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# Is Prenatal Stress Bad for Babies? It Depends on Maternal Perception

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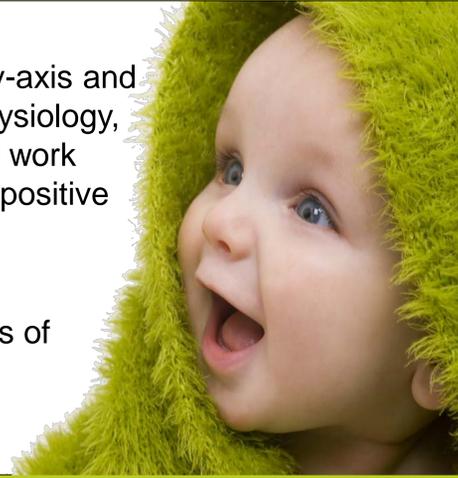
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## BACKGROUND

Research has found the maternal prenatal hypothalamic pituitary-axis and autonomic nervous system to affect both infant behaviour and physiology, with much literature describing strictly negative results. Emerging work however shows that mild to moderate levels of distress can yield positive results. (Del Giudice, 2012; DiPietro 2006).

This study aims to further:

- investigate early psychological and/or physiological predictors of infant state-regulation
- investigate a potential optimal level of stress which can differentiate between positive and negative infant outcomes.



## OBJECTIVES

- To assess if maternal i) stress history and/or ii) cortisol & salivary alpha-amylase during pregnancy are predictive of infant state regulation, including i) Negative Affect ii) Sleep and iii) Crying
- To assess if there are specific levels of cortisol & salivary alpha-amylase that indicate optimal infant state regulation.

## METHOD

### PARTICIPANTS

- 77 women recruited during pregnancy (89% Caucasian, age 25.3-42.8 years; mean gestational age 21.5 weeks; gravida 1-6)

### MEASURES

**Predictor Variables (Prenatal):** 1. Diurnal salivary cortisol 2. Diurnal salivary alpha-amylase, both collected via salivettes 3. Diurnal mood – Profile of Mood States (POMS).

**Control Variables (Postnatal):** 1. Maternal age during pregnancy 2. Infant gestational age (three months post-partum) 3. Infant sex.

**Outcome Variables (Postnatal):** 1. Infant Behaviour Questionnaire – Revised (IBQ-R) 2. Brief Infant Sleep Questionnaire (BISQ) 3. Crying Patterns Questionnaire (CPQ)

### PROCEDURE

- Mothers self-collected 5 mood and saliva samples at home daily for 3 consecutive days during pregnancy.
- At 3 months postpartum, mothers reported on infant outcomes.

### DATA ANALYSIS

Participants were grouped using POMS quartiles, from which bivariate and partial correlations (see control variables above) between prenatal and postnatal variables were determined.

## RESULTS

**Table 1.** Means (SD) of infant crying and sleep data from 77 participants at 3 months post-partum.

	Cry Duration (hrs)	Sleep Total (hrs)	Night Wake Duration (min)	Sleep Latency (min)	Sleep Efficiency (%)
Mean	1.92 (1.31)	14.06 (2.29)	42.77 (38.81)	31.78 (29.64)	87.83 (8.15)
Minimum	.00	9.00	.00	.00	65.69
Maximum	6.00	20.00	195.00	120.00	100.00

**Table 2.** Pearson correlations between maternal prenatal predictors and infant postnatal outcomes divided into 3 groups based on Profile of Mood States score quartiles.

	Negative Affect	Sleep Total	Sleep Consolidation	Crying Total	Total crying bouts over past week
AUCgCort					
1 <sup>st</sup> quartile	<b>-.35(-.56)</b>	<b>.36(.62)</b>	<b>-.37(-.76)</b>	<b>-.19(-.56)</b>	<b>-.03(-.49)</b>
2 <sup>nd</sup> and 3 <sup>rd</sup> quartiles	-.22(-.12)	<b>-.26(-.25)</b>	<b>.40(.34)</b>	-.23(-.14)	-.12(-.23)
4 <sup>th</sup> quartile	<b>.35(.51)</b>	<b>-.47(-.54)</b>	<b>-.25(-.38)</b>	<b>.13(.37)</b>	<b>.12(.53)</b>
AUCgsAA					
1 <sup>st</sup> quartile	-.16(-.25)	<b>.40(.44)</b>	<b>-.44(-.54)</b>	-.20(-.20)	-.18(-.09)
2 <sup>nd</sup> and 3 <sup>rd</sup> quartiles	-.12(-.11)	.15(.20)	-.07(-.09)	-.14(-.13)	-.12(-.20)
4 <sup>th</sup> quartile	-.08(-.20)	<b>-.08(-.31)</b>	-.00(-.05)	<b>.15(.33)</b>	-.11(-.04)
AUCiCort2					
1 <sup>st</sup> quartile	<b>.57(.57)</b>	<b>-.57(-.66)</b>	<b>.32(.40)</b>	<b>.33(.33)</b>	<b>.25(.27)</b>
2 <sup>nd</sup> and 3 <sup>rd</sup> quartiles	-.11(-.07)	-.17(-.10)	.05(.03)	.11(.14)	.02(.04)
4 <sup>th</sup> quartile	<b>-.51(-.54)</b>	-.18(.24)	<b>.51(.46)</b>	-.14(.04)	<b>-.46(-.31)</b>
AUCisAA2					
1 <sup>st</sup> quartile	.12(.30)	<b>-.42(-.54)</b>	<b>.30(.49)</b>	.13(.22)	.10(.10)
2 <sup>nd</sup> and 3 <sup>rd</sup> quartiles	.23(.27)	.12(.13)	-.10(-.17)	-.11(-.10)	-.05(-.08)
4 <sup>th</sup> quartile	<b>.39(.43)</b>	-.20(-.09)	.05(-.04)	<b>-.50(-.45)</b>	-.01(-.22)
LN Stress History					
1 <sup>st</sup> quartile	<b>.28(.39)</b>	<b>-.34(-.52)</b>	<b>-.33(-.26)</b>	<b>.34(.39)</b>	<b>.37(.41)</b>
2 <sup>nd</sup> and 3 <sup>rd</sup> quartiles	-.16(-.16)	.03(.12)	-.17(-.16)	-.14(-.27)	.13(.12)
4 <sup>th</sup> quartile	-.17(-.38)	<b>-.40(-.50)</b>	.11(.12)	-.14(-.06)	<b>.07(.36)</b>

-Correlations of  $r > .25$  are bolded -Partial correlations are listed in parentheses

## SUMMARY & CONCLUSION

Early psychological and physiological factors were both correlated to infant outcomes, though not all were negative associations. Predominantly correlations to negative outcomes were found with high distress predictors, especially in the 4th POMS quartile. In contrast the least distressed group during pregnancy showed beneficial relationships between higher cortisol levels and many outcome variables.

The effects of the maternal HPA-axis and ANS on infants are dependent on the perception of stress.

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