Biology and Environment, Mothers and Infants: Linking Stress Physiology, Depression, Anxiety and Attachment

Judith Catherine Warner
BPsych (Hons) Griff.

School of Applied Psychology
Griffith Health
Griffith University, Mount Gravatt

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Abstract

The last two decades have seen research on early life experiences expand to include the prenatal environment and, more specifically, examination of the effects of prenatal maternal mental health on foetal and infant development. Cortisol, the hormonal end product of the Hypothalamic Pituitary Adrenal (HPA) Axis, has been identified as one mechanism associated independently with stress, pregnancy and mental health, which can account for changes during foetal development. In the postpartum, these early life experiences may serve as protective or risk factors for the infant. The longitudinal study conducted here examined nulliparous pregnant women ($N = 40$, $M_{age} = 30.5$, $SD = 5.27$) and their infants commencing during the first trimester of pregnancy until 12 months after birth, with the aim of identifying potentially modifiable mother-infant characteristics associated with mothers' mental health, infant stress physiology and attachment.

The longitudinal study was subdivided into four studies. First, in Study 1A, concurrent and prospective associations between maternal stress (cortisol and self-report of daily stress), coping, and mental health were examined across the three trimesters of pregnancy. Mothers completed questionnaires and gave saliva samples during each trimester of pregnancy and overall the findings showed the important role of coping in modulating baseline cortisol levels and anxiety in the face of daily stressors during pregnancy.

Second, in Study 1B, the importance of early identification of prenatal risk factors for postnatal depression (PND) to preserve mother and infant wellbeing was recognised and investigated. It was found that PND symptoms were elevated in women who reported more general anxiety, more pregnancy-related anxiety, more stress in the second trimester, and more anxiety and stress in the third trimester of pregnancy.
Mothers who had higher cortisol and anxiety about their child’s health, relative to other mothers, across the three trimesters had more symptoms of PND when measured two months after the child's birth. Also, a path model showed that anxiety fully mediated associations of prenatal maternal basal cortisol, depressive symptoms and stress with PND symptoms.

Third, in Study 1C, maternal cortisol and perceived stress during pregnancy were linked to infant baseline cortisol and cortisol reactivity. Measures of mothers’ prenatal baseline cortisol levels, daily stress, and mental health symptoms, as well as mental health symptoms two and four months after birth, were assessed. Infant saliva samples were collected before and after 2-month and 4-month vaccinations to assess baseline cortisol and to determine cortisol reactivity and recovery. Lending support to the foetal programming hypothesis, mothers’ higher cortisol levels and greater perceived daily stress during pregnancy, were associated with infants’ higher cortisol at baseline, but lower response and greater recovery from stress at four months, perhaps indicating a priming effect whereby the system was primed for stress but regulated efficiently. However, at four months of age a moderation effect was found, whereby infants of mothers who had reported more mental health problems two months prior showed greater decline in cortisol recovery from 2 to 4 months of age.

Finally, in Study 1D, relationships were examined between maternal prenatal cortisol, mental health in the pre- and post-natal periods, infant attachment behaviour, and other responses during the Strange Situation. Prenatal maternal basal cortisol and anxiety were associated with infant baseline cortisol at twelve months of age. Maternal anxiety and depression symptoms reported in the postpartum period (when infants were 2, 4, and 12 months of age) were strongly negatively associated with infant cortisol recovery from the Strange Situation conducted when they were twelve months of age.
When maternal anxiety and depression were higher, infant cortisol recovery from the stressor was poorer. Additionally, mothers' mental health symptom level, reported when their infants were twelve months of age, was associated with higher infant baseline cortisol levels and poorer cortisol recovery from stress. There were no significant differences in cortisol levels between infants with secure compared to insecure attachment classifications. However, infants’ cortisol recovery was lower when mothers’ mental health symptoms were high and infants used more proximity seeking.

The current study findings suggest that: (1) prenatal maternal cortisol level, psychological stress, coping, and mental health symptoms are linked during pregnancy, and coping can reduce the association between mothers' perceived stress and their cortisol level, (2) there may be a pathway whereby cortisol and perceived stress during pregnancy increase mothers' general anxiety, which in turn places mothers at greater risk of PND symptoms, (3) maternal cortisol and anxiety during pregnancy are associated with 2-month-old infants' baseline cortisol levels, reactivity and recovery, and (4) when mothers' report more symptoms of depression and anxiety in the postnatal period, these are even more strongly and consistently associated with infants' baseline cortisol and recovery than are measures taken during pregnancy.
Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

(Signed)_______________________________

Judith Catherine Warner
Publications and Presentations

Publications


Poster Presentation

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