



# Maternal Neglect:

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Risk factors, consequences  
and the neurobiology of  
mother-infant attachment.

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# Risk Factors and Outcomes of Child Abuse and Neglect



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# Child Abuse and Neglect

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- Every 10 days in England and Wales one child is killed at the hands of his or her parent
- 25% of children experience physical violence during childhood
- 6% of children experience frequent and severe emotional maltreatment
- 6% experience serious absence of care at home

Biological mothers are the most frequent perpetrators of maltreatment



# The Cost of Maltreatment

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- In 1996, the cost of child abuse was estimated to be **£1 billion per year** in the UK.
    - Most of this is associated with consequences of abuse, rather than prevention
    - Individuals and families bear most of the consequences, sometimes for the rest of their lives, at an incalculable cost
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# Consequences of Child Neglect

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- Impaired cognitive development
- Language delays
- Increased risk of childhood aggression
- Internalizing and externalizing behavior problems

In 8 out of 10 cases, the biological mother is identified as the perpetrator of neglect

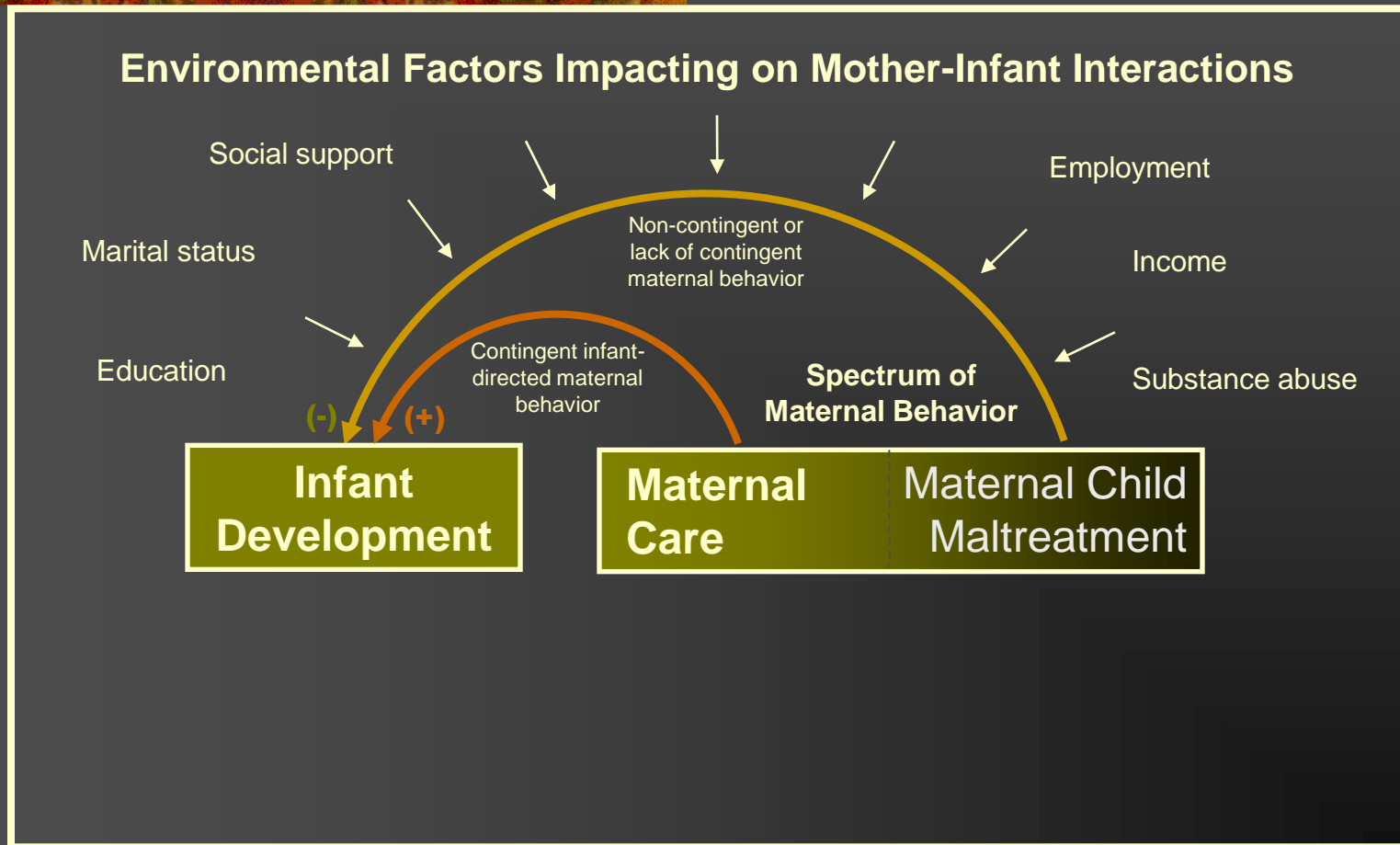
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# Questions:

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- What impact does child maltreatment have on infant development?
  - What early maternal, child or societal factors may help to prevent maltreatment?
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# Contingency Model of Maternal Care and Infant Development



# Study of Extremely Low Birth Weight (ELBW) Infants

- 352 ELBW infants (<1000g) followed over 4 years
- Cognitive outcomes
  - General Quotient (GQ) – age 1 & 2 years
  - General Cognitive Index (GCI) – age 4 years
- Outcomes linked to reports of child abuse and neglect

# Covariates examined

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## ■ Perinatal risk factors

- Low birth weight (<750g)
- Gestation <27 wks
- Male sex
- PVH
- Ventricular dilation
- Home oxygen requirement
- Necrotizing enterocolitis

## ■ Parental risk factors

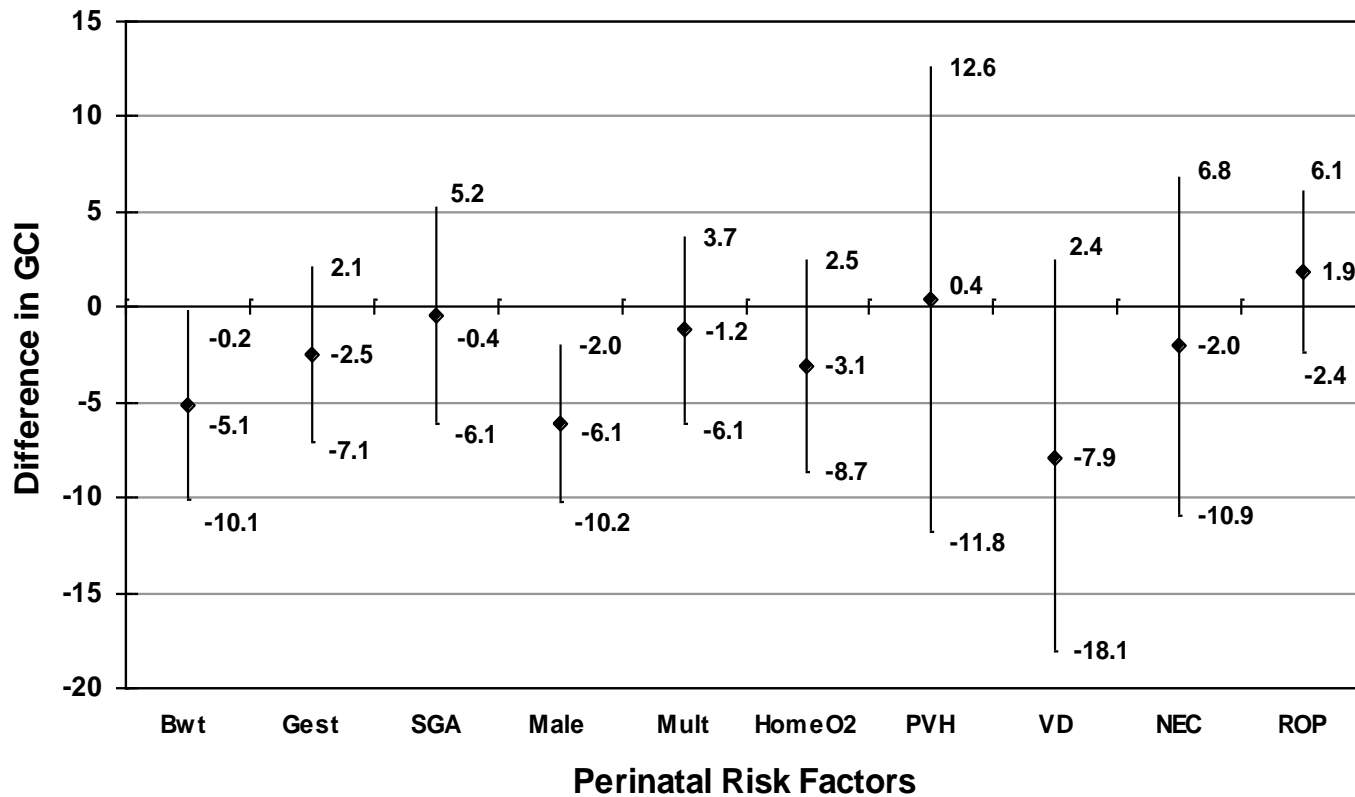
- Young maternal age
  - Non-Caucasian race
  - Unmarried or defacto relationship
  - Incomplete high school education
  - Public hospital status
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# Incidence of Maltreatment over 16 Year Follow-Up

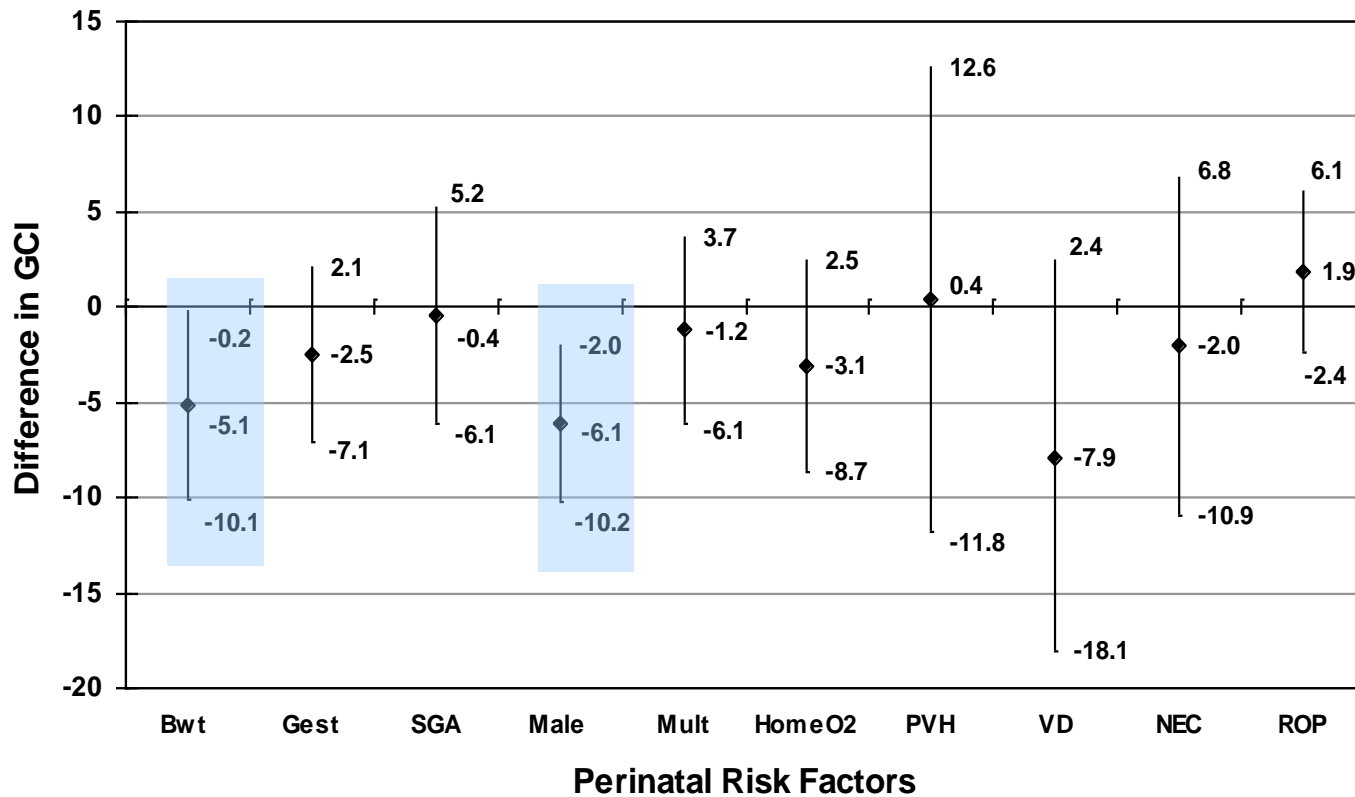
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- 15% of population were reported for child maltreatment
    - Over 50% of these were reported for maltreatment on multiple occasions
    - Around 50% were substantiated reports
  - The only perinatal risk factors associated with a decreased GCI were
    - Male gender (male 93 vs. female 99;  $p=0.01$ )
    - Ventricular dilatation (86 vs. 97;  $p=0.04$ )
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# Difference in General Cognitive Index at age 4 years



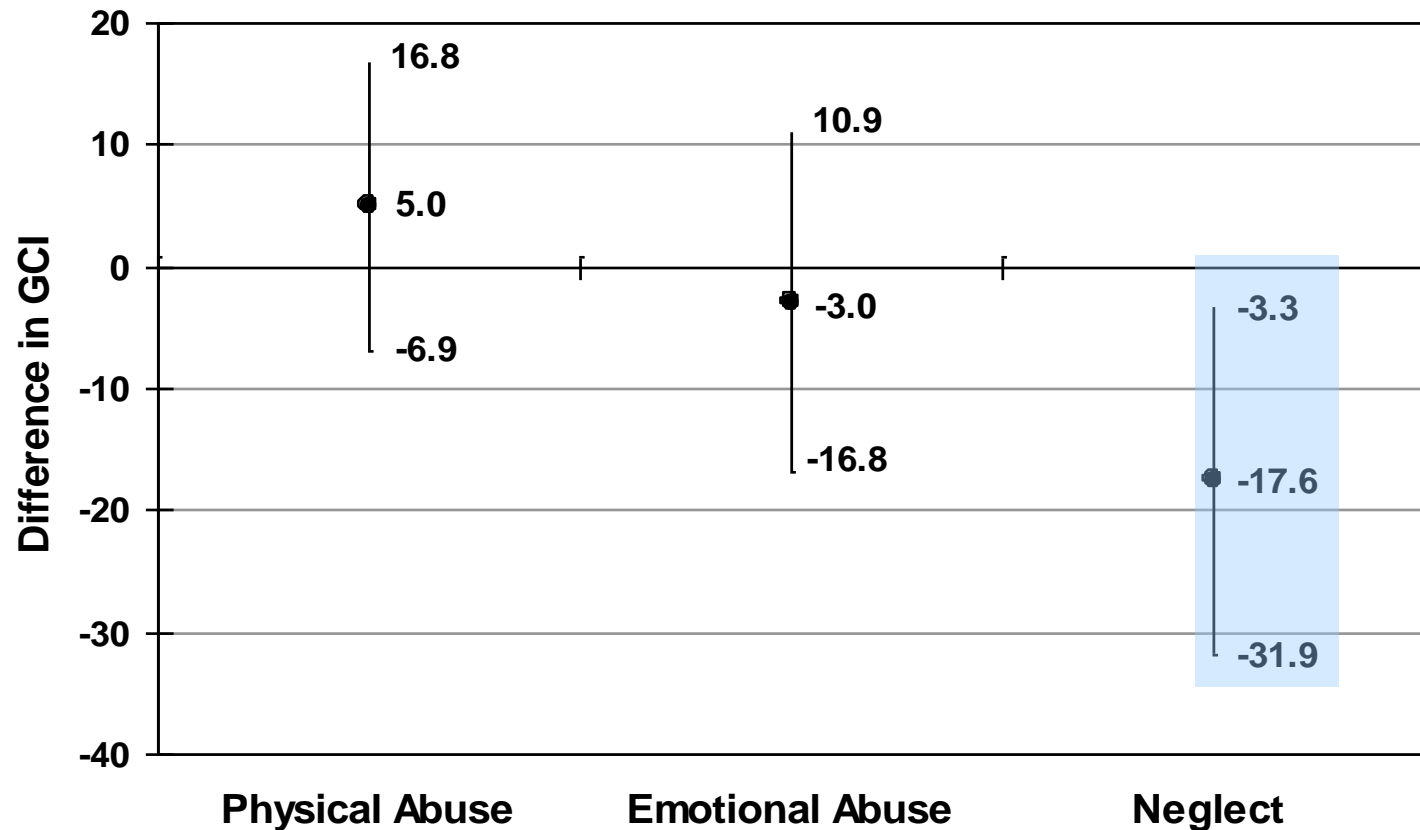
# Difference in General Cognitive Index at age 4 years



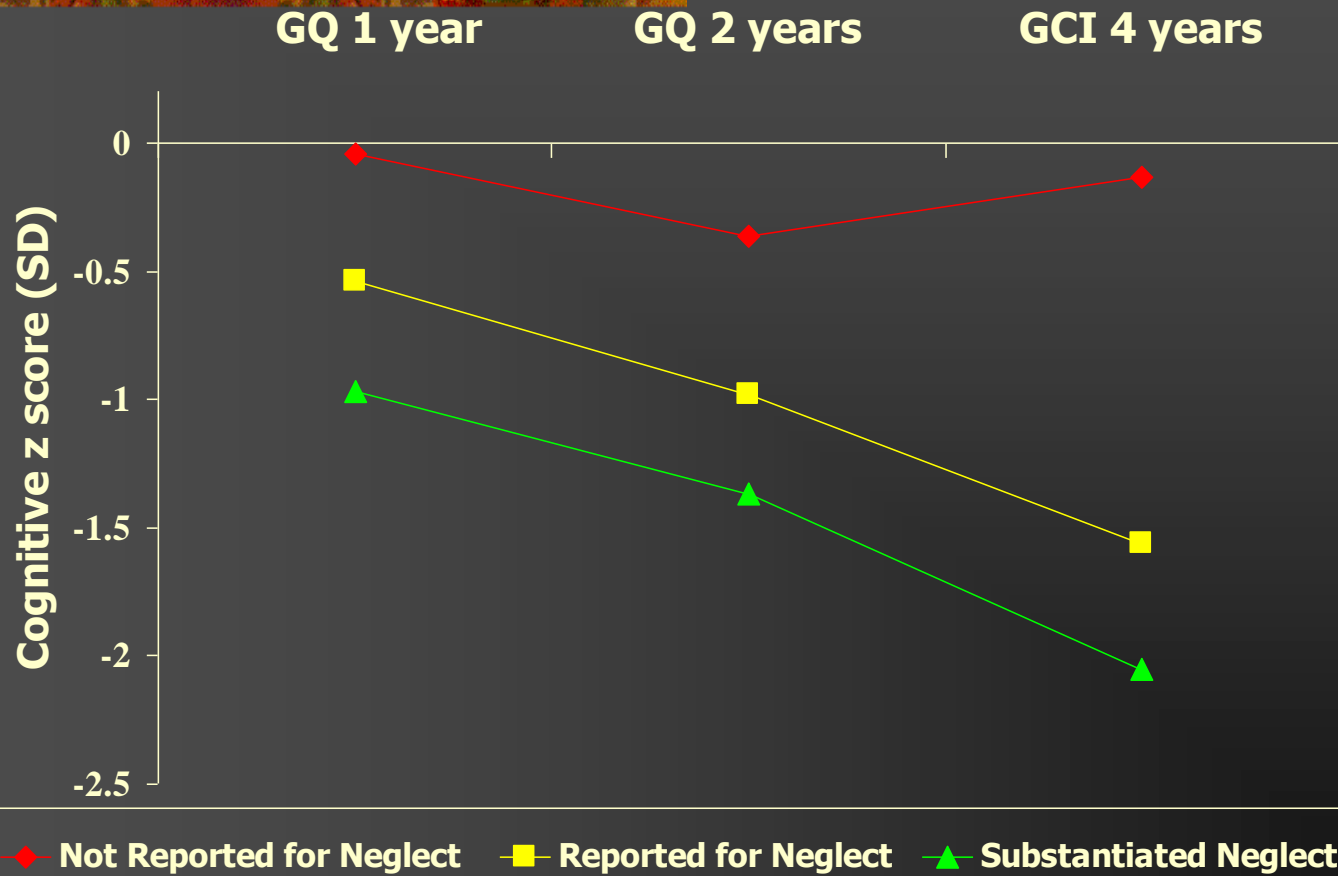
# Difference in General Cognitive Index at age 4 years



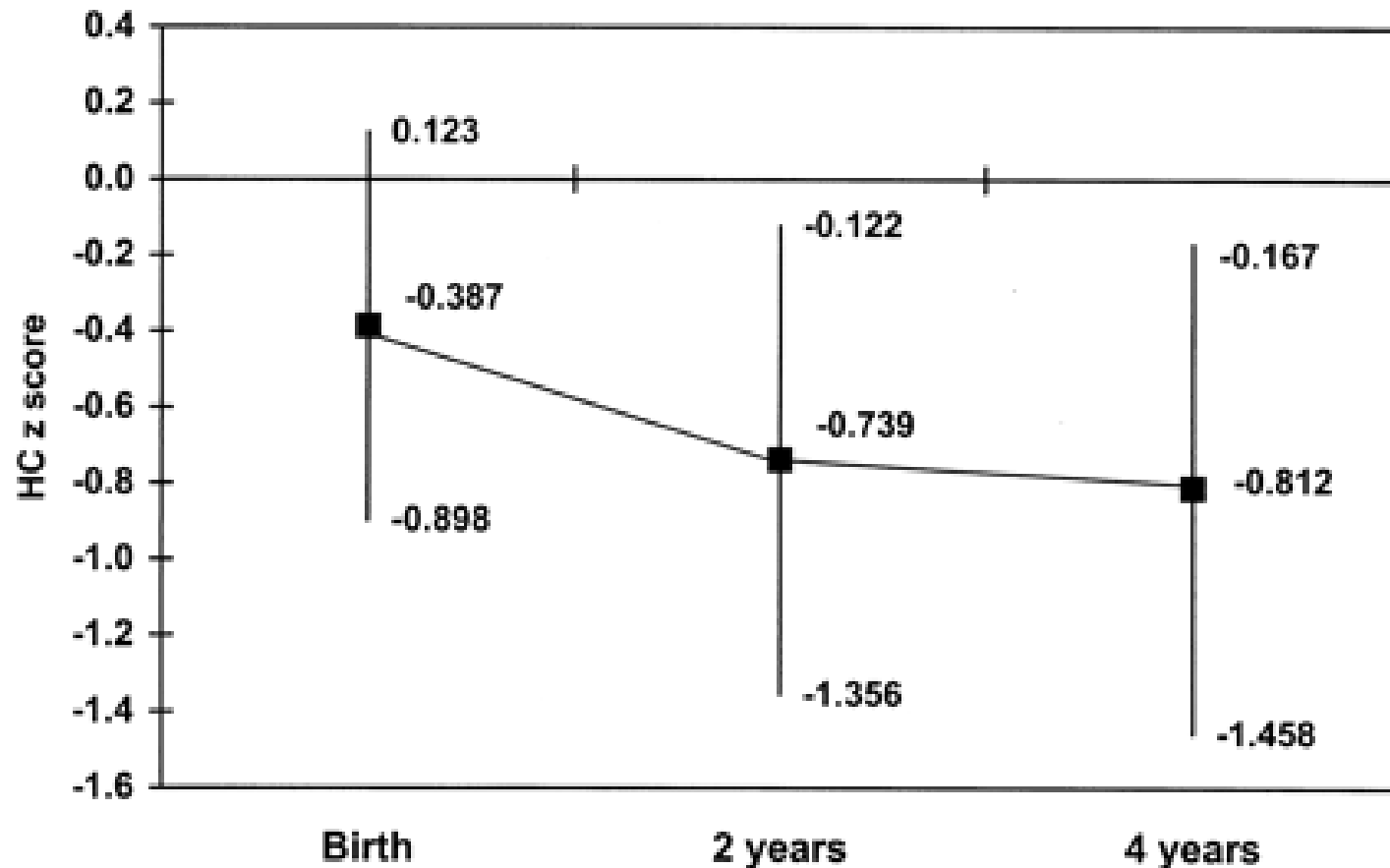
# Difference in General Cognitive Index at age 4 years



# Impact of Neglect on Cognitive Development



# Adjusted head circumference z scores in children with substantiated neglect



So... do these findings apply in  
a normative infant population?



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My research journey  
continues...

# Mater-University Study of Pregnancy (MUSP)

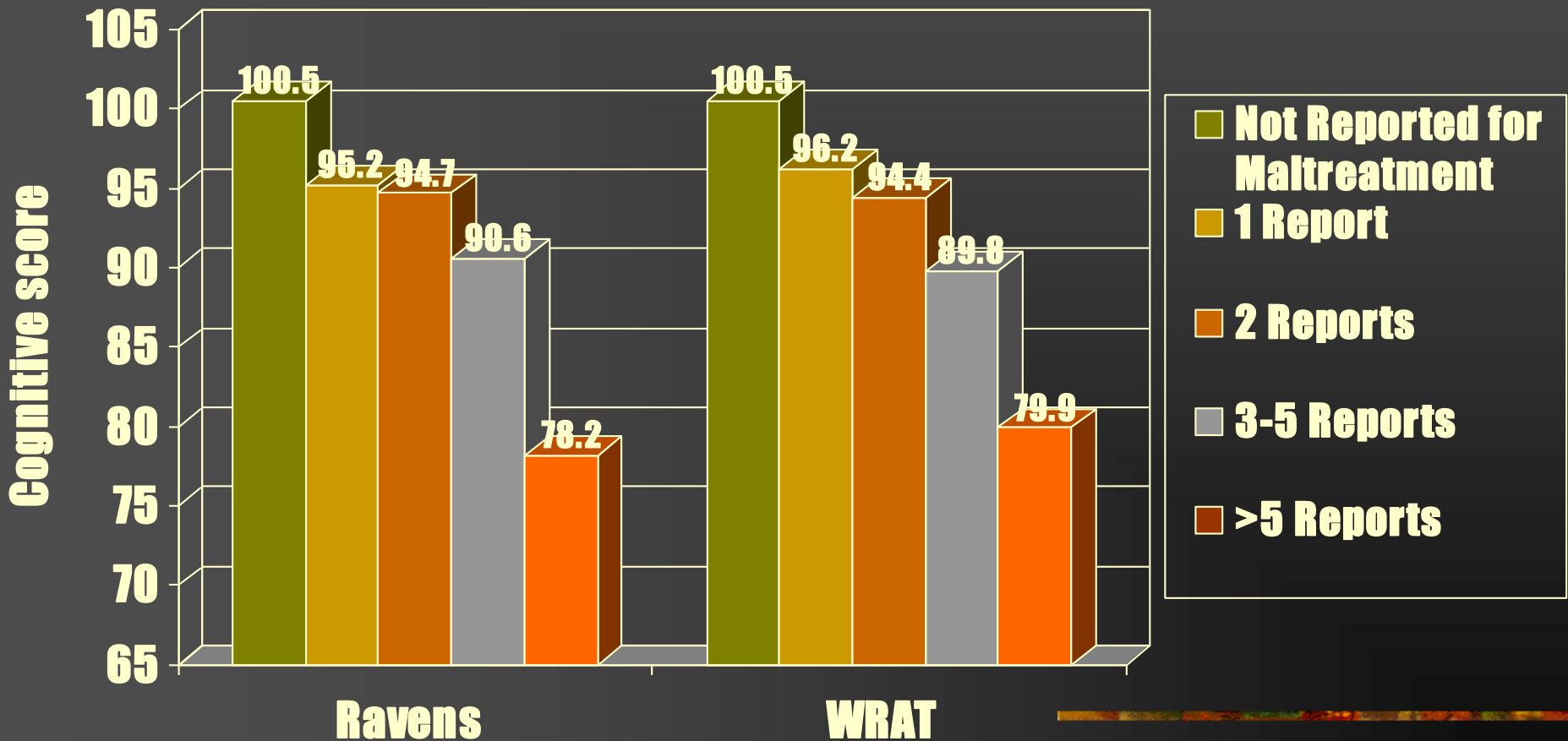
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- Prenatal cohort of public hospital patients enrolled at the Mater Mothers' Hospital, Brisbane, Australia between 1981 and 1984
  - 95% of birth cohort were term infants
  - Database anonymously linked to reports of child abuse and neglect, from Department of Child Safety
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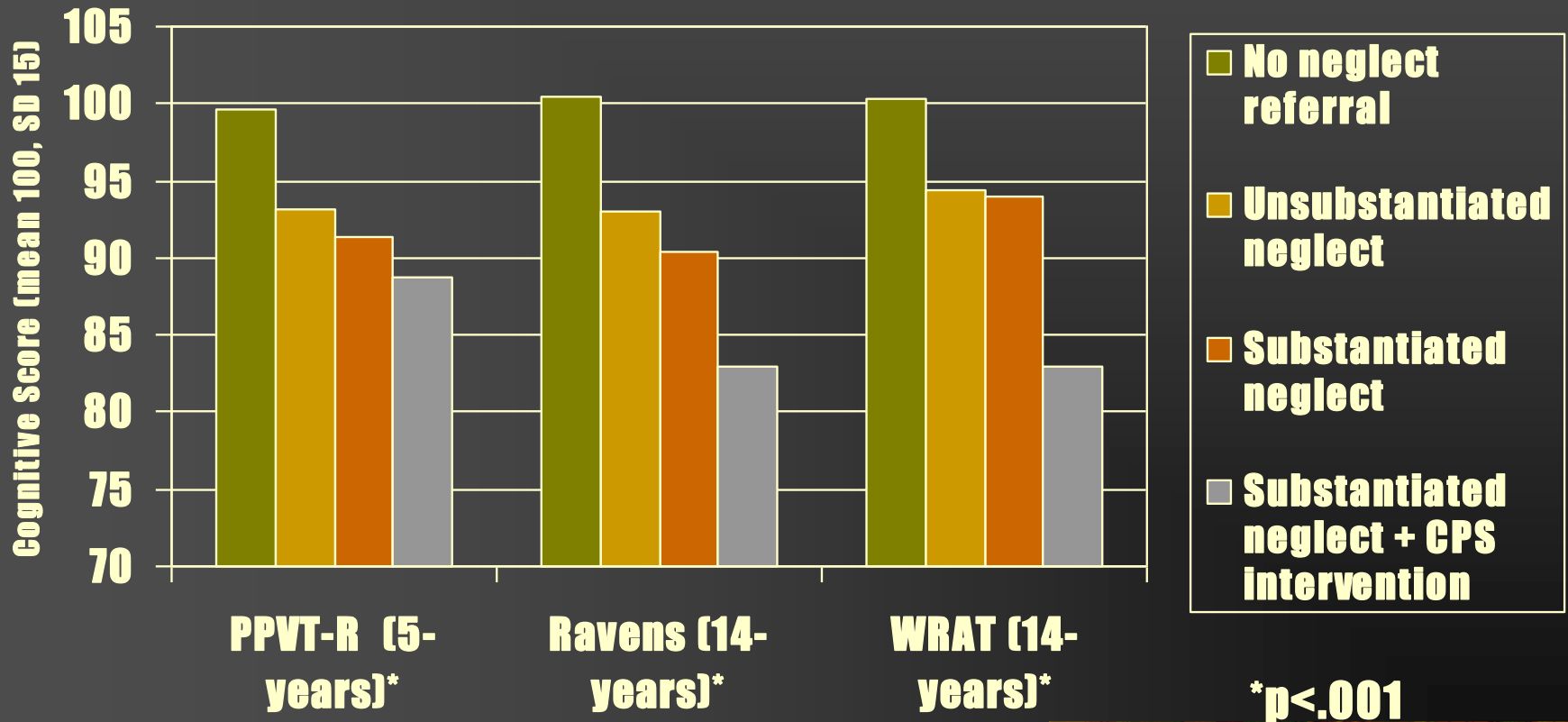
# Mater-University of Queensland Study of Pregnancy (MUSP)

	Maternal questionnaire		Child-based questionnaire		Hospital / physical assessment	
	No.	%	No.	%	No.	%
Total live birth cohort (excluding adoptions)	7695	100.0			7694	100.0
First antenatal clinic visit	7680	99.8				
Age 3-5 days	7387	96.0				
Age 6 months	6932	90.1				
Age 5 years	5401	70.2	5423	70.5	4154	54.0
Age 14 years	5347	69.5	5340	69.4	3926	51.0

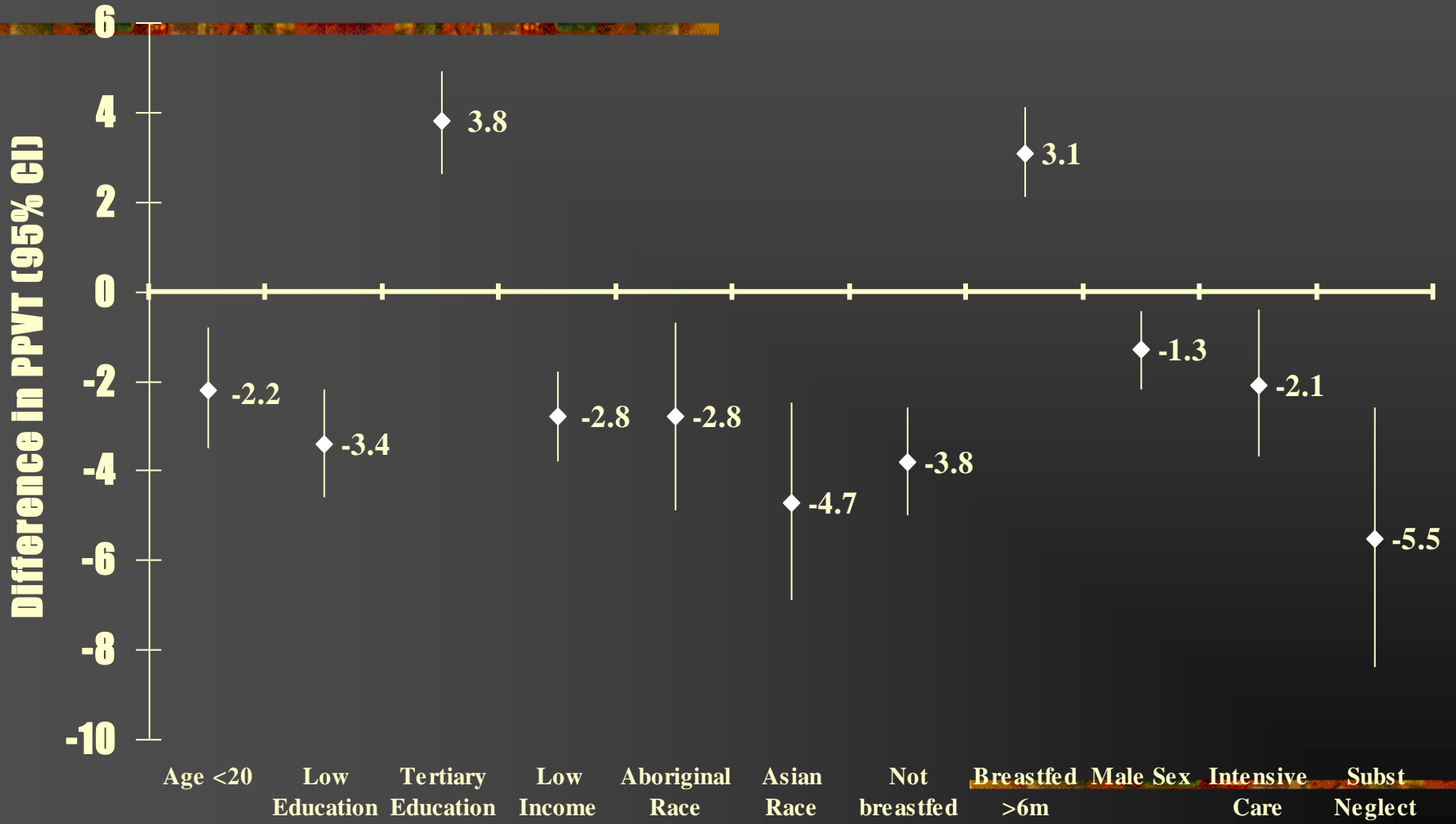
# Frequency of Maltreatment and Cognitive Outcomes at 14 Years



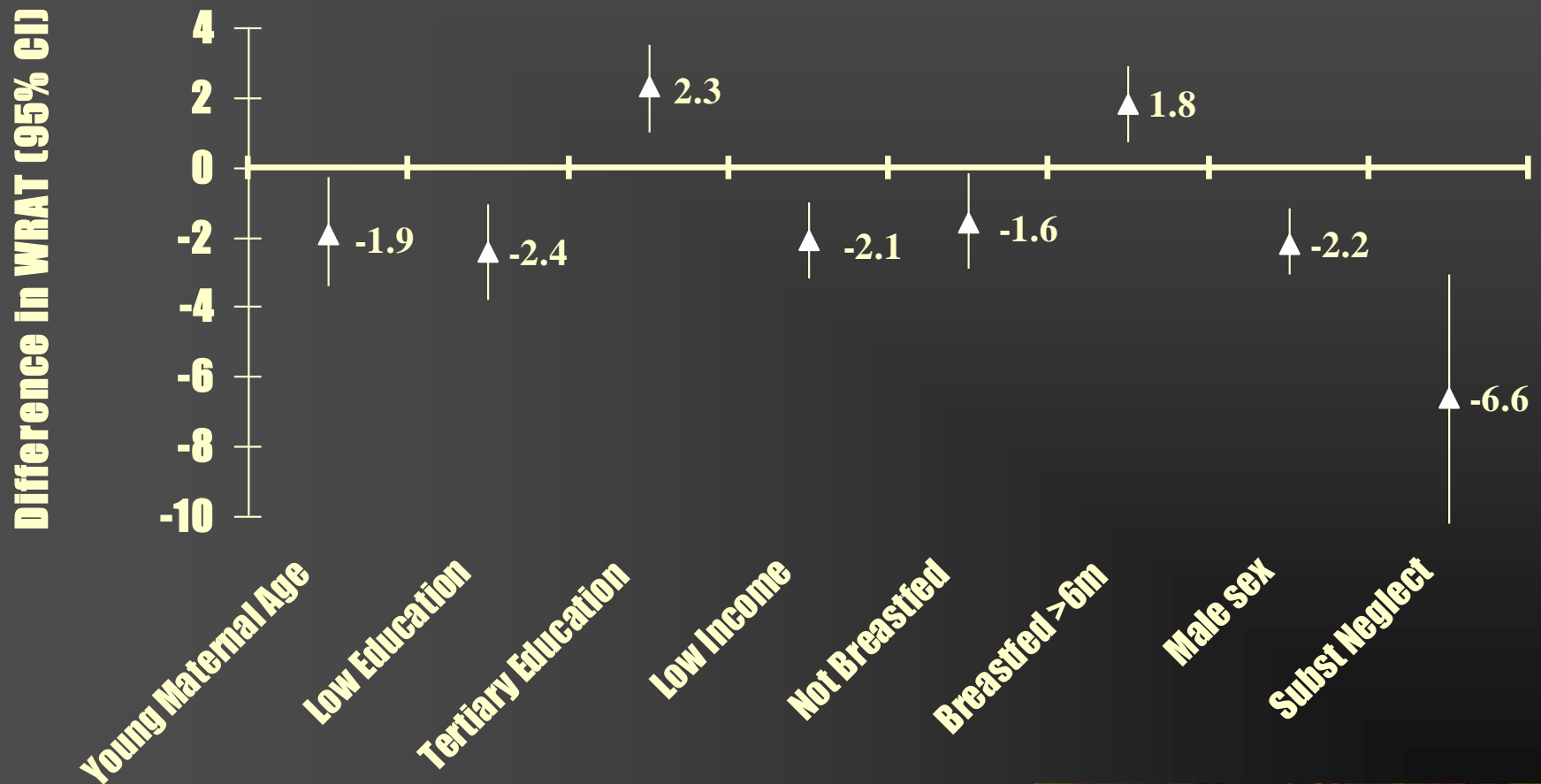
# Cognitive Scores in Children Referred for Neglect



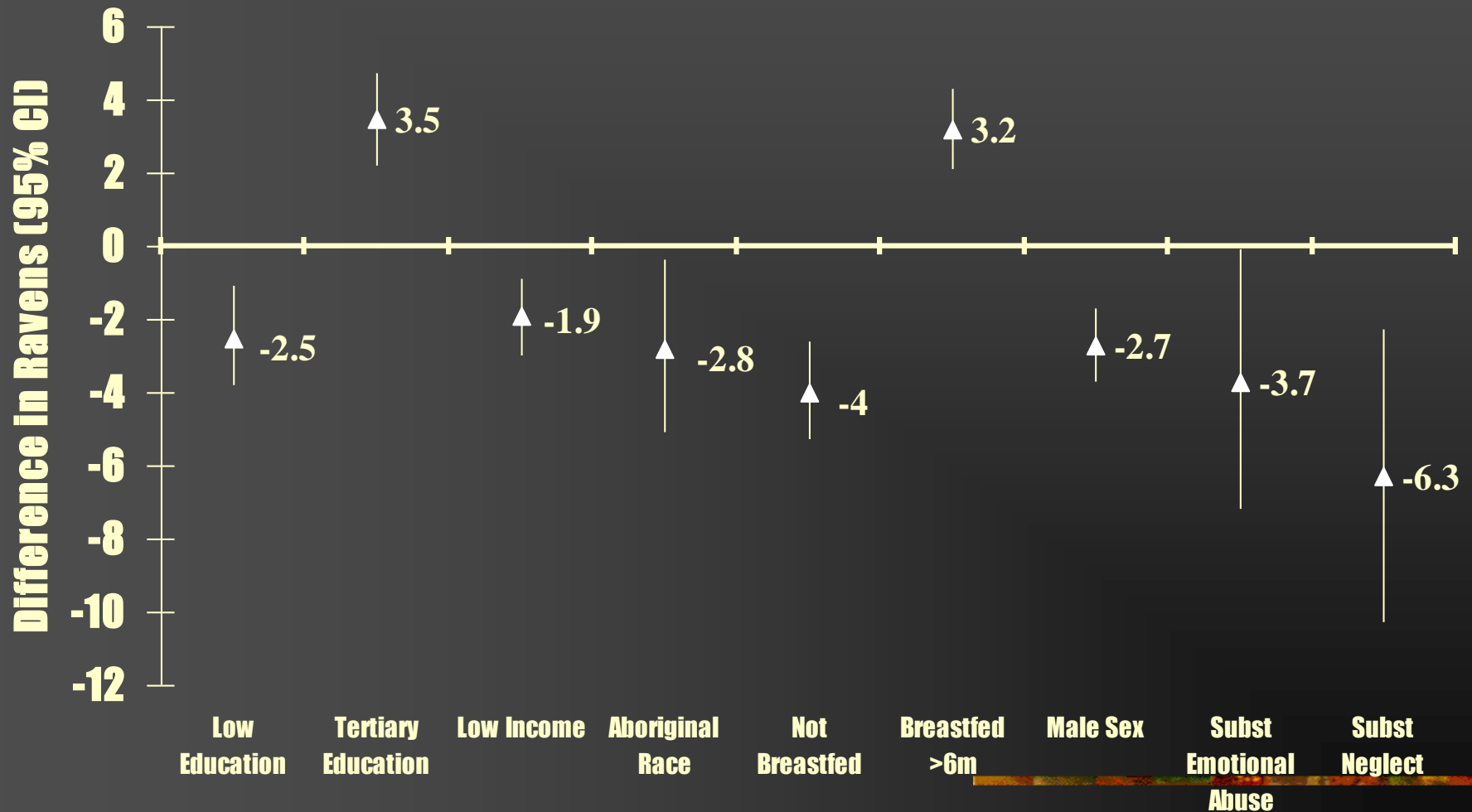
# Factors Significantly Associated With Adjusted 5-Year Peabody Score (PPVT-R)



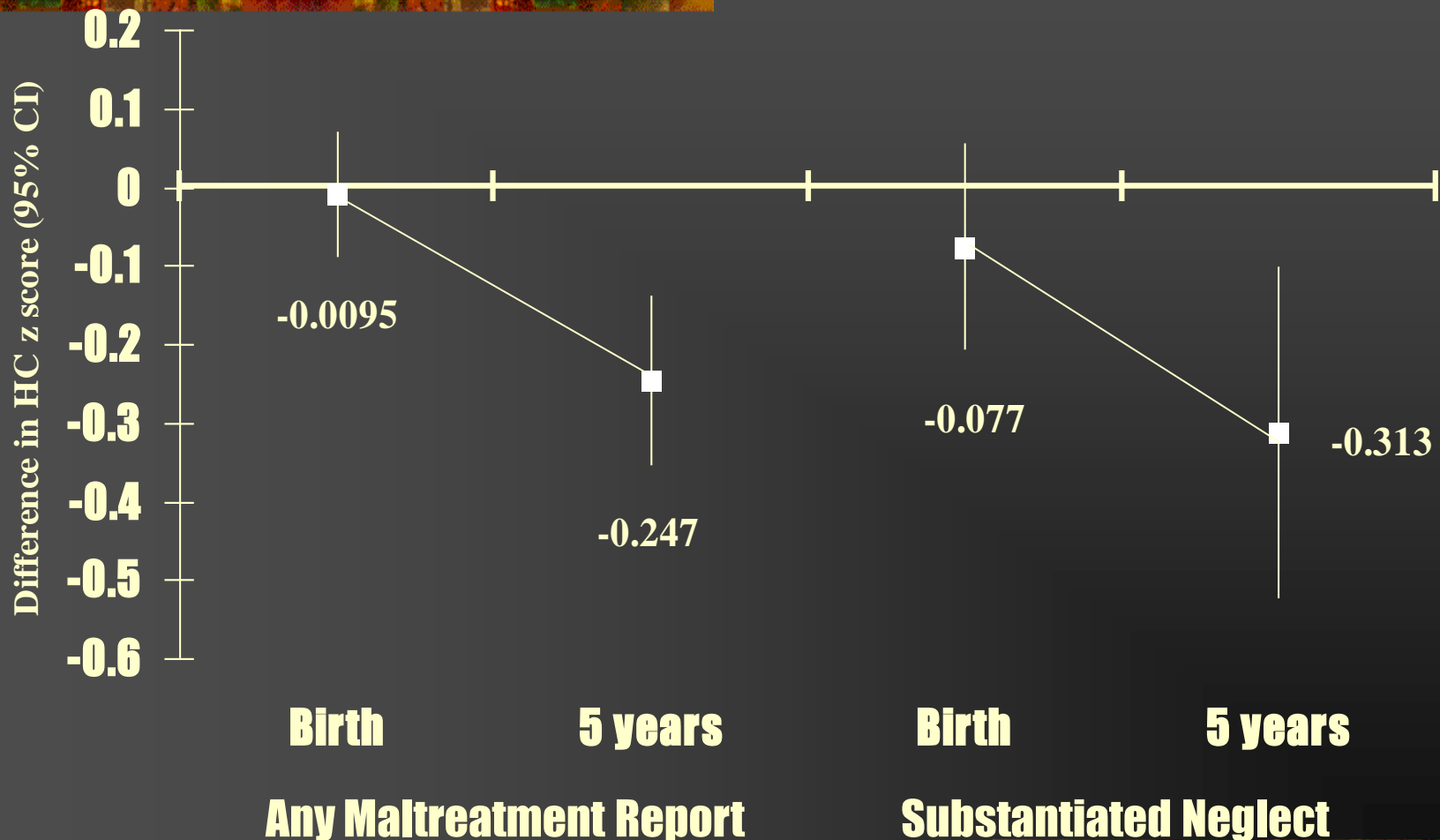
# Factors Significantly Associated With Adjusted 14-Year WRAT z Score



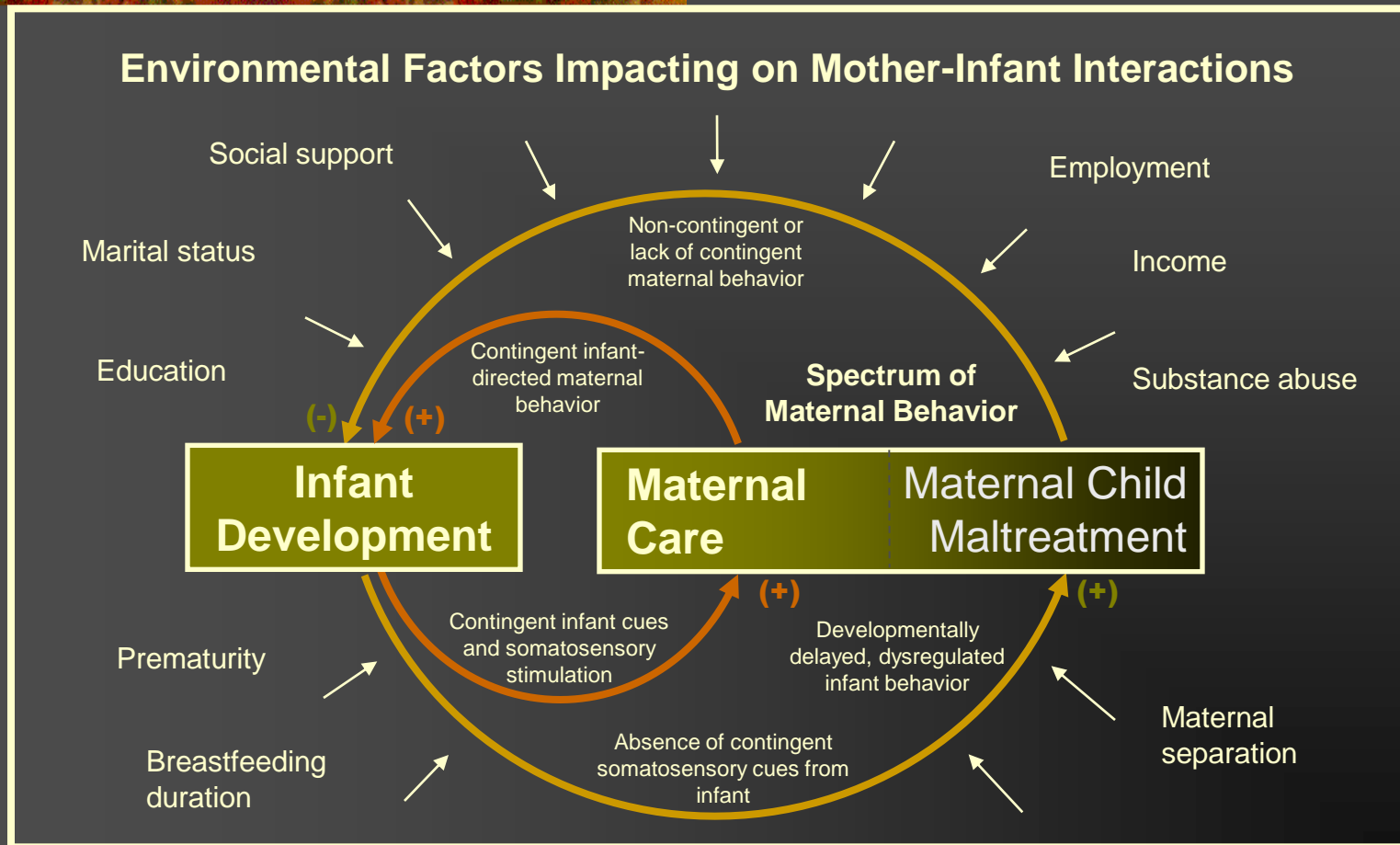
# Factors Significantly Associated With Adjusted 14-Year Ravens z Score



# Adjusted Head Circumference z Scores in Maltreated Children



# Contingency Model of Maternal Care and Infant Development



# Predictors of Maltreatment in ELBW population

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- Perinatal risk factors and physical disability at 2 years did NOT predict maltreatment referral
  - Only parental risk factors were independent predictors
    - Unmarried cohabitation – adj OR 3.3 (95%CI 1.4-7.7)
    - Public hospital status – adj OR 3.5 (95%CI 1.1-10.6)
-

# Predicting Maternal Child Maltreatment

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- In human and/or animal studies, breastfeeding is associated with:
  - Blunted maternal stress reactivity (e.g. BP and cortisol levels)
  - Reduced maternal anxiety
  - More attuned maternal caregiving
  - Possible long-term effects on central oxytocin receptor expression

Does breastfeeding have a protective influence on subsequent child abuse and neglect?

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# Mater-University of Queensland Study of Pregnancy (MUSP)

	<b>No.</b>	<b>% of prenatal cohort</b>	<b>% of birth cohort</b>
Consecutive women seen at 1 <sup>st</sup> prenatal visit	8556	100	-
Women enrolled in study	8458	98.9	-
<b>Birth cohort</b> (3-5 days post-birth)	7223	84.4	100
Complete breastfeeding (at 6 months) and maltreatment data	6621	77.4	99.8
Complete breastfeeding, maltreatment and covariate data	5890	68.8	96.0

# Breastfeeding Data

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- Breastfeeding data collected from mother at 6 month assessment
  - Duration of breastfeeding assessed
    - Not at all
    - 2 weeks or less
    - 3-6 weeks
    - 7 weeks to 3 months
    - 4-6 months
    - > 6 months
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# Controlled Variables - Prenatal

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## ■ Parental factors

- Maternal age
- Marital status – single, married, unmarried cohabitation
- Race
- Cigarette / alcohol consumption
- Maternal anxiety
- Maternal depression
- Partner conflict
- Pregnancy ambivalence

- Maternal education
- Employment
- Income

## ■ Child factors

- Birth weight
  - Sex
  - Prematurity
  - Neonatal complications
-

# Outcome Measures

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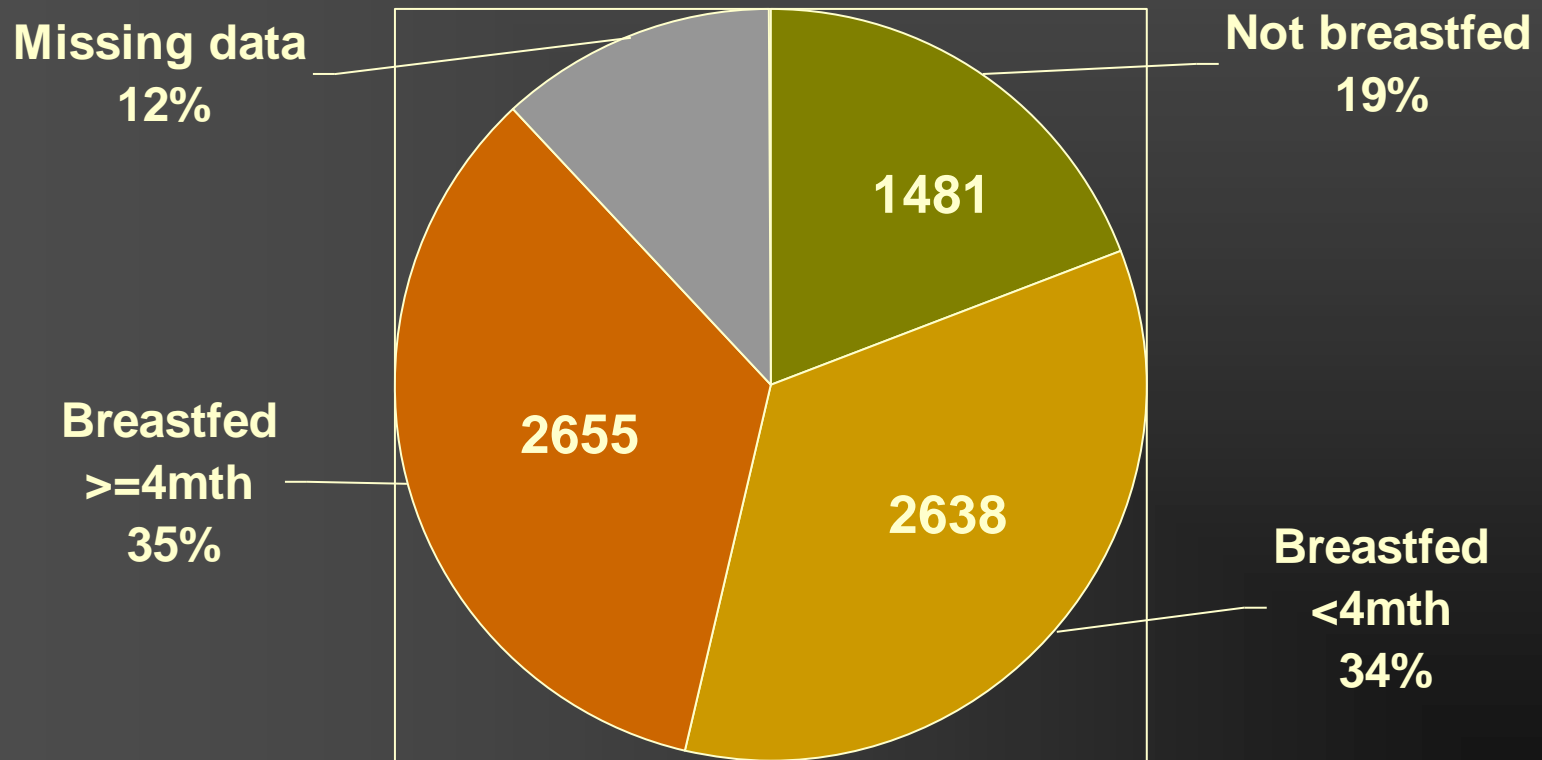
- Database linked to child maltreatment reports, from Department of Child Safety
  - Included reports from 1981 to Sept 2000
  - Confidential ID number preserved anonymity of families reported
  - Dept of Child Safety report of any type of child maltreatment (neglect or physical, emotional, sexual abuse)
  - Substantiation of report
  - Intervention received (child protection follow-up, court orders)
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# Incidence of Maltreatment

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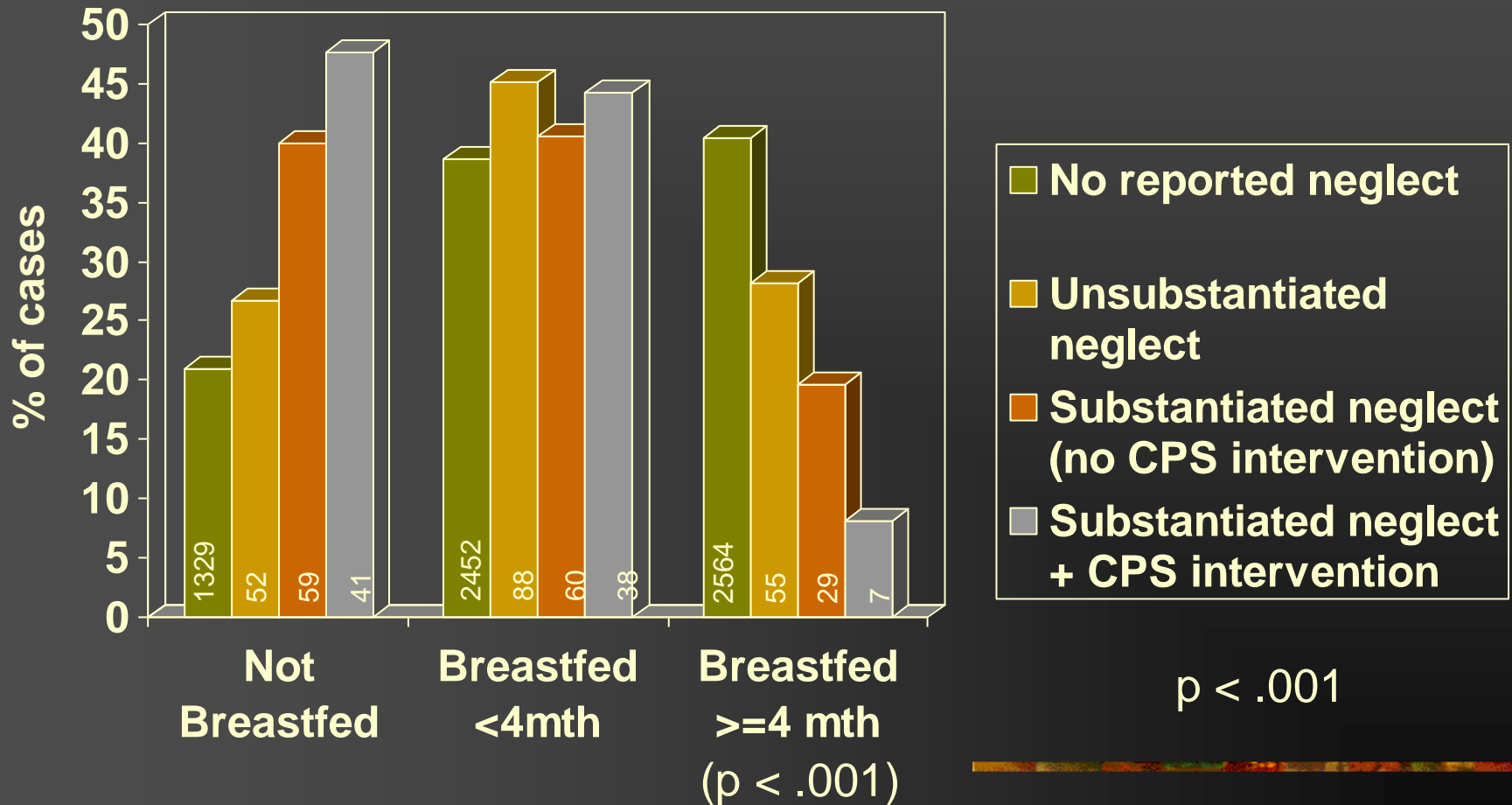
- 11% of birth cohort reported for suspected child abuse or neglect
  - 7% of birth cohort had at least one substantiated episode of maltreatment
  - Over 60% of children with substantiated maltreatment had at least one episode of maternally-perpetrated abuse or neglect
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# Breastfeeding Duration



n=6774

# Duration of Breastfeeding and Severity of Neglect



# Breastfeeding and Substantiated Neglect

Breastfeeding duration	Unadjusted OR (95%CI) Substantiated Maltreatment			Adjusted OR (95%CI) Substantiated Maltreatment		
	None	Non-maternal	Maternal	None	Non-maternal	Maternal
	<b>Any maltreatment</b>					
4 or more months	1.0	1.0	1.0	1.0	1.0	1.0
Less than 4 months	1.0	<b>1.8 (1.2-2.8)</b>	<b>3.0 (2.1-4.4)</b>	1.0	1.4 (0.9-2.2)	<b>2.2 (1.5-3.2)</b>
Not at all	1.0	<b>1.7 (1.0-2.8)</b>	<b>4.5 (3.0-6.6)</b>	1.0	1.1 (0.6-1.9)	<b>2.6 (1.7-3.9)</b>
	<b>Neglect</b>					
4 or more months	1.0	1.0	1.0	1.0	1.0	1.0
Less than 4 months	1.0	0.9 (0.3-2.6)	<b>3.4 (2.1-5.6)</b>	1.0	0.8 (0.3-2.4)	<b>2.5 (1.5-4.0)</b>
Not at all	1.0	2.3 (0.9-6.0)	<b>6.5(4.0-10.5)</b>	1.0	1.9 (0.7-5.3)	<b>3.8 (2.3-6.2)</b>

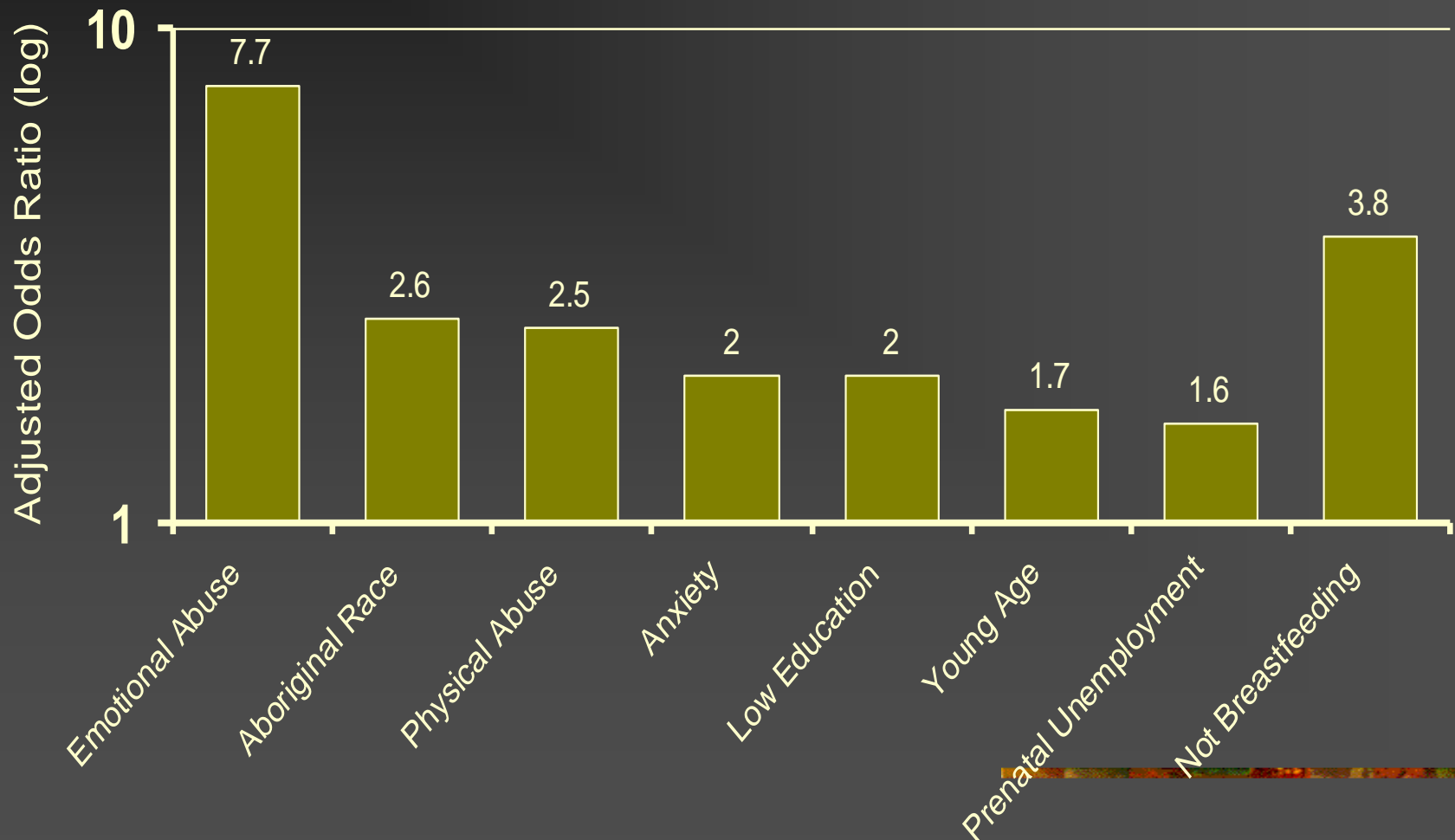
# Breastfeeding and Substantiated Emotional and Physical Abuse

	Unadjusted OR (95%CI) Substantiated Maltreatment			Adjusted OR (95%CI) Substantiated Maltreatment		
	None	Non-maternal	Maternal	None	Non-maternal	Maternal
	<b>Emotional Abuse</b>					
4 or more mths	1.0	1.0	1.0	1.0	1.0	1.0
Less than 4 mths	1.0	1.3 (0.7-2.5)	<b>2.7 (1.6-4.3)</b>	1.0	1.1 (0.5-2.0)	<b>1.8 (1.1-2.9)</b>
Not at all	1.0	1.5 (0.7-3.2)	<b>4.3 (2.6-7.0)</b>	1.0	1.0 (0.5-2.2)	<b>2.4 (1.4-4.0)</b>
	<b>Physical Abuse</b>					
4 or more mths	1.0	1.0	1.0	1.0	1.0	1.0
Less than 4 mths	1.0	<b>2.1 (1.2-3.8)</b>	<b>2.7 (1.7-4.4)</b>	1.0	1.6 (0.9-2.9)	<b>2.0 (1.2-3.3)</b>
Not at all	1.0	<b>2.3 (1.2-4.4)</b>	<b>3.7 (2.2-6.2)</b>	1.0	1.4 (0.7-2.7)	<b>2.3 (1.3-3.9)</b>

# Adjusting for Maltreatment Subtypes

Breastfeeding Duration	Adjusted OR (95%CI) for Substantiated Maltreatment		
	None	Non-maternal	Maternal
	<b>Neglect</b>		
4 or more months	1.0	1.0	1.0
Less than 4 months	1.0	0.7 (0.3-2.1)	<b>2.3 (1.3-4.2)</b>
Not at all	1.0	1.6 (0.6-4.6)	<b>3.8 (2.1-7.0)</b>
	<b>Emotional Abuse</b>		
4 or more months	1.0	1.0	1.0
Less than 4 months	1.0	0.8 (0.4-1.7)	1.1 (0.5-2.0)
Not at all	1.0	0.8 (0.3-1.7)	1.1 (0.5-2.5)
	<b>Physical Abuse</b>		
4 or more months	1.0	1.0	1.0
Less than 4 months	1.0	1.5 (0.8-2.8)	1.7 (0.9-3.1)
Not at all	1.0	1.1 (0.5-2.2)	1.2 (0.6-2.4)

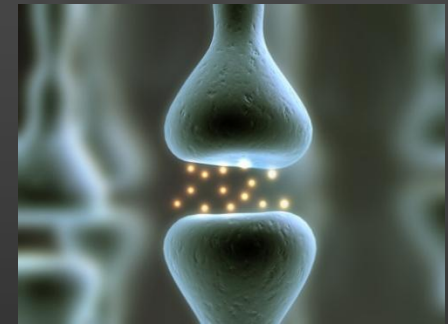
# Maternal Risk Factors for Substantiated Neglect



# Possible Mechanisms Underlying Breastfeeding / Neglect Connection

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- Oxytocin is a
- Areas of known significance
  - Oxytocin “affiliation” pathways
    - Pituitary gland
    - Hypothalamus (MPOA, PVN)
  - Dopamine “reward” pathways
    - Ventral striatum
    - Medial prefrontal cortex
- The development of these systems appears to be strongly influenced by early maternal care



# Oxytocin and maternal caregiving

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- Oxytocin is a peripheral hormone important in childbirth and lactation
  - Breastfeeding/suckling stimulates its production
  - It also has important central effects in the brain to help prepare for long-term child rearing
  - “Calm and connection” effect
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# Oxytocin and maternal caregiving

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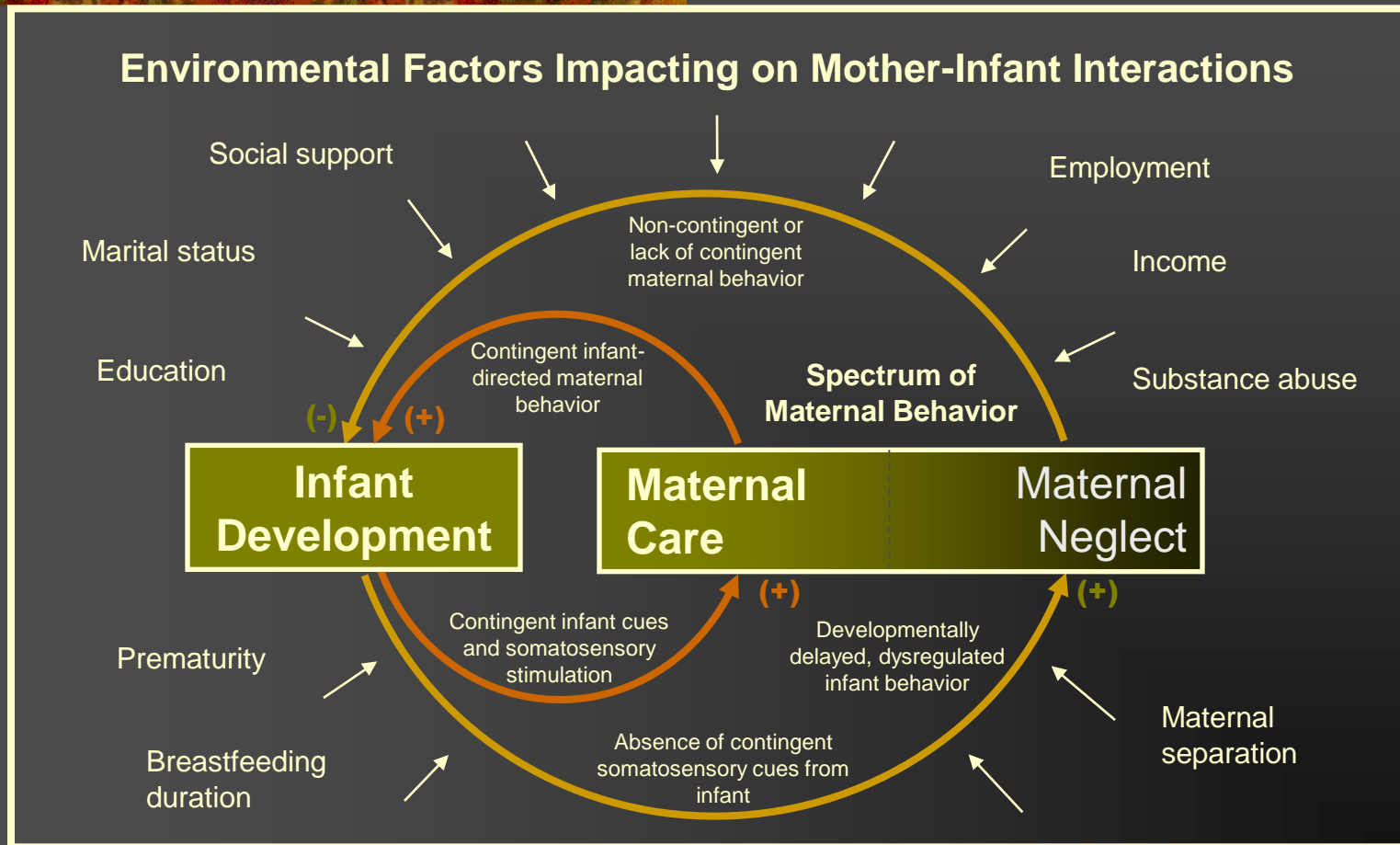
- In animal models of maternal care, oxytocin is critical for the initiation of maternal care
  - In ewes, oxytocin results in selective bonding with the lamb
  - Oxytocin neurons may also connect with the brain's dopamine "reward" system, resulting in changes in "long-term conditioned preferences"
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# Oxytocin and maternal caregiving

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- In human studies, intranasal oxytocin results in:
    - Increased trust
    - Reduced anxiety
    - Improved recognition of facial affect
    - Decreased fear responses
    - Increased eye gaze
  - Oxytocin may stimulate dopamine reward pathway in the brain
-

# Contingency Model of Maternal Care and Infant Development



# In Summary

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- Breastfeeding beyond 4 months may have a protective role in preventing child abuse and neglect
  - Early intervention addressing these factors may reduce the risk of maltreatment both within individual mother-infant dyads and subsequent generations.
  - Reducing the incidence of neglect, may have an important effect on cognitive development
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# Acknowledgements

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- Dr Peter Gray, Dr David Wood and the Growth and Development Research Unit, Mater Hospitals
  - Dr Michael O'Callaghan, Prof Jake Najman, Mamun Abdullah and the Mater-University Study of Pregnancy
  - Department of Child Safety, Queensland, Australia
  - Child Protection Information Systems, Brisbane, Australia
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