

Stress, Relationships, and
Development:
What we know and what we still
need to learn

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Charlotte Buhler In Minnesota



- Charlotte and Karl Buhler came to Minnesota in 1940. Charlotte taught for a year at the College of St Catherine (St Kate's). Went back east in 1942 then returned in 1943. At that point Charlotte worked as a



St. Kate's

psychologist at
Minneapolis
General Hospital



General Hospital

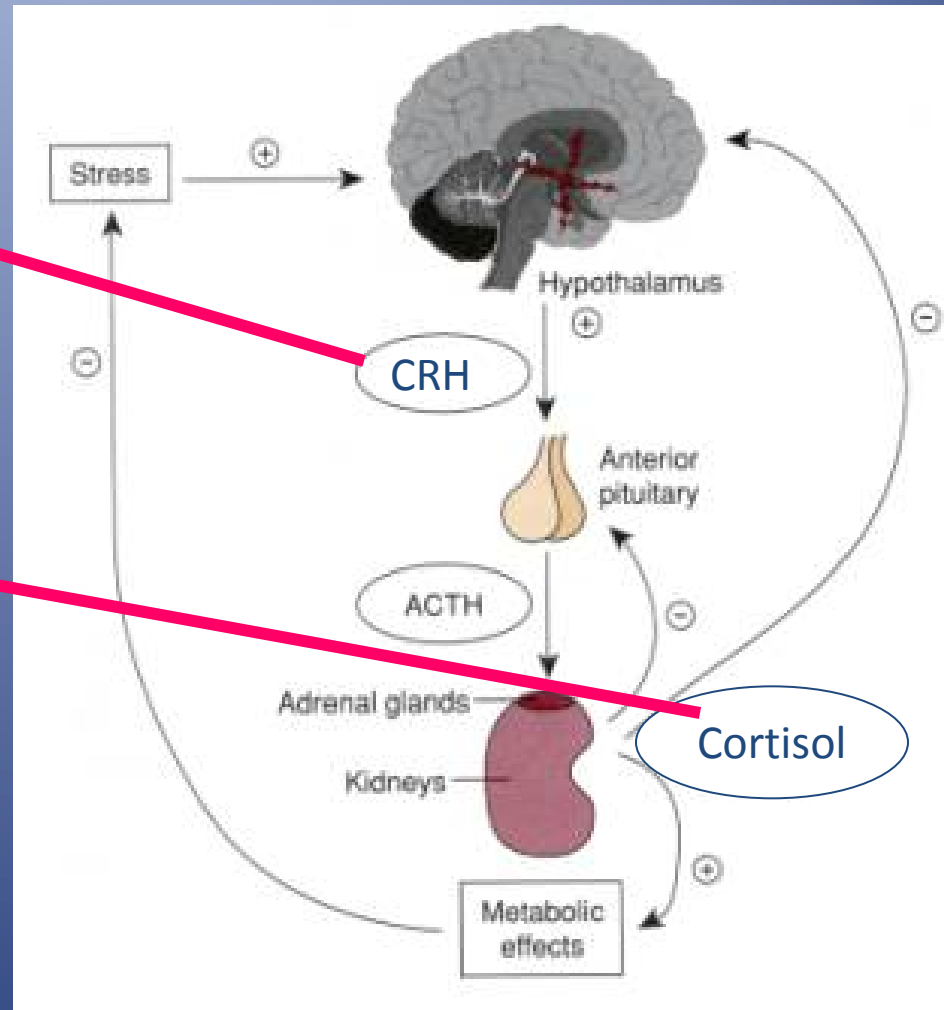
Relationships Are Critical Regulators of Stress in Children



Hypothalamic-Pituitary-Adrenocortical (HPA) System

Corticotropin-Releasing hormone

Cortisol (corticosterone)



HPA Role in Stress

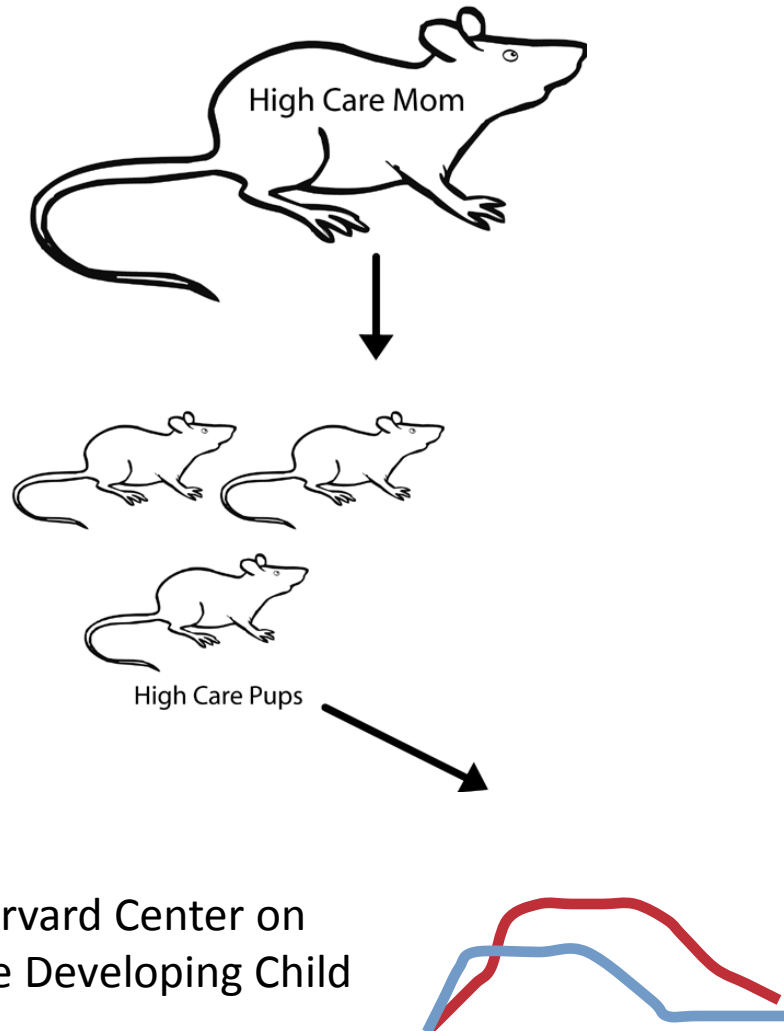
- Cortisol is a gene transcription factor
- Cortisol increases or decreases the activity of genes that recognize this hormone (many genes in the brain)
- The genes regulated by cortisol are in neurons involved in memory, emotion, emotion-regulation, and autonomic reactivity
- Activity of the HPA axis plays an important role in the biological embedding of experience

Social Stimulation and HPA Axis Development



- Stress Hyporesponsive Period (SHRP)
- Maintained by maternal stimuli; Remove for 6-24 hours and axis begins to become more responsive (Levine; DeKloet)
- During SHRP pup will approach odors paired with shock (i.e., will approach mother who is aversive; Sullivan)

Experience Shapes HPA Reactivity and Regulation



Harvard Center on
the Developing Child

Source: Levitt (2008),
adapted from Liu et al. (1997)

We are not rats



We do not have a stress
Hypo-responsive period

Social Buffering

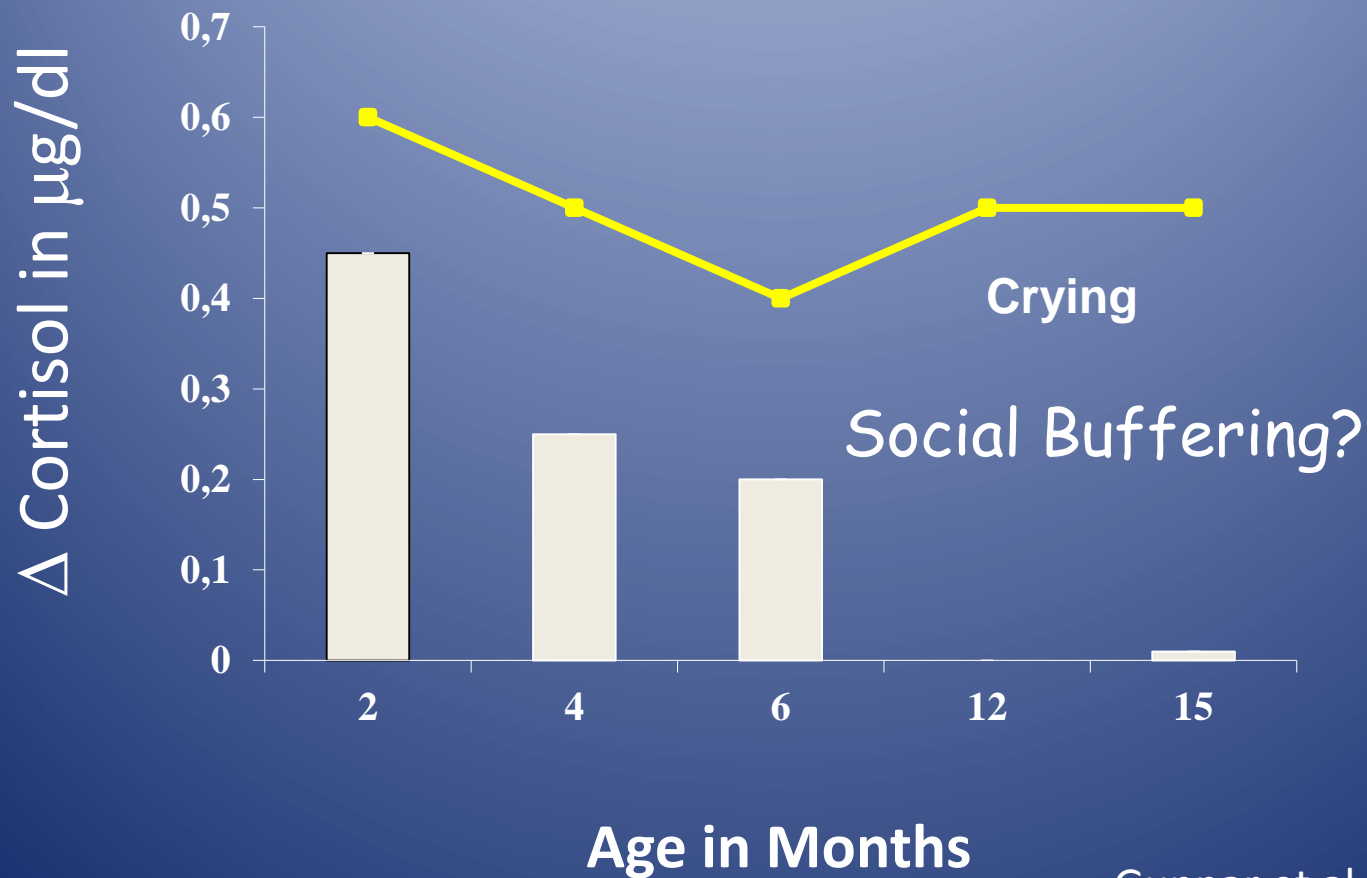
- The capacity of distal or proximal contact with another human being to reduce or prevent activation of the stress system or to facilitate return the stress system to basal functioning.



Response to Physical Exams and Inoculations



Dampening of Cortisol Response to Doctor's Exams and Shots

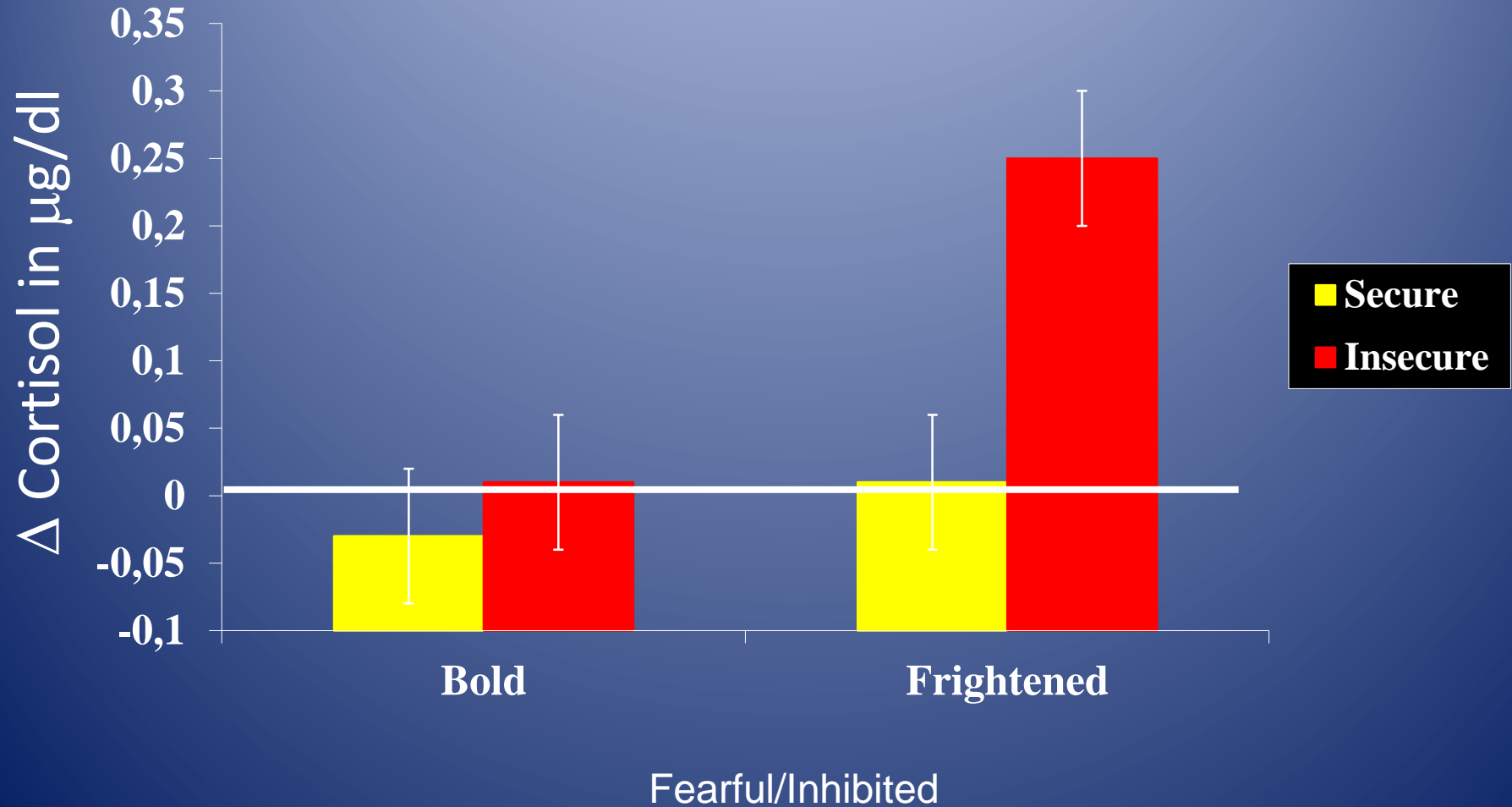


Gunnar et al., 1996

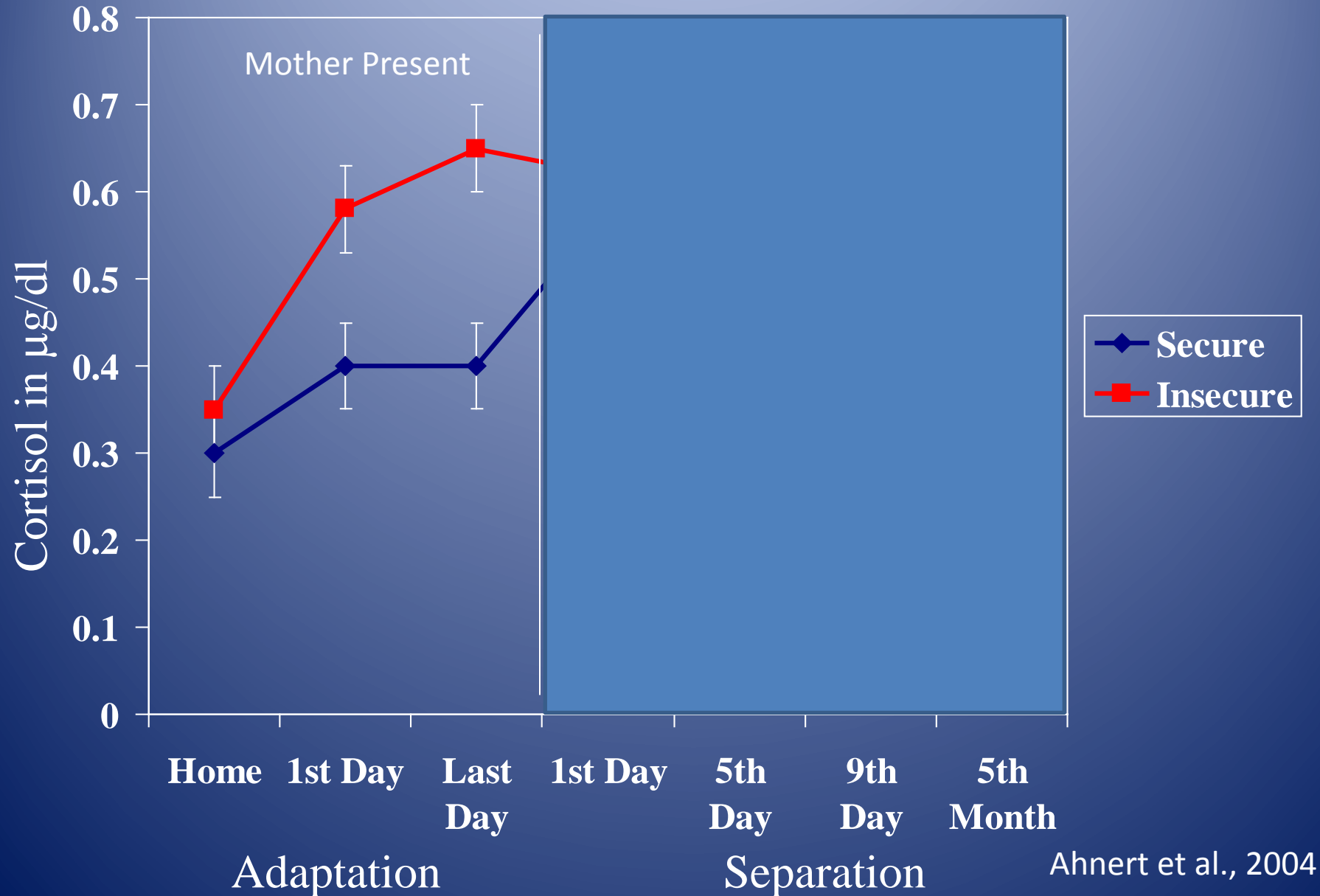
Are All Social Relations Equally Effective?

- Children were 18 months old
- Visited Laboratory Twice
- Time 1:
 - With mother present they were presented with 3 arousing and potentially scary events: Live Clown, Loud and Abrasive Puppets, Clown Robot
 - Median split into bold/low fear and wary/higher fear children
- Time 2: Strange Situation
 - Secure versus Insecure Attachment groups

Secure Attachment Buffers Cortisol Response to Threatening Events



Toddlers Entering Child Care



How Long Does Social Buffering By the Attachment Figure Last?



Infancy 



Preschool?



Middle Childhood?

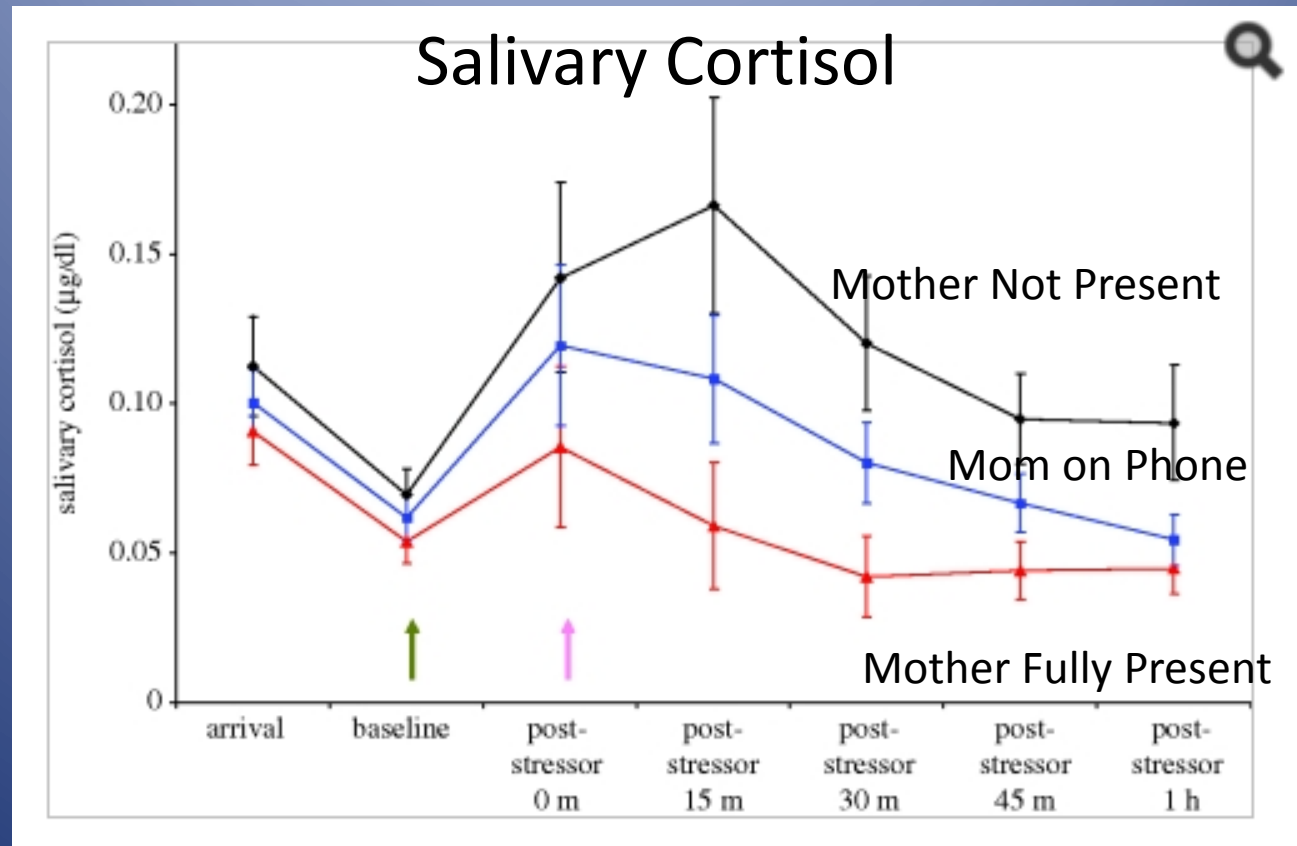


Teen Years?

Social Buffering From 7-12 Years

- Seltzer, Ziegler, & Pollak, 2010
- Trier Social Stress Test for Children
 - Speech and mental arithmetic, in front of judges, while being filmed
 - Social evaluative threat (Dickerson & Kemeny)
- Girls Only
- 3 condition; After Speech, during recovery,
 - (1) Mom is with you
 - (2) Call mom on the phone
 - (3) No mom, just the experimenters

Maternal Contact and Response to Trier Social Stress Test (TSST) in 7- to 12-year Old Girls



How Long Does Social Buffering By the Attachment Figure Last?



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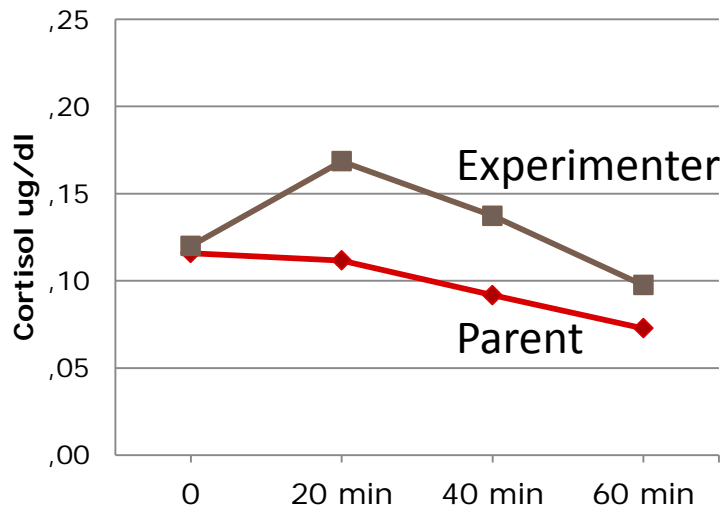
Teen Years?

Does Social Buffering By the Attachment Figure Last Into the Teen Years?

- Cam Hostinar and Anna Johnson
- Used Kirschbaum design: social support present during speech preparation in TSST
- Contrasted Mother Present vs Stranger (Experimenter) Present. Adult could provide emotional support and ideas for the speech.
- Participants were 9-10 and 15-16 years old
- Half boys/half girls

Parental buffer loses potency with age

Cortisol Response to TSST-C in Children (N=40)



Significant interaction of age group x condition ($F(1,199)=3.93, p=.049$)

Interim Summary

- Parents are powerful buffers of the HPA axis in childhood
- Development of buffering in the first year corresponds to the development of the attachment relationship
- Even the knowledge that you can talk to mom on the phone may be enough to keep cortisol low (Seltzer et al)

Interim Summary Continued

- In adolescence, parents become ineffective buffers of the HPA axis during performance stressors
- Mechanism(s) of this developmental change are unexplored; may include pubertal changes to regulation of the HPA system

Childhood Questions

- If attachment figures serve a buffering role, how do children fare when they are not with their attachment figures?
- Who else can serve the buffering role?
- What is needed for other adults to buffer the child's stress system?

Sensitive/Response Care by “Babysitters” Buffers Stress Hormones in 9-month-olds

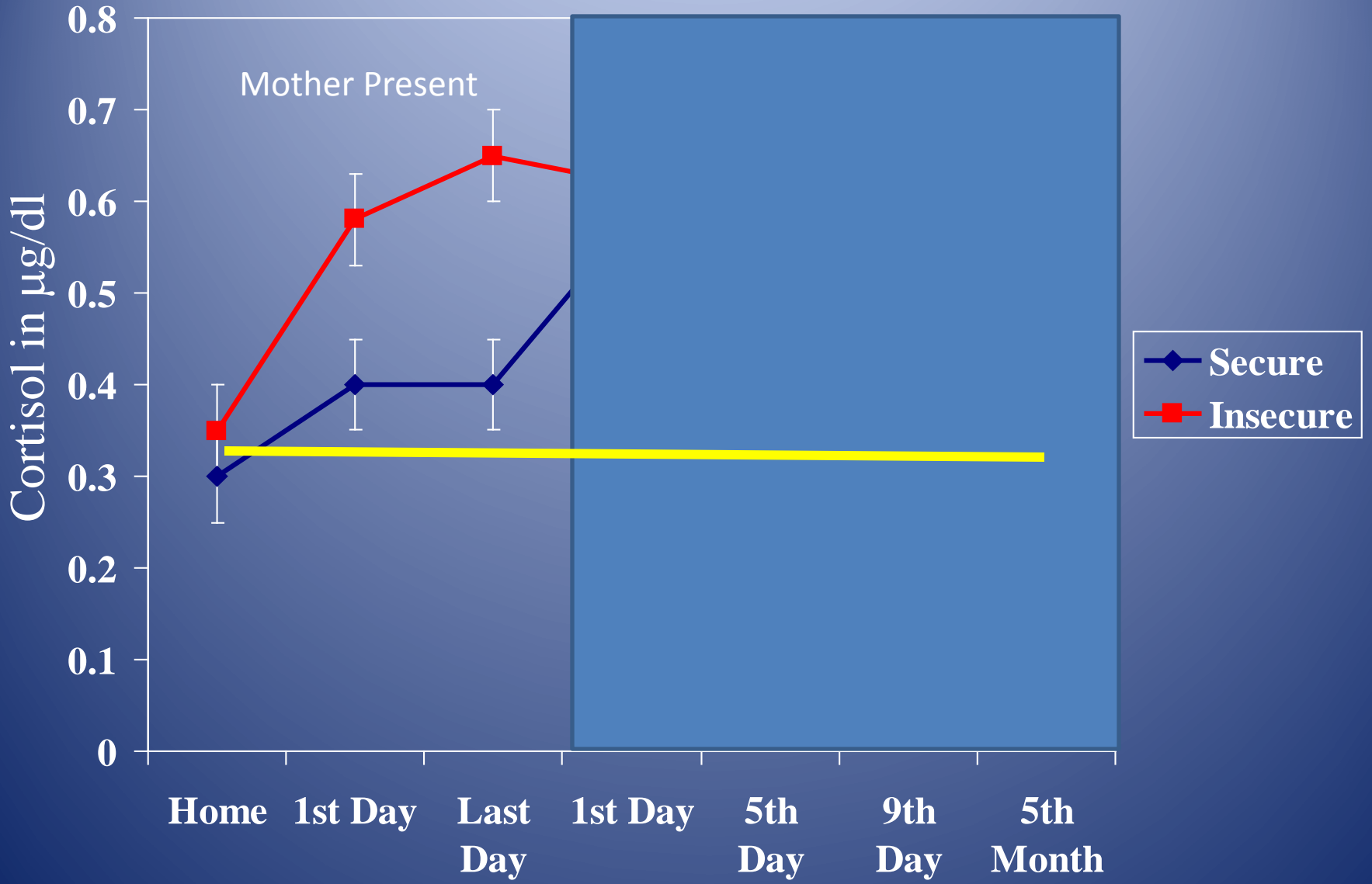


High

Low

Sensitive/Responsive Care

Gunnar et al., 1992

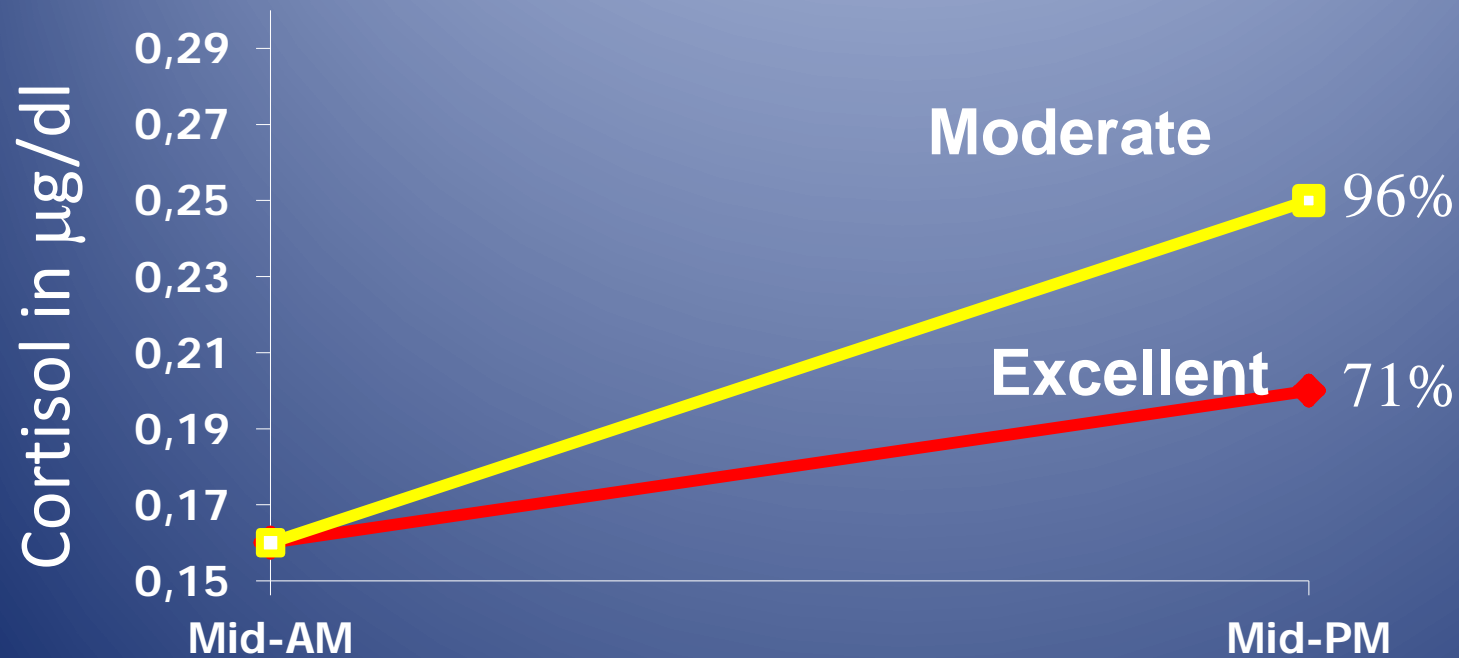


Adaptation

Separation

Ahnert et al., 2004

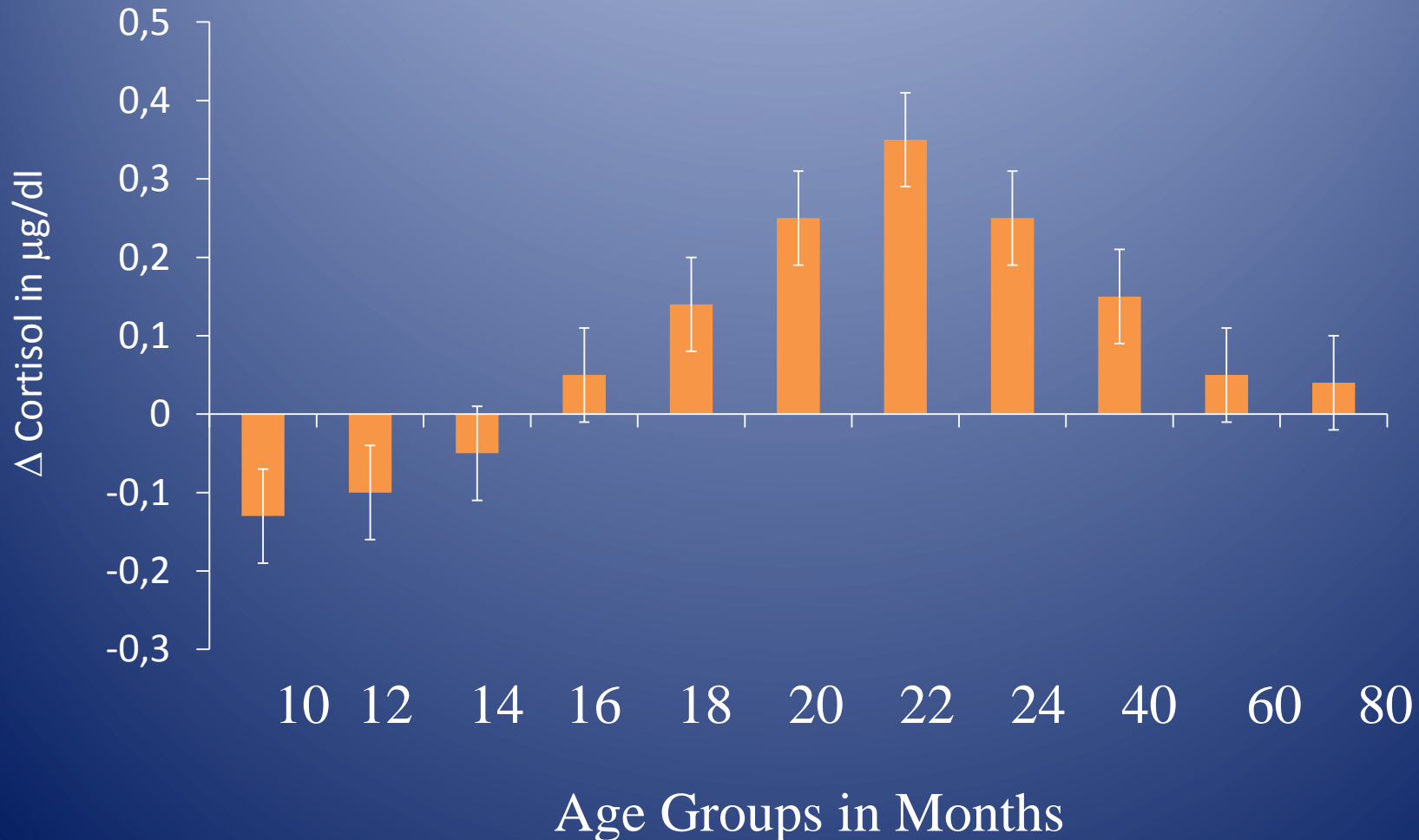
Center-Base Childcare Data on 3- to 5-Year-old Children



x

Tout et al, 1998

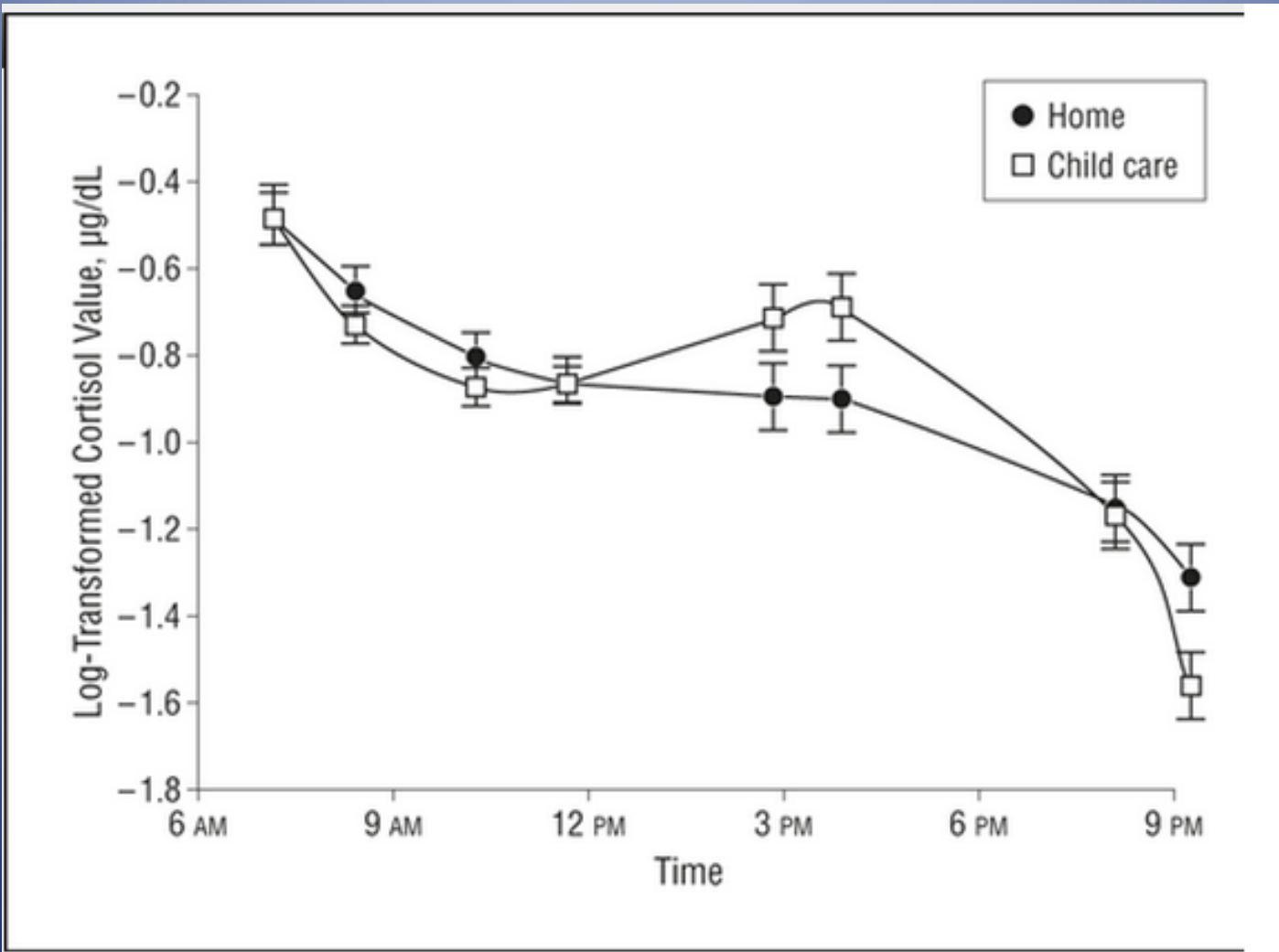
Increases in Cortisol from 10 a.m. to 4 p.m. at Center Based Care



Is It a Separation Response?

- Do cortisol levels begin to rise as soon as the child is dropped off at child care?
- Summer, Bernard and Dozier
- Child Care Center at the University of Delaware
- Children 16-24 Months of Age
- Child Care and Non-Child Care Day

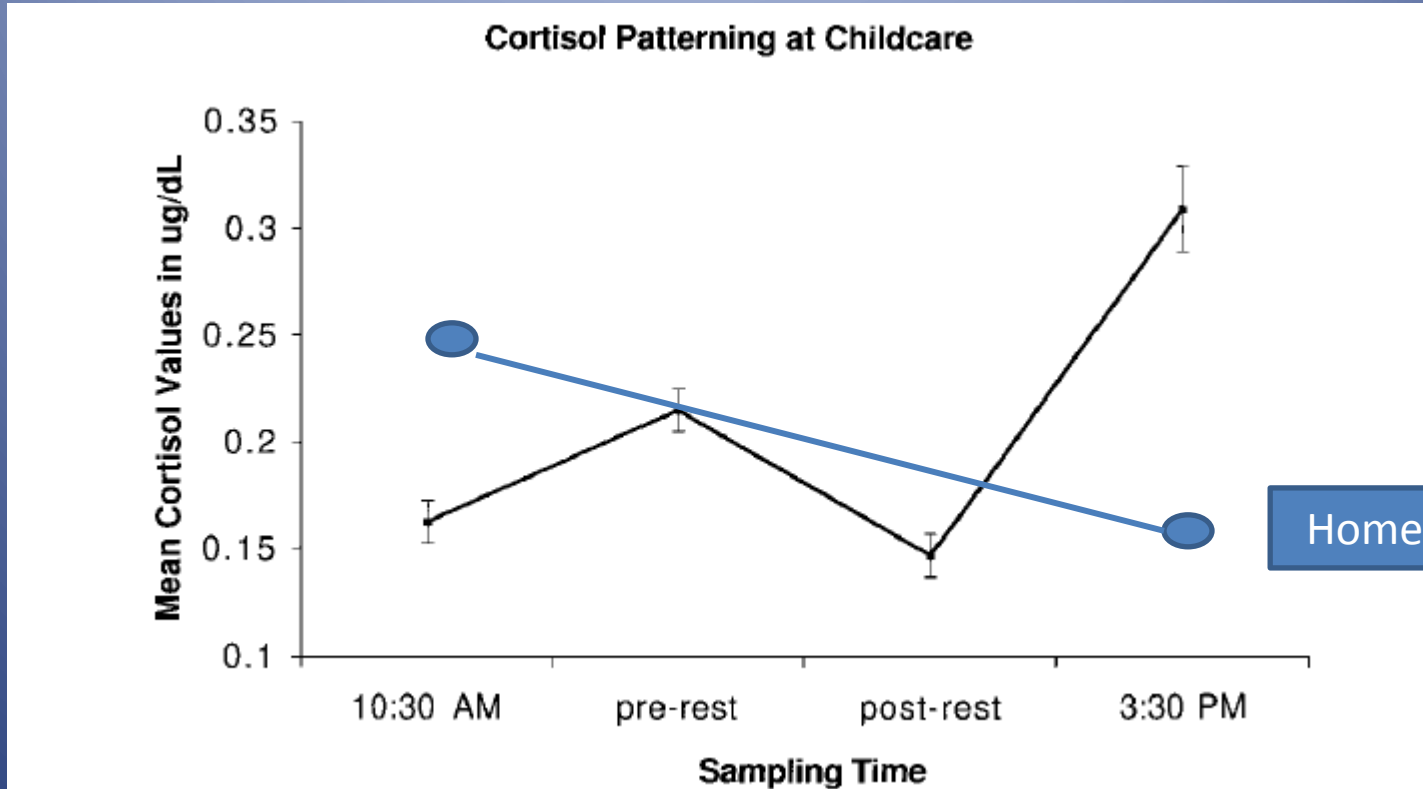
Toddlers in Center Based Care



Is It Just That They Get Tired?

- Do cortisol levels rise at child care because children don't get enough of a nap
- 35 children in 4 classrooms aged 2.8-5.4 yrs.
- Sample at 10:30, immediately before nap, immediately after nap and 30+ minutes later around 3:30 pm
- Observed the nap to determine if they "appeared" to be asleep or not.

Cortisol Data from “Napping” Study Three and Four Year Olds



Children nap longer at child care than at home

Children nap longer on days when their cortisol is higher

Levels postnap do not differ by how much or whether the child sleeps during the nap period

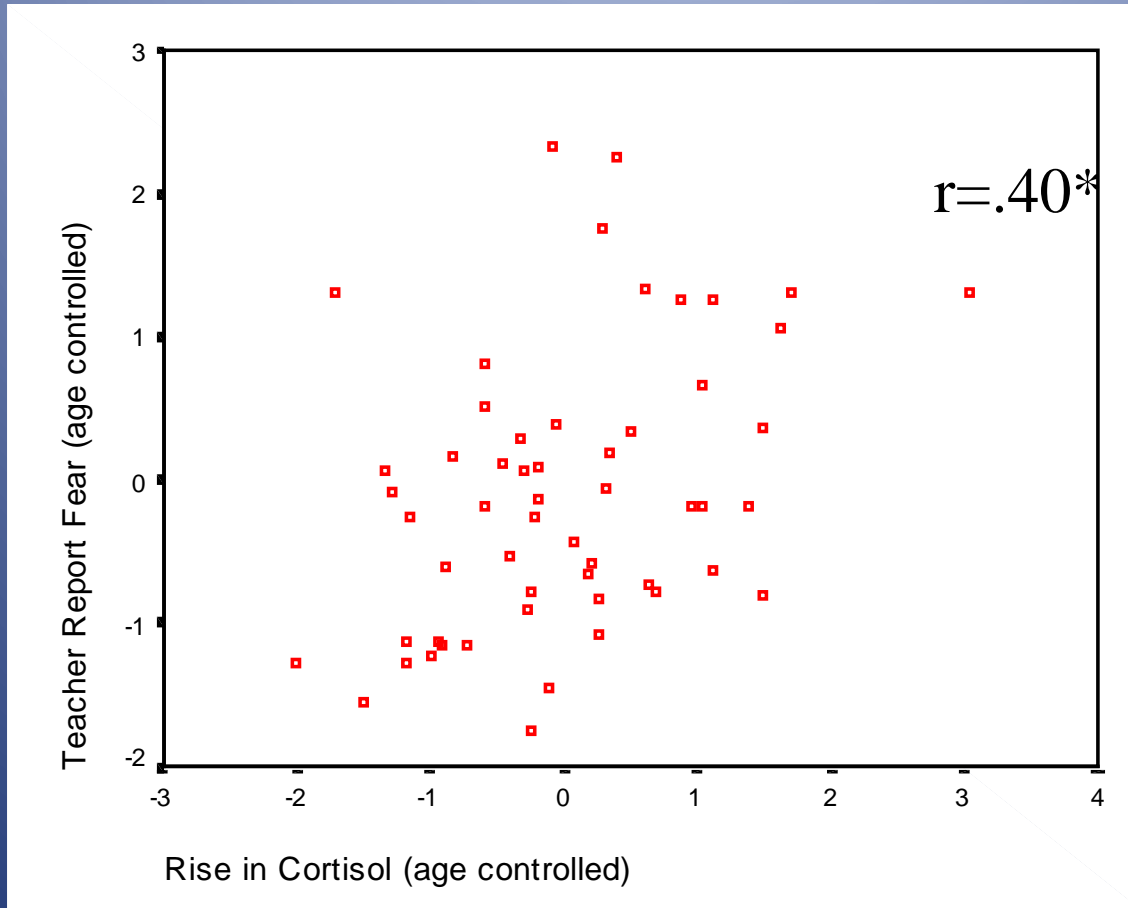
Temperament and Stress Reactivity in Peer Group Settings



Exuberant

Fearful

Fearful Toddlers Show Larger Rise in Cortisol Over Childcare Day

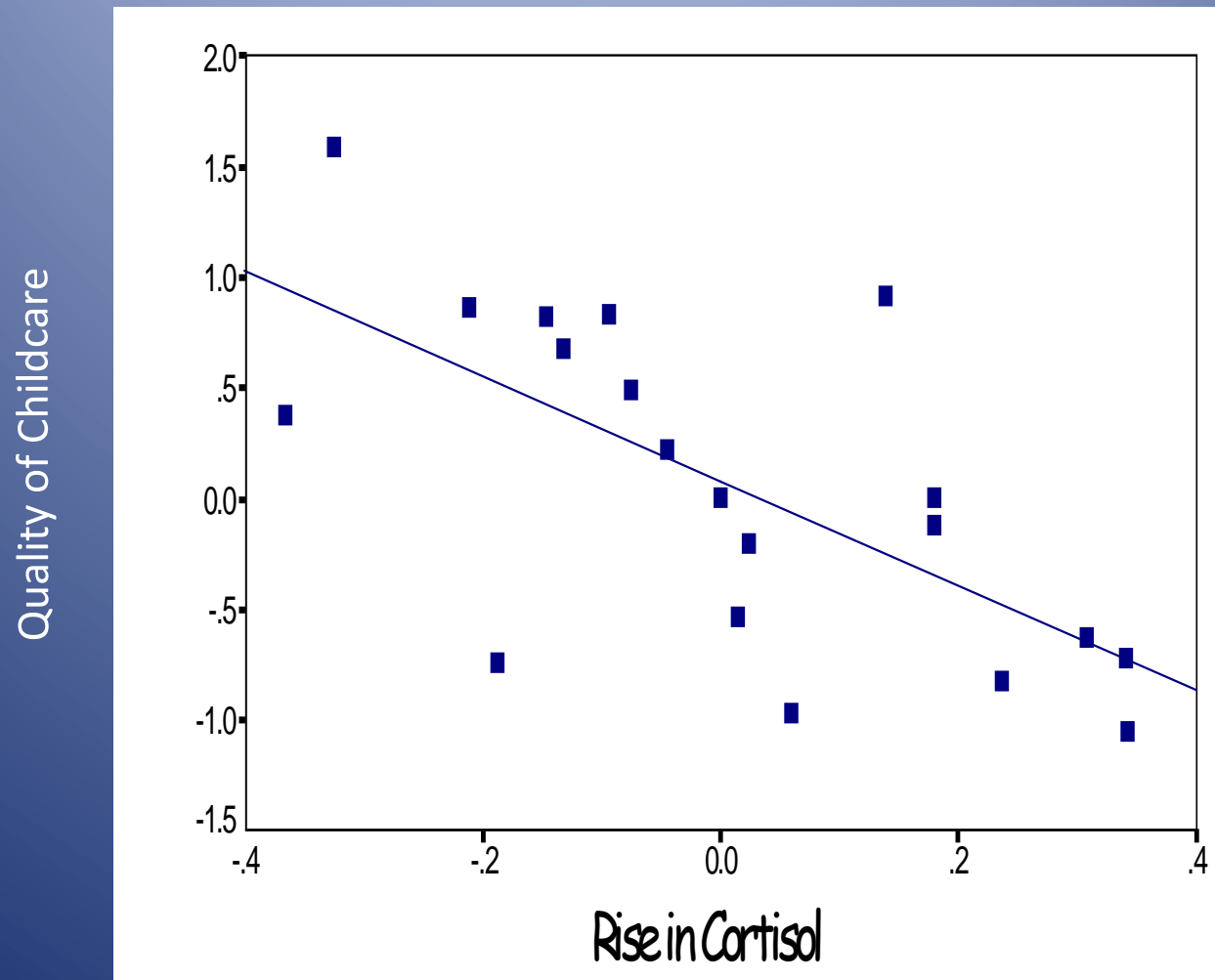


Does the Quality of Care Matter?

- Is the rise in cortisol over the child care day a function of the amount of sensitive and responsive care provided at child care



Children in Poorer Quality Home-Based Childcare Show Rises in Cortisol Over the Day



x

Unanswered Questions

- What aspects of quality affect cortisol elevations?
- Does it matter?
 - Do elevations in cortisol predict changes in child behavioral or emotional dispositions?
 - Are some children affected more than others?

Design

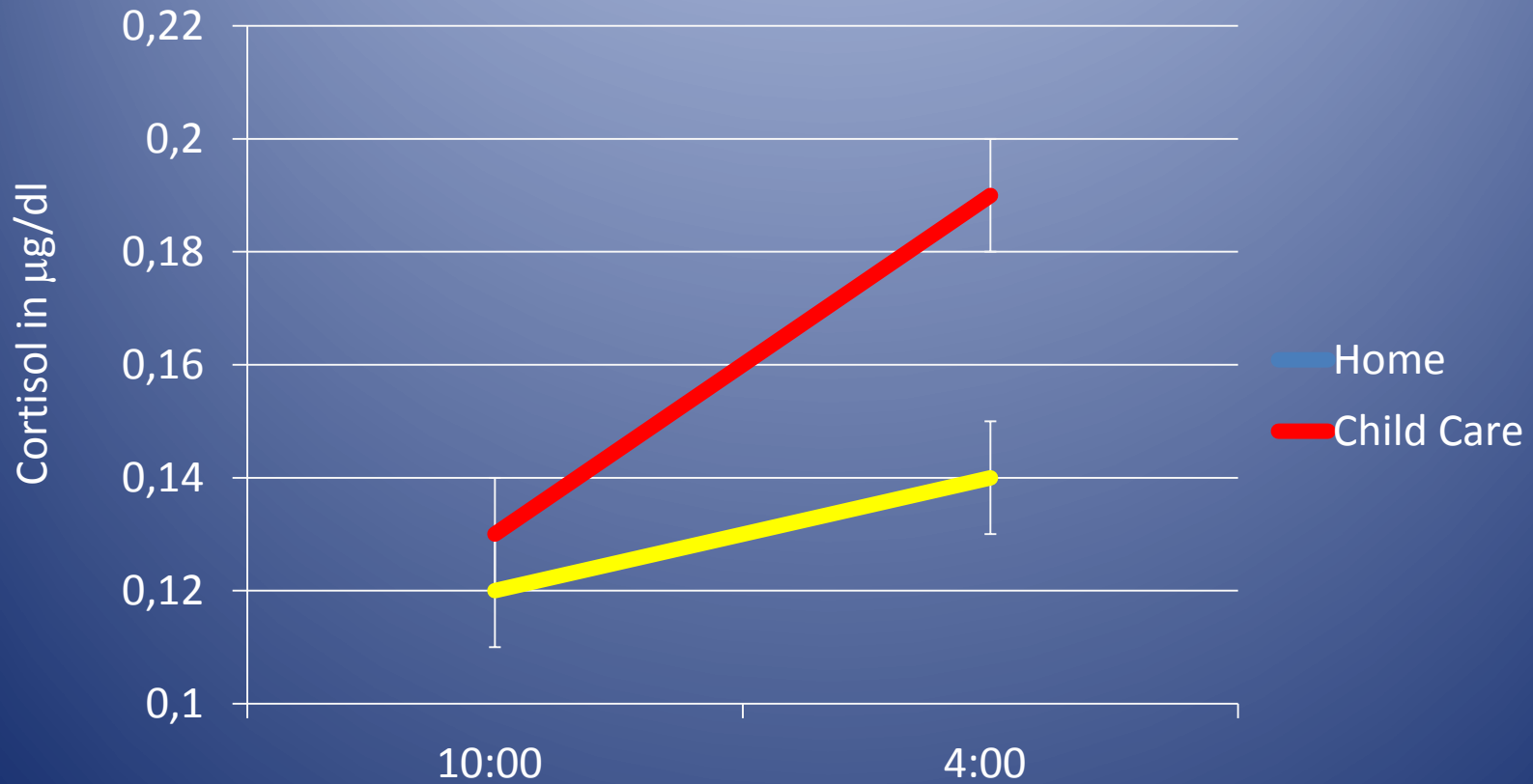
- Assessment Times
 - Time 1: Children 3 to 4.5 years old
 - Time 2: Six Months Later (in same child care site)
- Measures
 - Quality of Care M-ORCE (T1)
 - Cortisol Rise (T1)
 - Home and Child Care
 - 10 AM and 4 PM
 - Child Behavioral Inhibition (T1)
 - LabTAB Stranger Approach
 - Parent and Teacher Children's Behavior Questionnaire
 - Child Behavior
 - Anxious/Vigilance at Child Care (T1 and T2)
 - Internalizing Problems (T2; Parent and Teacher Report)
 - Externalizing Behavior (T2; Parent and Teacher Report)

Child Care Sites

- 111 Licensed Family Child Cares Participated
- Size of child cares:
 - Typically 1 adult and 5 children (range 2 to 12)
- Provider Education:
 - Median= some college



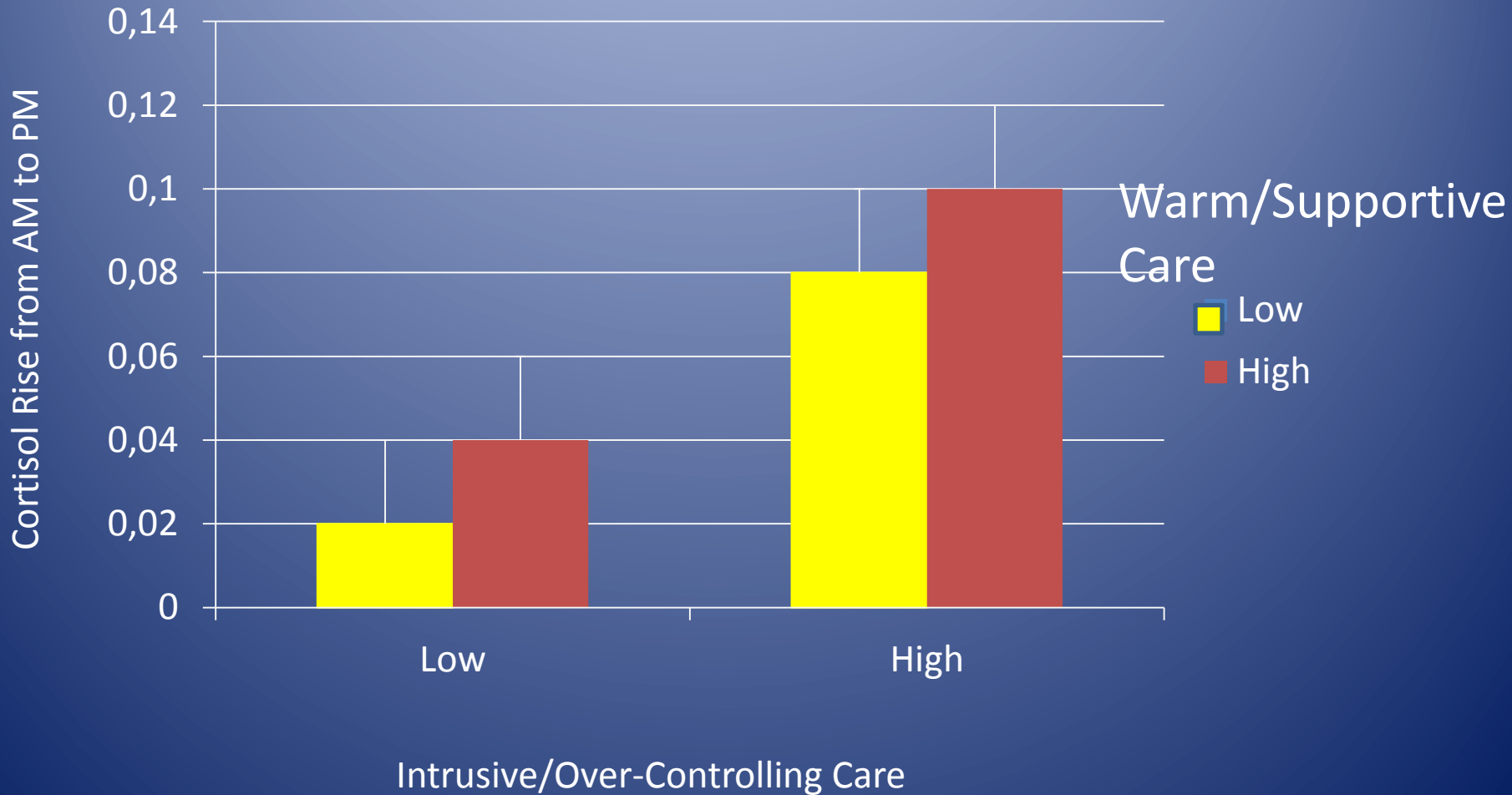
Rise in Cortisol: Home and Child Care



Process Measures of Quality

- Modified Observational Rating Scale of Caregiving Environment scored over 2 morning
- 9 scales from M-ORCE subjected to Principle Component Analysis
- Yielded 2 Factors
 - Warm/Supportive Care
 - Sensitivity, Positive Regard, Positive Community Building minus Negative Community Building, plus Detachment and Chaos (negative loadings)
 - Intrusive/Overcontrolling Care
 - Intrusiveness, Negative Regard, and Overcontrol

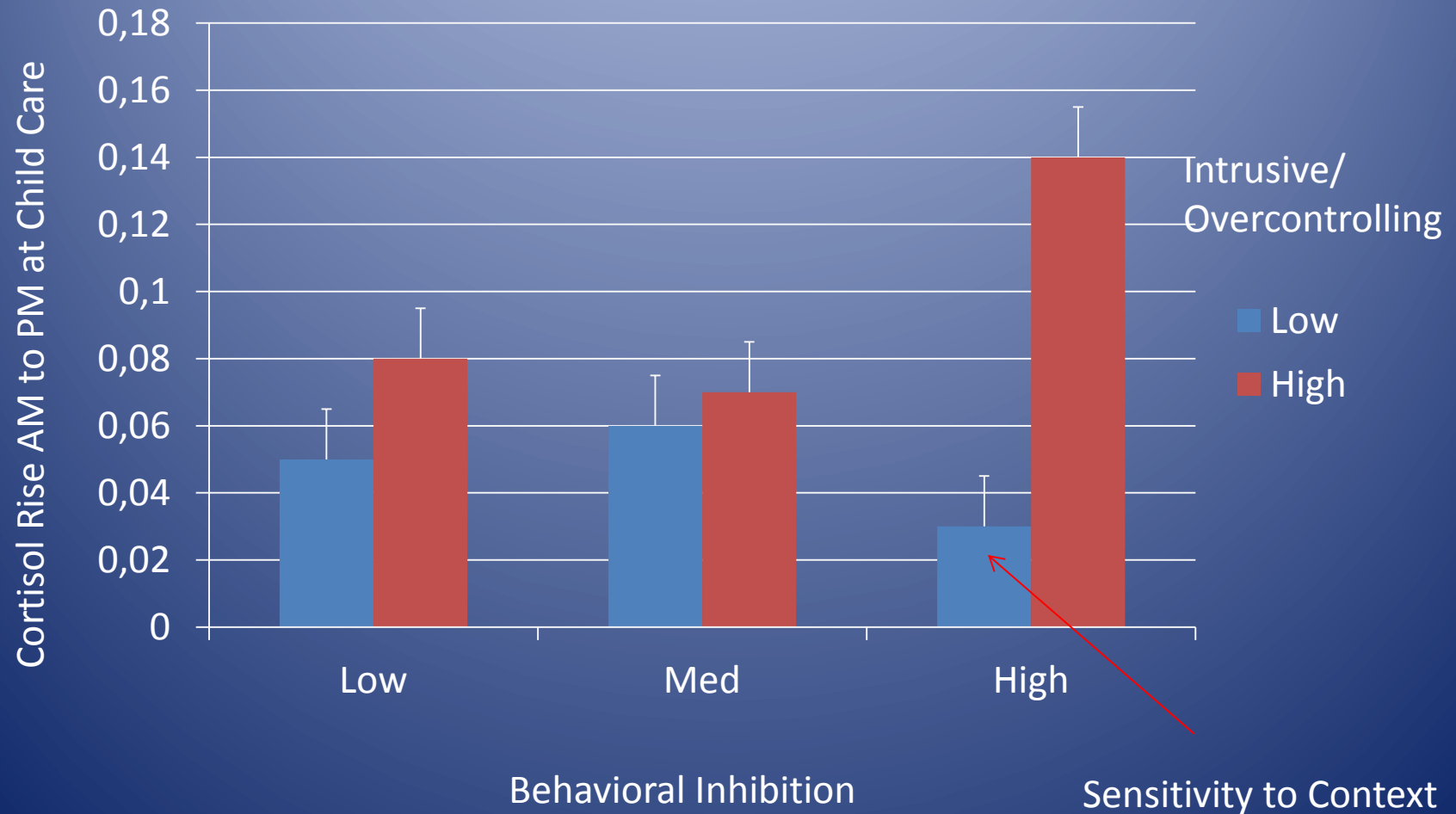
Intrusive/Over-Controlling Care Elevates Cortisol at Child Care



Behavioral Inhibition Predictions

- Behavioral Inhibition is associated with increased risk of anxiety disorders
- Hypothesis: Behaviorally Inhibited Children would be more likely than non-inhibited children to show cortisol increases in poorer quality settings.

Behavioral Inhibition Plus High Intrusive Care: Largest Cortisol Increases at T1



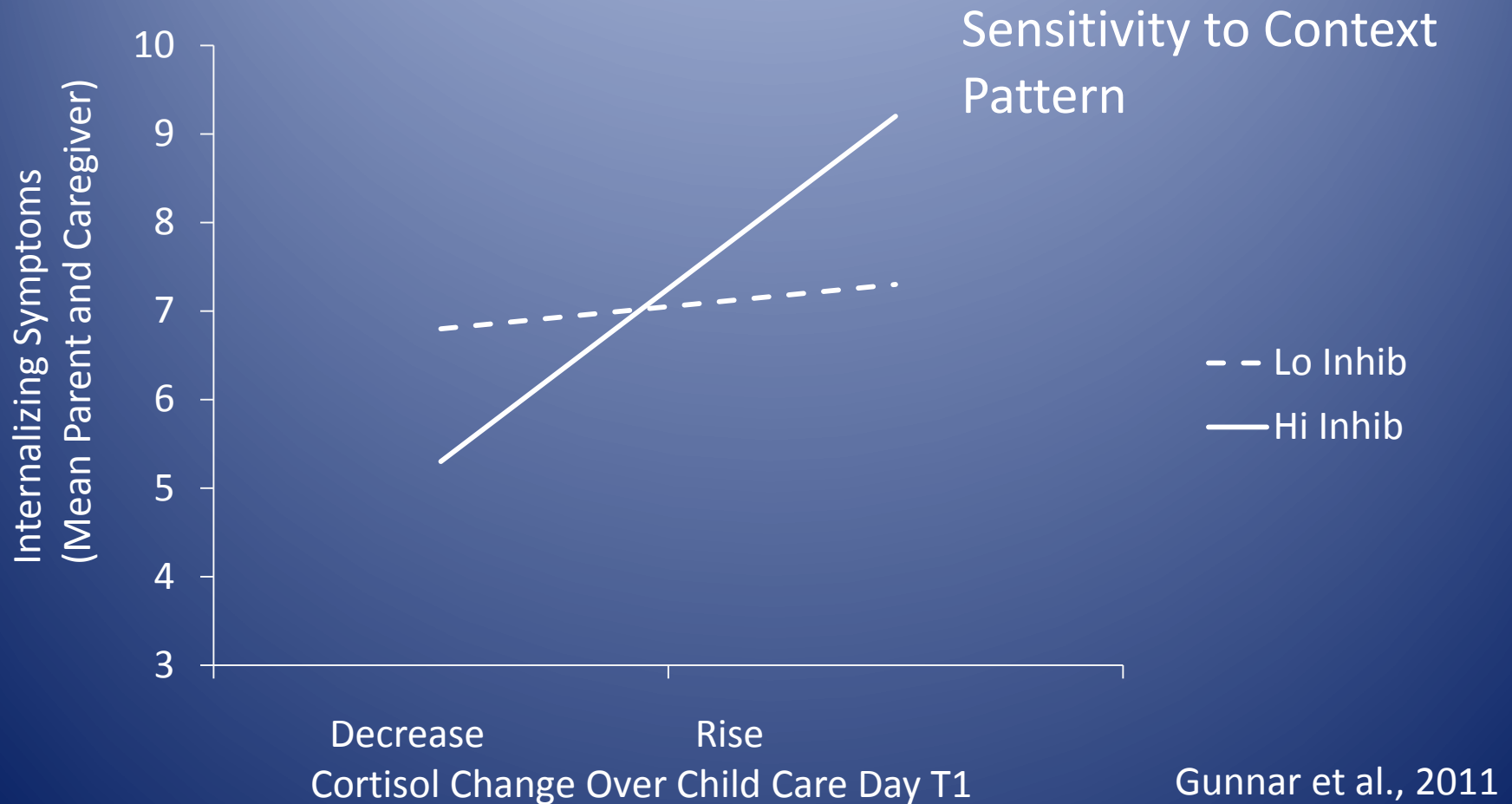
Six Months Later

- 107 (of 151) children
- 58% Girls
- Most common reason for not being in follow-up
 - Recruited at the end of the study
 - Started Kindergarten
 - Changed or Left Child Care

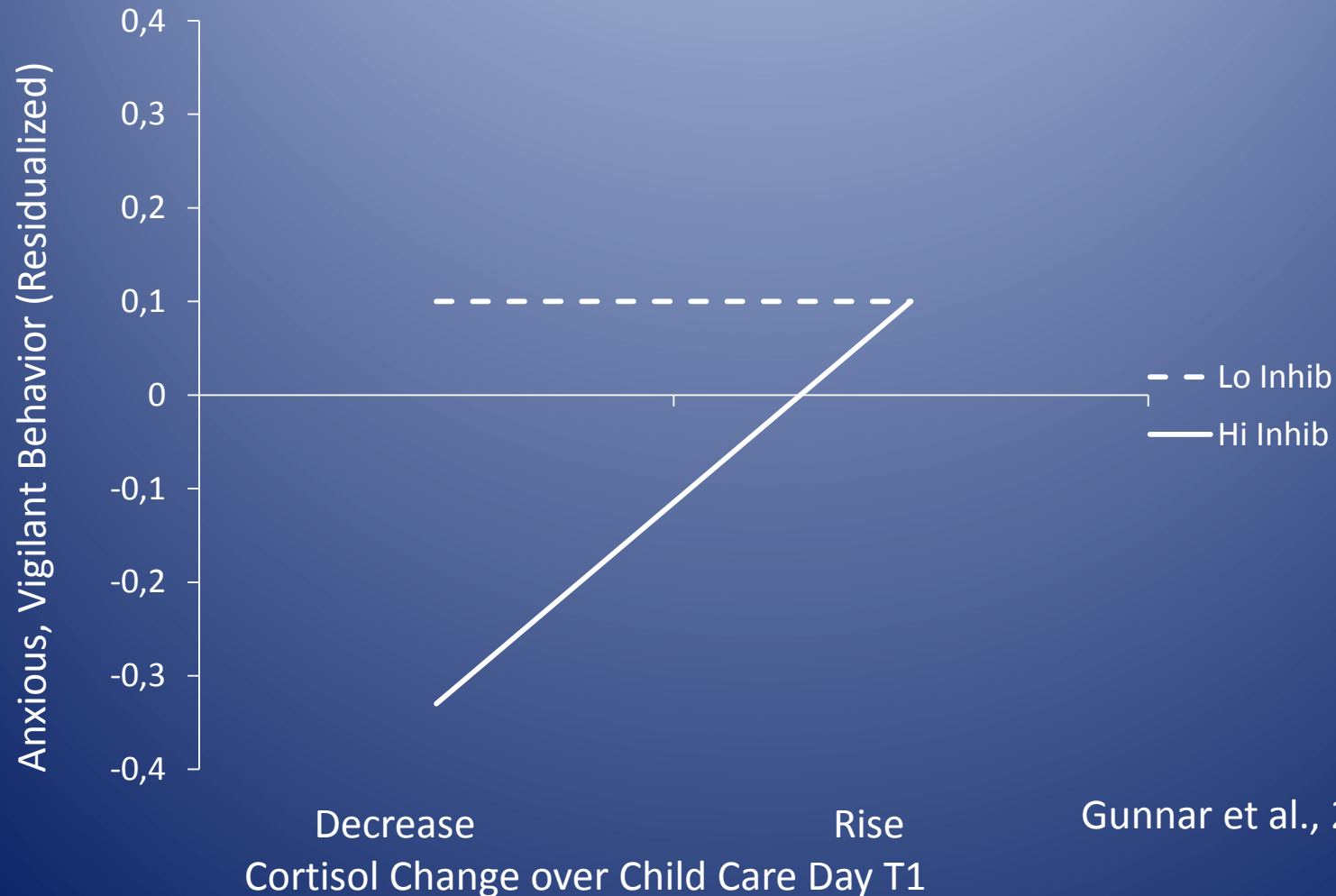
Predictions

- Chronic Stress increases anxious, vigilant behavior
- Neurobiological processes beginning to be understood
- Stress hormones Play a Role
- Hypothesis: Larger Elevations in cortisol at T1 would be associated with Anxious/Vigilant Behavior at Child Care and Parent/Teacher reports of internalizing symptoms.

High Inhibition Children are Sensitive to Cortisol Context



Highly Inhibited Children in Low Cortisol Stress Child Care Show Decreasing Levels of Anxious Behavior

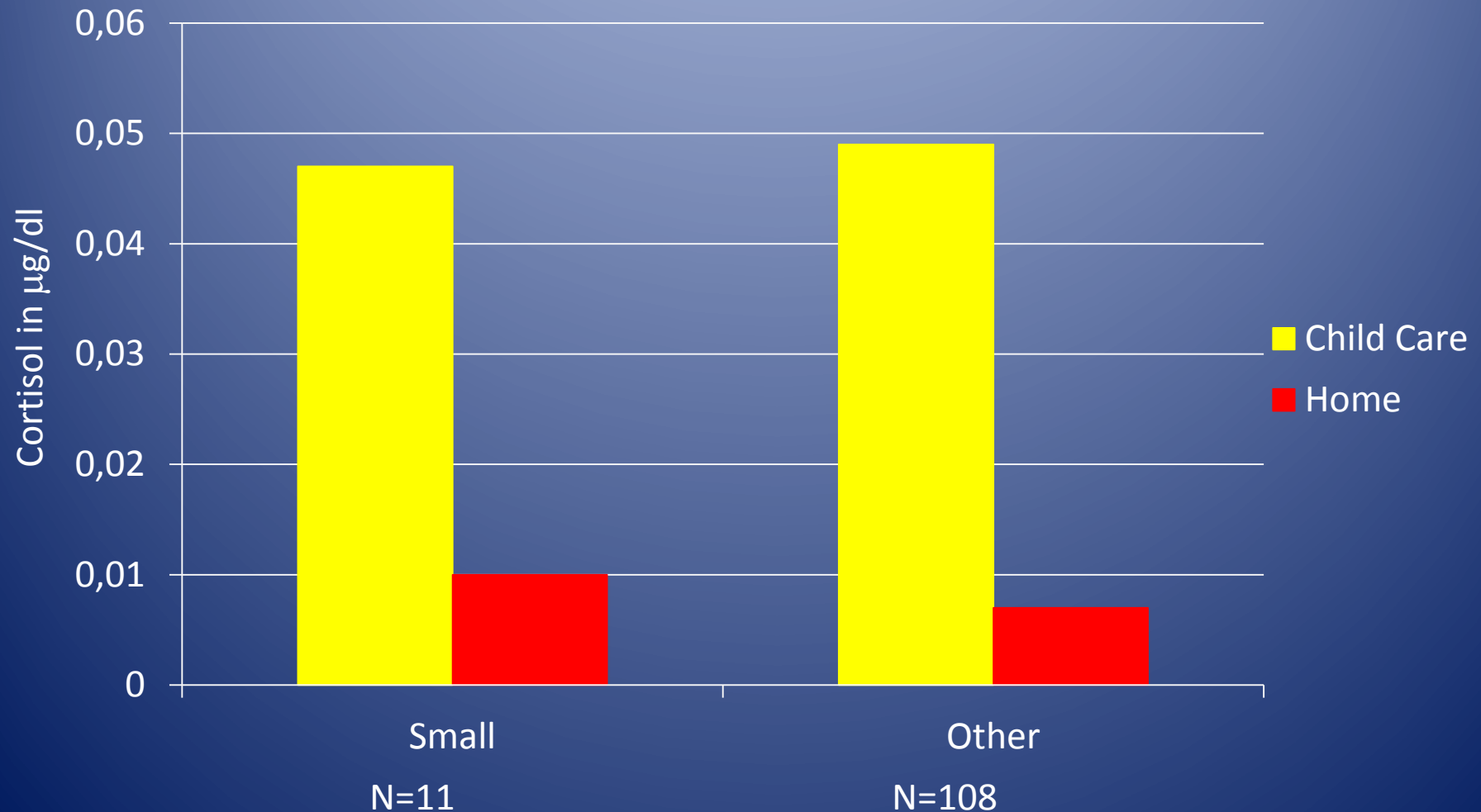


Gunnar et al., 2011

Back to Social Buffering

- Is what is happening at child care a reflection of a loss of social buffering?
- Could it just be that the stimulation of being with lots of children of one's own age is exhausting and requires more physical resources than being home for children of this age?
- If it is the number of children, then home-based child care with small numbers (4 or fewer) children should be very family like and not demand extra physiological resources.
- Especially in home-based child care where the children are rarely all the same age.

Rise in Cortisol at Child Care and Home For Small (4 child or fewer) versus Other Child Care



Child Care and Social Buffering Summary

- Child Care Produces Elevations in Cortisol Over the Child Care Day for preschool-aged children
- We still do not know if this is because of a loss of the social buffer and a failure of that buffering to transfer to the child care provider or whether it has to do with stimuli in child care that even the parent could not buffer if s/he was there.

Continued.....

- We do know that:
 - Quality of care matters: intrusive, over-controlling care produces larger elevations
 - Behaviorally-inhibited children are more vulnerable to cortisol increases at child care and appear to be more affected by them

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