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Title: Maternal Social Support: Associations with Fetal Autonomic Nervous System

Background

Research supporting the concept of “fetal programming” has demonstrated that maternal psychosocial stress during pregnancy can affect gestational biology, fetal behavior, and infant development (Davis et al., 2018; O’Donnell et al., 2017; Monk et al., 2019). Social support has been established as a key predictor of physical and psychological health outcomes in women aged 18-77 years (Hakulinen et al., 2016; Milgrom et al., 2019). In the perinatal period, social support may function similarly, ultimately influencing fetal development; a contrasting exposure to examinations of life stress.

Objective

Examining indices of fetal neurobehavioral development as outcomes may reveal indicators of the association between maternal prenatal social support and offspring development before birth. Using fetal heart rate (FHR) and fetal movement (FM) “coupling” as a measure of fetal autonomic nervous system (ANS) development (DiPietro et al., 1996), this study investigated social support as a factor in fetal programming.

Method

Pregnant women (n=131) were recruited via referrals from routine prenatal visits at Columbia University Irving Medical Center in NYC. Women completed the Interpersonal Support Evaluation List (ISEL) and a fetal monitoring session during lab visits between 22-28 weeks gestation. The ISEL distinguishes nuanced dimensions of social support: Tangible, Appraisal, Belonging (Cohen&Hoberman, 1983). FHR and FM were measured across a 20-minute period, and a variable was computed indicating the average degree of “coupling” – the cross-correlation between FHR and FM changes.

Results

Analyses showed a significant overall positive effect of the Appraisal dimension of social support on fetal FHR-FM coupling in the 2nd trimester, adjusted for gestational age at fetal session. Higher Appraisal scores were associated with greater FHR-FM coupling. When stratified by fetal sex, this association was significant only for female fetuses. In females only, the Belonging dimension of social support also was associated with fetal coupling.

Conclusion

These findings offer a novel way to understand the effects of social support, by dimension, on fetal development. Higher levels of FHR-FM coupling is thought to be an indicator of more advanced ANS development; these results suggest some aspects of maternal social support may contribute to advanced offspring neurobehavioral development and that this effect can be detected before birth. Social support is a modifiable psychological experience and thus a possible target for future studies on therapeutic intervention to help pregnant women, and potentially future children.