Why are associations between maternal cortisol in pregnancy and early infant behaviors so different in boys and girls?

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'When we hold our babies for the first time, we imagine them clean and new, unmarked by life, when in fact they have already been shaped by the world, and by us. It's a koan of parenthood, one worthy of long contemplation: We are meeting someone we know well for the very first time.'

-Annie Murphy Paul, Origins

The earliest life stress … during fetal development

Depression, anxiety and stress during pregnancy increases the risk of:

Poor birth outcomes e.g. low birth weight and premature birth
(Grote *et al*. 2010)

Infant cognitive, behavioral and emotional problems
(O'Connor *et al*. 2002)

Adolescent psychological disorders e.g. depression
(Rice *et al*. 2010)

Biological mechanisms: A key question

Increased maternal circulating cortisol

Maternal and fetal cortisol are correlated
(O'Donnell et al (2012)

Increased fetal circulating cortisol

Prenatal stress is associated with altered epigenetic DNA regulation , structure and function of the brain
Franke et al 2017
Buss et al 2012
Cao-Lei et al 2017

Alters infant brain development

Infants born to depressed mothers have increased cortisol responses to acute stress
Davis et al (2011)
Brennan et al (2008)

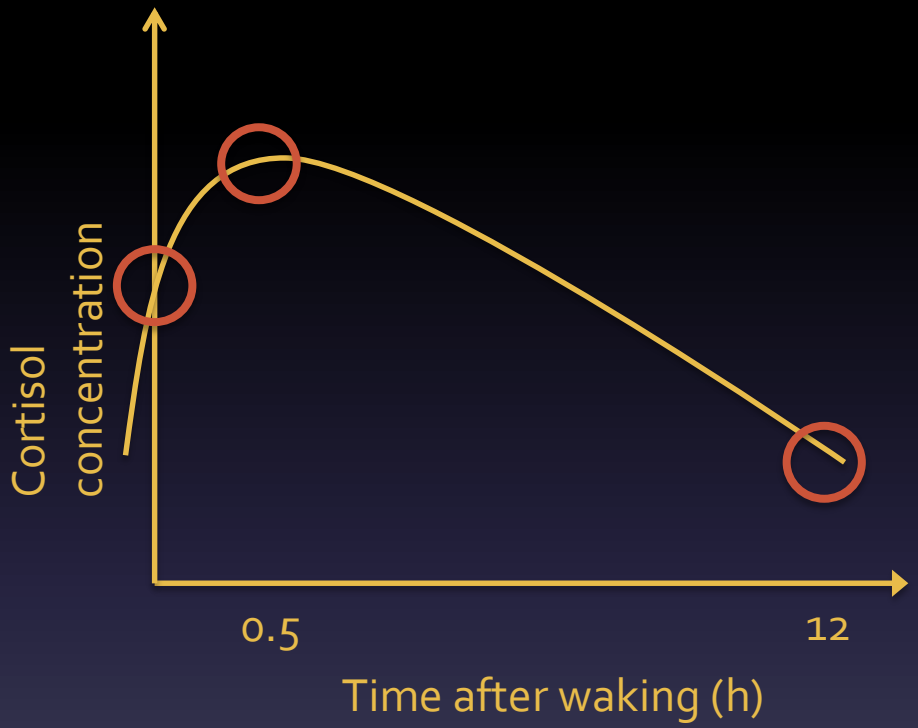
Infant has heightened behavioural and physiological stress reactivity
Talge et al (2007)
Glover et al (2011)

Evidence linking maternal cortisol and infant behaviour is mixed
Baibazarova et al 2013
Davis et al 2007
Gutteling et al 2005

Sex differences?

Does prenatal cortisol predict early infant behaviors in a sex dependent manner?

WCHADS methods

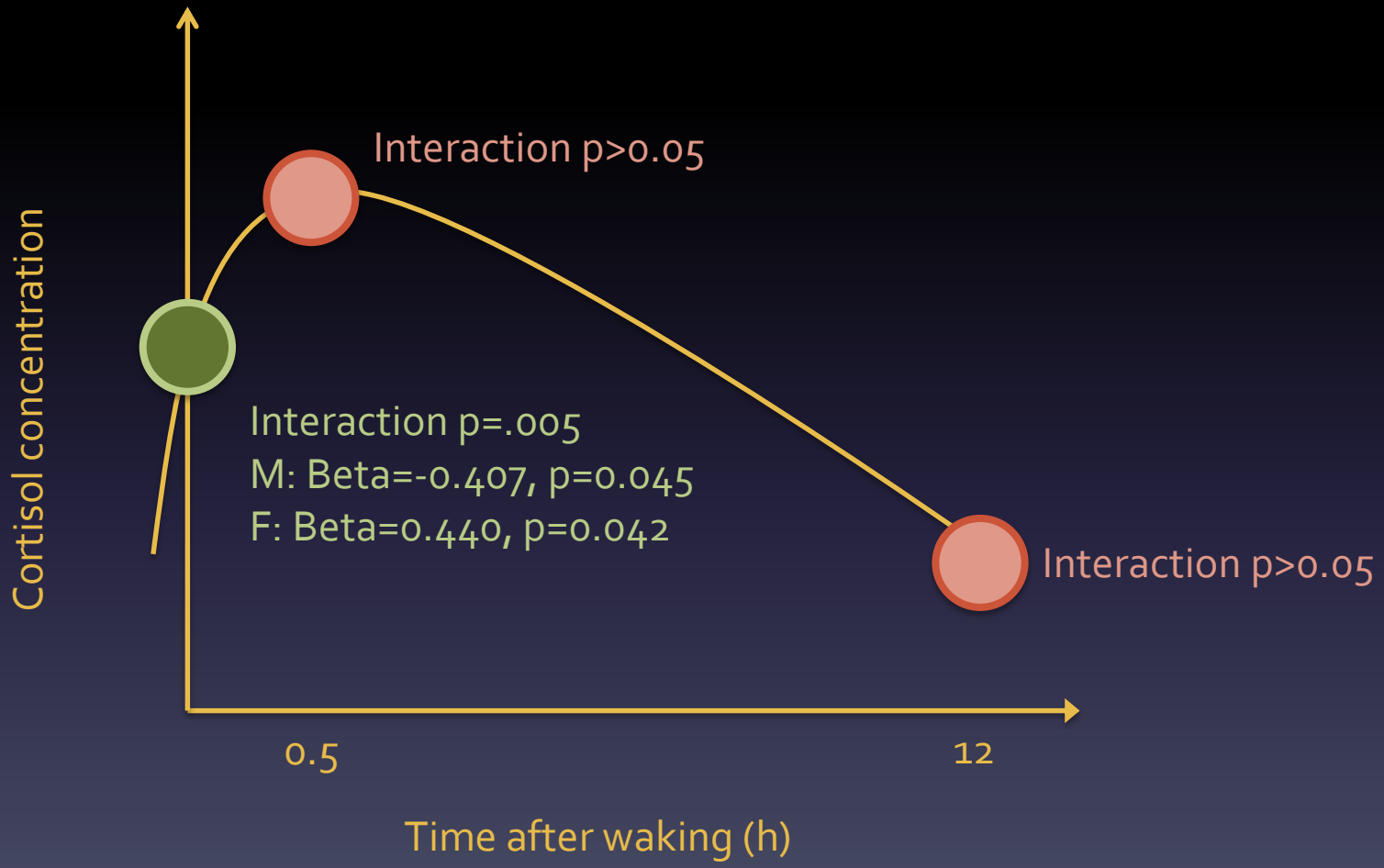


32 weeks gestation
Salivary cortisol

5 weeks postnatal
Infant negative emotionality
NBAS

Braithwaite et al., 2017, Physiology & Behavior

WCHADS Results



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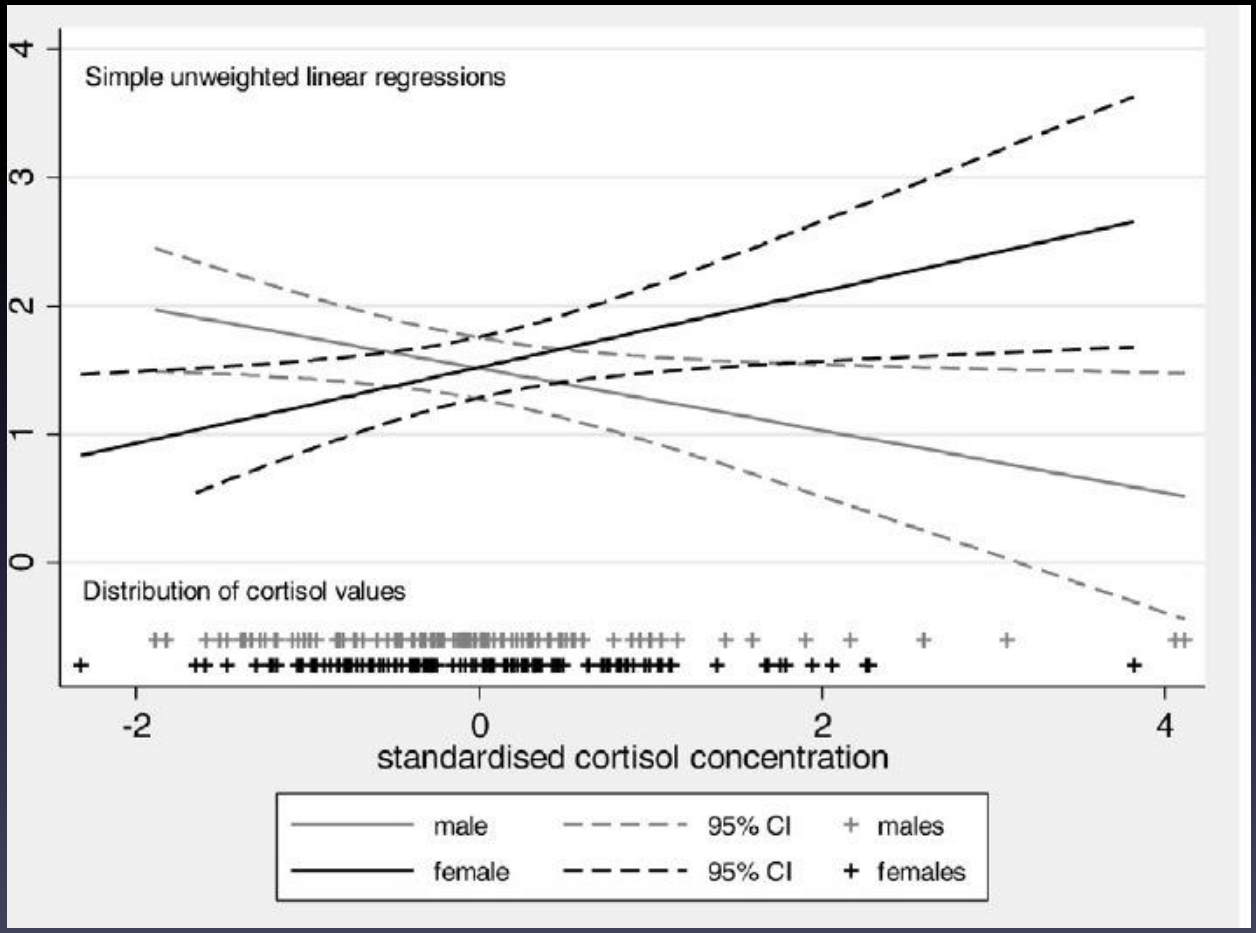
WCHADS Results



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The Oxford Pregnancy Study

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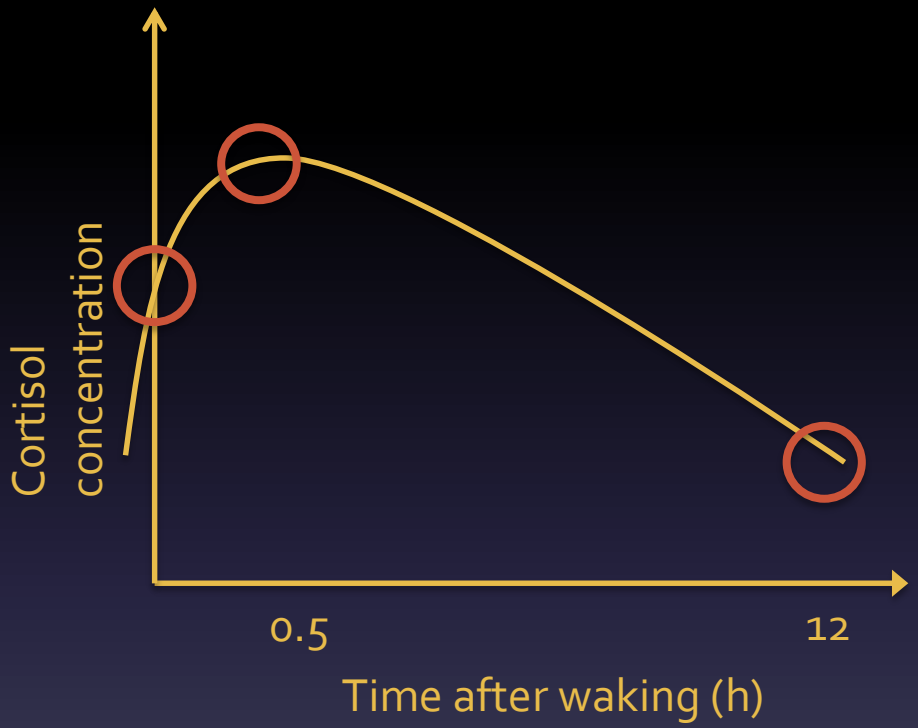
MRC Medical Research Council

- N=103 1st time pregnant women
- Prenatal assessment during either the second of third trimester
- Follow up postnatal assessment with infant at 2 months (N=88)

Braithwaite et al., 2017, Psychoneuroendocrinology

OPS Methods

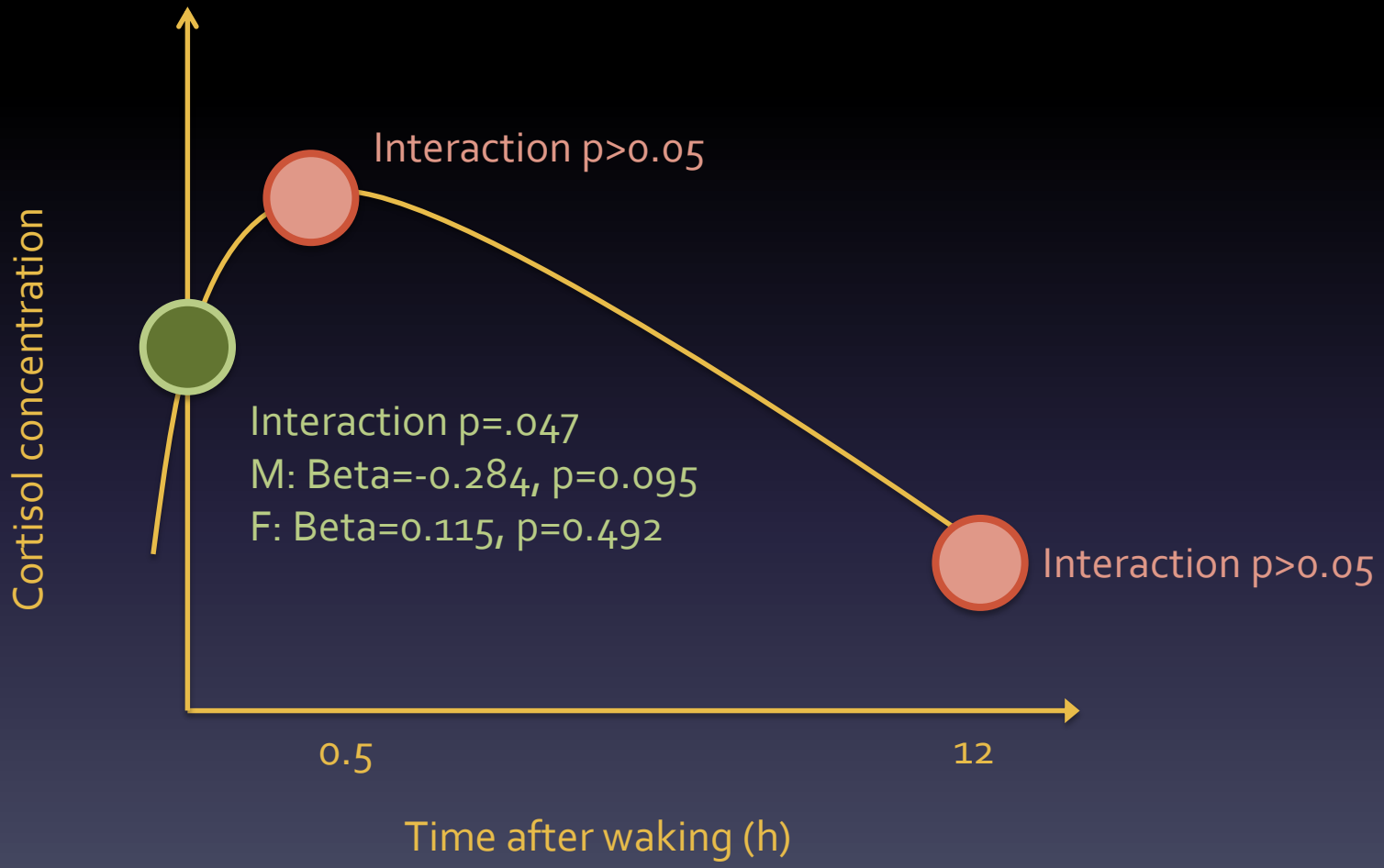


2nd or 3rd trimester
Salivary cortisol

2 months postnatal
Distress to limits
Infant Behavior Questionnaire

Braithwaite et al., 2017, Psychoneuroendocrinology

OPS Results

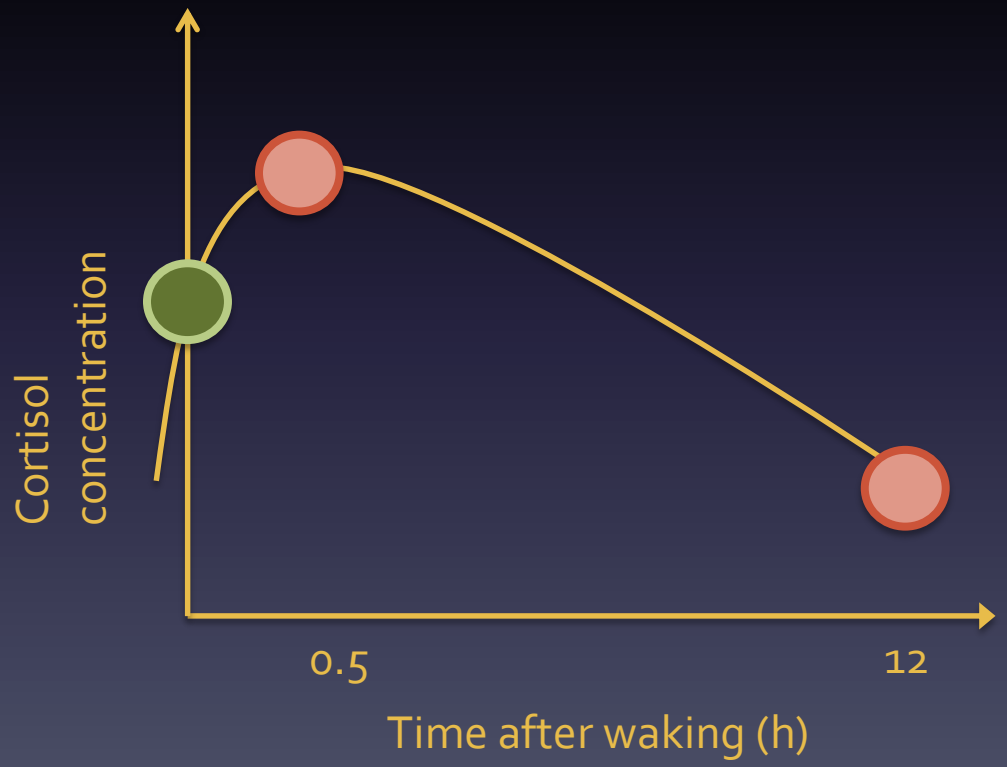


Braithwaite et al., 2017, Psychoneuroendocrinology

Summary of both studies:

- Opposite effects of prenatal cortisol in males and females on negative emotionality
- Sig. effect from waking cortisol, but not +30min and +12h

Why is waking cortisol a marker for infant behavior?



Why do we get opposite effects in males and females?

Why do we get opposite effects in males and females?

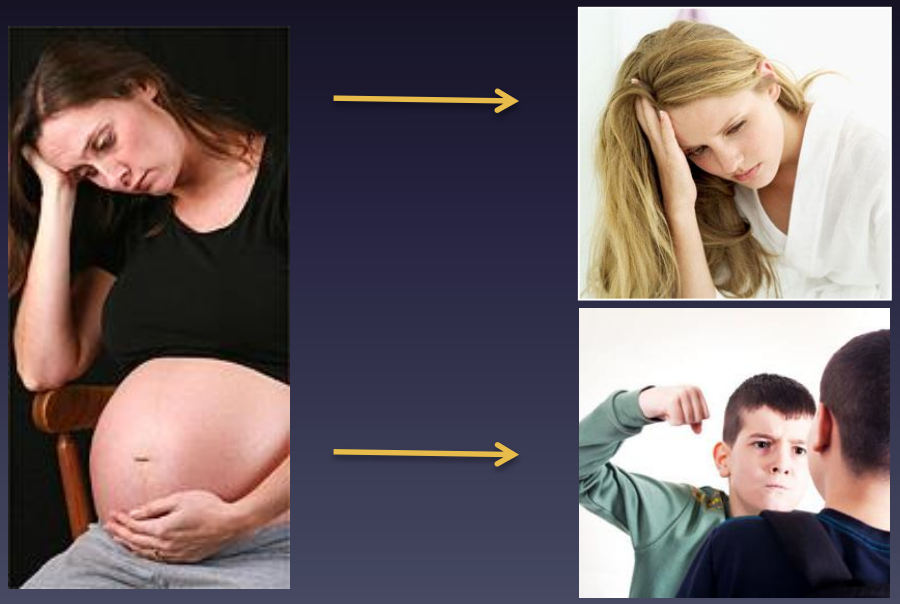
1. Differential Risk Exposure

Why do we get opposite effects in males and females?

2. Different risks for male and female psychopathology

Why do we get opposite effects in males and females?

3. Same risks but different mechanisms



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