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# Does prenatal exposure modify the response to first use of alcohol and tobacco?

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## Introduction

Previous research has found that maternal drinking during pregnancy is associated with drinking among female adolescent offspring (e.g., Griesler and Kandel, 1998) and that maternal smoking during pregnancy is significantly associated with with increased risk of child's tobacco experimentation (Cornelius et al., 2000). However, little work has been done to investigate whether prenatal exposure to alcohol or tobacco by-products affects subjective responses to first drink or first cigarette use.

## Objectives

- To explore the associations of maternal drinking and smoking during pregnancy with the following responses to first use of cigarettes:
  - enjoying first experience, liking the taste, coughing, getting a headache, feeling dizzy, feeling nauseous, and racing heart

## Objectives

- To explore the associations of maternal drinking and smoking during pregnancy with the following responses to first use of alcohol:
  - enjoying first experience, flushing, feeling sleepy, getting a headache, feeling dizzy, feeling nauseous, and racing heart

# Missouri Adolescent Female Twin Study (MOAFTS)

- Families with female like-sex twin pairs born July 1, 1975 – June 30, 1985 in the state of Missouri identified through Missouri birth records.
- Data for the present analysis were obtained from both parental and twin pair telephone diagnostic interviews.
- Parental smoking history was assessed by twin report at interview.
- Parental alcohol dependence, maternal smoking during pregnancy, maternal alcohol use during pregnancy, and birth weight of the twins were assessed by parental self-report.

# Prenatal risk factors

- **Maternal drinking during pregnancy:**
  - days of alcohol use
  - some heavy use: drinking at least 5-6 drinks on the days they typically drank and having 5 or more drinks in a single day  $\leq 1$  day/month
  - frequent heavy use: same as above but having 5 or more drinks in a single day at least 2-3 days/month
- **Maternal smoking during pregnancy:**
  - during 1<sup>st</sup> trimester
  - beyond 1<sup>st</sup> trimester
- **Low birth weight:** < 2500 g (5 lb, 8 oz)
- **Very low birth weight:** < 1500 g (3 lb, 4 oz)

## Childhood/familial risk factors

- **Parental history of DSM-IV alcohol abuse (AA) or DSM-IV alcohol dependence (AD):** assessed from parental self-report
- **Parental regular smoking:** assessed from twin report
  - If mother or father is a current smoker?  
OR
  - If mother or father has quit smoking but used to smoke at least 1 or 2 days a week.



## Sample Information (N=2850 twins, N= 1425 families)

Variable	Mean	Variable	Percent of sample
Age	15.3 +/- 2.3	Very low birth weight (<1500g)	4.8%
Variable	Percent of sample	Maternal smk: 1 <sup>st</sup> trimester only	12.9%
Maternal AD (self report)	4.7%	Maternal smk: Beyond 1 <sup>st</sup> trimester	20.7%
Maternal AA (self report)	8.9%	Alc. use 1-10 days of pregnancy	24.8%
Paternal AD (maternal report)	19.5%	Alc. use 11-35 days of pregnancy	2.8%
Mother-regular smoker (twin rpt)	36.9%	Alc. use >35 days of pregnancy	0.9%
Father-regular smoker (twin rpt)	39.0%	Some heavy alc. use in pregnancy	2.4%
Low birth weight (<2500g)	47.8%	Frequent heavy alc. use in pregnancy	1.0%

## Subjective response variables (N=2850 twins, N= 1425 families)

Variable	Percent of sample <sup>^</sup>	Variable	Percent of sample <sup>#</sup>
Enjoy smoking the first time	17.3%	Enjoy drinking the first time	76.1%
Coughing--smoking	69.5%	Feeling flushed--drinking	29.5%
Feeling dizzy--smoking	46.7%	Feeling dizzy--drinking	41.0%
Headache--smoking	25.3%	Headache--drinking	19.4%
Racing heart--smoking	20.9%	Racing heart--drinking	16.1%
Nausea--smoking	17.0%	Stomach ache--drinking	26.6%
Enjoying the taste--smoking	16.3%	Feeling sleepy--drinking	30.0%

<sup>^</sup> Among those who have tried cigarettes (N=1218 twins). <sup>#</sup> Among those who have had a full drink (N=1216 twins).

**Adolescent girls whose mothers reported frequent heavy drinking during pregnancy were no more likely to report reactions to first cigarette use.**

	No maternal drinking during preg.	Frequent heavy drinking during preg.	
Response Variables	%	%	OR# (95% CI)
Enjoy Overall	17.5	25.0	1.64 (0.54-5.02)
Cough	70.9	80.0	1.66 (0.64-4.30)
Dizzy	46.7	70.0	2.51 (0.89-7.11)
Headache	26.5	40.0	1.49 (0.62-3.58)
Racing Heart	20.7	40.0	2.24 (0.84-5.94)
Nauseous	16.9	35.0	2.23 (0.90-5.54)
Enjoy taste	16.6	20.0	1.19 (0.32-4.40)

# Unadjusted odds ratios, among those who have tried cigarettes. \* p < 0.05; \*\* p < 0.01

**Adolescent girls whose mothers reported smoking beyond the first trimester were more likely to report dizziness, headache, racing heart, and nausea in response to first cigarette use.**

	No maternal smoking during preg.	Smoking during the first trimester		Smoking beyond the first trimester	
Response Variables	%	%	OR# (95% CI)	%	OR# (95% CI)
Enjoy Overall	17.5	15.9	0.86 (0.53-1.40)	17.8	0.99 (0.69-1.41)
Cough	69.1	67.7	0.95 (0.64-1.40)	71.3	1.16 (0.85-1.58)
Dizzy	44.2	47.7	1.10 (0.74-1.63)	51.7	1.35* (1.01-1.81)
Headache	21.8	31.8	1.72** (1.14-2.59)	29.6	1.56** (1.13-2.14)
Racing Heart	17.1	22.4	1.35 (0.85-2.14)	28.2	1.91** (1.38-2.64)
Nauseous	13.9	20.6	1.54 (0.96-2.48)	21.6	1.72** (1.21-2.45)
Enjoy taste	15.2	16.5	1.09 (0.66-1.81)	18.6	1.19 (0.82-1.72)

# Unadjusted odds ratios, among those who have tried cigarettes. \* p < 0.05; \*\* p < 0.01

**Adolescent girls whose mothers reported frequent drinking during pregnancy were more likely to report nausea in response to first use of alcohol.**

	No maternal drinking during preg.	Days of alc. use during pregnancy: > 35		Frequent heavy drinking during pregnancy	
Response Variables	%	%	OR# (95% CI)	%	OR# (95% CI)
Enjoy Overall	75.2	88.9	2.68 (0.32-22.33)	65.2	0.62 (0.26-1.47)
Flushing response	29.8	44.4	1.81 (0.67-4.87)	39.1	1.34 (0.57-3.19)
Dizzy	40.6	66.7	3.08 (0.88-10.78)	52.2	1.83 (0.78-4.35)
Headache	20.2	38.9	2.37* (1.01-5.63)	30.4	1.47 (0.46-4.64)
Racing Heart	17.4	22.2	1.28 (0.34-4.82)	17.4	0.94 (0.24-3.80)
Nauseous	27.6	16.7	0.48 (0.10-2.21)	60.9	3.41** (1.43-8.16)
Feeling sleepy	30.2	44.4	1.73 (0.47-6.37)	34.8	1.07 (0.38-3.01)

# Unadjusted odds ratios, among those who have had a full drink. \* p < 0.05; \*\* p < 0.01

**Adolescent girls whose mothers reported smoking beyond the first trimester were more likely to report racing heart, nausea, and feeling sleepy in response to first use of alcohol.**

	No maternal smoking during preg.	Smoking during the first trimester		Smoking beyond the first trimester	
Response Variables	%	%	OR# (95% CI)	%	OR# (95% CI)
Enjoy Overall	77.5	77.4	1.00 (0.67-1.52)	73.2	0.80 (0.57-1.11)
Flushing response	27.9	32.9	1.30 (0.87-1.95)	31.0	1.18 (0.86-1.62)
Dizzy	42.1	36.6	0.75 (0.51-1.10)	40.0	0.91 (0.68-1.23)
Headache	18.0	23.8	1.41 (0.87-2.30)	20.7	1.19 (0.83-1.71)
Racing Heart	14.4	15.2	1.10 (0.66-1.83)	20.7	1.57* (1.07-2.30)
Nauseous	23.3	32.3	1.48 (0.95-2.31)	31.0	1.50** (1.09-2.10)
Feeling sleepy	27.5	33.5	1.35 (0.89-2.05)	34.2	1.39* (1.01-1.92)

# Unadjusted odds ratios among those who have had a full drink. \* p < 0.05; \*\* p < 0.01

After adjustment for childhood and familial risk factors, girls whose mothers reported frequent heavy alcohol use during pregnancy were no more likely to report any subjective reactions in response to first cigarette use.

	Frequent heavy drinking during pregnancy	
Response Variables	Adjusted OR (95% CI)	Significant Covariates
Enjoy Overall	1.96 (0.63-6.11)	
Cough	1.86 (0.62-5.65)	
Dizzy	1.75 (0.59-5.16)	Paternal alcohol dependence, Maternal regular smoking
Headache	1.30 (0.55-3.08)	Maternal smoking during pregnancy
Racing Heart	2.18 (0.69-6.92)	
Nauseous	2.27 (0.82-6.28)	
Enjoy taste	1.47 (0.41-5.22)	Drinking >35 days during pregnancy

Among those who have tried cigarettes. \* p < 0.05; \*\* p < 0.01

After adjustment for childhood and familial risk factors, children whose mothers smoked during the first trimester were more likely to report headache in response to first cigarette use.

	Smoking during first trimester	Smoking beyond first trimester	
Response Variables	Adjusted OR (95% CI)	Adjusted OR (95% CI)	Significant Covariates
Enjoy Overall	0.73 (0.42-1.29)	0.81 (0.50-1.31)	
Cough	0.80 (0.51-1.27)	0.94 (0.62-1.42)	
Dizzy	0.76 (0.49-1.18)	0.84 (0.57-1.22)	Paternal alcohol dependence, Maternal regular smoking
Headache	1.65* (1.04-2.60)	1.45 (0.97-2.17)	
Racing Heart	1.11 (0.67-1.84)	1.48 (0.96-2.26)	
Nauseous	1.11 (0.66-1.87)	1.21 (0.76-1.91)	
Enjoy taste	1.03 (0.59-1.78)	1.17 (0.74-1.86)	Drinking >35 days during pregnancy

Among those who have tried cigarettes. \* p < 0.05; \*\* p < 0.01



**After covariate adjustment, children whose mothers reported frequent drinking during pregnancy were more likely to report dizziness, headache, and nausea in response to first use of alcohol.**

	Days of alc. use during pregnancy: >35	Frequent heavy drinking during pregnancy	
Response Variables	Adjusted OR (95% CI)	Adjusted OR (95% CI)	Significant Covariates
Enjoy Overall	2.74 (0.33-22.91)	0.49 (0.21-1.16)	Paternal regular smoking
Flushing response	2.05 (0.77-5.48)	1.45 (0.58-3.63)	Paternal regular smoking
Dizzy	3.84* (1.06-13.94)	1.80 (0.65-4.96)	Maternal regular smoking, Paternal regular smoking, Drinking 11-35 days during pregnancy
Headache	2.51* (1.02-6.16)	1.16 (0.34-3.97)	
Racing Heart	1.37 (0.36-5.16)	1.09 (0.24-5.03)	
Nauseous	0.54 (0.12-2.47)	3.68** (1.67-8.12)	
Feeling sleepy	1.97 (0.57-6.85)	1.17 (0.38-3.59)	Maternal regular smoking

Among those who have had a full drink of alcohol. \* p < 0.05; \*\* p < 0.01

**After covariate adjustment, children whose mothers reported smoking during pregnancy were no more likely to report any subjective reactions in response to first use of alcohol.**

	Smoking during first trimester	Smoking beyond first trimester	
Response Variables	Adjusted OR (95% CI)	Adjusted OR (95% CI)	Significant Covariates
<b>Enjoy Overall</b>	1.04 (0.64-1.69)	0.73 (0.48-1.13)	Paternal regular smoking
<b>Flushing response</b>	1.12 (0.72-1.75)	0.95 (0.63-1.43)	Paternal regular smoking
<b>Dizzy</b>	0.53 (0.34-0.82)	0.60 (0.41-0.90)	Maternal regular smoking, Paternal regular smoking, Drinking 11-35 days during pregnancy
<b>Headache</b>	1.46 (0.87-2.44)	1.13 (0.73-1.75)	
<b>Racing Heart</b>	0.96 (0.54-1.71)	1.25 (0.76-2.04)	
<b>Nauseous</b>	1.22 (0.76-1.96)	1.18 (0.79-1.77)	
<b>Feeling sleepy</b>	1.11 (0.70-1.75)	1.05 (0.69-1.59)	Maternal regular smoking

Among those who have had a full drink of alcohol. \* p < 0.05; \*\* p < 0.01

# Conclusions

- After adjusting for childhood risk factors, among those who have tried cigarettes, most of the associations between prenatal exposure variables and subjective response to **first cigarette use** were no longer found to be significant, suggesting potential confounding effects of paternal alcoholism and maternal regular smoking.
- Among those who have had a full drink of alcohol, a similar pattern was seen for maternal smoking during pregnancy and subjective response to **first use of alcohol**; however, prenatal exposure to alcohol remained a significant predictor of nausea and headache in response to **first use of alcohol**.

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