



# Maternal Prenatal Cigarette Smoking: Effects on Maternal Characteristics and Child Factors

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## INTRODUCTION

Some current problems in the treatment of childhood disorders are trying to help children overcome social and emotional difficulties, such as: deviant behavior, conduct disorders, and disruptive behavior disorders (e.g. Attention Deficit Hyperactivity Disorder; Gillion & Shaw, 2004; Dodge 2003). A common trait found in all of these problems is externalizing behavior (e.g., anger, hostility, hyperactivity, and impulsivity). Other behaviors associated with negative outcomes for children are internalizing behavior and dysregulation. Internalizing behaviors can include such problems such as anxiety and depression. Dysregulation is when a child has difficulty regulating their emotions (Gratz & Roemer, 2004).

Maternal cigarette smoking during pregnancy can put children at higher risk for externalizing behavior problems (Cornelius, Goldschmidt, DeGenna & Day, 2007; Ellis, Berg-Nielsen, Lydersen & Wichstrøm, 2012). Smoking is also related to maternal characteristics that could also have a negative impact on their children. Some negative maternal characteristics such as hostility and anger are associated with the parent child relationship in negative ways (Schuetze, Eiden, & Dombkowski, 2006). Maternal characteristics such as hostility may play a large role in parenting behavior (McCabe, 2014). Maternal hostility could affect how a parent conducts themselves around their child, which could result in modeling behavior.

Child gender may also play a role in how the parent responds to different problems. Young children can be more prone to display different types of behavior depending on their gender. Some of these differences include boys being more prone to physical aggression and externalizing behavior, and girls being more prone to relational aggression and internalizing behavior (Lansford et al., 2012). Parents may respond to behavioral problems differently depending on their child's gender because certain behaviors are more typical/expected to occur depending on the child's gender (Parent et al., 2011; McKee et al., 2007); therefore, the mother's perceived severity of the behavior problem and/or the mother's reaction to the problem may differ depending on her child's gender.

In the present study, we examined correlations between maternal smoking during pregnancy, maternal hostility, and child factors. We then separate these results by the gender of the child in order to see the differences between them. We hypothesized that if the child is a boy there would be a stronger correlation between negative child factors (e.g., externalizing, internalizing, and dysregulation) and maternal hostility.

## METHODS

**Sample Selection.**  
 Participants for this study were taken from the Growing Up Health Study. The Growing Up Healthy study targeted pregnant woman who presented for prenatal care at a large city hospital. Those who met the edibility criteria listed below were invited to participate in the study.

Eligibility criteria

- Maternal age > 18 years
- No illicit drug use other than cannabis
- No heavy alcohol or cannabis consumption (< 1 drink or 5 joints per day or < 4 drinks or 4 joints on a single occasion after pregnancy recognition)
- Between 12 and 20 weeks gestation

Matching:

- At the end of each month, non-smoking women that closely matched the group of smokers enrolled that month were recruited into the study.
- Matched on maternal age and education.

**Participants.**  
 At 24 months 209 mother child dyads (63 nonsmokers, 146 smokers; 102 girls, 107 boys), Maternal Age: 18-39, Primarily low-income, minority woman, high school or below education with 1-2 children

## METHODS

**Measures.**

**Maternal Hostility:** To measure maternal hostility the Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992) was administered. This measure contains 29 items which includes some reverse score items. Some examples of the questions are: "I tell my friends openly when I disagree with them" which is a reverse score item and "I can't help getting into arguments when people disagree with me." The response scale is a 1-5 scale with the following options for responses: 1= Extremely uncharacteristic of me, 2= Moderately uncharacteristic of me, 3= Neither characteristic or uncharacteristic of me, 4=Moderately characteristic of me, 5=Extremely characteristic of me. The Cronbach's alpha for items that measured hostility is .85 with 8 items.

**Maternal Smoking During Pregnancy:** Maternal smoking during pregnancy was measured by maternal self-report at different time points. For the purposes of this study, analyses were based on the average number of cigarettes per day across the entire pregnancy.

**Child Factors:** To measure child factors the Brief Infant Toddler Social Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2008) was administered. This measure contains 42 items. Example items from this measure are "Hits, bites, or kicks you (or other parent)." and "Hugs or feeds dolls or stuffed animals." The response scale is a 1-3 rating scale with 1= not true/rarely, 2= somewhat true/sometimes, 3= very true/often. Cronbach's alpha for the factors were, externalizing .85 with 6 items, internalizing .94 with 8 items, and dysregulation .95 with 8 items.

## Maternal Hostility and Maternal Prenatal Smoking

	2 months	9 months	16 months	24 months
Boys	.20 <sup>+</sup>	.29 <sup>**</sup>	.14	.22 <sup>*</sup>
Girls	.17 <sup>+</sup>	.13	.02	.02

Table 1. Note: <sup>+</sup>=p<.10, <sup>\*</sup>=p<.05, and <sup>\*\*</sup>=p<.01

The circled location indicates the largest magnitude difference between boys and girls

- Table 1 shows us that for mothers of boys, average number of cigarettes per day across the pregnancy was significantly associated with maternal hostility at 2 months, 9 months, and 24 months of child age
  - In table 2, we can see the break down for individual factors that are correlated to maternal hostility at 24 months for boys and girls.
- All significant values were highlighted in both tables.

## Correlations For Boys and Girls at 24 Months

	Hostility	Externalizing	Internalizing	Dysregulation
Girls				
Boys				
Hostility	X	.47 <sup>***</sup>	.27 <sup>**</sup>	.30 <sup>**</sup>
Externalizing	.16	X	.22 <sup>+</sup>	.55 <sup>***</sup>
Internalizing	.17	.29 <sup>**</sup>	X	.35 <sup>***</sup>
Dysregulation	.24 <sup>*</sup>	.31 <sup>**</sup>	.57 <sup>***</sup>	X

Table 2. Note: <sup>+</sup>=p<.10, <sup>\*</sup>=p<.05, and <sup>\*\*</sup>=p<.01 <sup>\*\*\*</sup> = p < .001

## RESULTS

**Data Analyses.**  
 Bivariate associations were examined using Pearson Product Moment Correlations, such as to investigate associations between maternal hostility and maternal prenatal smoking from the 2 month to 24 month period. This sample was then divided by gender. We found that for mothers of boys, average number of cigarettes per day across the pregnancy was significantly associated with maternal hostility at 2 months, 9 months, and 24 months of child age. We also found that maternal hostility was significantly associated with 3 child factors: externalizing, internalizing, and dysregulation. This sample was then divided by gender to see if there were any differences between associations for boys and girls. It was found that for boys at 24 months maternal hostility was associated with dysregulation. For girls at 24 months maternal hostility was associated with child externalizing, internalizing, and dysregulation.

## CONCLUSIONS

**Discussion.**

- Maternal hostility and smoking cigarettes during pregnancy are related to negative outcomes for children.
- Differences between associations at 24 months can be due to developmental differences between boys and girls at that age. Boys and girls typically develop different styles of play around this time but more research is needed to analyze this further (Hoffman 2001).

**Limitations.**

- Smoking was measured by self report
- Only maternal reports were used to assess child factors
- Potential practice effects

**Future Work.**  
 For future work, we would like to further examine maternal hostility and maternal prenatal smoking at 16 months. These results may be mediated by changes in childhood development, but requires further analysis. We would also like to further examine these factors across a longer period of time. As children grow some of these associations may no longer continue to be significant or become stronger. We hope that subsequent studies will provide these answers

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