.001
	Low risk	62	58.50			
	High risk	28	59.71			
	<b>Total</b>	<b>124</b>				

Table 1. (Continued)

	<i>Risk level group</i>	<i>N</i>	<i>Mean rank</i>	<i>Chi-square</i>	<i>Df</i>	<i>Asymp. sig.*</i>
Anyone ever made negative comment/pressure?	No current risk	42	78.83	8.710	2	0.013
	Low risk	63	64.00			
	High risk	29	58.69			
	<b>Total</b>	<b>134</b>				
<b>Health Professionals Advice</b>						
Did doctor/health carer ask about alcohol use – current pregnancy?	No current risk	43	76.99	7.810	2	0.020
	Low risk	64	65.16			
	High risk	27	57.94			
	<b>Total</b>	<b>134</b>				
<b>Other drug use</b>						
Do you use any other drugs?	No current risk	44	72.36	8.289	2	0.016
	Low risk	64	70.06			
	High risk	27	56.00			
	<b>Total</b>	<b>135</b>				

\*This is the level of statistical significance output from the Kruskal-Wallis H Test in SPSS. It is the significance level of the differences between groups.

Note: Skip questions were used before: Benefits and Concerns, and questions on alcohol use in the 12 months prior to pregnancy.

Descriptive data (Table 2) indicate that women in the no current risk group were more likely to be engaged in full time home duties (46.8%) compared with women in either the low or risky groups (30.8% and 23.3% respectively). A similar proportion of women in each group worked part time (no current risk: 31.9%; low risk: 27.7%; risky: 33.3%); however, women in both risky (33.3%) and low risk (33.8%) groups were more likely to work full time than women in the no current risk group (12.8%). A small proportion of women in the no current (4.2%) and low risk (4.6%) groups were studying.

### *Pregnancy histories*

Two pregnancy history variables were significantly different between risk level groups: drinking during previous pregnancies ( $p = 0.044$ ) and drinking before pregnancy (preconception) ( $p = 0.002$ ) (Table 1). Under 15% of women in the no current risk group consumed alcohol during previous pregnancies; however, women in the low risk group were over twice as likely and women in the risky group were over four times as likely to have drunk alcohol in

previous pregnancies (Table 2). A high proportion of women in all study groups consumed alcohol during the preconception period; however, the no current risk group were significantly less likely to drink during this period (17%) than women in the low risk (1.5%) or risky (3.3%) groups (Table 2).

Over two-thirds of women in the no current and low risk groups had planned their pregnancy compared with just over half of the women in the risky group (Table 2). The majority of women had their pregnancy confirmed early with over 50% of each group gaining confirmation by week five (no current risk: 56.5%; low risk: 56.9%; risky: 53.3%) and over 90% by week nine (no current risk: 95.7%; low risk: 96.9%; risky: 93.3%).

### *Preferred type of alcohol*

One preferred type of alcohol variable was significantly different between risk groups (Table 1). This was the type of alcohol most often drunk – beer ( $p = 0.001$ ). Women in the no current risk group were significantly less likely to consume beer (14.9%) compared with women in the low (52.3%) and risky (56.7%) groups.

**Table 2.** Descriptive data by risk level group

<i>Variable</i>	<i>No current risk</i>	<i>Low risk</i>	<i>Risky</i>
<b>DEMOGRAPHICS</b>			
Age (mean)	28.64	29.56	29.96
Income (medium, mode)	\$52-68k, \$45-60k	\$60-75K, \$45-60k	\$60-75K, \$45-60k
Education (mean, mode)	2.6, 12 years	3.61, 16 years	3.43, 12 years
Marital status = married or defacto (%)	93.6	92.3	83.3
Living arrangement = with partner (%)	91.5	90.8	90
Centrelink healthcard (% yes)	19.1	16.9	30
Postcode = inner suburbs (%)	8.5	18.8	13.3
Employment (mode, alpha reported)	Homeduties	full time	full or part time
Country of Birth = Australia (%)	76.6	75.4	76.7
Aboriginality (% yes)	6.4	0	3.3
<b>PREGNANCY HISTORIES</b>			
Number of full term pregnancies (mean, mode)	2.3 2	2.15 1	2.27 1.2
Age of living children (mean, mode)	6.11 2	5.44 2	4.86 2
Number of weeks pregnant (mean)	21.65	23.76	22.55
Was the pregnancy planned? (% yes)	68.1	67.7	53.3
Week pregnancy was confirmed (mean)	5.19	6.29	5.86
Did you drink in previous pregnancies (% yes)	14.9	35.4	60
Did you drink prior to pregnancy preconception (% yes)	83	98.5	96.7
<b>PREFERRED TYPE OF ALCOHOL</b>			
<b>Type of alcohol usually consumed*</b>			
- beer (%)	10.6	15.4	23.3
- wine (%)	34	63.1	40
- spirits (%)	31.9	13.8	26.7
<b>Type most often drunk</b>			
- beer (%yes)	14.9	52.3	56.7
- wine (% yes)	53.2	73.8	51.1
- spirits (%yes)	51.1	46.2	50
- other (% yes)	4.3	6.2	6.7
<b>ALCOHOL USE IN 12 MONTHS PRIOR TO PREGNANCY</b>			
<b>Beer</b>			
How often in 12 months prior to pregnancy (% 1-2 /week or more, mode)	12.7 never	32.4 1-2 time/month	40 1-2 time/month
How many SD per occasion (mean, mode)	2, 1	2.3, 1	2.7, 3
<b>Wine</b>			
How often in 12 months prior to pregnancy (% 1-2/ week or more, mode)	23.4 1-2 time/month,	61.6 1-2 times/month	43.3 3-4 times/week
How many SD per occasion (mean, mode)	never 2.7, 2	2.6, 2	2.7 , 2
<b>Spirits</b>			
How often in 12 months prior to pregnancy (mean, mode)	12.7 Never	16.9 1-3 times/month	36.6 1-3 times/month
How many SD per occasion (mean, mode)	2.8, 2	2.8, 2	3, (2,3)
<b>ALCOHOL USE SITUATION</b>			
<b>Where do you usually drink?</b>			
- home (% yes)	72.3	87.7	93.3
- pub/bar (% yes)	19.1	21.5	33.3
- friends house (% yes)	53.2	70.8	70
- restaurant (% yes)	29.8	53.8	40

Table 2. (Continued)

<i>Variable</i>	<i>No current risk</i>	<i>Low risk</i>	<i>Risky</i>
<b>Where do you most regularly drink? (select one venue)*</b>			
- home (%)	57.4	60	73.3
- pub/bar (%)	8.5	3.1	10
- friends house (%)	8.5	18.5	13.3
- restaurant (%)	8.5	10.8	0
- other (%)	2.1	1.5	0
<b>Who do you usually drink with?</b>			
- partner (% yes)	63.8	81.5	73.3
- friend/s (% yes)	68.1	86.2	76.7
- alone (% yes)	6.4	15.4	13.3
<b>Who do you most regularly drink with?*</b>			
- partner (%)	51.1	55.4	50
- friend/s (%)	29.8	27.7	30
- alone (%)	2.1	6.2	10
- other (%)	2.1	1.5	3.3
<b>Who usually suggest you drink?</b>			
- you (% yes)	78.7	83.1	83.3
- partner (% yes)	36.2	38.5	40
- friend (% yes)	38.3	29.2	40
<b>Who most regularly make suggestion?*</b>			
- you (%)	63.8	66.2	70
- partner (%)	8.5	12.3	6.7
- friend (%)	12.8	16.9	13.3
- other (%)	0	1.5	0
<b>BENEFITS AND CONCERNS</b>			
<b>Are there benefits of drinking? (% yes)</b>	<b>55.3</b>	<b>93.8</b>	<b>90</b>
- taste (% yes)*	14.9	46.2	40
- relax (% yes)*	31.9	52.3	63.3
- socialising (% yes)*	25.5	21.5	33.3
<b>Do you have concerns about drinking? (% yes)</b>	<b>17</b>	<b>33.8</b>	<b>50</b>
- FAS (% yes)*	6.4	26.2	30
- liver (% yes)*	4.3	1.5	0
- newguid (% yes)*	2.1	3.1	6.7
<b>Has anyone ever made negative comment/pressure? (% yes)</b>	<b>12.8</b>	<b>32.3</b>	<b>40</b>
- Mother*	0	7.7	3.3
- Partner*	0	4.6	13.3
- Doctor*	0	0	6.7
- other friends/family*	8.5	12.3	10
<b>HEALTH PROFESSIONALS ADVICE</b>			
<b>Did doctor or health carer ask about alcohol use in previous pregnancies? (% yes)</b>	<b>36.2</b>	<b>50.8</b>	<b>46.7</b>
<b>Did doctor or health carer ask about alcohol use in current pregnancy? (% yes)</b>	<b>55.3</b>	<b>76.9</b>	<b>80</b>
<b>Has doctor or health carer provided advise on alcohol during current pregnancy? (% yes)</b>	<b>38.3</b>	<b>60</b>	<b>56.7</b>
<b>What was their advice? (% don't drink, occasional drink OK)</b>	<b>21.3, 0</b>	<b>33.8, 7.7</b>	<b>33.3, 3</b>
<b>OTHER DRUG USE</b>			
<b>Do you use any other drugs? (% yes)</b>	<b>8.5</b>	<b>12.3</b>	<b>30</b>
- Tobacco (% yes)	4.3	6.2	16.7
- Cannabis (% yes)	2.1	10.8	13.3
- Other (% yes)	4.3	4.6	3.3

(Continued)



Table 2. (Continued)

Variable	No current risk	Low risk	Risky
<b>OTHER COMMENTS*</b>			
Do you have any other comments about alcohol use during pregnancy? (% yes)	21.3	33.8	43.3
- Confusing because of conflicting advice	20	18.2	0
- Did not know I was pregnant	20	4.5	7.7
- Moderate consumption is acceptable	10	63.6	61.5
- Should not drink while pregnant	50	9	7.7
- More/accurate information required	0	4.5	15.4
- Other	0	0	7.7

Significant differences bolded

Means all fall within 95% Confidence Interval upper and lower boundaries

Some variables have multiple modes (all listed in parentheses)

Variable values: **Education:** 0-primary, 1-to year 10, 2-year 11 or 12, 3-Tafe certificate, 4-Associate Diploma, 5-Undergraduate Diploma, 6-Bachelor Degree, 7-Masters/Post Grad. Diploma, 8-Doctorate. **How often in 12 months prior to pregnancy:** 0-everyday, 1-3 to 4 times per week, 2-1 to 2 times a month, 3-1 to 3 times a month, 4-7 to 11 times in 12 months, 5-3 to 6 times in 12 months, 6-twice in 12 months, 7- once in 12 months, 8-never in 12 months.

\* some missing responses

### *Alcohol use in the 12 months prior to pregnancy*

Three variables measuring quantity and frequency of alcohol consumption in the 12 months prior to pregnancy were statistically significant between drinking level groups (Table 1). These included: how often beer was consumed in the 12 months prior to pregnancy ( $p = 0.001$ ); how often wine was consumed in the 12 months prior to pregnancy ( $p < 0.000$ ); and how often spirits were consumed per occasion in the 12 months prior to pregnancy ( $p = 0.008$ ).

Women in the no current risk group were two and a half to three times less likely to consume beer once or twice a week, or more often, in the 12 months prior to pregnancy than women in either the low risk or the risky groups. Women in the no current risk group were nearly two to two and a half times less likely to consume wine one or twice a week, or more often, in the 12 months prior to pregnancy than women in either the low or the risky groups. Women in the no current risk and low risk groups were two to three times less likely to consume spirits once or twice a week, or more often, in the 12 months prior to pregnancy than women in the risky group.

### *Situation of alcohol use*

There was no significant difference in any of the alcohol use situational variables between risk level

groups. When asked to select one venue where they were most likely to drink, the majority of study women selected their home, with a smaller proportion of women selecting a friend's house, or a pub or bar (Table 2). A small proportion of no current and low risk women also selected a restaurant (Table 2). However, women generally drank in a range of settings as indicated in open option questions. Women in each risk level group were most likely to drink in their own home or at the home of a friend, and at times in a restaurant or a pub or bar (Table 2).

### *Benefits and concerns about alcohol use*

Two benefit and concern variables were significantly different between the three drinking level groups (Table 1). These included: recognised benefits of drinking alcohol (while pregnant) ( $p = 0.001$ ) and receiving a negative comment about drinking (while pregnant) ( $p = 0.013$ ). All the women in the low and risky groups continued to drink alcohol during pregnancy and the majority of these women recognise that there were benefits to drinking compared with a smaller proportion of women in the no current risk groups who had discontinued drinking. The most noted benefit reported by women in all study groups who answered this question was that of relaxation (Table 2). The low and risky groups were more likely to enjoy the

taste of alcohol, and each group had a proportion of women who gained social benefits from drinking (while pregnant) (Table 2).

Nearly one-third of women in the low risk group and a higher proportion of women in the risky group reported a negative comment in response to their drinking (Table 2). Family and friends (other than mother and partner) were most likely to make a negative comment about drinking in the no current and low risk groups, with partners most likely to make a negative comment about drinking for women in the risky group (Table 2).

A proportion of women in each group had concerns about drinking during pregnancy (Table 2). The most common concern noted by women who responded to this question was the potential risk of FAS to their unborn child with approximately one-third of women who continued to drink during pregnancy reporting this concern.

### *Health professional advice*

One health professional variable was significantly different between risk level groups: did a doctor or health professional ask about alcohol use during your current pregnancy? ( $p = 0.020$ ). Descriptive data (Table 2) indicate that although over half of the women in the no current risk group were asked about their current alcohol use, they were less likely to be asked about their current alcohol use than women in either the low or risky groups.

### *Other drug use*

There was a significant difference in the proportion of women from each study group who reported use of other drugs ( $p = 0.016$ ) (Table 1). A higher proportion of women in the risky drinking group reported other drug use compared with women in the no current and low risk groups (Table 2). Women in the risky group were most likely to use tobacco and cannabis in addition to alcohol, while women in the low risk group were more likely to use cannabis in preference to tobacco.

### *Other comments*

There was no significant difference in the number of women from each study group who chose to make an additional comment about alcohol use during pregnancy (Table 2).

Women in the no current risk group were over five times more likely to comment that women should abstain while pregnant compared with other study women (Table 2). Women in the low and risky groups were most likely to comment that moderate consumption during pregnancy is acceptable (Table 2). Some of these comments were related to prior pregnancy outcomes.

Although all professional advice is that abstinence is best, out of my friends and associates most women who have children have taken alcohol whilst pregnant with no obvious harm to their children, making the decision to consume it myself on occasions much easier. (Low risk woman)

Everything in moderation I feel is acceptable – food and alcohol although I watch what I eat. I am more concerned about smoking for which I have tried everything to give up and can't although I still try this every morning. (Risky woman)

Approximately one-fifth of women in both the no current and low risk groups made comment about the conflicting advice they received from health professionals (Table 2). Women in the low and risky groups asked that more accurate research information be available (Table 2).

There is a lot of contrasting literature. One booklet I received contradicted the midwives advice. If the health profession wishes to pursue a zero tolerance line towards alcohol consumption during pregnancy they need to provide details and the reports and statistics which have led to this stance. I personally find it a difficult notion that all alcohol consumption is excessive. (Low risk woman)

I know I shouldn't drink or smoke but sometimes it's a small relief from life's stress and situations. Also midwives and people can make you feel very guilty without perhaps encouraging and supporting you in quitting. (Risky woman)

## **Discussion**

This descriptive study focuses on the experiences, situations and context of some Australian women who drink alcohol while pregnant, in order to gather

information that may assist in the development of intervention research planning and strategies. Based on Australian Guidelines, three risk level groups were identified: women who ceased drinking during pregnancy (risk exposure during the non-recognised phase of pregnancy), women who continued to drink to low risk levels (one to two standard drinks per week) and women who continued to drink to risky levels (greater than two standard drinks per week). As noted in the Australian Guidelines, risk refers to the impact of alcohol use on the health of the developing foetus rather than any possible health impact on women. Although there was a significant difference between risk level groups for some variables, those variables where no statistical significant was reported are of practical significance for they help to define intervention foci for alcohol consuming pregnant women generally, rather than for specific risk level groups.

There were several features unique to women in the risky group. They were more likely to: have a Government Health Care Card; be single; experience a negative comment about their drinking from their partner; use other drugs, in particular tobacco and cannabis. Previous studies report that partners play a significant role in modifying prenatal behaviours and therefore may be an important target for interventions (19,20). However, the risky women in this study were less likely to have a partner and were more likely to have a less supportive partner, suggesting that alternative forms of social support interventions are necessary. Some risky women stated that they were concerned about drinking during pregnancy, but less so than about their use of other drugs, particularly tobacco. Combined prevention efforts may therefore be an important consideration, as will be intensive individually targeted programmes to assist in quitting multiple substances. This is particularly important as recent research confirms the synergistic effects of alcohol and tobacco use during pregnancy on preterm labour, birth weight and growth restriction (21). Risky women were less likely to have a planned pregnancy. Research suggests that unplanned pregnancies can result from ineffective contraception use often associated with the use of alcohol (22). The combination of drinking and ineffective contraception suggests that interventions with combined messages for women who drink to risky levels may be an important form of intervention.

Effective programmes focusing on these two issues will possibly reduce the number of alcohol exposed pregnancies. The social determinates that have given rise to women's risky use of alcohol (and other drugs) during pregnancy are likely to be complex and will therefore require a complex mix of intervention, the focus of which can perhaps best be identified during focus groups or in-depth interviews and will require cross sectional planning, implementation and spending.

There were similarities between women from the low and risky groups which may prove useful in identifying intervention foci. Women in these groups: were more likely to work fulltime, were up to four times more likely to have consumed alcohol in previous pregnancies and were more likely to consume alcohol during preconception. These findings highlight the importance of targeting women prior to and in the early stages of pregnancy. Prevention programmes that target women during childbearing years will also be important as research findings from this study and others show that pre-pregnancy drinking levels predict drinking levels during pregnancy (19,23); that alcohol use 10 years earlier can predict alcohol consumption during pregnancy (23,24); and that preconception health and lifestyle issues can play a significant role in postnatal outcomes (25,26). Programmes that target women of childbearing age are an important feature of policy and programmes in the USA, a country which is considerably more advanced than Australia in dealing with prevention of harmful outcomes for infants associated with alcohol use during pregnancy (27). The importance of intervention programmes focusing on women of childbearing age is further reinforced by the 'no current risk' women in this study who gave up drinking once pregnancy was confirmed, but who had not reduced consumption in the non-recognised phase of pregnancy. These women may be more attuned to cease consumption if there is a possibility of pregnancy, particularly if information and programmes are available during the preconception phase.

Women in the low and risky drinking groups were most likely to be asked by a health professional about their current alcohol use and to be advised to stop (most commonly) or reduce use. That this advice was not adopted (particularly by risky women) suggests the need for more intensive intervention. Chang *et al.* (20) have noted that Brief

Interventions (approximately 25 minutes' duration) can be effective in modifying drinking behaviour of pregnant women in a clinical setting. Women in the low and risky groups were most likely to make comment that moderate consumption during pregnancy is acceptable. These comments were often based on the observation that no harm had occurred to infants from previous pregnancies and therefore was unlikely to have an impact on future pregnancies. However, a proportion of women from both groups were concerned about the potential for FAS and asked that more accurate research information be available. This request reinforces the need to provide up-to-date and more detailed information about FAS/FASD to women of childbearing age, women who are planning to become or who currently are pregnant. Information could include the potential of lifelong learning and behavioural problems that may result in affected children (and the associated social and economic costs) and detailed information about current understandings of confounding factors that impact on the likelihood of the presentation of FAS or FASD. Information may also include the lack of available research into the effects of low level use during pregnancy and how this relates to Australian Guidelines for women, and the current dearth of effective tools for adequately diagnosing FAS or FASD in Australia and resultant under reporting and under diagnosing of these conditions. There is an immediate need to make up-to-date information widely available and to conduct further research in areas where information is limited.

Nearly half of the study women continued to drink alcohol to low risk levels during pregnancy and these women were more likely to have a higher level of education than women in either the no risk or risky groups and were more likely to consume wine as their preferred alcohol of choice. These findings are common among other research into predictors of alcohol use during pregnancy (19,28). That women in the low risk group were more likely to select wine as their alcohol of choice indicates the potential for specific point of sale, warning label or taxation strategies. Furthermore women who drank to low risk levels were likely to identify the benefits of drinking during pregnancy, particularly the benefit of socialising, suggesting the potential intervention targets of partners, family and friends to extend social support for reduced use, and the

need for strategies that promote alternatives to alcohol use in social situations.

There are some variables that are unique to women who chose to cease alcohol consumption on confirmation of pregnancy that may be pertinent to prevention efforts. Women in this group were most likely to be engaged in full time home duties, however, there are issues inherent to this group that predisposes them to drink less during preconception and to stop drinking during pregnancy that were not uncovered in this study. This group tended to display fewer risky behaviours generally, indicated by a smaller proportion of women in this group reporting use of other legal and illegal drugs. They were also less likely to identify benefits of drinking and were over five times more likely to make additional comment that women should abstain from alcohol while pregnant. To assist in intervention planning there is a need to conduct focus groups or in-depth interviews to help clarify some of the issues and traits that are pertinent to this group of women. These factors may be subsequently introduced into prevention activity to assist in reducing alcohol use during pregnancy in women who do drink or are considering drinking during pregnancy.

All study participants noted that they were most likely to drink at home, suggesting the potential for point of sale intervention, labelling regulations and social support programmes. All study women had their pregnancy confirmed early in their pregnancy with over 50% of each group gaining confirmation by week five and over 90% by week nine. This highlights the opportunity women have for reducing or ceasing alcohol consumption during early pregnancy and a clear opportunity to conduct intervention activity during early pregnancy. However, over 50% of the women in the study continued to drink after confirmation of pregnancy, which reinforces the appropriateness of prevention programmes and campaigns that target women of childbearing age generally, and women in the preconception phase specifically.

There are several study limitations. The study recruits were self-selected, were required to meet the selection criteria and were drawn from public hospitals in the Perth area. A higher number of surveys were issued to hospitals than were returned to researchers. This discrepancy may be partially explained by factors inherent to the study including: women who were issued surveys subsequently

noting that they were not eligible; and a change of interest in completing a self-completion survey without any external motivation. The survey involved a controversial issue that had gained increased media exposure during the period of the study, and this may also have impacted on motivation to be involved. Additionally, there were some hospital related issues that appeared to have impacted on returns, including: withdrawal from the study; change of staff with different levels of interest/motivation to promote the study and discuss the surveys with potential respondents in line with the training provided by study staff. Although face and content validity included input from the target group, there is also the possibility that the study variable did not encompass all issues relating to alcohol consumption during pregnancy. Focus groups with women who consume alcohol during pregnancy would add to our understanding of the depth of issues that impact and influence women who consume alcohol during pregnancy.

Exposure to alcohol during the prenatal period is the leading cause of preventable birth defects and developmental problems in the USA, where diagnosis and notification are rigorous (27). In Australia, where diagnosis and notification of FAS/D are limited, there is a higher level of alcohol use among women of childbearing age and pregnant women (27,29), therefore Australia is likely to have a higher unrecorded level of FAS/D (26,29). To ensure optimal outcomes for infants and children in the future, multiple levels of intervention are likely to be required, focusing on programmes, laws and regulations that are based on evidence of impact (30). However, the minutiae of intervention must also involve information gained directly from the target group, as programmes that resonate with the target audience and meet their needs will be most effective in creating change (31). This formative descriptive study of pregnant women's alcohol related experiences and situation of use, although not generalisable to a broader population, can assist in identifying target group informed strategies and components for testing in future intervention research. The formative intervention research undertaken in this study is particularly important in the early stages of intervention development (11) as is the case in Australia, or when the behavioural impact of evidence based programmes has limited scope, as noted in recent systematic literature

reviews of interventions to reduce alcohol use during pregnancy (32,33). Replication of this type of formative intervention study among other groups and in other jurisdictions will be important in helping to identify and shape potential intervention research.

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