Parenting Interactive Bedtime Behaviors and Sleep Among Toddlers Living in Socioeconomically Disadvantaged Homes

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Objectives

- Describe study on sleep, stress, and health among toddlers living in socioeconomically disadvantaged homes
- Present preliminary data that focus on the role of parenting interactive bedtime behaviors and toddlers' sleep
- Discuss next steps

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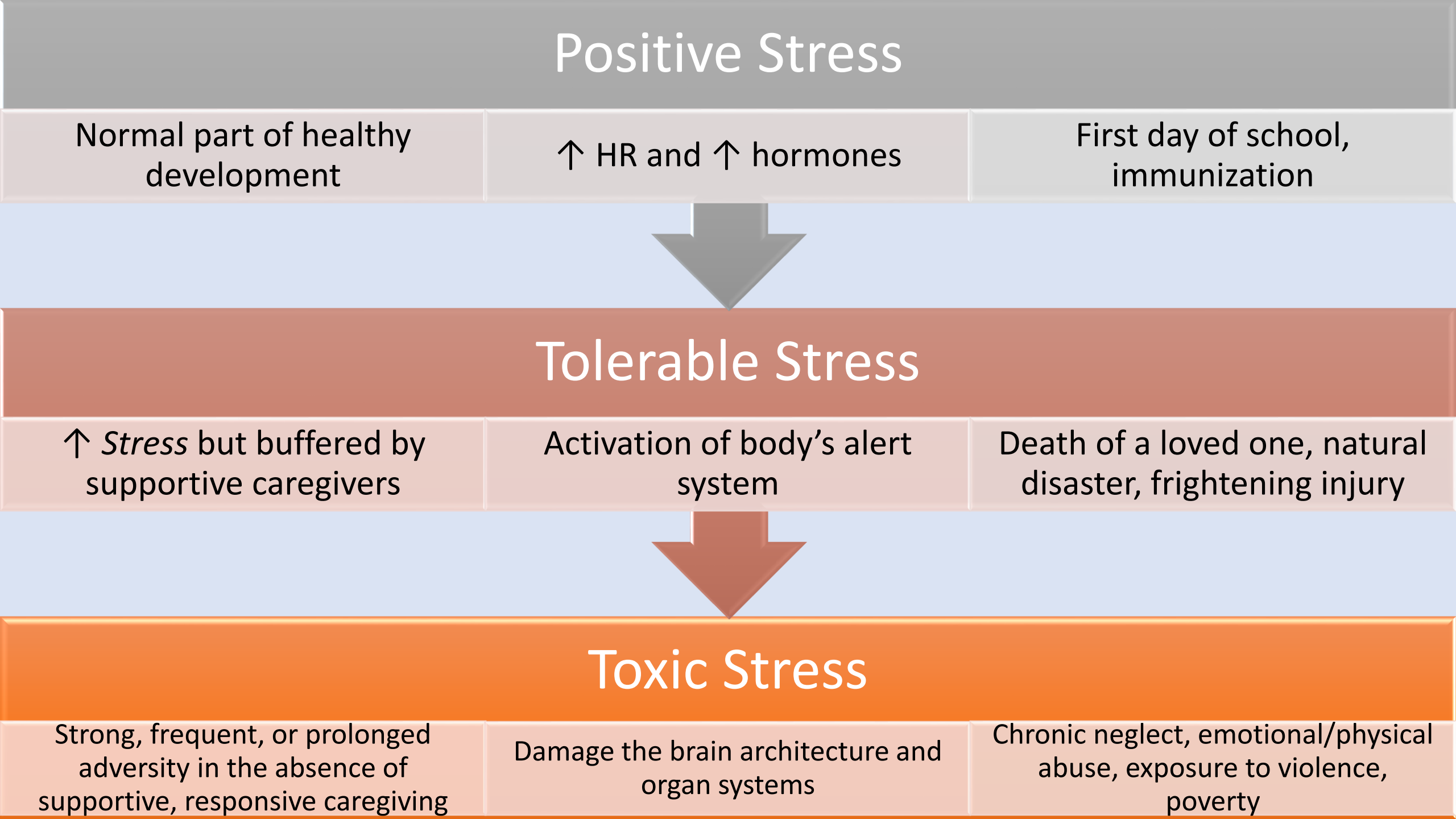
Significance

- Adversity early in life strongly is associated with health outcomes (Shonkoff J., et al.; Boyce WT, Sokolowski MB, Robinson GE)
- Persistent lack of resources and increased stressors experienced by young children can lead to toxic stress
- The experience of socioeconomic adversity early in life can result in poor sleep
- Poor sleep early in life may interfere with child's ability to maintain homeostasis and compound the risk for stress-related health problems (Grandner, Sands-Lincoln, Pak, & Garland, 2013)


Positive Stress
Normal part of healthy development
↑ HR and ↑ hormones
First day of school, immunization
Tolerable Stress
↑ *Stress* but buffered by supportive caregivers
Activation of body's alert system
Death of a loved one, natural disaster, frightening injury
Toxic Stress
Strong, frequent, or prolonged adversity in the absence of supportive, responsive caregiving
Damage the brain architecture and organ systems
Chronic neglect, emotional/physical abuse, exposure to violence, poverty

Why do we worry about toxic stress?

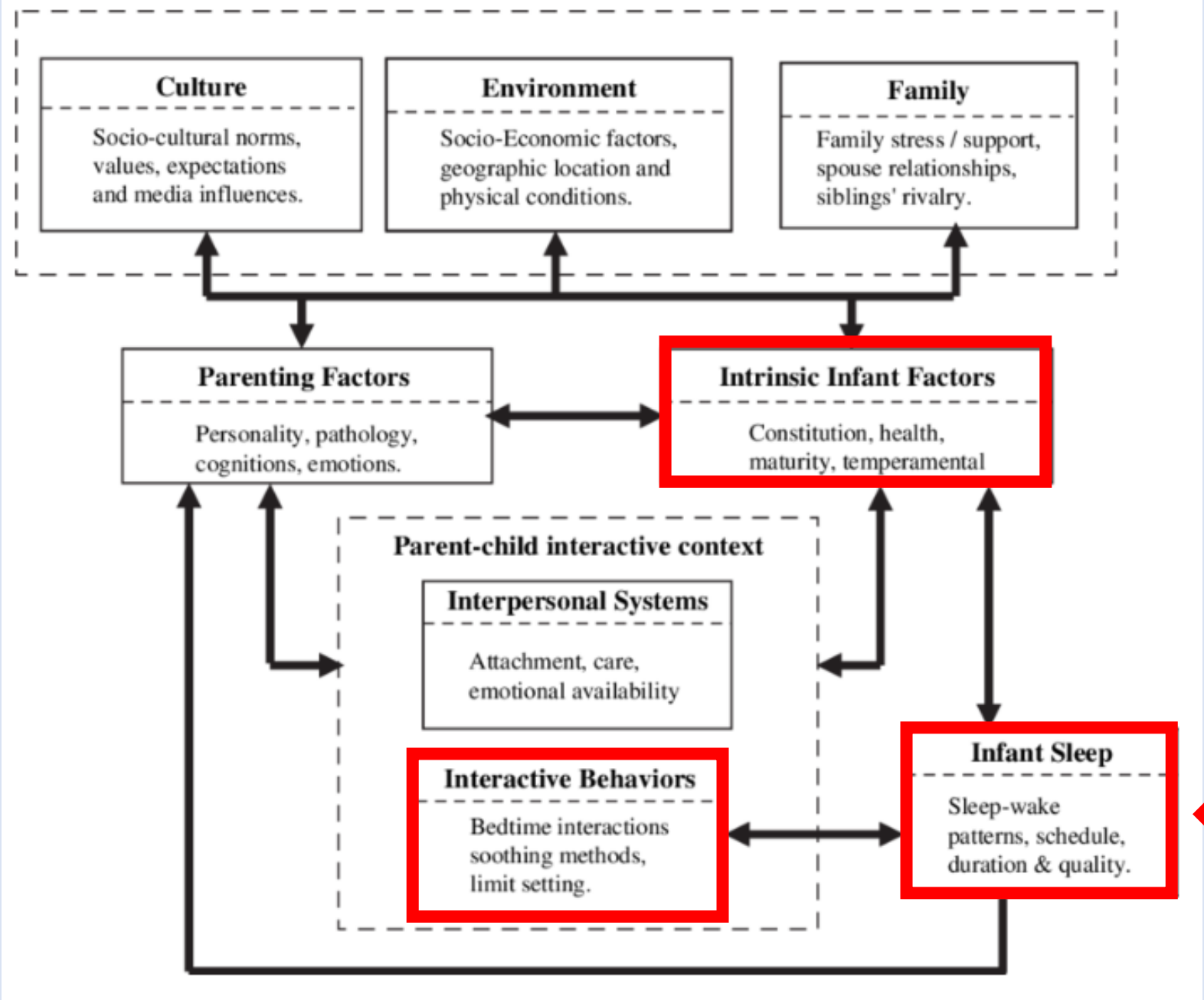
- Toxic stress response that occurs repeatedly or frequently from multiple sources can have a cumulative effect on children's health into adulthood
- Supportive, responsive relationships with caring adults early in life can prevent or reverse damaging effects (Shonkoff et al., 2012)
- Additional buffering mechanisms include safe, supportive environment and healthy nutrition (Shonkoff et al., 2012)
- Can sleep mitigate the relationship between adversity and poor health outcomes among children at risk for toxic stress?

Importance of Sleep

- Adequate sleep duration and efficiency is essential to children's health and development (Sheldon, Ferber, Kryger, & Gozal, 2014)
- Young children often do not obtain sufficient sleep duration or efficiency leading to health risks (Magee, Gordon, & Caputi, 2014)(Spruyt, Alaribe, & Nwabara, 2015)
- Emerging research suggesting a disparity in sleep duration occurs as early as one year among those living with socioeconomic adversity compared to children of higher income families (Cronin, Halligan, & Murray, 2008)
- There is limited research on sleep characteristics among young children living with socioeconomic adversity
- More information is needed on the nature of the relationships between sleep and stress to support sleep interventions for this population

Transactional Model of Infant Sleep

(Sadeh & Anders, 2009)



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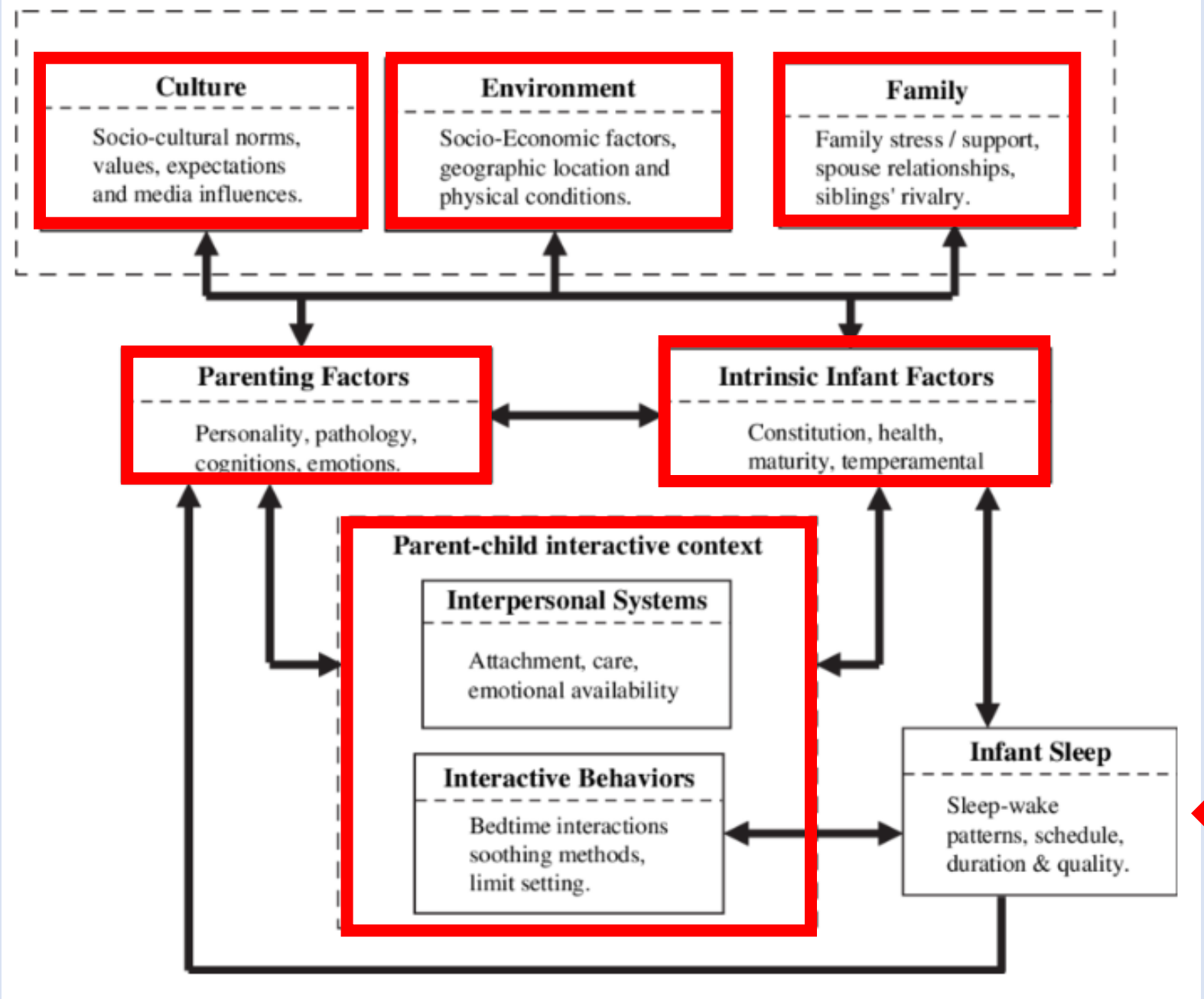

Overall goal

Identify causal pathways to explain how adversity is biologically embedded and ultimately test the effects of interventions, such as those that may improve sleep, among young children at risk for exposure to toxic stress response.

Current study: *Sleep, Biological Stress, and Health among Toddlers Living in Socioeconomically Disadvantaged Homes*.

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Purpose

The purposes of this study are to:

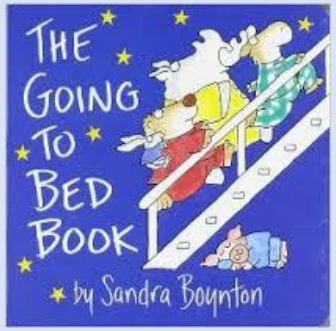
- Examine the relationships among sleep characteristics (duration, efficiency), stress biomarkers, and behavioral health among toddlers living in socioeconomically disadvantaged homes
- Examine how these characteristics change over time from age 12 months to 24 months.

Aims

1. Examine changes in subjective and objective sleep characteristics from 12 to 24 months of age
    a. **Examine the characteristics of sleep and parenting interactive bedtime behaviors (PIBB) among toddlers living in urban socioeconomically disadvantaged homes.**
2. Examine changes in stress biomarkers from 12 to 24 months of age.
3. Examine the cross sectional and longitudinal relationships between sleep characteristics and stress response
4. Examine the cross sectional and longitudinal relationships between sleep characteristics and toddlers' child behavior problems.

Study Design

- Prospective longitudinal study of toddlers aged 12-15 months at initial visit
- 4 research visits:
  - 2 visits, 2 weeks apart at age 12-15 months
  - 2 visits, 2 weeks apart one year later
- Caregivers receive $50 per study visit
- Each toddler receives an age-appropriate book



Sample

- Primary caregivers and toddlers aged 12-15 months
- Recruited from Yale PCC and Early Head Start programs
- Exclusion criteria:
  - Caregivers without English fluency
  - Sibling of child already enrolled in study (select one twin)
  - Children diagnosed with sleep apnea or any medical condition affecting sleep
  - Children in the custody of the CT Department of Children and Family Services
  - Caregiver <18 years old

Setting

- Participants’ homes
- Yale-New Haven Primary Care Center
- Early Head Start centers
- Yale School of Nursing Bio-behavioral Laboratory
- Local libraries

Variables and Measures

Variable	Measure	Instrument
Socioeconomic adversity	Caregiver educational level, Income to needs ratio, Family functioning/resiliency, Social support Concrete support,	Protective Factors Survey (F.R.I.E.N.D.S. National Resource Center, 2011)
	Parenting Stress	Parenting Stress Index-4th edition (Abidin, 2012)
	Caregiver depressive symptoms	Center for Epidemiological Studies Depression Scale (CESD) (Lewinsohn, P.M., et al., 1997)
Toddler sleep	Actigraphy (sleep duration, efficiency, naps, wake after sleep onset (WASO), fragmentation	Ankle-worn Respironics Minimitter Actiwatch AW2 for 9 days/nights
	Parent reported sleep patterns and concerns regarding sleep	Sleep Evaluation Questionnaire (SEQ) (Mindell &Owens, 2010); sleep diary; Extended Brief Infant Sleep Questionnaire (BISQ) (Sadeh, 2004)
	Parenting interactive bedtime behavior	Parental Interactive Bedtime Behavior Scale (PIBBS) (Morrell & Cortina-Borja, 2002)
Stress response	Salivary and hair samples	Cortisol (saliva and hair); CRP; SIgA
Toddler behavioral health	Externalizing problems, Internalizing problems, Problems with deregulation, Maladaptive behaviors	Brief Infant Toddler Social and Emotional Assessment (BITSEA) (Briggs-Gowan, 2006)

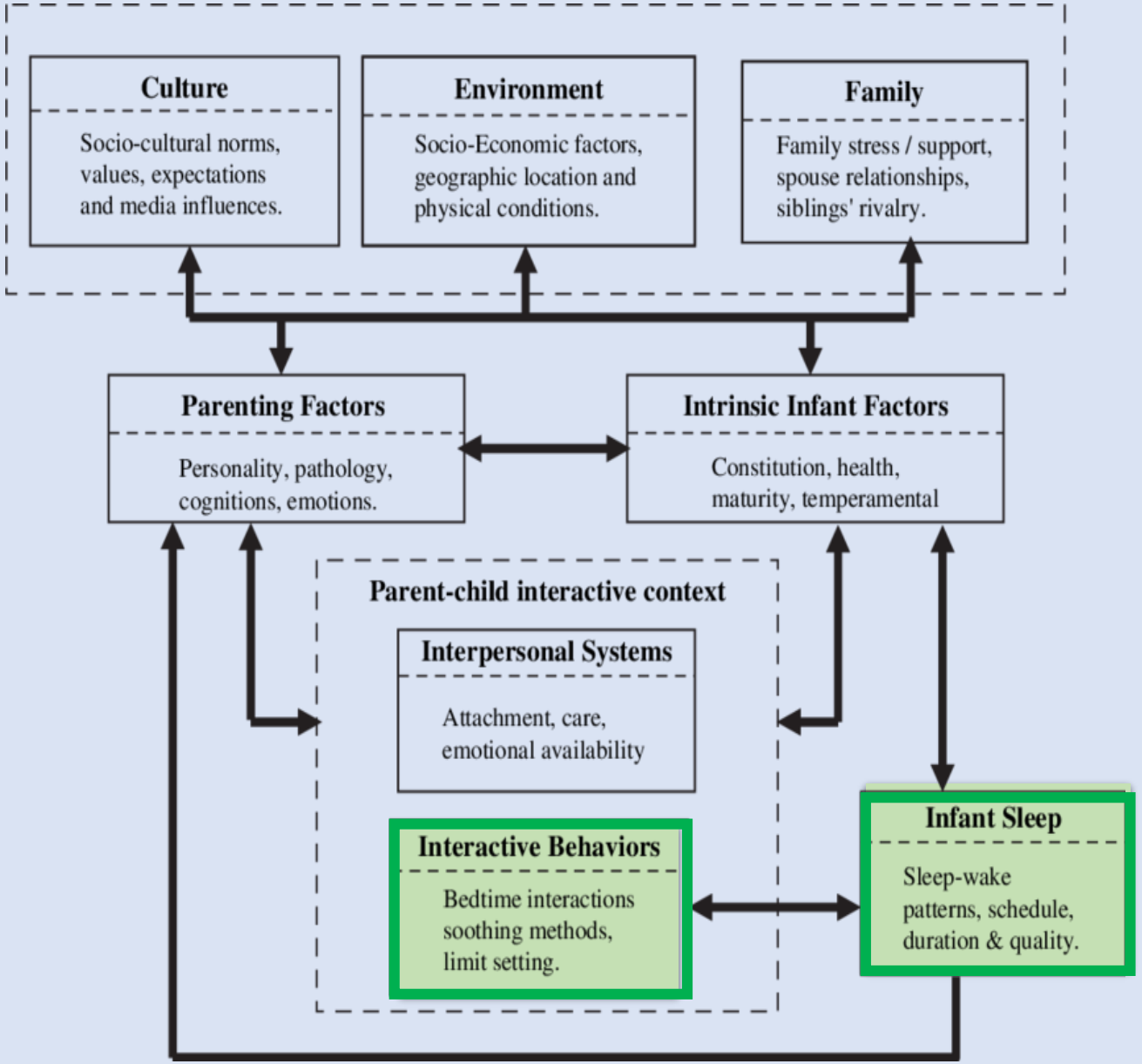
Statistical Analysis Plan

- Distributions and descriptive statistics on sleep characteristic values and biomarkers
- Calculation of diurnal cortisol slope
- Pearson or Spearman Correlation Coefficient and Generalized Linear Mixed Model for cross-sectional associations of sleep characteristics, biomarkers of stress and toddler's behavior problems at 12 and 24 months

Preliminary Results

Specific aim 1a:

Examine the characteristics of sleep and parenting interactive bedtime behaviors (PIBB) among toddlers living in urban socioeconomically disadvantaged homes.



Demographic Data (N=33)

Family Demographic Variable		Frequency (%)	
Income:	<$10,000	14	(42.42)
	$10,000-20,000	4	(12.12)
	$20,000-30,000	4	(12.12)
	$30,000-40,000	5	(15.15)
	$40,000-50,000	3	(9.09)
	>$50,000	3	(9.09)
Education:	Some high school	3	(9.09)
	High school/GED	9	(27.27)
	Trade/vocational	3	(9.09)
	Some college	12	(36.36)
	College	6	(18.18)
Race	Black/African American	14	(42.42)
	White	7	(21.21)
	Asian	1	(3.03)
	Unknown	11	(33.33)
Ethnicity	Hispanic	13	(39.39)
	Non-Hispanic	20	(60.61)
Marital	Married	5	(16.13)
	Partnered	4	(12.90)
	Single	20	(64.52)
	Divorced	2	(6.45)

Sleep actigraphy data

Sleep Variable	Mean (SD)
Sleep duration (total night sleep time), min	492*(51.9)
Wake after sleep onset (WASO), min	74.7 (21.1)
Intra-individual variability in WASO, min	32.6 (11.9)
Sleep fragmentation (%)	32.1 (5.9)
Intra-individual variability in sleep fragmentation (%)	7.3 (3.1)

*=8.2 hours

Parenting Interactive Bedtime Behavior (PIBBS)

PIBBS subscale	% of caregivers endorse
Active physical comforting (APC)	52.5
Encourage autonomy (EA)	33.1
Settle by movement (SBM)	18.2
Passive physical comforting (PCC)	27.3
Social comforting (SC)	52.3
Total parental interactive behavior	44.2

Parenting Interactions and Sleep

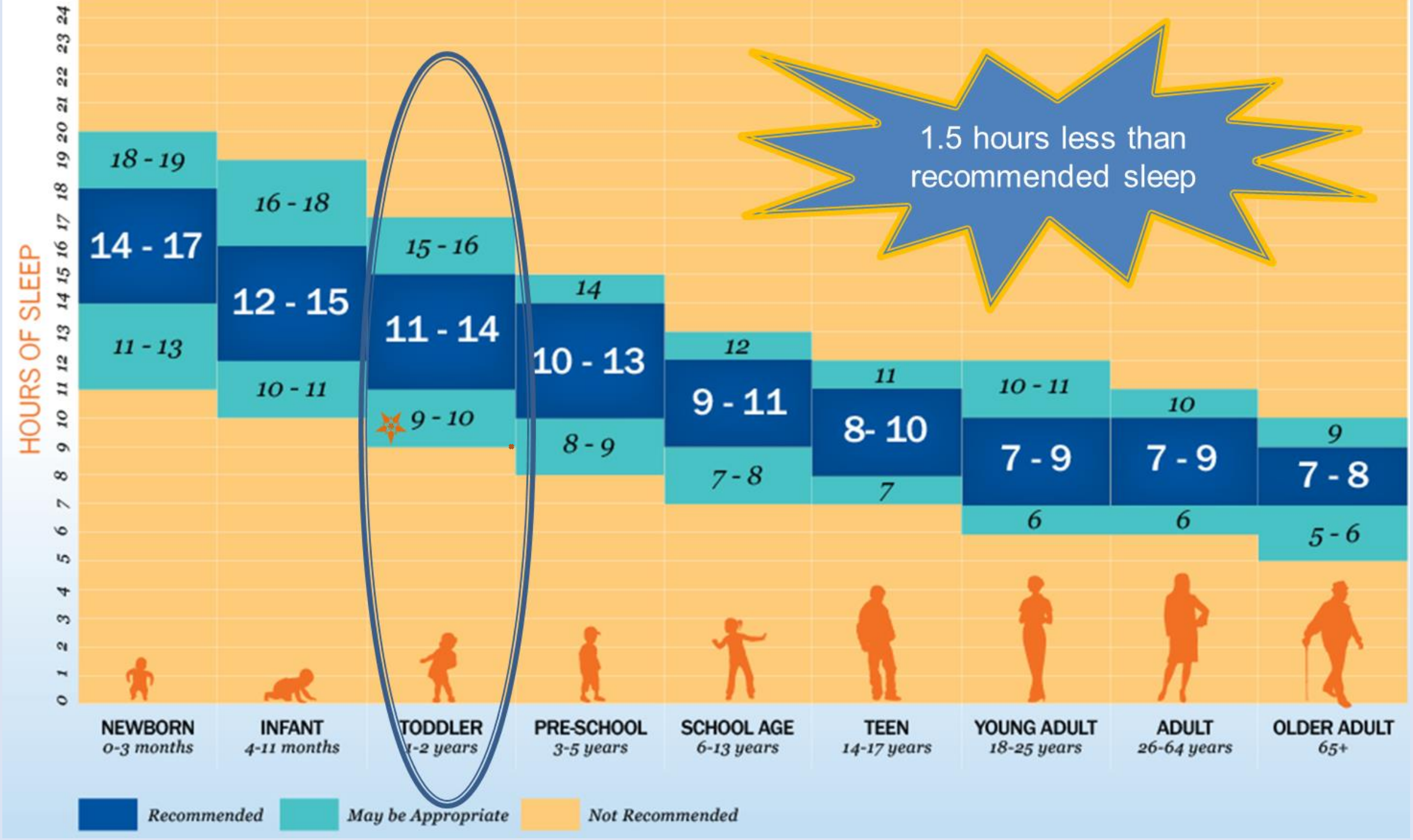
Spearman Correlations *p<.05

	APC	EA	SBM	PPC	SC	Total
Sleep duration	-.34	-.06	-.09	**-.41***	-.00	-.29
Wake after sleep onset (WASO)	-.03	.03	-.11	.11	-.07	.01
Intra-individual variability in WASO	-.11	.16	.32	**.52***	.08	**.37***
Sleep fragmentation	-.05	-.00	-.26	.08	-.11	-.09
Intra-individual variability in fragmentation	.07	.30	.21	.26	.27	**.36***

APC: Active physical comforting, e.g. rocking to sleep, patting or rubbing child's back
EA: Encourage autonomy, e.g. play music, offer a toy, leave to cry
SBM: Settle by movement, e.g. walk in a stroller, car ride
PPC: Passive physical comforting, e.g. presence of the parent in the room to fall asleep
SC: Social comforting, e.g. talking softly to child, sing lullaby, read a story, play with child
Total: Total

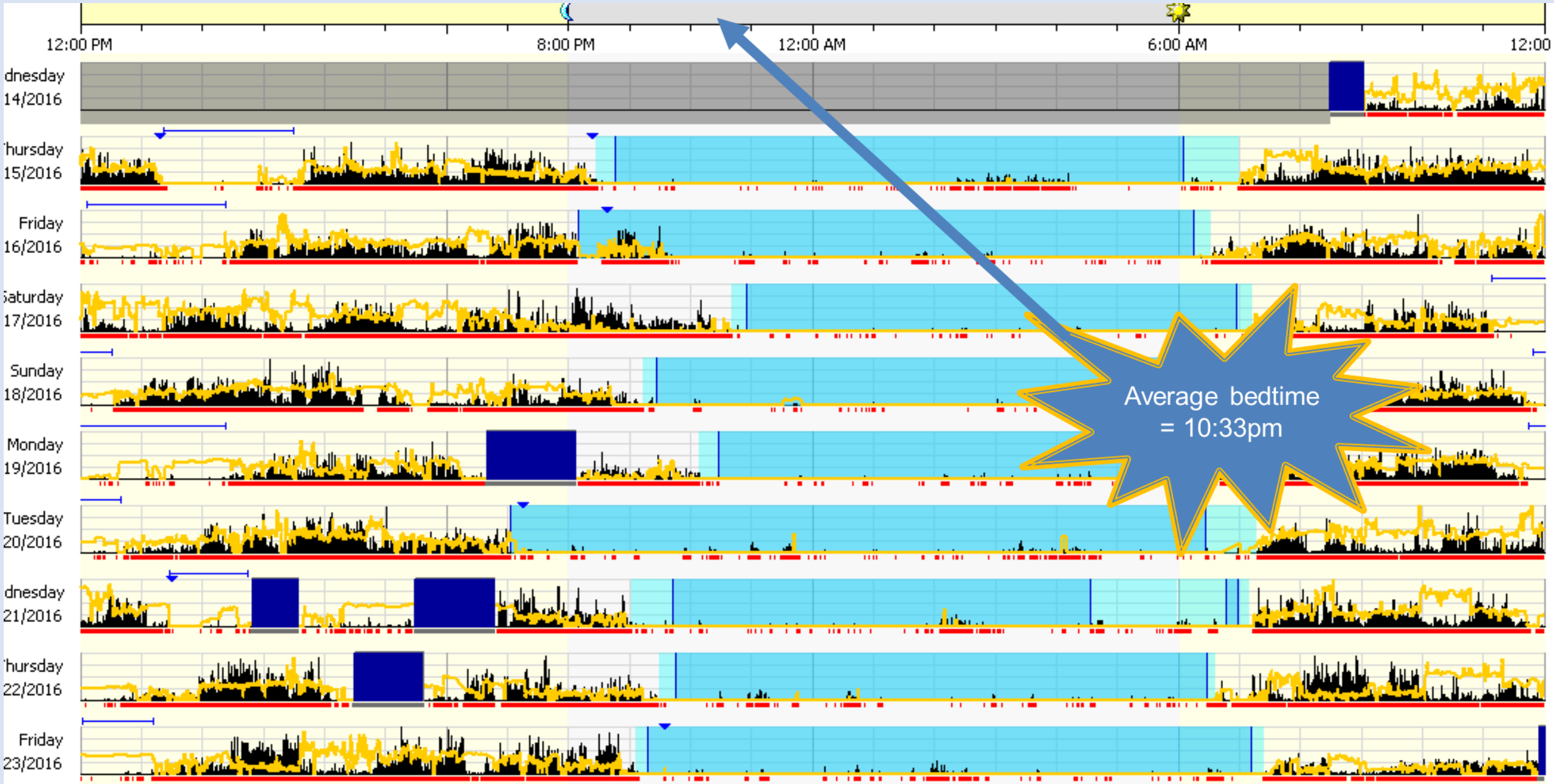
Discussion

- Preliminary data are similar to extant research regarding insufficient sleep duration in low-income children
- APC associated with sleep patterns among infants and toddlers of higher socioeconomic status
- Findings from this study suggest a stronger association between PPC and sleep patterns.


HOURS OF SLEEP
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
1.5 hours less than recommended sleep
NEWBORN 0-3 months
18 - 19
14 - 17
11 - 13
INFANT 4-11 months
16 - 18
12 - 15
10 - 11
TODDLER 1-2 years
15 - 16
11 - 14
9 - 10
PRE-SCHOOL 3-5 years
14
10 - 13
8 - 9
SCHOOL AGE 6-13 years
12
9 - 11
7 - 8
TEEN 14-17 years
11
8- 10
7
YOUNG ADULT 18-25 years
10 - 11
7 - 9
6
ADULT 26-64 years
10
7 - 9
6
OLDER ADULT 65+
9
7 - 8
5 - 6
Recommended
May be Appropriate
Not Recommended

Conclusions

- These results will inform future intervention development that may address the role of parenting behavior in promoting healthy sleep early in life.
- Need for higher sample size and longitudinal study of sleep among this population.
- Examine the relationship between sleep characteristics and biomarker data
- Identify the characteristics of sleep associated most closely with stress response


12:00 PM
8:00 PM
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14/2016
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Friday
16/2016
aturday
17/2016
Sunday
18/2016
Monday
19/2016
Tuesday
20/2016
dnesday
21/2016
hursday
22/2016
Friday
23/2016
Average bedtime
= 10:33pm

Future directions

- Complementary work with Drs. Redeker, Sadler, and Caldwell
- Future R-series grants
- Consider genomics to explore the effect of sleep and adversity on epigenetic changes to children's DNA – "clock genes"
- Identify causal pathways and ultimately test the effects of interventions, such as those that may improve sleep, among young children at risk for toxic stress

Thank you

The families who have participated

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Mentors

- Nancy S. Redeker, PhD, RN, FAHN, FAAN
- Lois S. Sadler, PhD, RN, FAAN
- Craig Canapari, MD

Consultants

- Gayle Page, PhD, RN, FAAN (Johns Hopkins)
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Research Assistants

- Patricia Miller, Grad Dip Psych
- Deborah York, RN, MPH
- Carissa Lawrence, RN

Questions