Association between postnatal depression and child outcome, and developmental mechanisms

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Postnatal Depression (PND)

- Nature: same as depression at other times
  - Persistent low mood, anhedonia, disturbances in sleep, appetite, concentration; retardation, agitation, guilt, hopelessness, suicidal thoughts or impulses
- Prevalence: 13% HICs; 20% LMICs
- Course: >60 % remit within 6 months; but more severe episodes persist; recurrence is common
- Risk factors: general adversity

  low SES, poor social/personal support

Recent evidence on Association of Persistent and Severe Postnatal Depression With Child Outcomes

Netsi et al, JAMA Psychiatry 2018

Participants in the Avon Longitudinal Study of Parents and Children in the UK (N= 8000 - 9000)

3 thresholds of PND defined on the EPDS:

Moderate	13-14
Marked	15-16
Severe	>16

Also defined as **persistent** if above threshold at both 2 ***and*** 8 months post-partum

Child Outcomes

Behavioral problems at 3.5 years of age

Rutter Scales

Mathematics grades at 16 years of age

GCSE state examinations

Depression at 18 years of age

Clinical Interview Schedule

Moderate Transient PND

(i.e., EPDS 13 or 14 at 8 weeks only)

Behaviour problems at 3-4 years:

OR = 2.22

Maths at 16 years (odds of worse than a C GCSE):

OR = 1.14

Depression at 18 years:

OR = 1.11

Severe/Persistent PND

Behaviour problems at 3-4 years:

Severe (EPDS >16 at either 8 weeks or 8 months) -
OR = 2.19

Severe and Persistent (EPDS >16 at 8 weeks *and* 8 months) - **OR = 4.39**

Severe/Persistent PND

Maths at 16 years (odds of worse than a C GCSE):

Severe (EPDS >16 at either 8 weeks or 8 months) - OR = 1.37

Severe and Persistent (EPDS >16 at 8 weeks *and* 8 months) **OR= 2.57**

Severe/Persistent PND

Depression at 18 years:

Severe (EPDS >16 at either 8 weeks or 8 months) OR = 1.66

Severe and Persistent (EPDS >16 at 8 weeks *and* 8 months) **OR= 7.14**

Summary: Raised risk (OR) of adverse child outcome in moderate-transient, and in severe persistent PND groups

	Moderate-transient	Severe-persistent
Behaviour 3-4 yrs	2.22	4.39
Maths 16yrs	1.14	2.57
Depression 18yrs	1.11	7.14

Conclusion from ALSPAC study regarding child outcome

Apart from behaviour problems, that **did** show adverse effects of moderate PND, child outcome is principally adversely affected in the context of PND that is **severe and persistent**.

The results of the ALSPAC study are consistent with much other research

The scale of the problem of persistent and severe postnatal depression

Epidemiological studies indicate that persistent depression (which also tends to be more severe) is likely to apply to around one third of those who become postnatally depressed (i.e. ≤ 5% women in HICs)

What are the mechanisms accounting for poorer child outcome ?

Impact on the child

Postnatal depression occurs at a time:-

-of maximum infant dependency

-when parents and infants are normally sensitive to each others' cues, and ready to be in relationship with each other

Postnatal Depression and Mother child interactions 3-6 mths

High risk samples

General insensitivity, with two broad patterns:

-PND mothers either remote and disengaged, or hostile and intrusive;

in turn,

-the infants avoid contact and become distressed

Low risk samples

PND mothers less sensitive, but disturbance more subtle:

-problems occur especially with boys, or in chronic depression

-infants not so obviously affected

Later mother-child relationship

Persisting interaction difficulties, despite maternal recovery

Martins & Gaffan, 2000	insecure attachment
Stein et al, 1991	19 mths
Cox et al, 1987	2-3 yrs
Murray et al, 1999	5 years
Apter-Levy et al, 2016	6yrs

But risks exacerbated by chronic depression

Effects of PND on later child development

Key questions concerning mechanisms

- Role of associated risk
- Role of early maternal interactions
  - are **different** kinds of interaction difficulty associated with **different** outcomes?

Specificity of effects

The psychology of Babies: how relationships support development from birth to two

L Murray 2014

Le prime relazioni del bambino' Cortina, Italia 2015

Different parenting practices are associated with different patterns of child development.

PND and Different Child Outcomes

- **Cognitive** development: IQ and school achievements
- **Behaviour** problems in childhood
- **Depressive disorder** in adolescence

The Cambridge longitudinal study

- Representative, low risk, community sample of 100 mother-infant pairs recruited at birth, screened and followed up through infancy, and at 5,8,13,16 and 22 years
- 58 mothers had PND
- 80- 93% retention throughout

Assessments

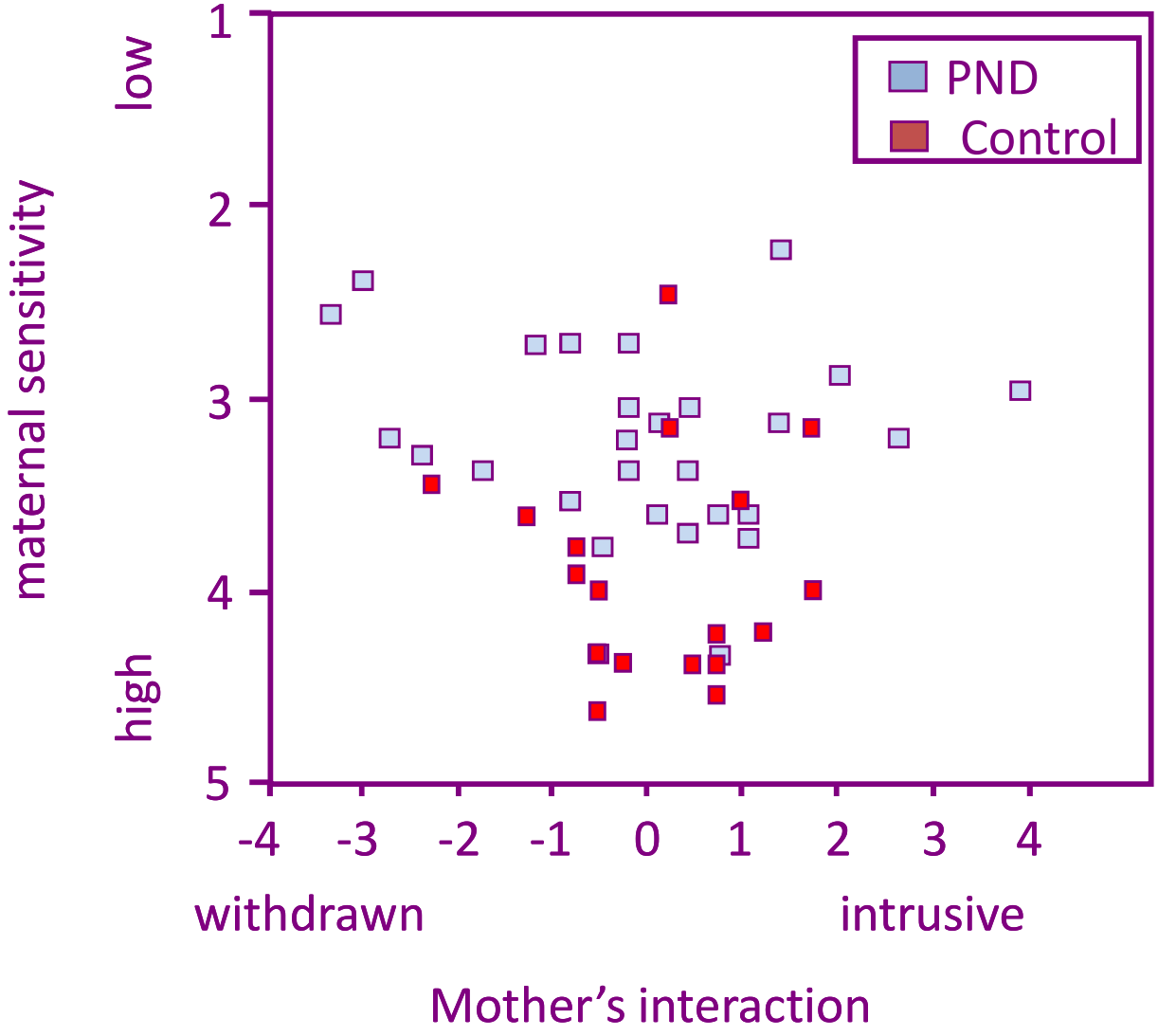
- **Infancy**: mother-infant interactions, attachment, cognitive performance, behaviour problems
- **5 years**: mother-child interactions, IQ, resilience, family representations, school adjustment
- **8 years**: as above
- **13 years**: cognitive vulnerability, HPA axis (baseline cortisol), child psychiatric disorder
- **16 years: academic functioning, psychiatric disorder**
- **22 years**: MRI, fMRI, HPA axis (cortisol reactivity)
- NB Maternal mental state and marital conflict monitored throughout

Retention: 93% to 16 years; 80% at 22 years

PND and poor child cognitive development: the role of mother-child interactions

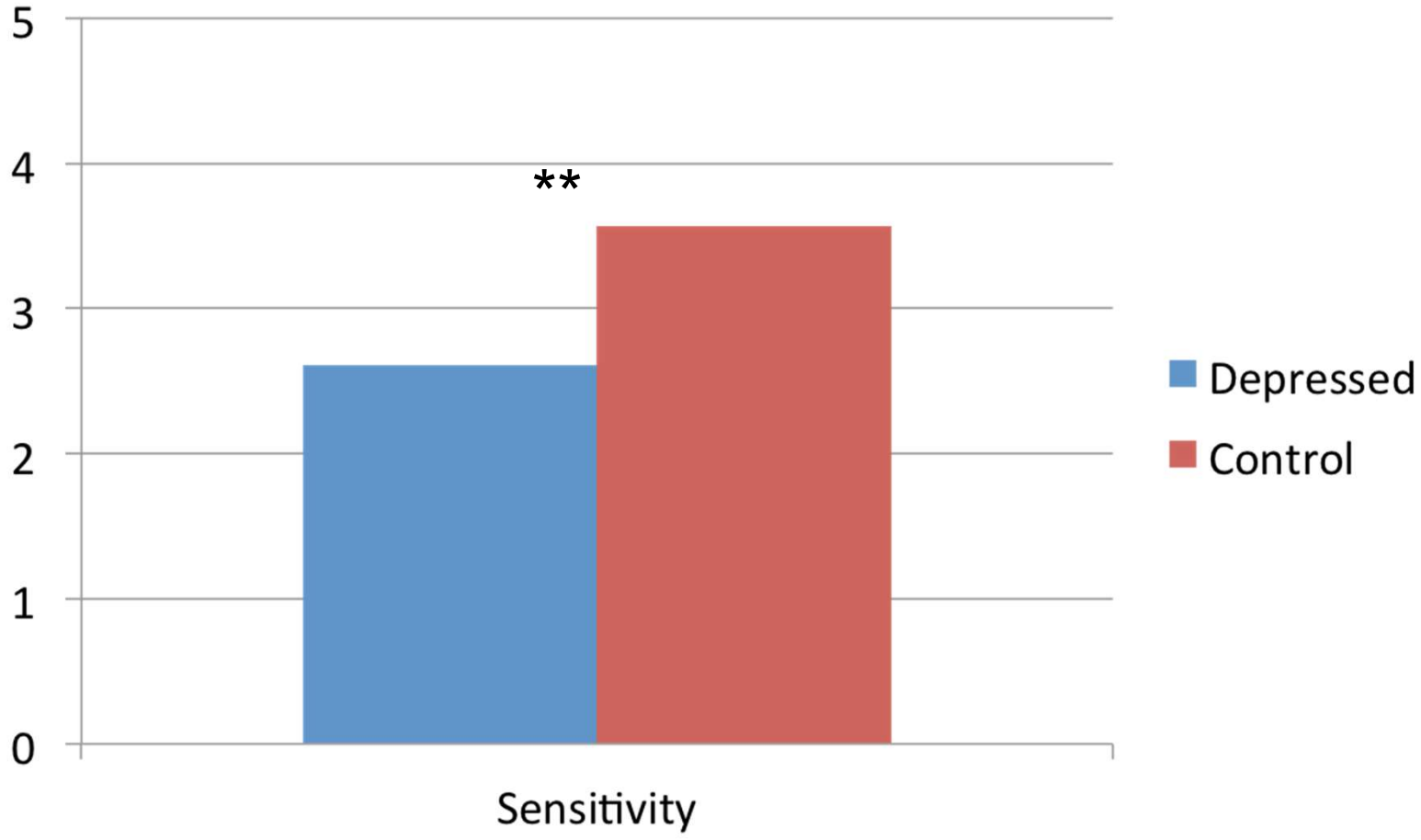
- General reduced responsiveness *(Murray et al., 1993; NICHD, 1999; Milgrom et al., 2004)*
- Lack of contingency & learning *(Tronick & Weinberg, 1997; Stanley et al., 2004)*
- Modulation of input to sustain attention *(Kaplan et al, 1999; Kaplan, et al., 2011)*
- Reduced, and less responsive book sharing *(Reissland et al., 2002; Paulson et al., 2006)*

Depressed and well mothers at 2 months: withdrawn and intrusive insensitivity profiles

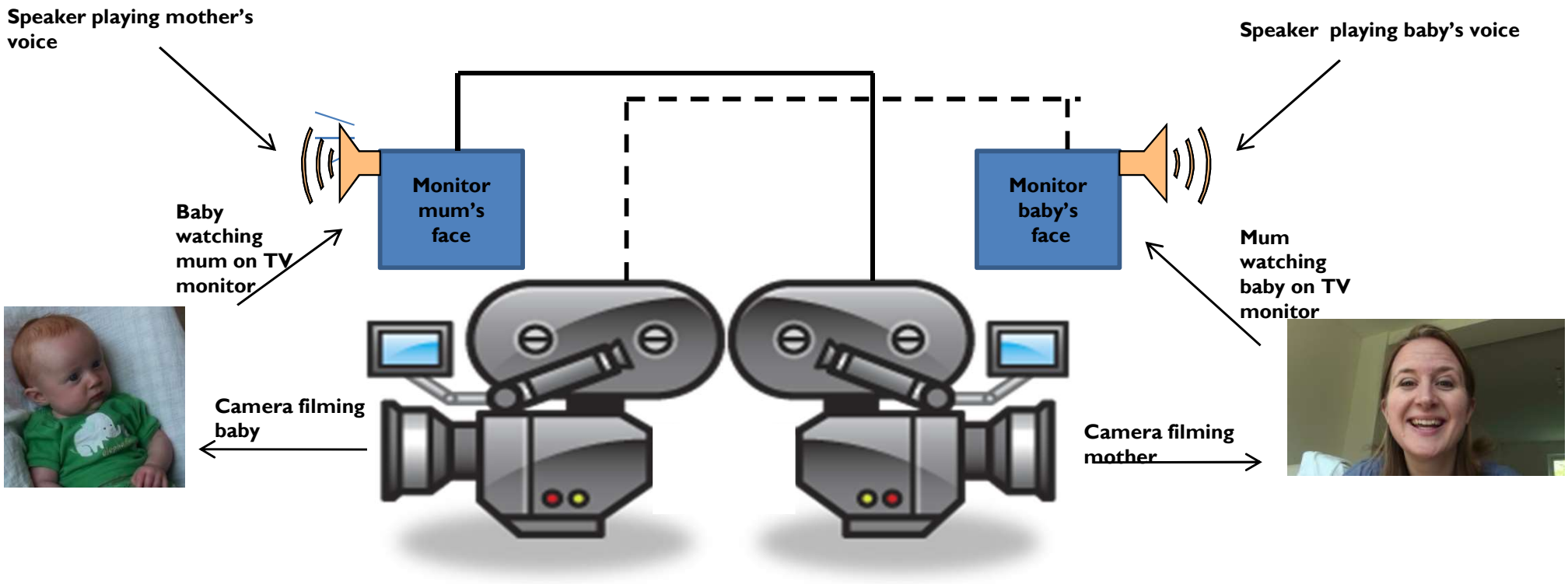


Depressed and control mothers in 2 month face-to-face interactions: general sensitivity (1-5 rating scale)

(Murray et al., Child Dev, 1996)

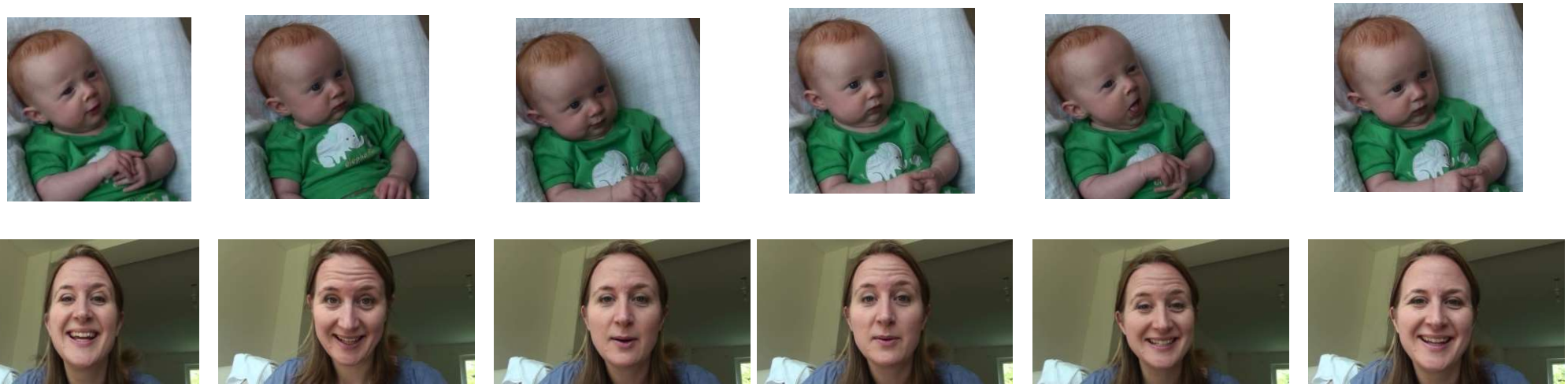


Non-contingency: the Double Video Experiment *(Murray & Trevarthen, 1985)*



Interactive Disruption-Double Video Experiment: Live

Iris watches her mother who is *contingently* responding to her behaviour



Interactive Disruption- Double Video experiment: Replay





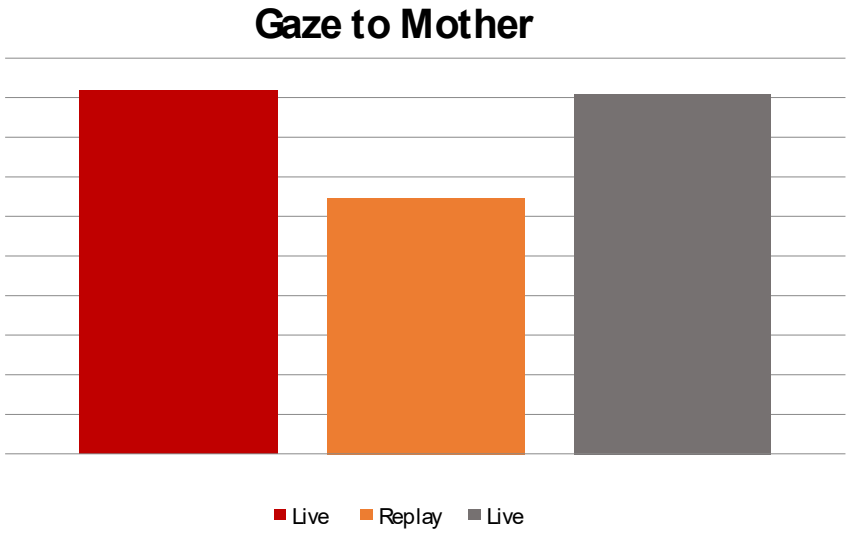

Iris watches her mother who is *not* contingently responsive to her behaviour

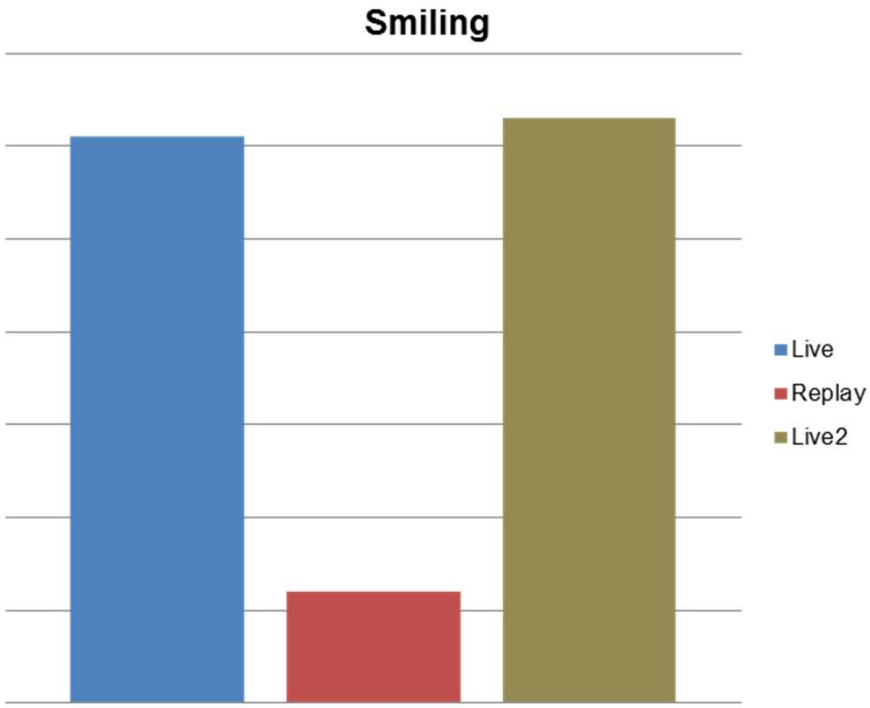





The Double-video experiment

Effects of contingent live vs. non-contingent replay

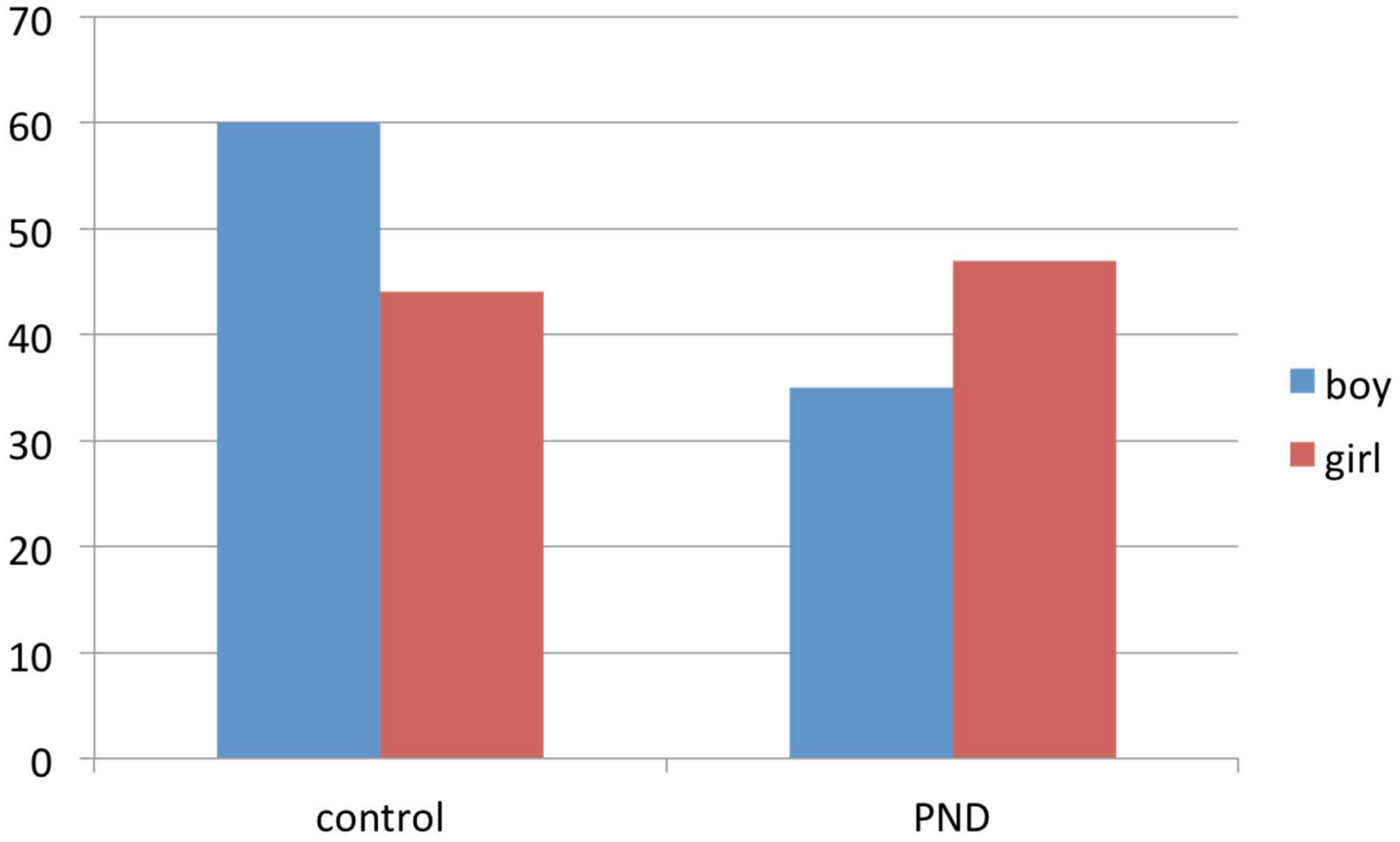




Murray & Trevarthen, 1985

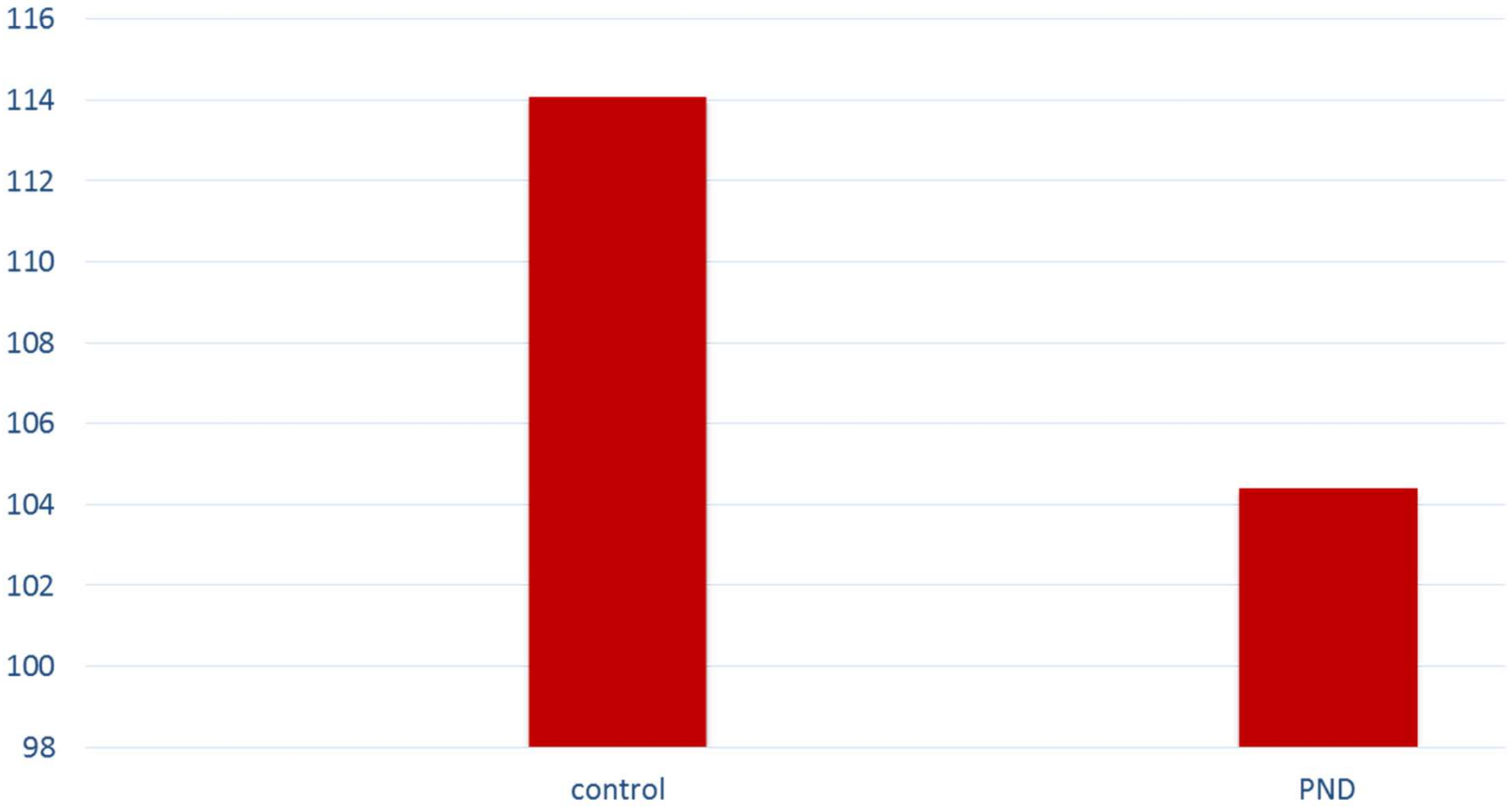
PND mothers' low contingent responsiveness (%) to boys at 2 months (p <.01)

(Murray et al., JCPP, 1993)



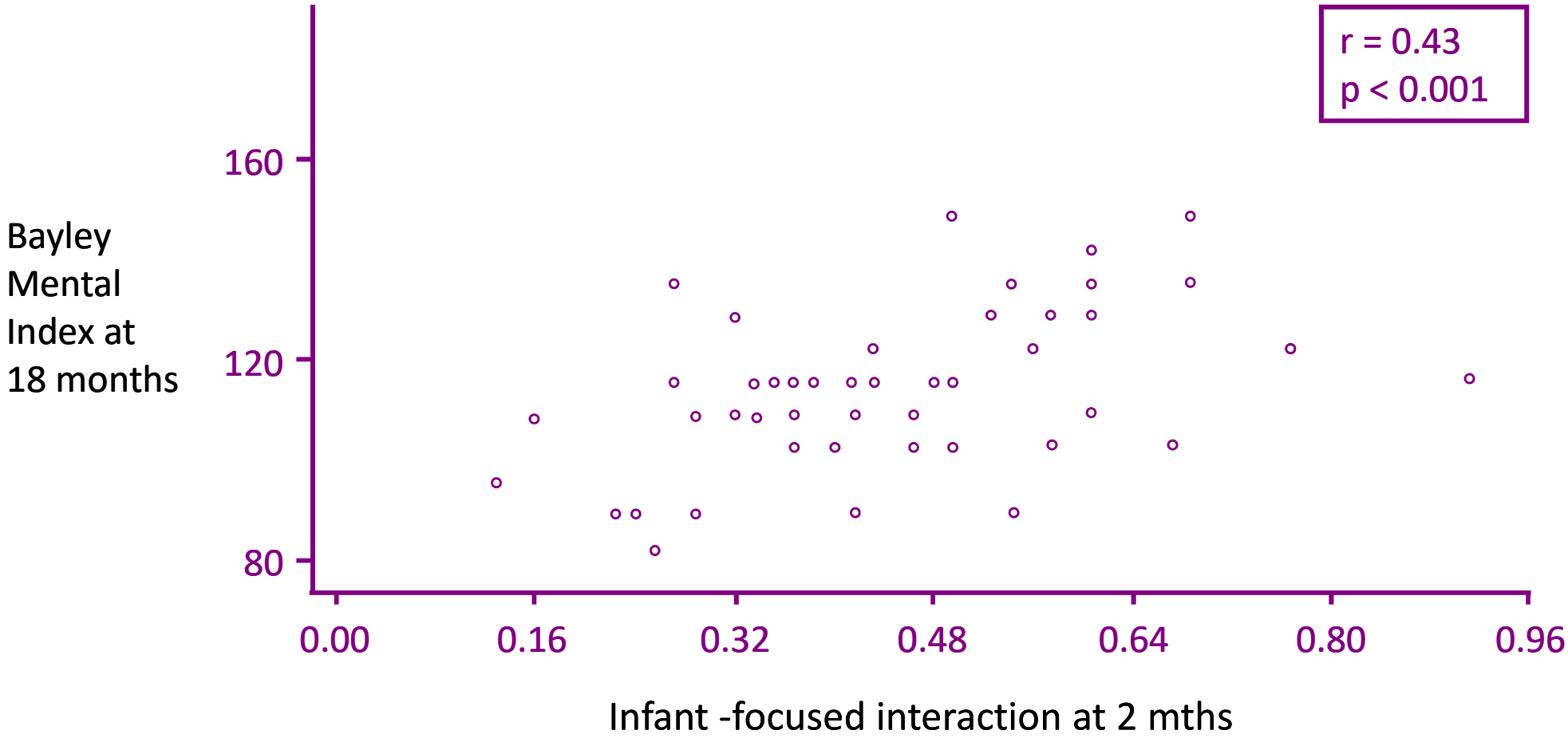
Boys of PND mothers have lower Mental development scores at 18 months

(Murray et al., 1996)



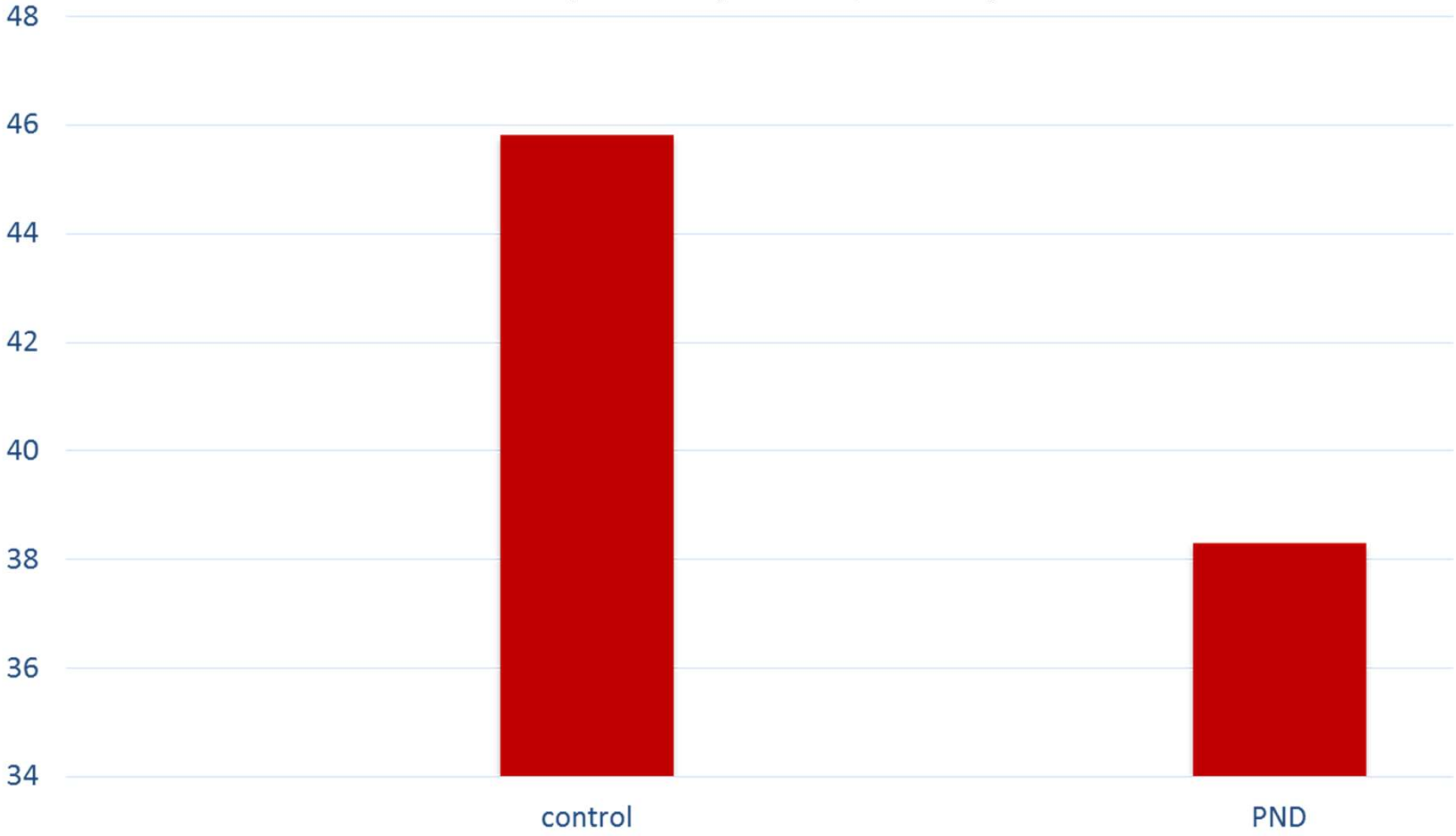
Effects of PND: Maternal interactions at two mths & infant Bayley Mental Index scores at 18 mths

(Murray et al., 1993)

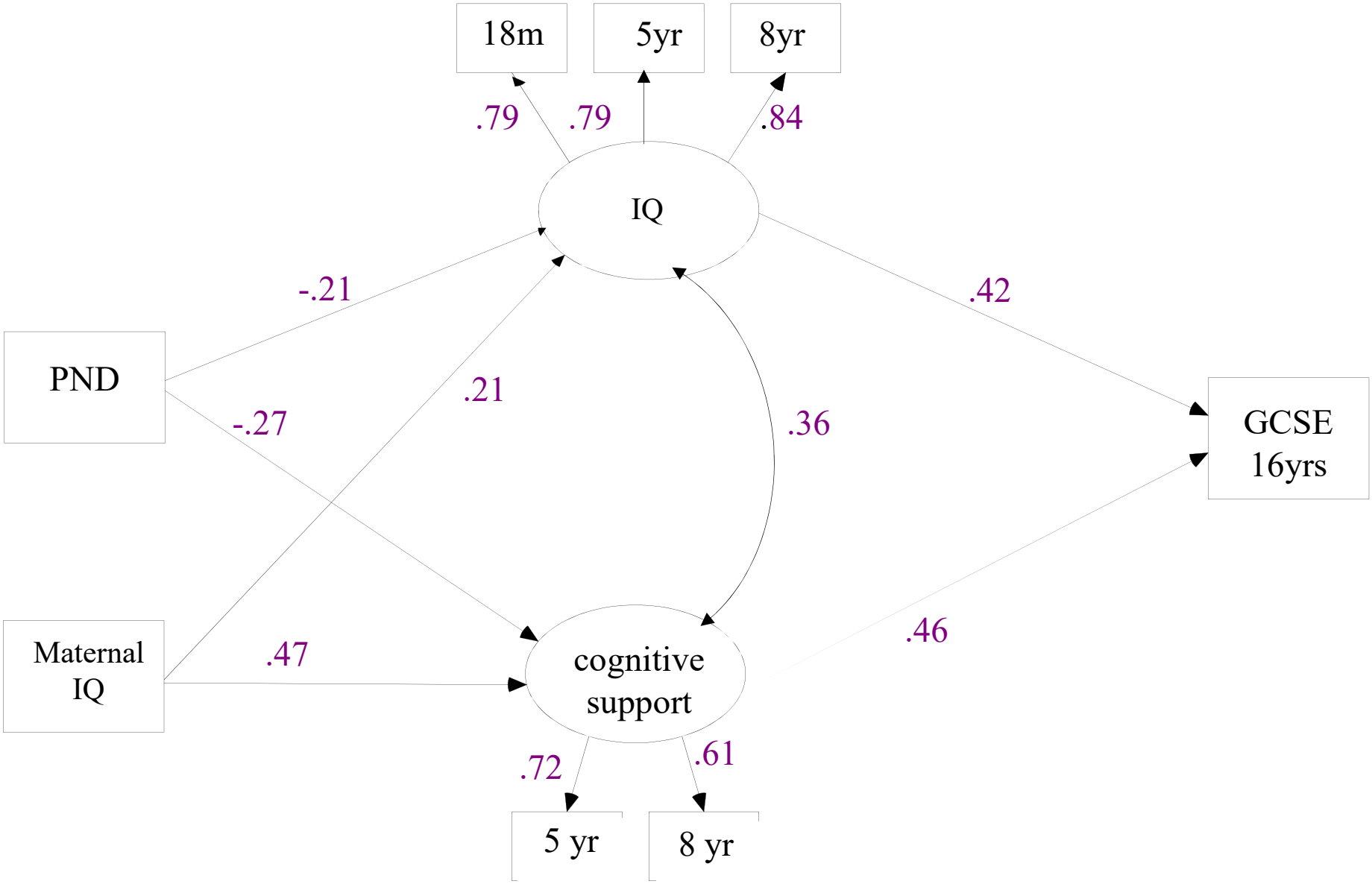


Boys of PND mothers at 16 yrs: score one grade lower on each of seven GCSEs

(Murray et al., 2010)



Effect of PND on boys' GCSEs in Cambridge study *(Murray et al., 2010, JCPP)*



Conclusions regarding cognitive development

PND principally a risk for poor child cognitive development in the context of wider adversity, and particularly where depression is chronic.

Maternal interactions- poor responsiveness, attention regulation, scaffolding, mediate effects of PND

PND and child behaviour problems: the role of mother-child interactions

Poor reparation of breakdown & support for self regulation	Tronick & Gianino, 1986
	Jameson et al, 1997
	Jaffe et al, 2001
Hostility & coercion	Murray et al, 1996
	Morrell & Murray, 2003
	Maughan et al., 2007

Support for child emotion regulation and control

- Mismatch repair
- Body games
- Play fighting
- Routines
- Reasoning and discussion
- Encouraging helpfulness

Handling conflicts

- Aggression normal 1-2 yrs
- If becomes persistent and pervasive, is strong predictor of later aggression and violence

Its prevention requires:

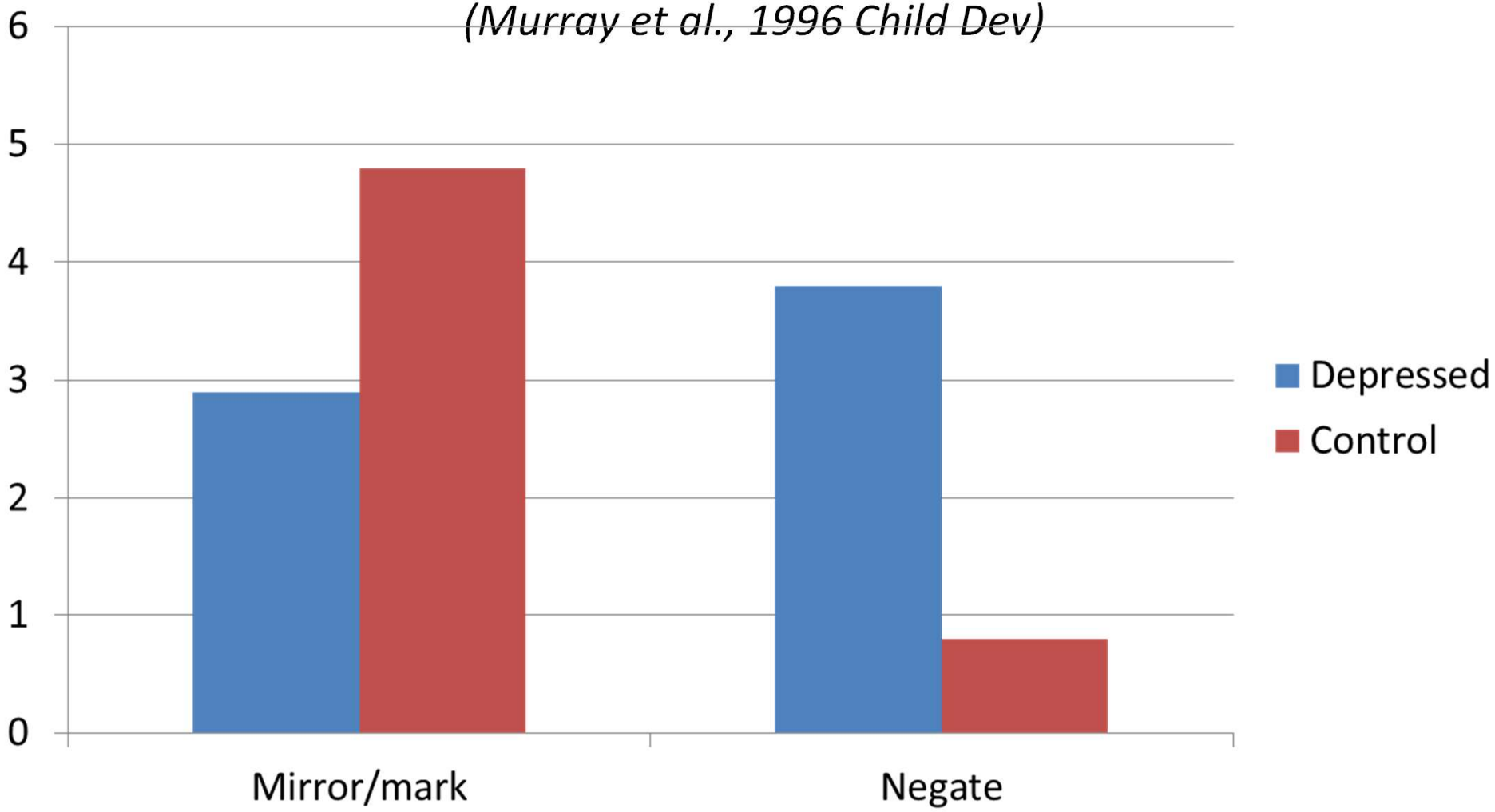
consistency

lack of harsh punishment

lack of coercion

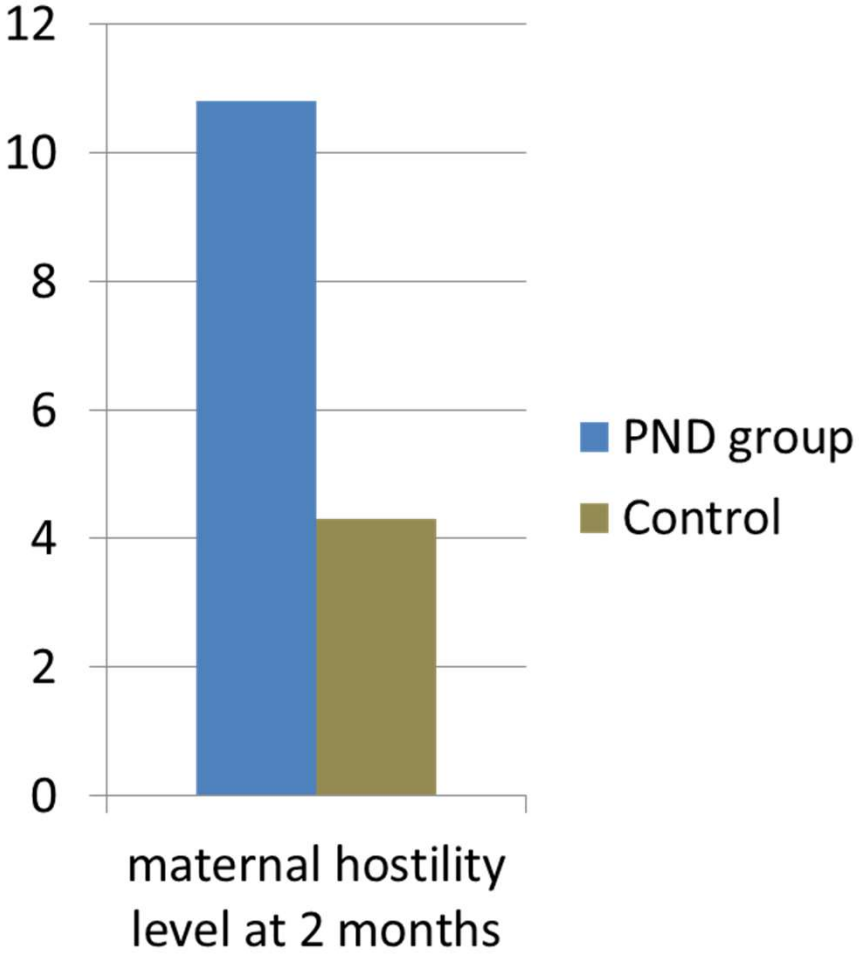
Rate /minute of supportive mirroring/marking vs. negating in depressed and non-depressed mothers in 2 month face-to-face interactions

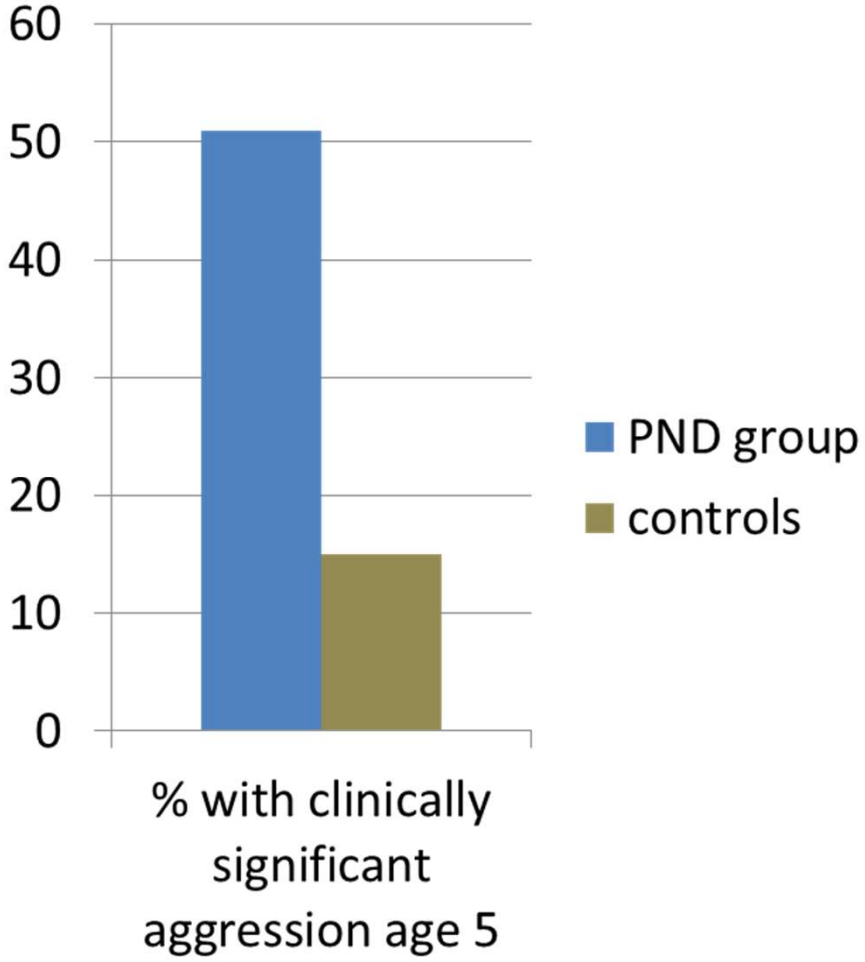
(Murray et al., 1996 Child Dev)



PND hostility, and Child aggressive behaviour at 5 years

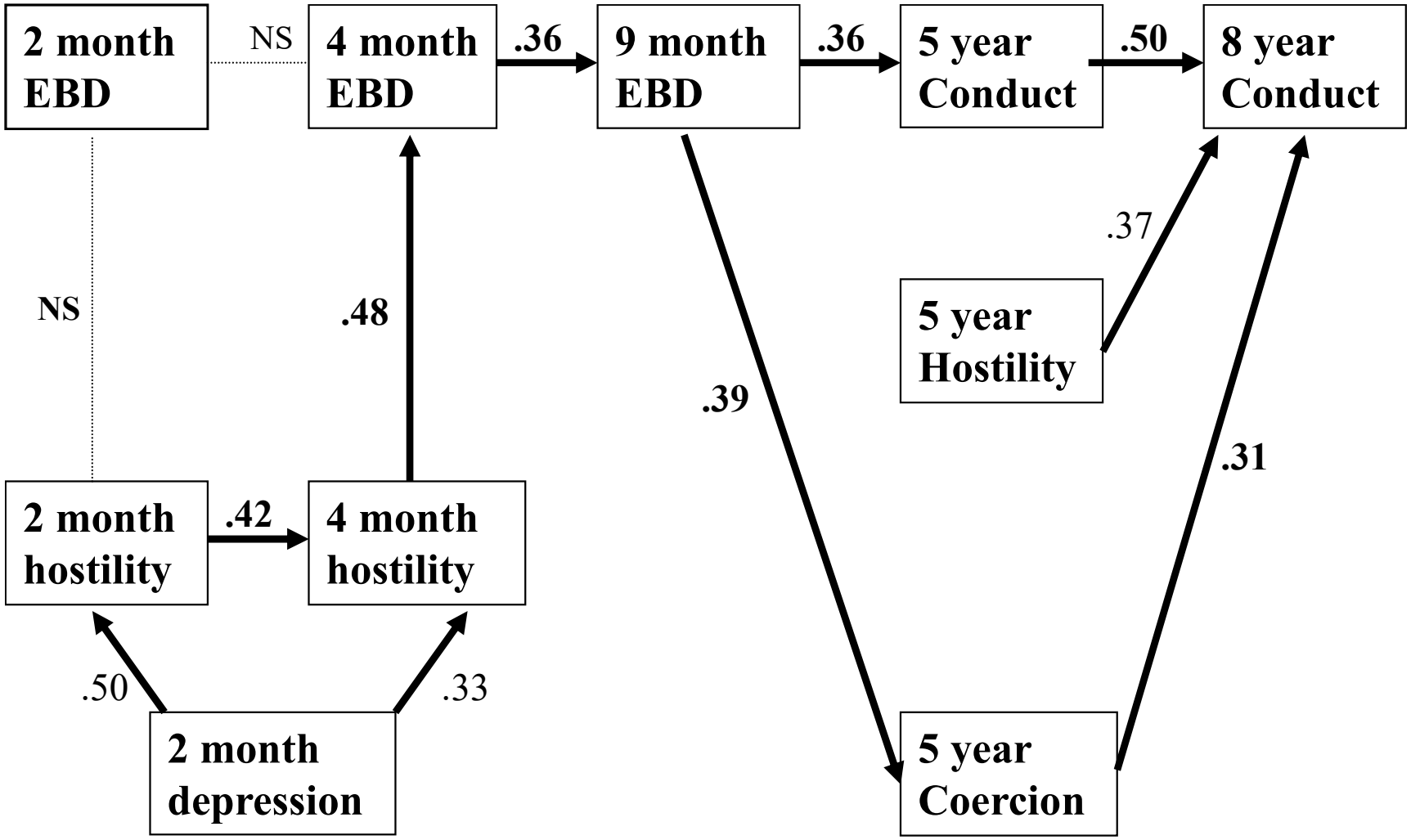
(Murray et al., 1993; 1999)





Cycles of difficult mother-child interaction in PND, and child conduct disorder

(EBD= emotion/behaviour dysregulation)



Morrell & Murray, JCCP, 2003

Conclusions regarding behaviour problems

PND is principally a risk for child externalising problems in the context of wider adversity, and particularly where depression is chronic.

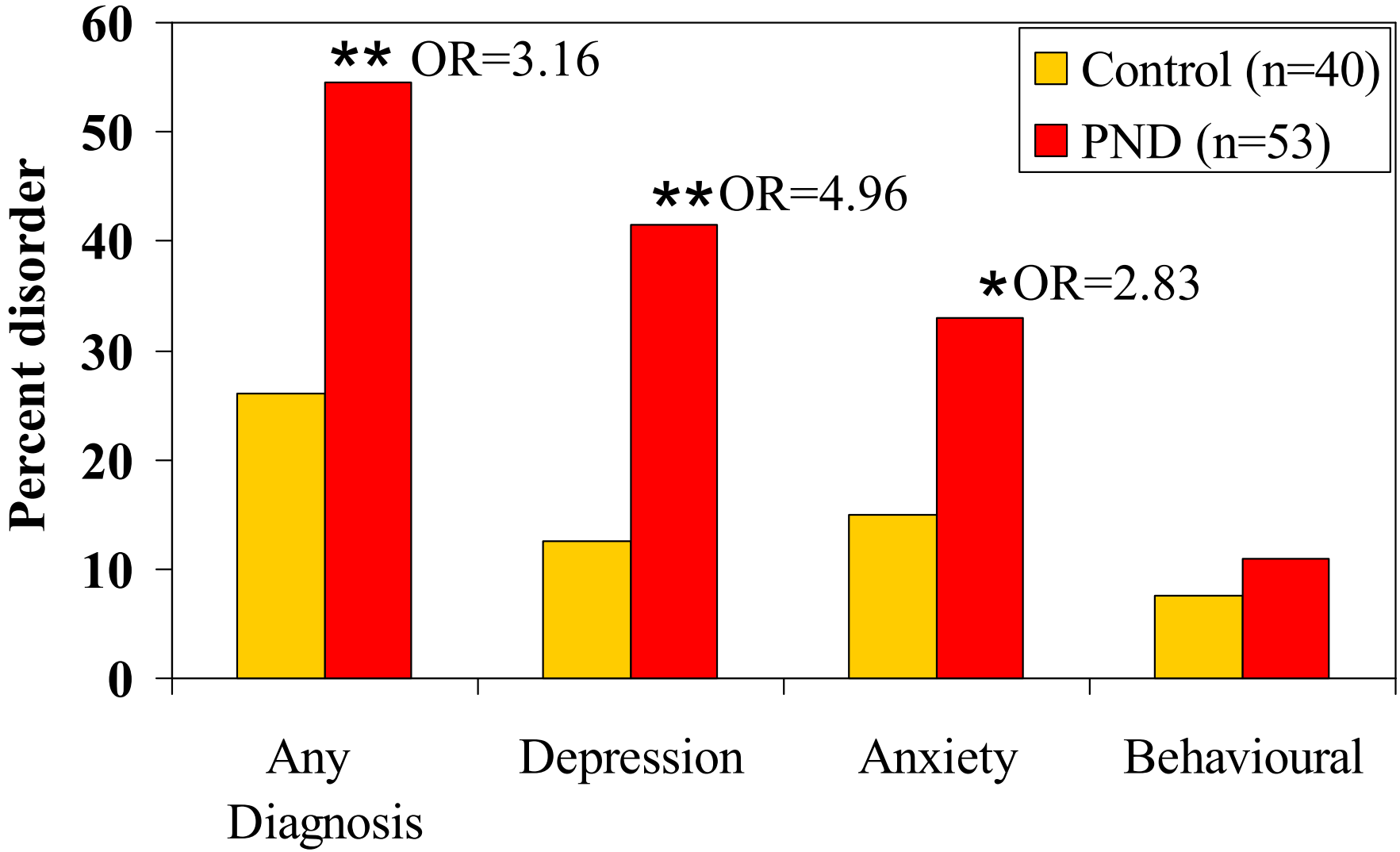
Maternal interactions- hostility, poor emotional regulation, mediate effects of PND

PND and child psychiatric outcome: the Cambridge study

Detailed information about occurrence and timing of mother and child psychopathology

- Diagnostic interviews conducted at 8-yr, 13-yr and 16-yr assessments.
- K-SADS used to assess child psychiatric status.
- Diagnostic interviews carried out with mothers using the SCID at all assessments.

Cambridge study: offspring lifetime diagnoses by 16-yrs



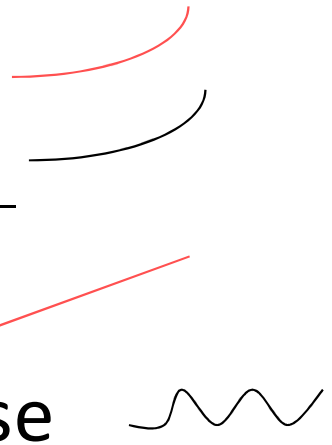
PND and child depression: the role of mother-child interactions

1. Emotional contagion	Field, 1984,1988
2. Effects on HPA axis	Halligan et al. 2004; 2007; Murray et al. 2010c
3. Insecure attachment and low resilience	Martins & Gaffan, 2000 Sroufe et al., 2005 Murray et al., 2010

Emotional contagion via maternal speech quality
Intonation categories coded during early interactions

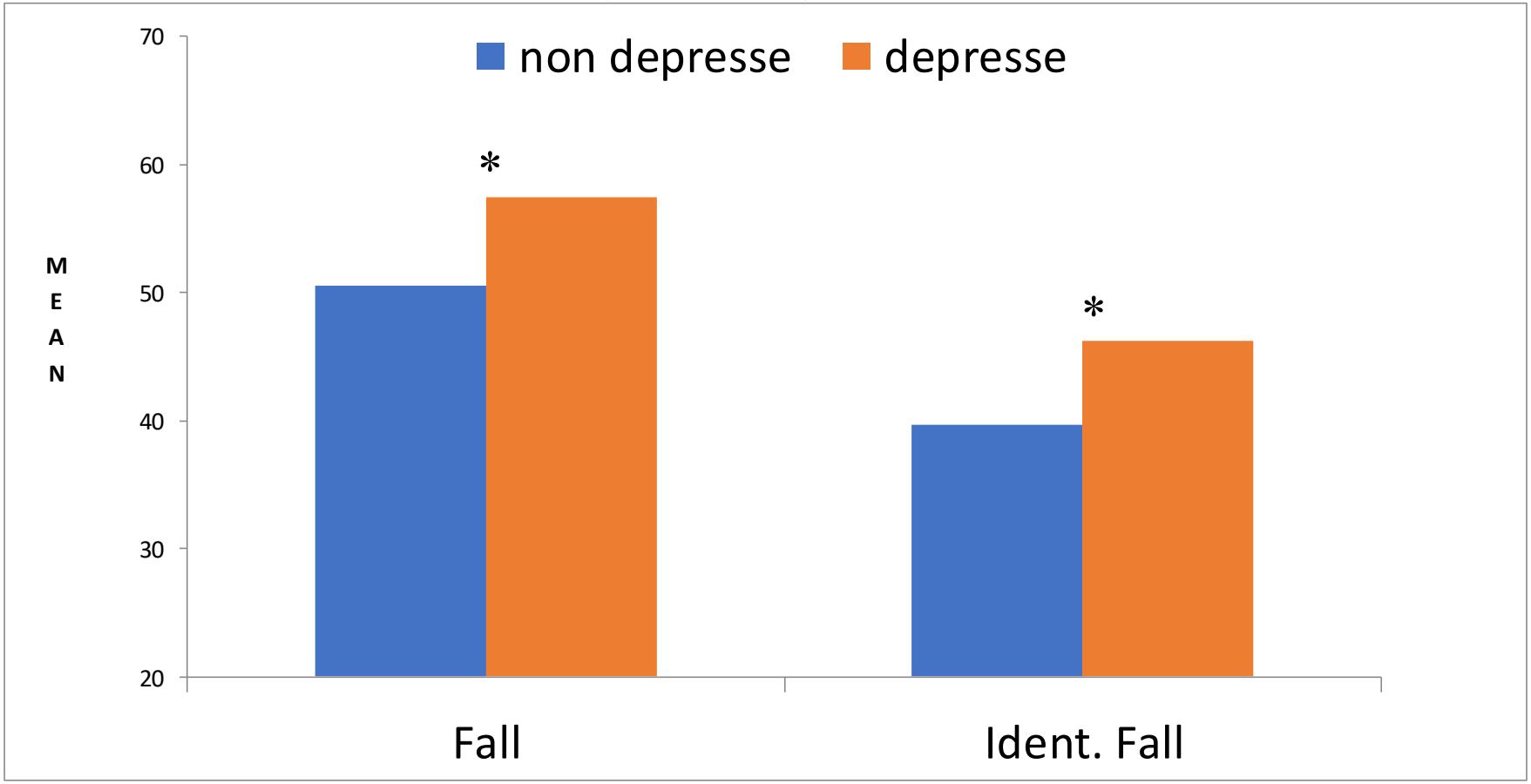
- Simple fall
- Jump fall
- Slope fall
- Undulating fall
- level

- Simple rise
- Jump rise
- Slope rise
- Undulating rise



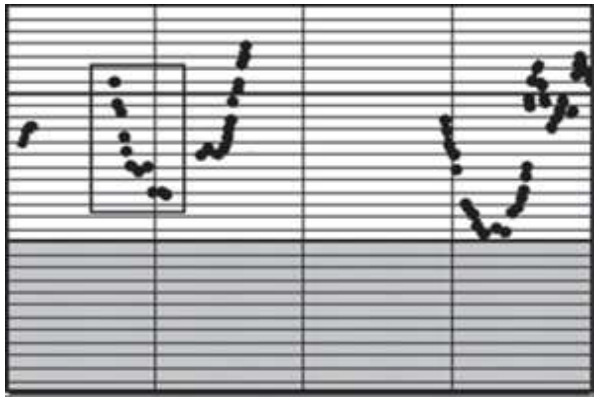
Effects of maternal depression on intonation quality (% utts)

(Murray et al., Inf Behav Dev, 2010)

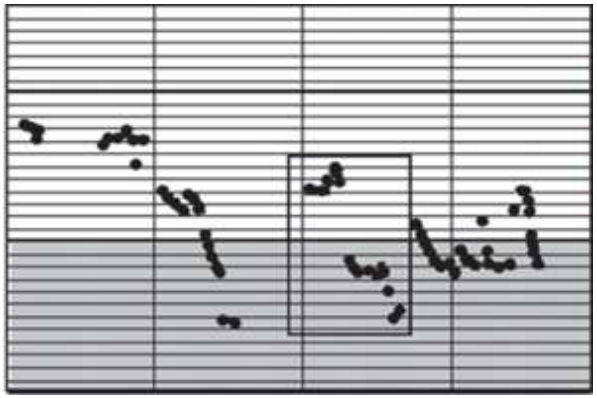


Depressed mothers show more falling intonation,
and repeated utterances using this form

Infant Directed Speech 2m



Non-depressed Dyad
Rhythmic
Variability in pitch

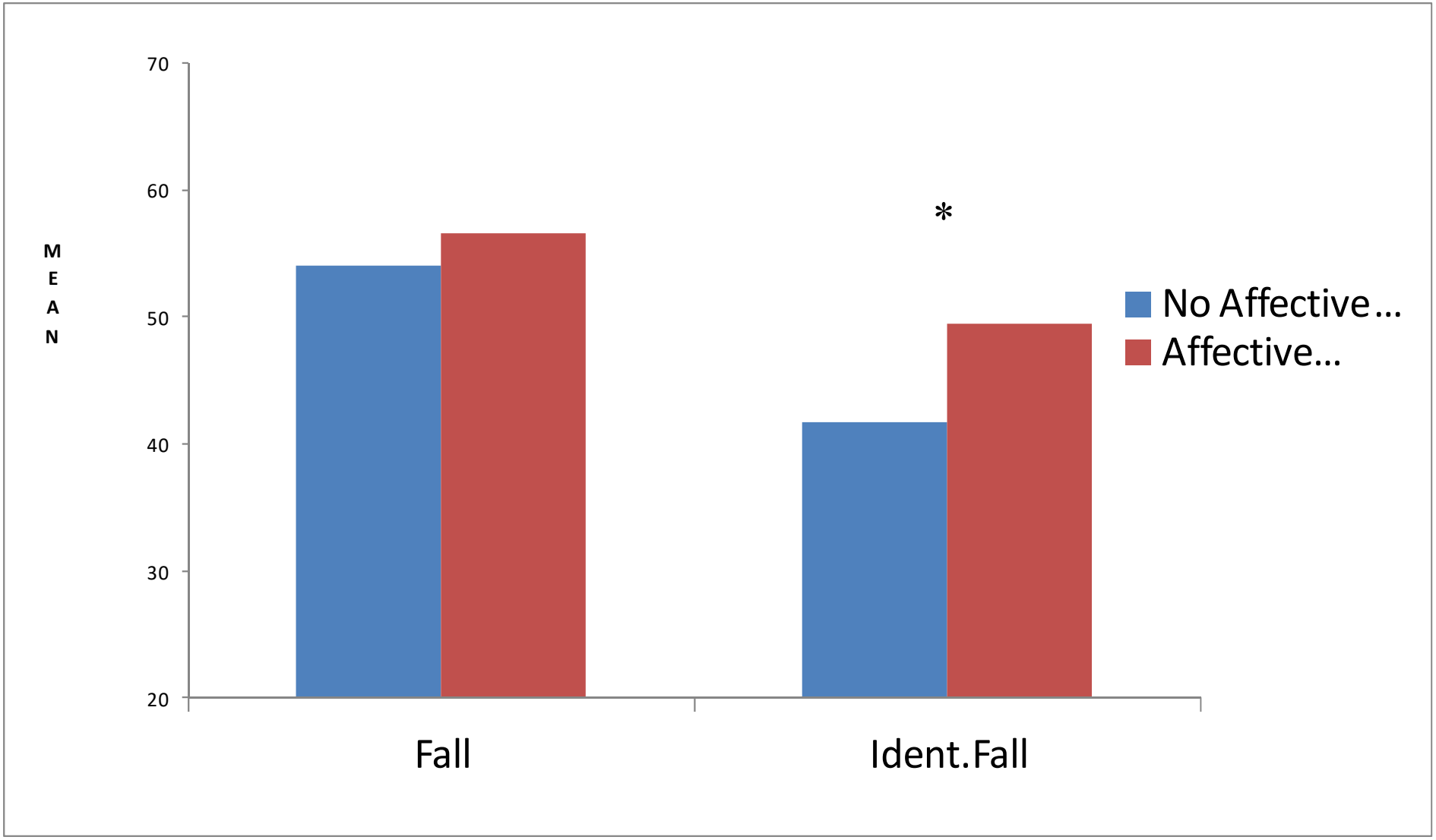


Depressed Dyad
Non-rhythmic
Falling pitch contours
Narrow pitch range

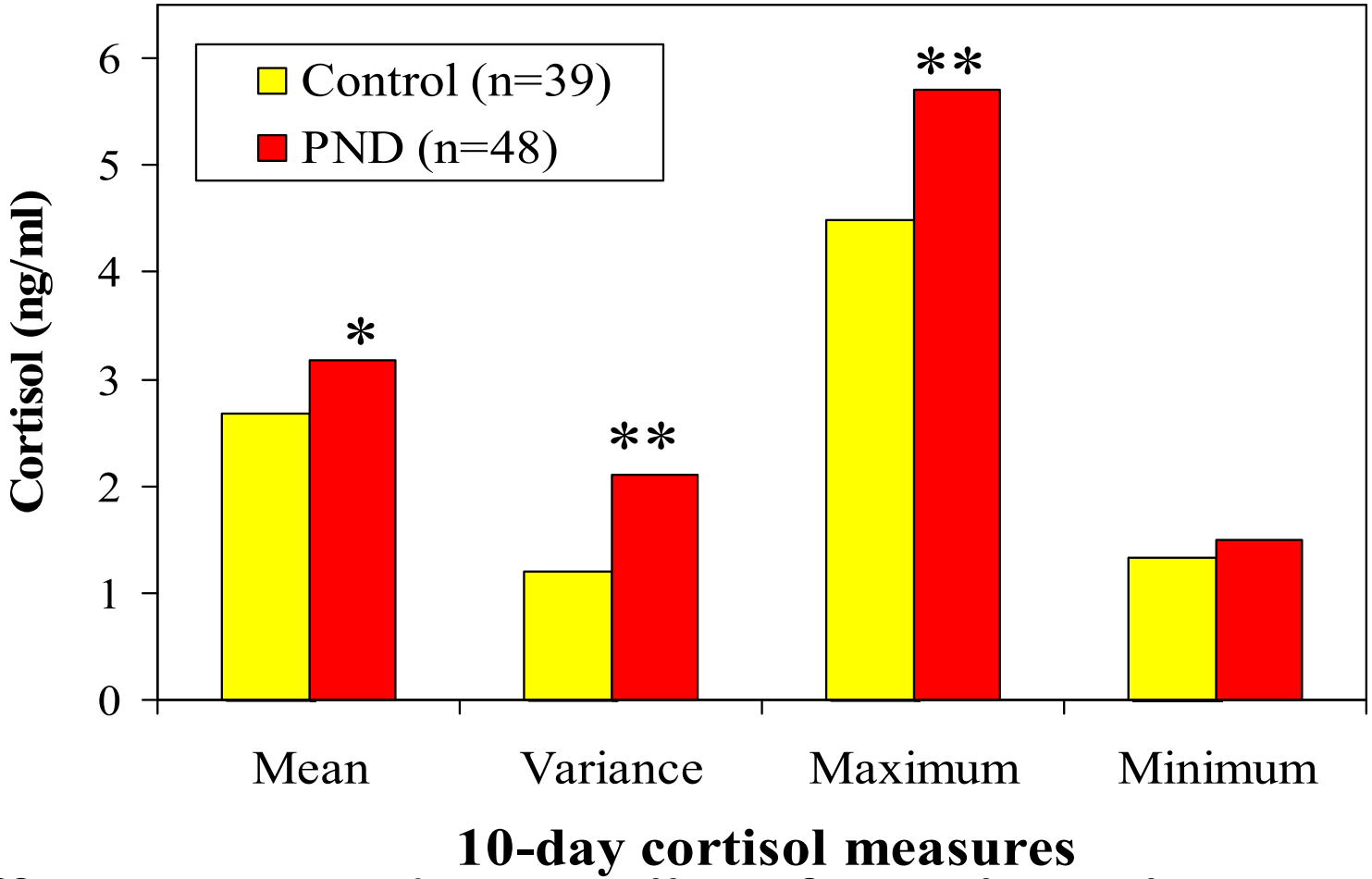
(*Murray, Marwick, & Arteche,2010)*

Falling intonation in early interactions and affective disorder at 13 years

(Murray et al, 2010; 2011)



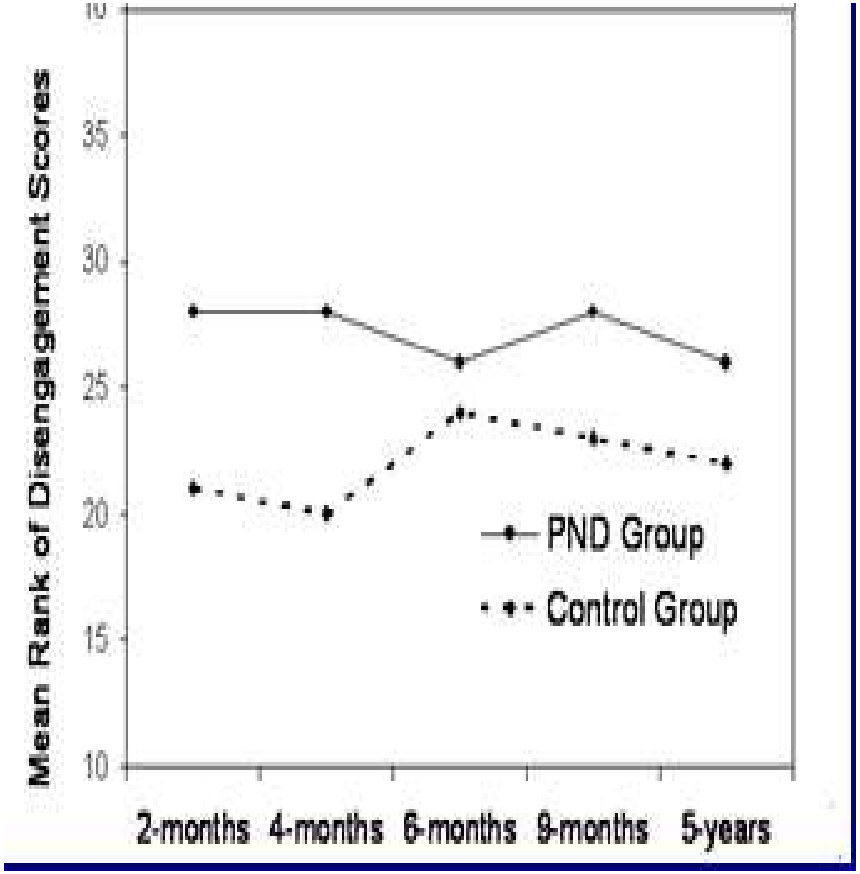
Effects of PND on child depression via the HPA axis: offspring 10-day 08:00 cortisol at 13-years



Effects retained controlling for pubertal status, BMI, current depressive symptoms, negative life events.

Halligan, Herbert, Goodyer & Murray: Biological Psychiatry, 2004

Mother-infant interactions in 1st 9 months and at 5 years in relation to 13 yr. a.m. cortisol



PND disengagement

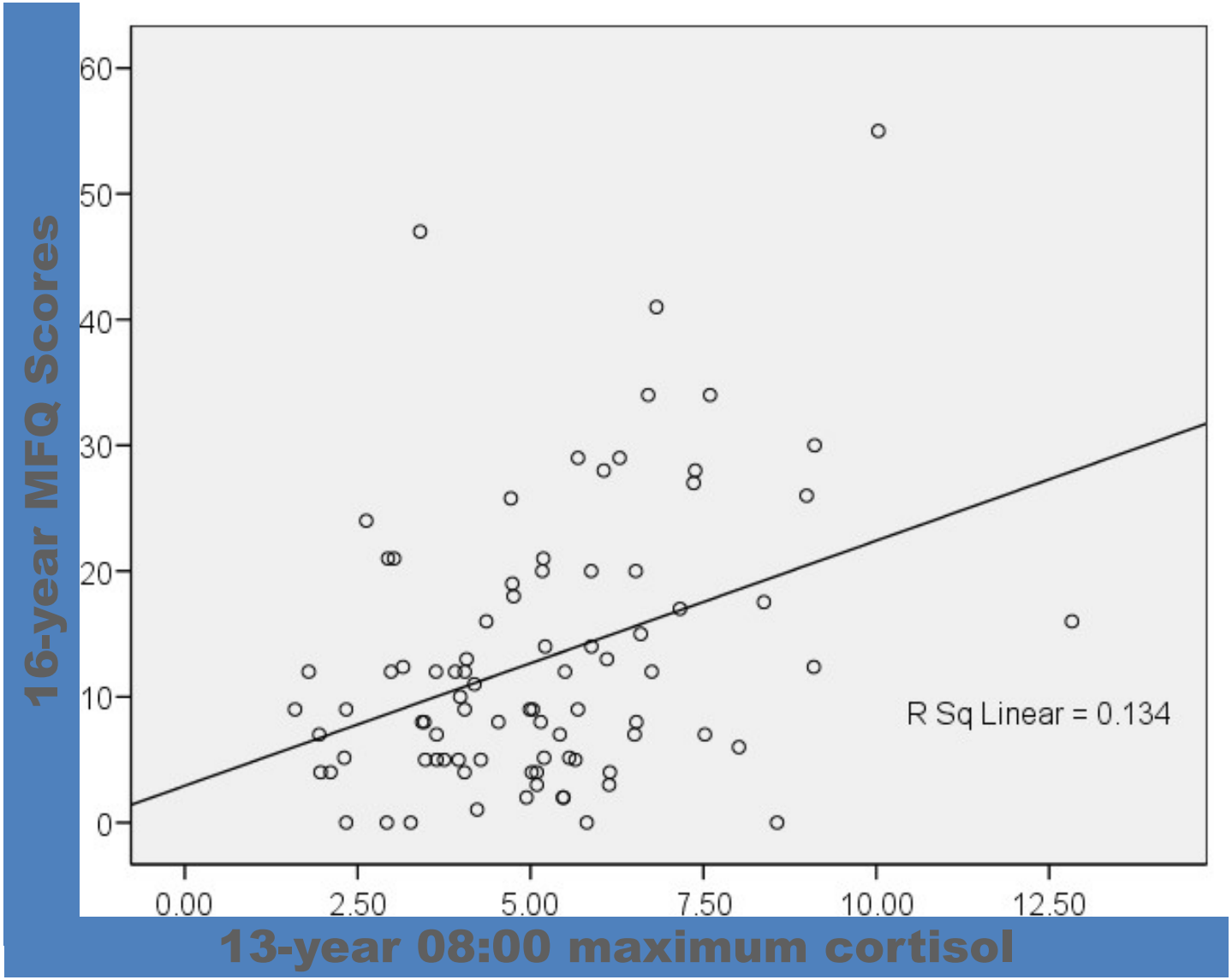
r = .40, p =.006

5 yr disengagement

r = <.05, *ns*

Murray et al. 2010 J Aff Dis

13-year morning cortisol and depressive symptoms at 16-years

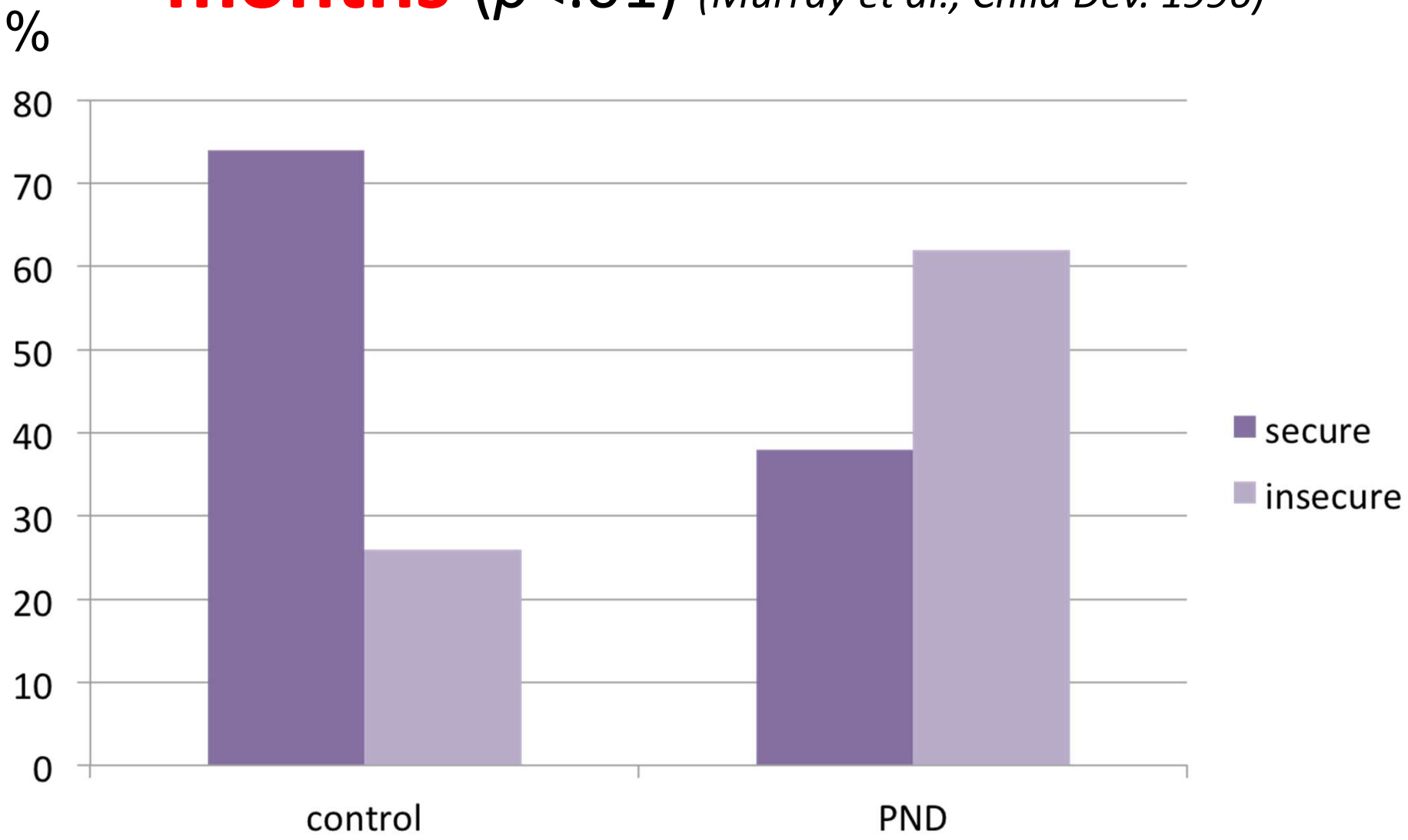


Halligan, Herbert, Goodyer & Murray: Biological Psychiatry 2007

Effects of PND on child depression via insecure attachment and poor resilience

Normal stranger fear in a securely attached infant at 10 months

PND and Infant attachment at 18 months ($p<.01$) *(Murray et al., Child Dev. 1996)*



Bowlby's view of mental health implications of attachment for ego resiliency

- Avoidant
  - Deny needs
  - Attempt to live without others' love and support
  - Sense of self as not worthy of love
  - Low expectations of others

- Ambivalent
  - Pervasive anxiety, especially re. separation/abandonment
  - Limited exploration of world
  - Coping capacities not developed

Ego resiliency

Thus, the insecure child may:-

lack capacity to cope with threat

have rigid, or limited coping strategies

be overwhelmed with sense of loss/anxiety

have low self-worth

(Erikson, 1985)

Assessment of resiliency at 5 and 8 years: Competitive card game *(Murray et al., 2001, JCPP)*

Game rigged by experimenter to provide losing and winning deals

Rate child's distress and anxiety vs. capacity to remain positive

Predicted pathway

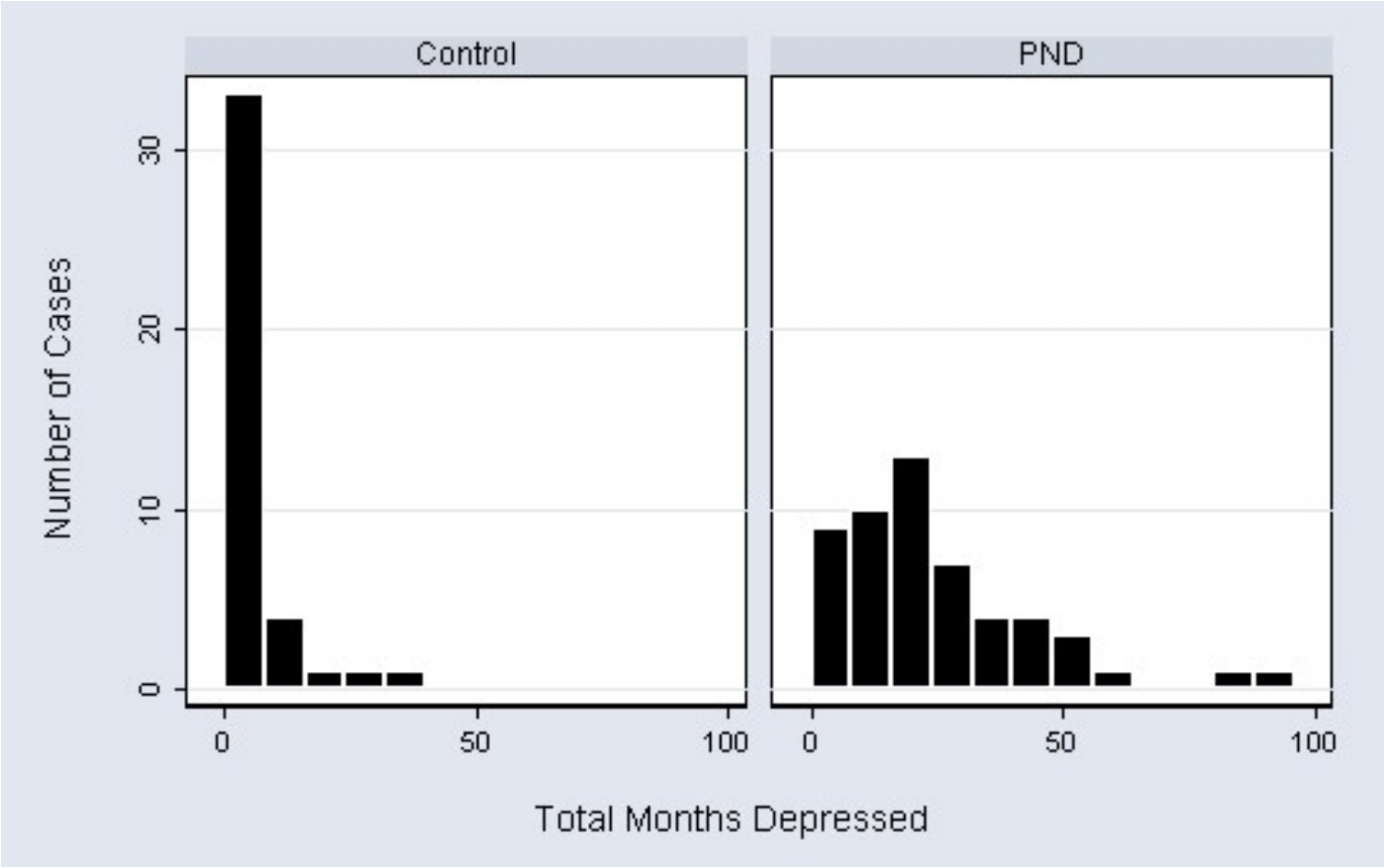
PND→ insecurity→ low ego resiliency→ depression

Role of chronic difficulties

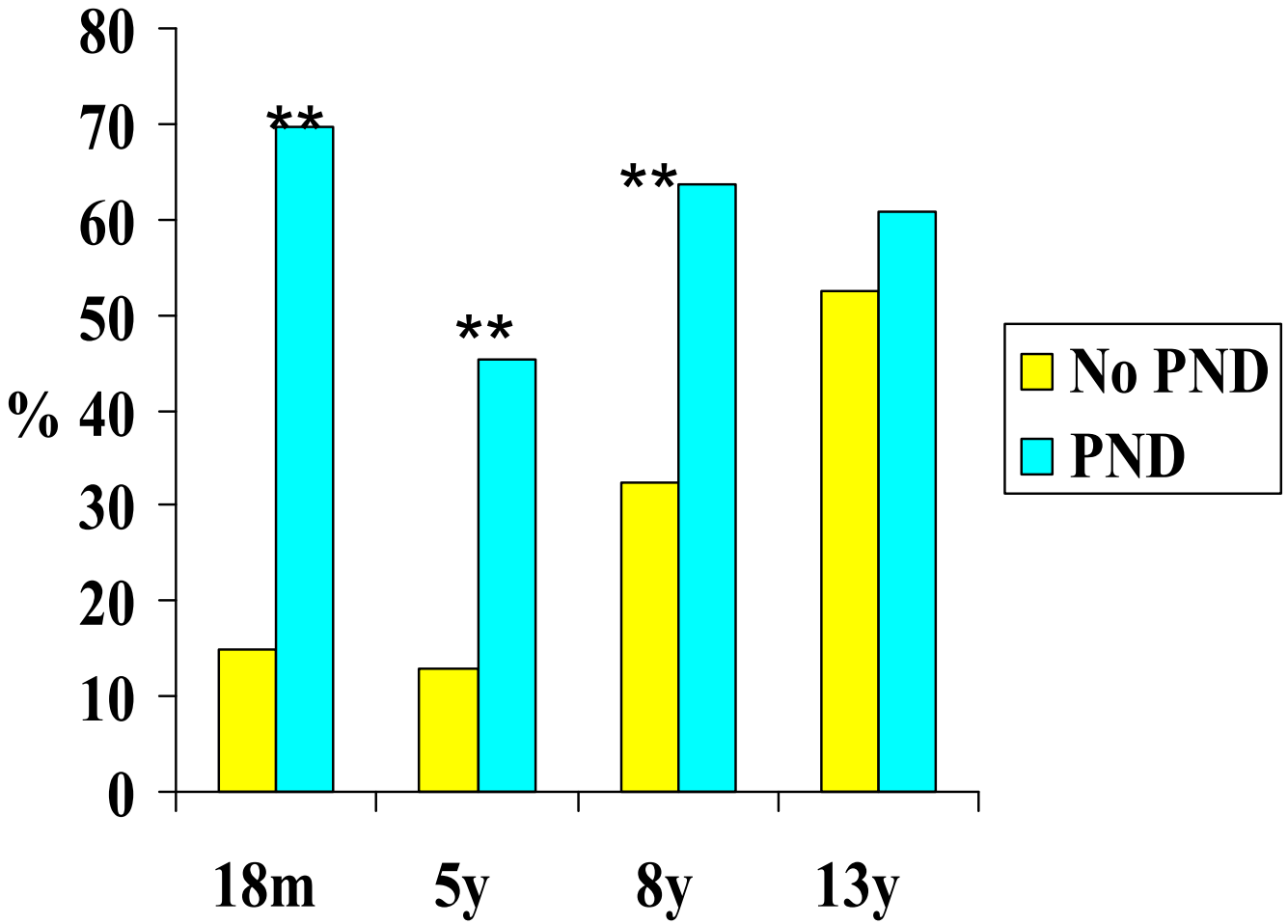
- Mother-child relationship
  - Observations at 5 and 8yrs
- Maternal depression
  - Assessed at each time point, with month-by-month recording of offsets and onsets of disorder to give chronicity
- Marital conflict
  - Assessed at each time point by interview/questionnaire

Chronicity of maternal depression

Women in the PND group experienced further depression outside the postnatal period



Marital conflict: Relation to PND



Pathway from PND to offspring depression at 16 years (*Murray et al., JAACAP, 2011)*

Subsequent maternal depression and marital conflict are partial mediators of effects of PND, but no effect for poor maternal support.

Child vulnerability (insecurity/low resilience), plus adversity, account for 81% effect of PND

Summary

-Child depression up to 16 yrs predicted by PND, insecure attachment, and poor resiliency, especially at 8 yrs.

-Marital conflict, and maternal chronic depression also add to risk, but do not account for PND effect.

Neurological-physiological findings at 22 years: direct effects of PND

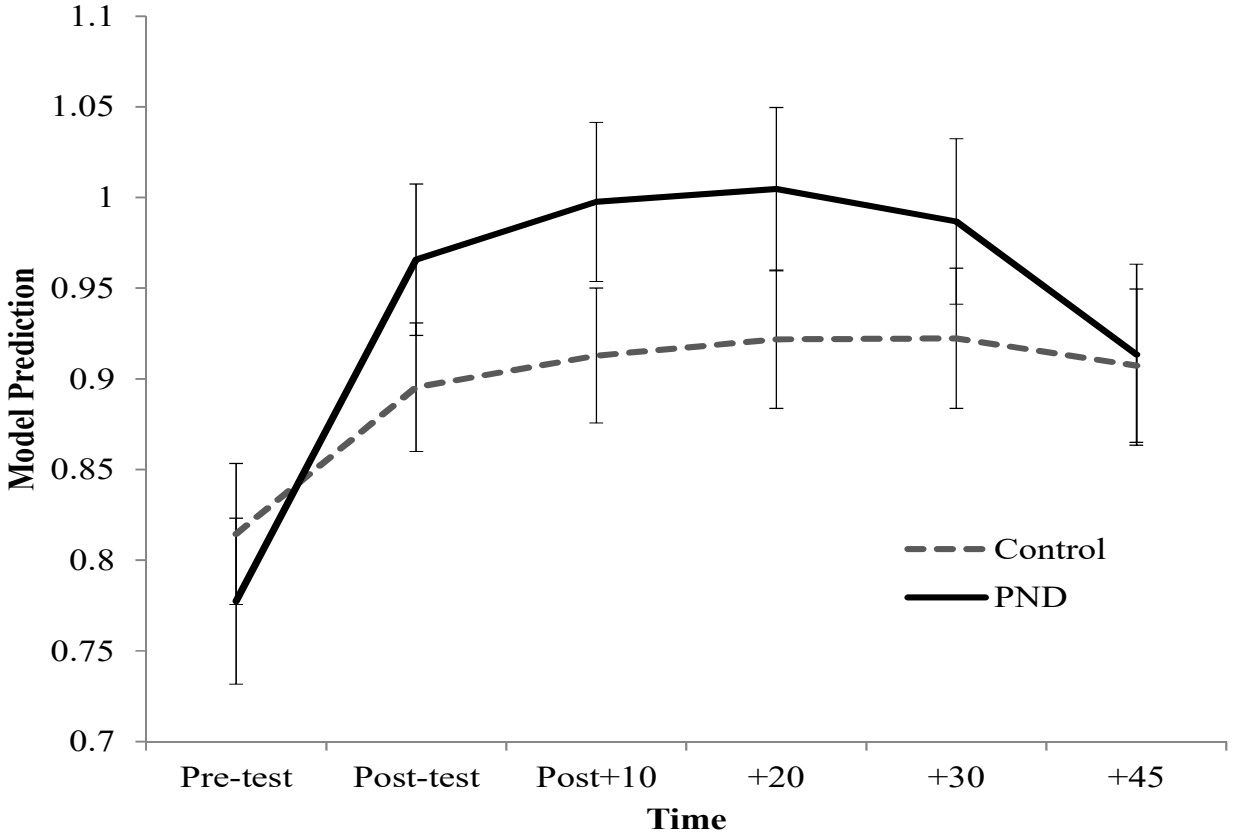
(McDonald et al., Biological Psychology, 2016; Barry et al., Psychoneuroendocrinology, 2015)

fMRI: while listening to own narratives of experiences with mother, PND group offspring show less efficient prefrontal regulation of autobiographical memories

HPA axis reactivity

Elevated cortisol

Response in TSST



Indirect effects of PND via attachment

MRI: insecurity predicted amygdala enlargement *(Moutsiana et al., JCPP, 2015)*

fMRI paradigm including effortful up-regulation of positive emotion, insecurity predicted relative inefficiency in neural regulation of positive affect (greater activation in prefrontal regions involved in cognitive control, and reduced co-activation of nucleus accumbens with prefrontal cortex) *(Moutsiana et al., 2014)*

Both direct, and indirect effects of PND via attachment, controlling for continuing maternal depression, offspring symptoms and history, life events

Wider considerations

- Cambridge study results consistent with adverse impact of PND found in other studies
- In addition, research emphasizes importance of persistent and severe depression
- Costs of perinatal disorders estimated to be £8.1 billion per annum in UK alone, mostly because of adverse impact on children (Bauer et al. 2014, LSE report)

Overall conclusions

- PND associated with range of disturbances in mother-infant relationship
- Offspring outcome affected in diverse domains- cognitive, behavioural, affective.
- Each outcome appears to have specific developmental trajectory
- Children of mothers with severe PND that persists are at especially high risk for adverse outcome