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Prenatal exposure to maternal smoking and symptom severity among offspring with first-episode nonaffective psychosis

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Dear Editors,

Prenatal exposure to maternal smoking (PEMS) has been linked to diverse negative perinatal outcomes (Cnattingius, 2004) and far-reaching neurobehavioral consequences, including impaired cognition, attention-deficit/hyperactivity disorder, and conduct disorder (Cornelius and Day, 2009; Gaysina et al., 2013). Although one study did not demonstrate a link between PEMS and risk for schizophrenia (Baguelin-Pinaud et al., 2010), Stathopoulou et al. (2013) found that prenatal tobacco exposure was independently associated with a later schizophrenia diagnosis. Ekblad et al. (2010) reported that the exposure is associated with increased risk of psychiatric morbidity including broadly defined psychosis. Other studies suggested that PEMS might increase risk for psychotic symptoms in offspring (Spauwen et al., 2004; Zammit et al., 2009). PEMS could conceivably impact illness manifestation among individuals with psychotic disorders. Smith et al. (2010) showed no association with symptom type or severity, or with symptom change across one year, among first-episode

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Conflict of interest

The authors know of no conflicts of interest pertaining to this research.

psychosis (FEP) patients, but Stathopoulou et al. (2013) found that PEMS was related to greater severity of negative symptoms.

Given limited/inconsistent findings to date, we examined associations between PEMS and symptom severity among FEP patients, while controlling for effects of gender and the patient's own smoking status. Participants (N = 93; age = 22.7 ± 3.7 years; 75.3% male; 91.4% African American) were recruited during an initial hospitalization as part of a larger study. Their biological mothers completed a questionnaire including items on smoking during the pregnancy. Data on current/past-month symptom severity were collected with the Positive and Negative Syndrome Scale (Kay et al., 1987). Comparisons between those with and without PEMS were made using Student's *t*-tests, and factorial analyses of variance (ANOVAs) to examine effects of gender and current smoking status.

Among the 93 mothers, 19 (20.4%) had smoked during pregnancy. The average number of cigarettes smoked per month during pregnancy was 113.7. As shown in Table 1, the two groups of FEP patients did not significantly differ on mean PANSS positive symptom severity. However, those with PEMS had greater severity of reality distortion: 13.6 ± 2.8 vs. 11.6 ± 3.0; $t = 2.64$, $df = 91$, $p = .01$; the difference being driven by greater hallucination severity (5.2 ± 1.3 vs. 4.0 ± 1.6; $t = 3.06$, $df = 91$, $p = .003$). Controlling for potential effects of gender and smoking status did not eliminate the effect of PEMS on reality distortion. Gender and smoking status were not significant predictors, but there was a main effect of PEMS ($F(1, 79) = 4.94$, $p = .029$). No interactions were observed.

The two groups did not differ significantly on mean PANSS negative symptom severity (Table 1). However, those with PEMS had *lower* severity of deficit symptoms (PANSS proxy for the deficit syndrome score): −7.1 ± 3.1 vs. −4.0 ± 3.3; $t = 3.69$, $df = 91$, $p < .001$. Controlling for potential effects of gender and smoking status did not eliminate the effect of PEMS on deficit symptom severity. Gender was not a significant predictor, but there were independent main effects of PEMS ($F(1, 79) = 4.66$, $p = .034$), and current smoking status ($F(1, 79) = 4.57$, $p = .036$). There were no interactions.

Although these initial results require replication, there appears to be an association between PEMS and greater hallucination severity at initial hospitalization for FEP. This is consistent with limited prior studies indicating that PEMS may elevate risk for psychotic symptoms/disorders (Spauwen et al., 2004; Zammit et al., 2009; Ekblad et al., 2010). We found a lower severity of deficit symptoms, which is inconsistent with the prior report indicating that PEMS was associated with greater negative symptom severity (Stathopoulou et al., 2013).

Several methodological limitations must be acknowledged: the cross-sectional/retrospective nature of the study, potential for social desirability bias among the mothers, and limited sample size. Nonetheless, our findings suggest that—in addition to potentially increasing risk for psychotic symptoms/disorders—this fetal environmental exposure might worsen severity of hallucinations among those with early-course psychosis.

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Table 1

Differences in mean PANSS subscale scores in first-episode psychosis patients exposed and not exposed to prenatal maternal smoking (n = 93).

	First-episode patients exposed to prenatal maternal tobacco smoking (n = 19)	First-episode patients not exposed to prenatal maternal tobacco smoking (n = 74)	*t*	*df*	*p*
PANSS positive symptom subscale	24.9 ± 6.3	23.9 ± 5.5	.715	91	.476
PANSS reality distortion subscale	13.6 ± 2.8	11.6 ± 3.0	2.64	91	.01
PANSS negative symptom subscale	22.3 ± 7.3	23.7 ± 6.9	.776	91	.439
PANSS proxy for the deficit symptom score	−7.1 ± 3.1	−4.0 ± 3.3	3.69	91	<.001