Drinking & Congenital Birth Defects: Alcohol Awareness in the Northern Rivers Region of New South Wales, Australia

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Abstract

Purpose*: Guidelines developed to minimise the risk of harm associated with alcohol consumption in Australia focus on promoting population health by changing cultural attitudes. This research study was conducted to uncover attitudes toward maternal drinking and awareness of alcohol-related birth defects within the semi-rural Northern Rivers area of New South Wales (NSW) Australia, December 2003 to April 2004. A pilot survey was conducted using a sample of convenience to gain initial insights into these perceptions at the local level. 162 people took part in the survey, with 57 declining.* **Findings:** *69.8% of respondents answered 'Yes' to the survey question, "Should women drink during pregnancy?". Overall responses to the survey showed a general trend in favour of drinking 4 – 8 glasses of beer or wine per week during pregnancy. Analyses of gender, age and level of education revealed that a moderating relationship exists between alcohol attitudes and level of education, with education negatively related to recommended alcohol quantity, and positively related to whether the respondent knew about alcohol-related birth defects.* **Discussion:** *These findings support the recommendations of both the National Alcohol Strategy, 2001 – 2003 and the NSW Alcohol Summit (2003) by suggesting that education remains an important consideration in terms of mapping effective attitudinal change. Recommended that an accurate measure of Australian alcohol-related birth defects be sought, and educational programs used to raise social awareness toward maternal drinking issues. Further research should seek a more representative sample and investigate urban/rural differences.*

Key Words*:* **Maternal Drinking, Fetal Alcohol Syndrome (FAS), Alcohol-Related Neurodevelopment Disorder (ARND), Health Education**

Introduction

Australian culture is a drinking culture.[1,2] This generally means associating drinking with such things as coming of age, having a good time, being dis-inhibited, and rebelling against the status quo.[3-5] Alcohol misuse in Australia is an issue for both rural and urban health, and involves underage drinking, binge drinking, drink driving, and drinking to excess.[6-7,2] Alcohol misuse has also been related to depression and youth suicide, both issues of particular importance to the area of *health education*.[6,8-9] The results of misuse behaviours contribute to domestic violence, rape, drunken assaults, verbal abuse, fighting, and (often fatal) motor vehicle accidents. Misuse occurs more frequently in low-SES males, rural adolescent males, professionally qualified males such as solicitors and medical doctors, and females 20 – 39 years.[2,10] This last group is of special interest to the present study as it represents an age bracket in which women drinkers are also most likely to be pregnant.[11,12] Of additional interest in this respect is that teenage pregnancy often involves major health risks for the unborn child.[7,12].

Alcohol and Health Risks

Health risks associated with alcohol include various cardiovascular diseases, brain damage, cirrhosis of the liver, alcohol dependence, self-injury and violent injury, motor vehicle accidents, drowning, and suicide.[13,14] Of specific interest to female drinkers is the issue of birth defects as caused by maternal consumption of alcohol during pregnancy, especially during the first trimester. These have not been widely acknowledged within Australian culture,[12] and include alcohol-related neurodevelopment disorder, alcohol-related birth defects, fetal alcohol effects and fetal alcohol syndrome. *Fetal Alcohol Syndrome* (FAS), first identified by Jones and Smith [15] involves a specific constellation of birth defects. Children born with FAS tend to have stunted growth, impaired intellectual development, and abnormal facial features. According to the U. S. *National Institute on Alcohol Abuse and Alcoholism* [16] FAS is considered the primary known preventable cause of intellectual disability in children. The other congenital birth defects that result from in-utero exposure to alcohol are described as follows:

- *Alcohol-Related Neurodevelopment Disorder* (ARND): Significant functional neuro-cognitive impairments.
- *Alcohol-Related Birth Defects* (ARBD): Malformation in the skeletal and major organ systems.
- *Fetal Alcohol Effects* (FAE): Less severe FAS-like physiological and cognitive abnormalities that sometimes occur.

The relationship between alcohol consumption during pregnancy and congenital problems has been acknowledged for some time. The *Third Report on Alcohol and Health* [17] reported alcohol abuse in pregnancy as being the third-leading cause of overall birth defects (after Down syndrome [Trisome 21] and spina bifida), with some research indicating it is the leading cause of intellectual disabilities in children.[18-20] Furthermore, in addition to the compromise of early intellectual capacity, alcohol exposed children are also susceptible to a wide range of later adolescent disability outcomes that can affect educational learning, such as emotional disturbance, sleep disorders, hyperactivity, and abnormal behavioural habits.[18,21]

Learning Problems and School Adjustment
Maternal alcohol consumption has also been recognised as a possible aetiology for negative educational outcomes.[22,23] For example, Streissguth et al reported children with FAS or ARND to have significant school adjustment problems characterised by impulsivity and hyperactivity, behaviours characteristically associated with ADHD.[23] These problems related mainly to learning and classroom behaviours, with younger children's hyperactivity being a significant barrier to adequate educational performance. Shaywitz, Cohen and Shaywitz found similar problems for FAS children.[24] In their sample these children had IQ measures in the normal range but all were experiencing school failure. Hyperactivity, usually medicated by stimulant drugs, was present in nearly all subjects. Statements by teachers indicated that the students had similar behavioural problems to those associated with ADHD, with comments such as 'cannot sit still' and 'cannot concentrate' used frequently to describe the behaviour of ARND or FAS students in the classroom.

Alcohol-related neurodevelopmental disorder (ARND), where alcohol exposure in utero results in developmental delay and other neurological and psychosocial problems, can be

seen to affect negative educational outcomes beyond the clearly defined FAS classification. In terms of the physical architecture of the developing brain for ARND children, evidence suggests that cognitive dendrites tend to be shorter, and involve less branching than for non-ARND children, leading to significant problems in terms of slow learning and social maturity.[25,26] In addition, the effects of this condition can often confound appropriate diagnosis and intervention strategies for alcohol-related disabilities. This is because the child will generally not have been identified as having exposure to alcohol as part of her or his primary aetiology and thus may be incorrectly labelled as having ADHD or Asperger's syndrome. Hence there exists inherent potential for misdiagnosis of the primary aetiology, with the suggested interventions - based upon a secondary label such as ADHD or Asperger's - being largely inappropriate. As well, misdiagnosis may obviate the underlying environmental circumstances that caused the child's problems in the first instance. In turn this can downplay the importance of psychosocial interventions aimed at reducing alcohol abuse in the child's home environment. This unfortunate series of events highlights the importance of public awareness in consuming alcohol, especially during the first trimester of pregnancy, and suggests a closer look at the relationship between alcohol and pre-natal health.

The Bio-Chemistry of Alcohol Consumption

Alcohol is the most widely abused drug in Australian culture.[11,2] This is most likely due to the fact that alcohol is commonly perceived as a social facilitator, that is, as helping people forget their problems, relieve tension and anxiety, and generally increase 'happiness'.[4] This is not surprising in that alcohol inhibits the flow of sodium across the membrane of neuron cells, making GABA receptors – a neurotransmitter involved in relaxation - more sensitive.[27-28]

A problem exists however in that alcohol remains an essentially teratogenic substance for many individuals, with varying degrees of risk for different social groups. Alcohol cannot be metabolised in its original form, and must go through a two-stage process in which the liver first metabolises it into *acetaldehyde* (a poisonous substance), and then secretes the enzyme *acetaldehyde dehydrogenase* to further convert the acetaldehyde into *acetic acid*, a useable chemical

form. This appears to be a stressful process in terms of both physiological and psychological health, but more importantly the rate of this metabolic process varies widely at the individual level, and the genes that affect this rate appear to be unequally distributed across different races of people.[29] This further obscures the division between safe levels of alcohol consumption and alcohol misuse, making it more difficult to dissociate healthy consumption from its social drivers and promote awareness of the true underlying risks involved in drinking.

Public Awareness and Safe Levels of Consumption

In terms of safe levels of alcohol consumption during pregnancy, Ernhart et al noted a direct correlation between the amount of alcohol a mother drinks and the incidence of congenital birth defects.[30] Yet one reason researchers are not certain whether there is a safe threshold for the effects of alcohol on the developing brain is that animal studies suggest that even very small quantities can have significant effects on brain development.[31,19] For this reason many medical researchers advise abstinence during pregnancy as the 'safest course' until generically safe levels are determined more precisely.[32,33] In spite of this however, the issue of safe levels for alcohol consumption for pregnant women remains contentious.

A meta-analysis of twenty-four studies exploring alcohol-related fetal malformations during the first trimester of pregnancy by Polygenis et al concludes that moderate alcohol consumption during pregnancy does not increase the risk of major malformations significantly.[34] Yet this study also acknowledges inherent methodological limitations relating to data extraction and the lack of a standardised alcohol consumption scale, as well as interpretive limitations due to recall bias and the inability to clearly define 'moderate alcohol consumption' across all included study outcomes. O'Leary generally agrees that no clear link has been demonstrated between low levels of alcohol consumption and FAS.[12] Yet she also acknowledges that debate about the amount of alcohol required to produce fetal malformations continues, and stems not only from the methodological problems noted above but also from the tendency of alcohol-related research to average alcohol intake over time to a 'daily' or 'weekly' level of consumption, a methodology that underscores the lack of standardisation.

O'Leary suggests that this tendency masks the underlying relationship between actual patterns of alcohol intake and the incidence of fetal malformations. She also notes that a number of additional causes for FAS also need to be more fully considered, including socio-economic status, age, gender, and rurality.

One clear recommendation deriving from O'Leary's review is that knowledge about the effects of alcohol is an important factor in eliciting change in existing attitudes toward consumption, yet many young people, including pregnant women, consume alcohol without the benefit of this sort of knowledge.[12,7] O'Leary emphasises the need to re-direct awareness of alcohol-related issues, in order to demystify cultural stereotypes and to highlight the sorts of problem areas most amenable to change. Noting that general awareness for many of the problems related to drinking are not clearly known, or are misunderstood, O'Leary encourages further inquiry into existing levels of alcohol awareness within Australian communities. She also suggests this data be fed back into public educational programmes as one of the key factors for eliciting long-term, substantial attitudinal change. To this end the current study looks at attitudes toward consuming alcohol during pregnancy, and awareness of the problems related to drinking while pregnant, within the Northern Rivers area of NSW (Australia). This area is demographically semi-rural, suggesting that the attitudes toward alcohol consumption found there may reflect elements of both rural and urban awareness.

Study Focus

Within Australia the National Expert Advisory Committee on Alcohol (NEACA),[11] the National Health and Medical Research Council (NHMRC),[34] and the NSW Alcohol Summit,[10] all suggest that a key aspect in facilitating healthier use of alcohol involves changing cultural attitudes. This is a complex issue, and one that encompasses aspects of both cost-effective health care and effective behavioural or lifestyle change.[35,36] Simply put, the overall costs of health care (in this case the supply of expenses and other resources needed to support families and individuals affected by alcohol-related fetal malformations) will benefit from factors such as awareness, prevention, and the behavioural motivation needed to address lifestyle changes. Within Australia the importance of this can be viewed through the budgetary blowouts in both public and privately funded health care costs that have been related to treatments for HIV and skin cancer. Public campaigns aimed at effecting lifestyle changes in these areas targeted "safe sex" practices and the use of "Sunsmart" skin-protecting behaviours, and both campaigns can claim success in having produced significant cultural change in terms of increased awareness and pro-active health-related behaviours.[37,38] These outcomes underscore the suggestions of the NEACA and the NHMRC, as well as support O'Leary's notion that the knowledge gained from tapping into existing attitudes can be used in turn to change attitudes and bring about greater awareness and health-related behaviours.

From this perspective the present research investigated public awareness concerning the relationship between alcohol consumption during pregnancy and negative post-natal outcomes at the local level. This is considered important because Australian alcohol suppliers are currently under no obligation to inform the public of possible risks associated with intake during pregnancy,[39] and because it has been suggested that a significant lack of awareness currently exists concerning alcohol-related congenital conditions in educational curricula and health promotional material within Australia.[2,12] This is in contrast to the U. S. situation, where liqueur agents are required to supply a consumer warning to the effect that alcohol consumption during pregnancy has been associated with congenital birth defects.[32] It is assumed therefore that ensuring higher public awareness of this knowledge in Australia forms an important aspect of global mental health and educational processes. The present research reports on the findings of a pilot alcohol awareness survey conducted from December 2003 to April 2004, in the Northern Rivers Region of New South Wales (NSW). This survey sought to uncover the attitudes of local women and men toward drinking during pregnancy, and to gauge an initial understanding of their perceptions concerning the relationship between maternal consumption and alcohol-related congenital malformations.

Methods

Participants

Two hundred nineteen participants were approached in the Northern Rivers region of NSW, and asked if they would take a few minutes to respond to an alcohol awareness

survey. All participants were advised that the information being gathered was confidential, and that their participation, though greatly valued, was entirely voluntary. The number of respondents who completed the survey was 162, with 57 individuals declining participation. Demographic information included gender, age and level of completed education. This information was organised in terms of bracketing: Age was grouped by range, and coded into five brackets (see table 1). Mean age for participating males was 28.3 years; for participating females was 28.0 years. Overall the first two age brackets (covering 16 – 35 years, inclusively) accounts for 63% of the study sample.

Education was also coded into five categories, according to the highest level of education completed (table 1). Participants who had completed year-10 comprised 32.7% of the sample. High school (HSC) graduates comprised another 28.4%. Taken as a group this accounts for 61.6% of the sample in terms of education level. TAFE and university participants combined (constituting a tertiary level cohort) account for an additional 28.4% of the sample. Table 1 details participant characteristics.

Note that in terms of gender the sample was composed of 93 females (57.4%) and 69 males (42.6%). Although somewhat unbalanced with respect to gender, age and education, this sample does reflect a demographic distribution relative to the normal population for this area, spanning unemployed persons, students, unskilled and skilled workers, professionals and home duties. Using the table 1 categories, figure 1 overviews this sample in terms of age and level of education, by gender. Note that on average women tended to be slightly younger than the men surveyed, and to have completed higher levels of education.

Materials

The information for this report was gathered using a constructed pilot survey, the *Alcohol Awareness* survey. This survey sought to tap into attitudes and beliefs about alcohol consumption during pregnancy, and perceived knowledge concerning alcohol-related neurological disorders (especially FAS) as indicators of maternal drinking awareness. The questions used in this survey were developed from focus-group discussions involving university students studying *Special Education*, and the initial data gathered for this study were

evaluated for reliability using a Guttman split-half reliability analysis, a model that tests the strength of association between test items in order to compute lower bounds for instrument reliability. This analysis returned a moderate coefficient for the existing survey of 0.41, a level deemed acceptable for pilot purposes. The survey asks participants to respond to the following questions:

Question one ('should') was categorical (yes/no), and asked whether the respondent thought expectant mothers should consume alcohol during pregnancy.

Question two ('type') was scalar, and asked what type of alcohol (beer, wine, spirits or other) was considered safe for consumption during pregnancy.

Question three ('quantity') was scalar again, and asked what level of alcohol consumption was considered safe for pregnant women.

Question four ('heard') was categorical, and asked if the respondent had ever heard of FAS.

Question five ('know') was categorical, and asked whether or not the respondent knew what FAS was (participants who responded in the affirmative were then asked to elucidate on this verbally).

For purposes of analysis, the coding for these responses was either:

- Categorical ('Should'/'Heard'/'Know', where 1 = YES & 2 = NO).
- Grouped by range:
    - ('Type', where 1 = consumption of beer or wine & 2 = consumption of spirits)
    - ('Quantity', where 1 = 1 - 3 glasses per week, 2 = 4 - 8 glasses per week, and 3 = 9 – 12 glasses per week).

Procedures

To gauge general knowledge and attitudes toward drinking during pregnancy within the local area the researchers approached individuals in places such as local CBDs, parks, shopping complexes, theatres, and restaurants. Although this represents a sample of convenience, these areas are considered representative in that all manner of SES, ethnic, indigenous and mainstream individuals commonly frequent them, including unemployed persons, students, unskilled and skilled workers, professionals, families, and single parents with children. Traditional drinking venues, such as hotels and pubs, were avoided as it was felt this might bias the sampled response. In order to

randomise participants as much as possible, individuals were approached on the basis of being every third person to come out of a shop, every fifth person in a line, every other person encountered in a park, etc., and asked to participate in a survey that queried people about drinking during pregnancy (a Latin square method was used at the beginning of each outing to randomise the selection number). If the response was positive, then the individual was asked to fill in the survey form and immediately return it to the researcher, who would review the form with the participant and ask any appropriate questions that may be needed to complete or explain a particular answer. No names were recorded and there were no other identifying markers associated with the information gathered. All data were numerically coded and entered into SPSS (Statistical Package for the Social Sciences), and analysed for differences in response rate and response type in terms of gender, age, and level of education.

RESULTS

Overall responses to the five questions in the awareness survey are tabled below (table 2). Note that the general trend was in favor of drinking 4 – 8 glasses of beer or wine per week during pregnancy. Only 17.9% of respondents reported having heard of FAS, with just 11.1% being able to elucidate the particular or characteristic effects of FAS.

A correlational analysis of the relationships between gender, age and level of education with respect to the awareness questions revealed several interesting relationships (table 3). Younger respondents had significantly lower levels of completed education ($r_{(162)} = -.362$, p<.01, 2-tailed), and higher levels of education were negatively related to the quantity of alcohol considered safe for consumption during pregnancy ($r_{(162)} = -.343$, p<.01, 2-tailed). Education level is also related to whether or not the respondent had heard of FAS ($r_{(162)} = +.233$, p<.01, 2-tailed); and to whether or not they were able to describe the effects of FAS ($r_{(162)} = +.251$, p<.01, 2-tailed). Thus, level of education appears to have been a key factor in relation to alcohol awareness for this group.

These findings are supported by univariate tests of the interaction effects between education and age with respect to the questions: "Should expectant mothers consume alcohol during pregnancy?" ($F_{(6)} = +3.07$, p = .008, ? = .12); "Have you ever heard of *Fetal Alcohol Syndrome* (FAS)? " ($F_{(6)} = +3.40$, p = .004, ? = .13); and "Do you know what FAS is?" ($F_{(6)} = +3.22$, p = .005, ? = .13). In addition, education is the only factor significantly related to the quantity of alcohol recommended for consumption by survey respondents ($F_{(4)} = +3.07$, p = .02, ? = .08). Although the effects for these interactions are low, they support the notion that level of education may exert a moderating effect on attitudes and beliefs concerning alcohol consumption during pregnancy for this group, with higher levels of education resulting in a more negative attitude toward drinking while pregnant, and in a greater awareness of the possible congenital effects of such consumption.

A secondary trend, though not significant, was also observed in which responses to the three critical questions, 'Should', 'Type', and 'Quantity' displayed differences in terms of gender (see Figure 2). Although the same basic attitude toward drinking during pregnancy was recorded by both female and male respondents, women felt overall that a milder type of alcoholic consumption ('Type') was more appropriate, and that a smaller amount of alcohol ('Quantity') should be consumed. These trends suggest possible differences in gender attitudes that may exist within the Northern Rivers area of Australia.

DISCUSSION

In terms of overall survey findings, respondents with higher levels of education felt that lower amounts of alcohol consumption were more appropriate during pregnancy, with the type and quantity of alcohol consumed during pregnancy inversely related to education level. Also, respondents with higher levels of education who felt that greater consumption was OK during pregnancy tended to believe that the type of alcohol to be consumed should not include spirits or other forms of strong beverage. Of additional interest is the fact that higher levels of education were related to a higher awareness of FAS in the surveyed population.

Study Limitations

It is to be noted that for purposes of generalisation the sample and effect sizes place limits on the confidence levels for this data. As well, the pilot nature of the survey used, though

displaying a moderate reliability coefficient, does constrain the scope of the information gathered. However, whilst provisional these findings must also be viewed in light of their purpose in establishing initial insights into maternal drinking attitudes at the local level. While there is still much to learn about alcohol awareness in Australia, these initial observations have provided important insights into local attitudes toward maternal drinking as well as providing possible directions for future investigation and policy development.

Policy Development and Implementation

The findings of the current study are largely in accord with current ideas about promoting alcohol awareness at the public health level. According to Shanahan, Wilkins, and Hurt, misuse of alcohol may be preventable, especially if it extends from attitudes based on learned associations between alcohol and the pursuit of happiness.[2] The results of this current research suggest that overall the cohort for this study viewed consumption of alcohol during pregnancy in fairly benign terms. Associated with this was a fairly low awareness of the possible problems associated with drinking during pregnancy. Taken together this suggests little understanding of the relationship between maternal drinking and congenital birth defects, and may well reflect local attitudes and values toward alcohol as an acceptable substance for use in social facilitation and perhaps self-medication. The fact that the sampled population was from a semi-rural area also raises the possibility that these attitudes incorporate other, more distinctly rural values as well, including the use of alcohol to alleviate depression and as a general risk-taking behaviour.[3,5]

The underlying question raised by these findings is whether the generalised connection between education and awareness can be utilised in a more focused manner. For example, if education is capable of operating as a moderator, or perhaps mediator of alcohol-related attitudes, then in terms of public health might an educational program that is targeted specifically at maternal drinking also affect the types of associations developed by women in the 20 – 39 years-of-age bracket suggested by Shanahan et al?[2] There seems to be an intuitive logic about this assumption, and thus the question bears further exploration.

Of further interest in this respect is that the relationship between education and more moderate attitudes toward drinking during pregnancy is supportive of some of the key recommendations stemming from other investigative sources, such as O'Leary's (2002) review, the NHMRC Australian Alcohol Guidelines (2000), the (Australian) National Alcohol Strategy (2001), and the (Australian) National Alcohol Campaign (2003). All raise questions concerning alcohol consumption during pregnancy and recommend increased educational activities as an important aid in promoting more generalised attitudinal changes toward drinking, as well as being a means for increasing cost-effective public health. The ability to promote individual and group health in the critical area of maternal consumption therefore appears to involve the educational process as a core principle by which large scale attitudinal change may be affected. The findings of this survey certainly support this relationship at the conceptual level.

In terms of policy development, because the SES and age for problem drinkers in Australia tend to be stratified as lower and younger,[11,12] a key direction for ongoing political investigation would be to seek to quantify the extent to which public educators are able to facilitate alcohol awareness within the realms of the Australian education system. These demographics suggest this forum to be well placed as a cultural change-agent in terms of an attitudinal shift about alcohol. In this respect, as with so many other enterprises which have sought to alter public opinion and public behaviours, early intervention would be expected to produce greater gains than simply attempting to address the issue at an adult level. Policy decisions in this direction need to be tested and, if necessary, more fully informed. Published findings, including pilot findings such as these, are worthwhile in that they afford politicians, policy-makers, and researchers insights into the various implications of alcohol use within Australia. Viewed within the present globalising processes that are shaping public health issues around the world this can be seen as a necessary, if not sufficient, aspect of developing accurate global models of the social trends and attitudes to be understood in order to effect public health in a responsible manner as we continue to move into the 21st century.

Recommendations

The results of this research highlight three important issues for ongoing consideration: the problem of consumption standardisation, the

need to index accurate measures of alcohol-related fetal malformations within Australia, and the place of education as a possible agent for cultural change. The common ground shared by all three is that they relate to increased alcohol awareness and the ability to promote informed individual choice.

It is the position of this report that these issues need to be investigated further, especially the possible links between health promotion and education. As pointed out by both Shanahan et al and O'Leary, [2, 12] there appears to be little information on prevalence rates for FAS and ARND within an Australian context. Therefore one appropriate direction for further research would be to seek additional information of this sort. Obtaining accurate measures of alcohol-related fetal malformations within Australia would provide a clearer cultural context within which to begin measuring the potential impact of alcohol misuse as an aspect of public health education. In turn, developing a nationally standardised scale by which alcohol intake can be measured would support the assignation of these prevalence rates by allowing the development of accurately defined patterns of maternal drinking in relation to fetal malformations. Together, these measures afford the prerequisites for cultural change.

In terms of increasing the generalisability of the findings for this study, future research should seek to use a larger sample and incorporate a wider distribution of demographic characteristics. A web-based survey methodology could be a cost effective way of going about this, yet within Australia many rural and low SES individuals would be disadvantaged by this approach. A better way might be to administer a nationwide survey via the major urban and rural newspapers. This would also allow specific comparisons to be made with respect to possible differences in rural/urban attitudes toward maternal drinking.

Finally, because one of the key problem areas relating to congenital defects with respect to alcohol may well be the establishment of learned associations between drinking and lifestyle, the plausibility of using warning labels on all types of alcohol within Australia should be vigorously investigated. It is interesting that this sort of labelling practice is a requirement in the United States and yet has only recently been considered in Australia.

Conclusions

Positioning a relationship between knowledge and behavioural change underpins the present study. A key motivation for performing this research has been to investigate the notion, as put forward by O'Leary, [12] and Shanahan, Wilkins, and Hurt, [2] that a relationship exists between knowledge and attitudes toward drinking. The findings of this report support that notion, as it seems that level of education may itself afford a moderating effect upon attitudes toward consumption, at least with respect to maternal drinking. This may afford the possibility of affecting cultural change toward alcohol in Australia. Cultural attitudes are constructed values in that they reflect commonly agreed opinion and belief. To change attitudes toward alcohol consumption may not be an easy task, and that very fact means that any such endeavour will need the weight of government action behind it. However, to fail to make this attempt would be tantamount to endorsing the cultural stereotype, and this could only serve to blur the distinction between alcohol use and its misuse.

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Table 1: Participant Overview

Attribute	Number & Range Brackets	Overall % of Sample
Gender	69 male	42.6%
	93 Female	57.4%
Age Range	(Bracket 1) 16-25 yrs	26.5%
(in years)	(Bracket 2) 25-35 yrs	36.4%
	(Bracket 3) 35-50 yrs	20.4%
	(Bracket 4) 50-65 yrs	12.3%
	(Bracket 5) 65+ yrs	4.3%
Education Level	Primary	10.5%
(Highest level completed)	Year-10	32.7%
	HSC	28.4%
	TAFE/Diploma	13.0%
	University/Post-Grad	15.4%

Table 2: Overall Response Rates to FAS Questions

FAS Question	Response Frequency	Relative Percentages
1) 'Should' (women drink during pregnancy?)	113 = 'YES'	69.8%
	49 = 'NO'	30.3%
2) 'Type' (If so – what type of alcohol should they drink?)	• None	30.3%
	• Beer/Wine	48.0%
	• Spirits	19.3%
	• Other	2.4%
3) 'Quantity' (in glasses per week)	• Nothing	30.3%
	1 – 3	19.3%
	4 – 8	38.5%
	9 – 12	10.5%
	12+	1.4%
4) 'Heard?' (of FAS)	29 = 'YES'	17.9%
	133 = 'NO'	82.1%
5) 'Know?' (What FAS is)	18 = 'YES'	11.1%
	144 = 'NO'	88.9%

Table 3: Correlations for gender, age and level of education with respect to questions 'should', 'type', 'quantity', 'heard', and 'know'.

Question	Gender	Age	Education	'Should'	'Type'	'Quantity'	'Heard'	'Know'
'Should'			.20*					
'Type'								
'Quantity'			-.34**					
'Heard'			.23**					
'Know'			.25**					
Education		-.36**				-.34**	.23**	.25**
Age			-.36**					
Gender								

n = 162
*p<.05, two tails
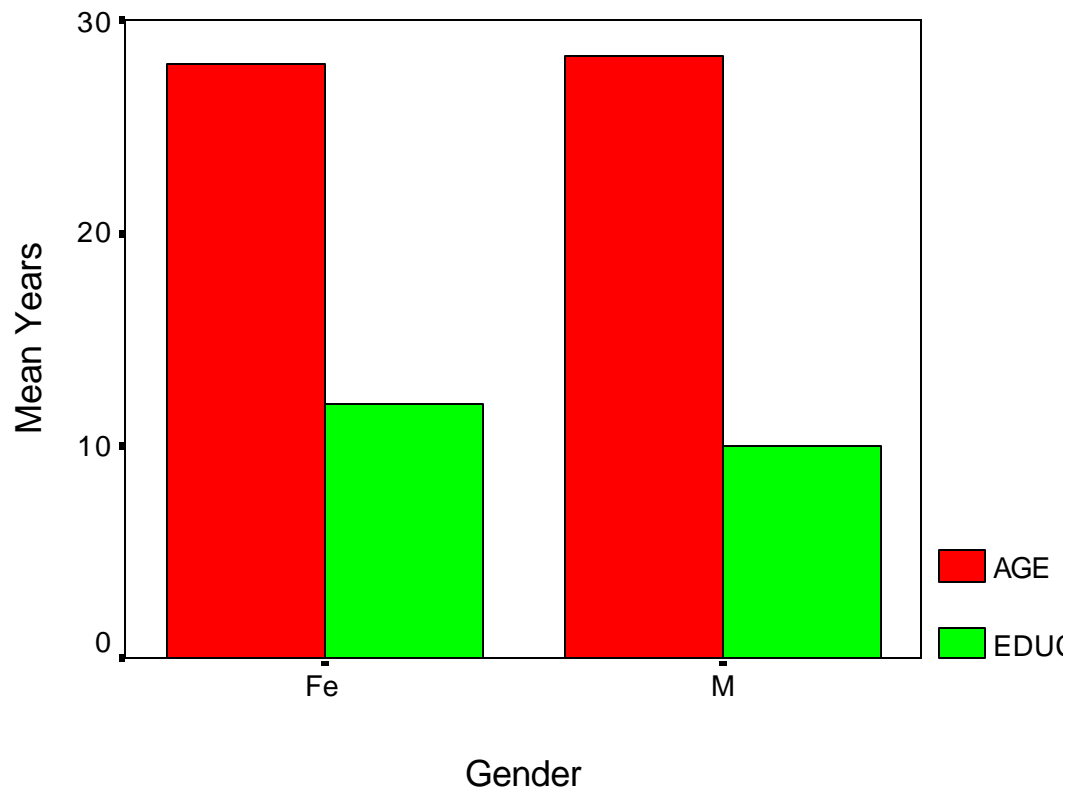**p<.01, two tails

Figure 1: Age & Education by Gender

Fig 2: "Should", "Type" & "Quantity"

As a Function of Gender