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PRENATAL MATERNAL STRESS INFLUENCES CHILD INTERNALIZING SYMPTOMS IN FEMALE OFFSPRING: EVIDENCE FOR SEX DIFFERENCES IN FETAL PROGRAMMING

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Offspring sex plays a key role in determining the effects of early life stress on fetal developmental trajectories (Doyle et al., 2015; Sandman, Glynn, & Davis, 2013; Weinstock, 2007). Evidence suggests that male fetuses invest most of their resources in growth regardless of environmental cues, rendering them at higher risk for morbidity and mortality early in life if exposed to adversity. Conversely, female fetuses rely more on conservation strategies, allowing them to adapt in response to maternal signals. Because females avoid the risk of early morbidity and mortality, they are at higher risk for certain vulnerabilities later in development. Previous studies have linked elevations in maternal psychobiological stress signals with infant fearful temperament and child anxiety selectively in female offspring (Sandman et al., 2013). The current study examined associations between prenatal maternal psychological stress and child self-report of internalizing symptoms at age 5. A sample of 88 women with singleton pregnancies reported their levels of psychological stress using the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) at 15, 19, 25, 31, and 36 weeks' gestation. Child self-report of internalizing symptoms at age 5 were obtained using scales of the Berkeley Puppet Interview (Measelle et al., 1998; Ringoot et al., 2013). In a hierarchical multiple regression, maternal prenatal psychological stress averaged across pregnancy was positively associated with child self-report of internalizing symptoms (see Table 1). Child sex moderated this effect (Table 1), such that the association maternal prenatal psychological stress and child internalizing symptoms was significant among girls, slope = 0.61, t = 3.83, p <.001, but not boys, slope = 0.14, t = 0.89, p = .38 (Figure 1). Maternal perceived stress measured at the time of the child assessment did not explain this effect. This investigation examined young children's own reports of their internalizing symptoms as the outcome of interest, which may provide unique information about their emotional functioning. As such, our finding is remarkably consistent with existing evidence that exposure to early life stress is linked to higher anxiety-related symptoms selectively in female children.

Table 1. ***Hierarchical regression model predicting child self-report of internalizing symptoms.***

Variable	*B*	*SE*	β	*t*	R^2 *change*
Model 1					
Offspring sex	0.50	0.13	.37	3.82***	
Maternal prenatal psychological stress	0.38	0.12	.32	3.30**	.22***
Model 2					
Offspring sex	0.49	0.13	.36	3.86***	
Maternal prenatal psychological stress	0.14	0.16	.12	0.898	
Interaction term	0.46	0.23	.28	2.04	.04*

*$p < .05$, ** $p < .01$, ***$p < .001$

Figure 1. Offspring sex moderates the association between maternal prenatal psychological stress and child self-report of internalizing symptoms