Childhood behavioural and developmental disorders – association with maternal alcohol consumption in Cape Town, South Africa

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Current maternal alcohol consumption, especially binge drinking, is strongly associated with childhood behavioural and/or developmental disorders (BDDs) in a population attending tertiary hospital ambulatory services. BDDs were also associated with maternal alcohol use 6 months before pregnancy. An association with BDDs could not be conclusively demonstrated for drinking during pregnancy, but this may have been influenced by under-reporting and reduced study power due to misclassification of exposure. We cannot rule out the *a priori* suspicion that some mild BDDs in children in the Western Cape could be undiagnosed fetal alcohol spectrum disorder. Nonetheless, the study highlighted the important impact of current maternal alcohol use on behaviour and development of children. Future research on the impact of maternal alcohol use on childhood development should include examination of environmental and social factors contributing to this increased risk. Upstream interventions aimed at reducing alcohol-related harms may also contribute to reducing the burden of BDDs.

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To the Editor: Prenatal alcohol exposure can result in a range of permanent birth defects known as fetal alcohol spectrum disorders (FASD). Fetal alcohol syndrome (FAS), which adversely affects the neurodevelopmental, physical and social capabilities of children, is the most severe diagnosis in the FAS spectrum. Rates of FAS in the Western Cape have been reported as among the highest in the world.[1] However, it is evident that a considerable burden may be posed by less severe consequences of prenatal alcohol exposure manifesting in a FASD continuum.[2,3]

Research suggests that FASD may be misdiagnosed as attention-deficit hyperactivity disorder (ADHD).[4] It is therefore possible that among children with behavioural and/or developmental disorders (BDDs), some may be children with FASD as a result of gestational exposure to maternal alcohol consumption, who either did not meet all of the diagnostic criteria for FAS or have undiagnosed FASD. The full impact of gestational drinking on birth defects and childhood development may therefore be underestimated, particularly in populations where the prevalence of full-blown FAS is already known to be high.

Research on the prevalence of BDDs in South Africa is scarce. Retrospective studies on prenatal alcohol exposure have been conducted among mothers of children with FAS in South Africa,[5,6] but there has been little research on the association between drinking during the gestational period and less severe forms of FASD presenting as BDDs.

Given the high prevalence of FASD[7] in the Western Cape and the possibility of less severe forms of FASD manifesting as BDDs, we investigated the additional burden of gestational maternal drinking on BDDs. The objective was to determine the association of childhood behavioural and developmental disorders with prenatal, gestational and recent maternal alcohol consumption, including binge drinking.

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Methods

Opportunistic sampling was employed to select parents or caretakers of 110 children aged 4 - 12 years for interviews at a tertiary children's public hospital in Cape Town, including 55 case children with BDDs drawn from selected developmental and behavioural disorder clinics and 55 controls, children without BDDs from the general outpatient population. To increase the likelihood of excluding confirmed cases of FASD, the age range chosen was one during which FAS is most accurately diagnosed.[8] Maternal alcohol consumption was compared between cases and controls.

Clinic records were reviewed to identify eligible cases and controls to approach for interview while waiting to see a doctor. Consenting parents or caregivers of the children were interviewed in their first language. Additionally, adult respondents of control children answered screening questions regarding the child's behaviour and social aptitude to exclude undiagnosed BDDs. The questionnaire comprised closed and open-ended questions on demographic information and maternal alcohol consumption habits. Logistic regression analyses explored the relationship between alcohol consumption variables and an outcome of BDDs (Table I), controlling for potential confounders such as the use of a proxy respondent (versus the biological mother) and the age of the child (model 1), and also including the gender of the child (model 2). The study was approved by the University of Cape Town Health Science Faculty Human Research Ethics Committee.

Results

The response rate among eligible cases was 100%. Ten (13.9%) of the 72 control children approached were excluded based on screening questions related to the child's behaviour. Seven potential controls declined to participate, resulting in a response rate of 88.7% (55/62) among eligible controls. The median ages of case and control children (8 and 7 years, respectively) and of the ages of their mothers during pregnancy (27 and 26 years, respectively) were not significantly different. Case children were more likely to be male than control

Table I. Crude and adjusted odds ratios for the association between maternal alcohol consumption and childhood behavioural and/or developmental disorders in a sample population, Cape Town, South Africa, 2009

Variables	Unadjusted OR (95% CI)	Adjusted OR, model 1* (95% CI)	Adjusted OR, model 2† (95% CI)
Gestational era alcohol consumption			
Drank 6 months before pregnancy‡			
No (*N*=71)	1.00	1.00	1.00
Yes (*N*=34)	2.37 (1.02 - 5.51)	2.17 (0.90 - 5.28)	3.00 (1.12 - 8.03)
Drank during pregnancy‡			
No (*N*=90)	1.00	1.00	1.00
Yes (*N*=18)	1.80 (0.64 - 5.05)	1.53 (0.52 - 4.51)	1.77 (0.57 - 5.53)
Current alcohol consumption			
Mother drinks alcohol now			
No (*N*=86)	1.00	1.00	1.00
Yes (*N*=24)	3.07 (1.15 - 8.15)	2.94 (1.06 - 8.12)	2.98 (1.02 - 8.70)
Mother binged in past 6 months*			
No (*N*=93)	1.00	1.00	1.00
Yes (*N*=15)	4.86 (1.29 - 18.35)	4.40 (1.10 - 17.64)	4.67 (1.10 - 19.90)

*Adjusted for use of a proxy respondent and age of child.

†Adjusted for use of a proxy respondent, age of child, and gender of child.

‡Where the sum for *N*<110 for the category denotes responses of 'Don't know' or 'Don't remember'.
OR = odds ratio; CI = confidence interval.

children (74.5% v. 45.5%; p=0.002) and less likely to be accompanied by a biological mother (72.7% v. 92.7%; p=0.006).

BDDs were positively associated with current maternal alcohol consumption (adjusted odds ratio (AOR) 2.98; 95% confidence interval (CI) 1.02 - 8.70), maternal binge drinking in the last 6 months (AOR 4.67; 95% CI 1.10 - 19.90), maternal alcohol use 6 months before pregnancy (AOR 3.00; 95% CI 1.12 - 8.03), and reported maternal gestational drinking (AOR 1.77; 95% CI 0.57 - 5.53), although the last association was not statistically significant. All associations were adjusted for use of a proxy respondent, age of the child, and gender of the child.

Discussion

Children with BDDs were 3 times more likely to have mothers who currently drink and over 4.5 times more likely to have mothers who had binged in the past 6 months compared with control children, while gestational drinking by the mother was non-significantly associated with BDDs. There are two possible reasons why current maternal drinking status was associated with BDDs. First, mothers could turn to alcohol to help cope with the stresses of taking care of a child with a BDD. It is more likely, however, that drinking status, especially binge drinking, may be a proxy for an unstable home environment and other social factors that could lead to, or exacerbate, behavioural issues in the children. This is supported by the consistency of the direction and strength of association for current drinking and for drinking before pregnancy.

The non-significant association between BDDs and gestational maternal alcohol use can be interpreted as follows. While the effect measure was non-significant (Table I), the ORs in the multivariate analyses were modestly elevated (1.5 and 1.8 for both models). Failure to show a significant difference may result from misclassification related to under-reporting alcohol consumption in pregnancy. Although previous research found that South African women admit to drinking alcohol more readily than women in First-World settings,[8] this study was conducted over 10 years later, and extensive media attention and health promotion efforts have focused on problems of FAS in the region over the past decade. Accordingly, our study participants may have been more aware of the effects of drinking alcohol during pregnancy and may have under-reported gestational drinking because of embarrassment and stigmatisation, similar to women in First-World settings.[2]

Proxy respondents were more likely than biological mothers to report drinking during gestation. Biological mother respondents of cases reported rates for alcohol use 6 months before pregnancy and during pregnancy of 38% and 15%, respectively, compared with 47% and 33%, respectively, reported by proxy respondents, which would be consistent with under-reporting by biological mothers.

Reports on alcohol consumption 6 months before pregnancy may be more indicative of drinking patterns during early stages of pregnancy, when much of the damage to the infant occurs,[9] especially since some women are unaware that they are pregnant until a few weeks into the first trimester. We found a stronger association between children with BDDs and drinking before pregnancy than with drinking during pregnancy. This may reflect biological mothers' behavioural change in cutting back on alcohol use while pregnant, under-reporting of gestational drinking habits, or a combination of these. Given a sample size calculation based on an anticipated effect measure of 3.0, the misclassification in measuring gestational consumption may have reduced study power, which could be a further explanation for the modestly elevated but non-significant OR (1.77; 95% CI 0.57 - 5.53) for the effect of gestational alcohol consumption.

The difference between gender distributions among the cases and controls is consistent with other research suggesting that behavioural disorders such as attention deficit hyperactivity disorder are more frequent among male children.[4] However, the role of gender in the associations between maternal alcohol consumption and gender is less clear. Current maternal alcohol habits could be related to gender in that the sex of a child could influence maternal drinking via differential attitudes toward parenting styles for boys

and girls. Alternatively, the gender and health status of the child might influence caregivers' retrospective reporting of maternal alcohol habits. However, adverse events in the gestational period, such as low birth weight, are associated with differential outcomes of behavioural disorders between males and females.[10] This raises a possible biological basis for sex-based differential susceptibility to the effects of prenatal alcohol exposure, a hypothesis that requires verification in further research.

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