



PHILIP R. NADER

Legacy of Health

LECTURESHIP

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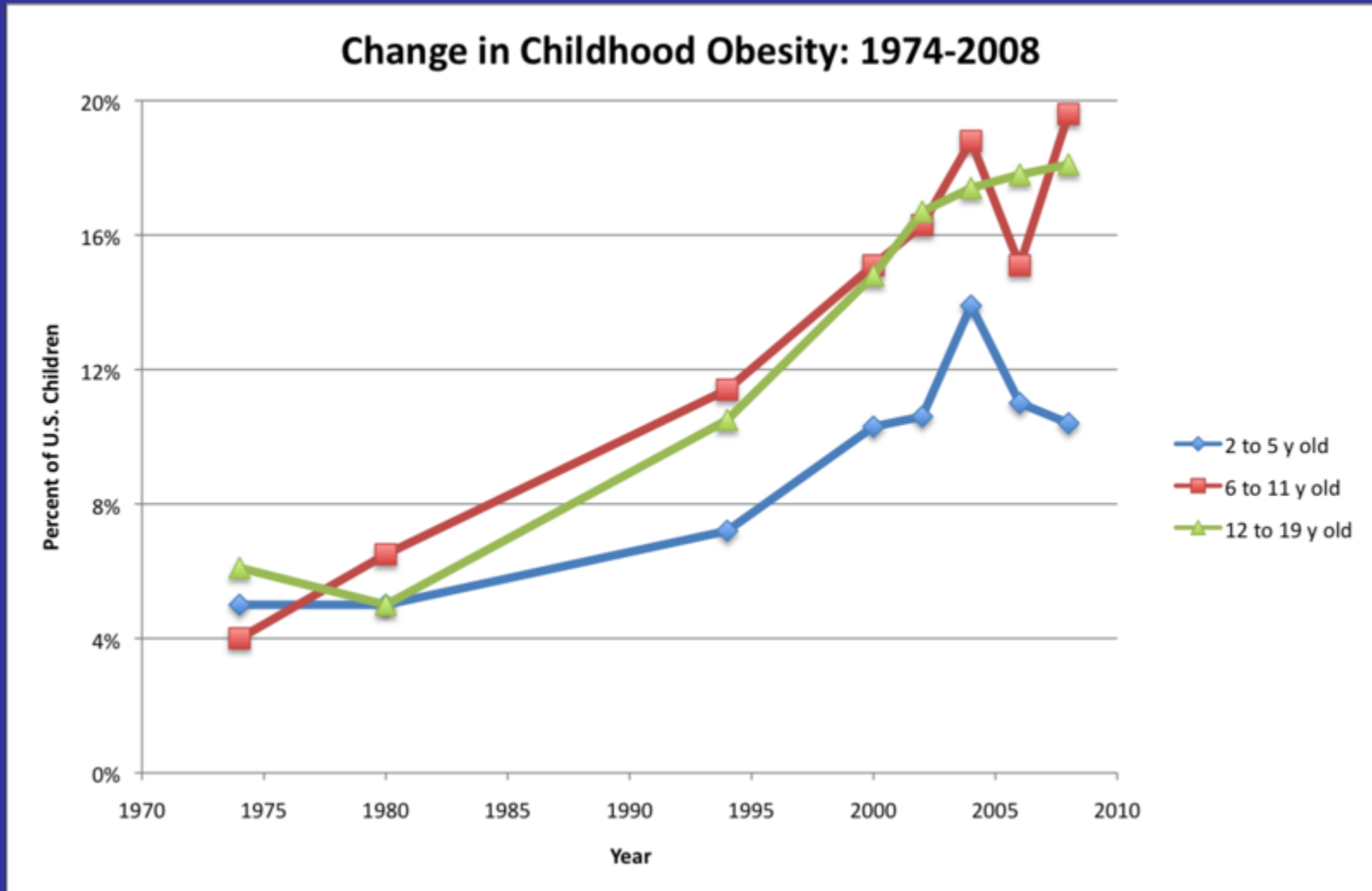
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Psychosocial Stress and Eating Behavior among Young Low Income Children

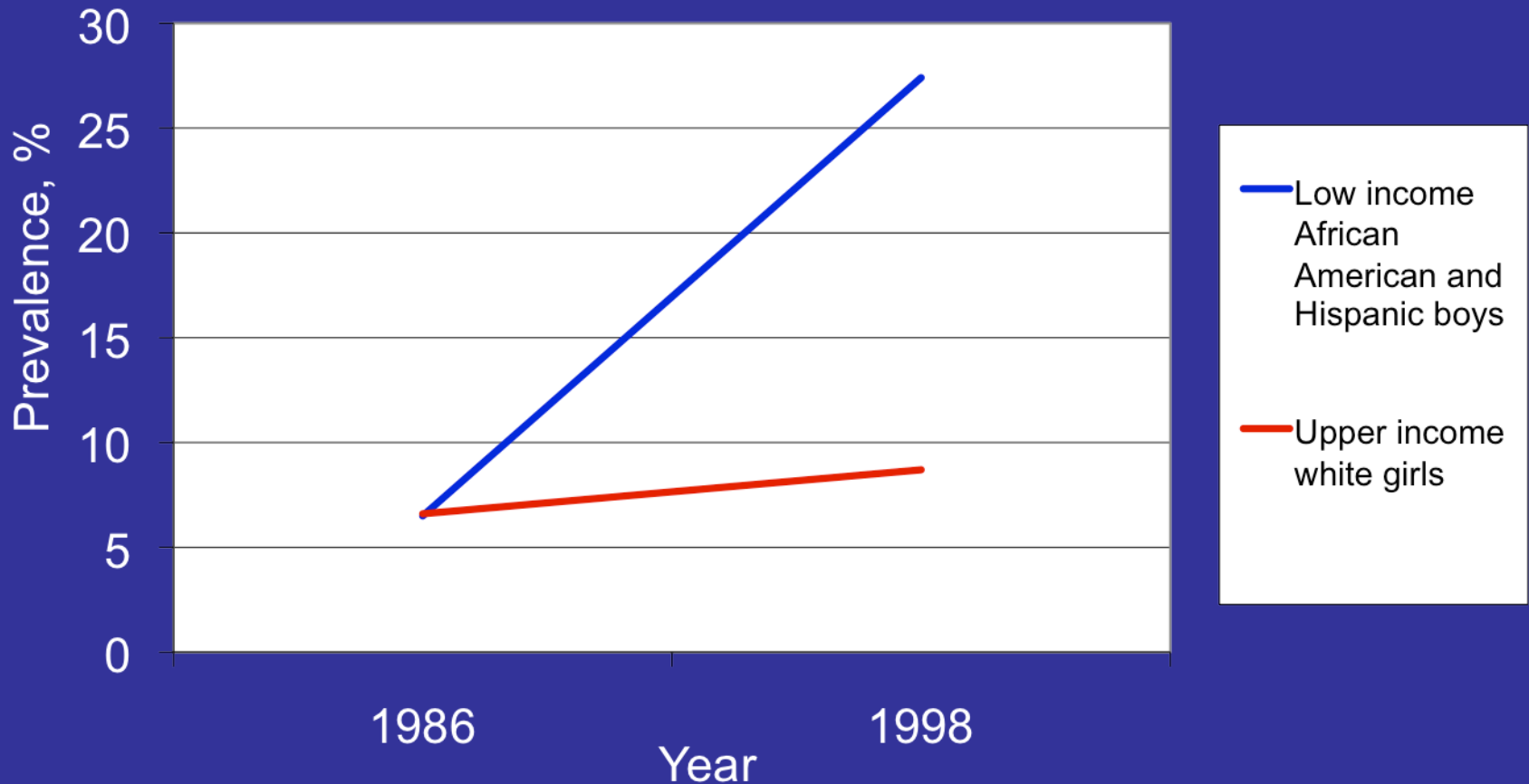
Julie C. Lumeng, MD
University of Michigan



Increase in Childhood Obesity

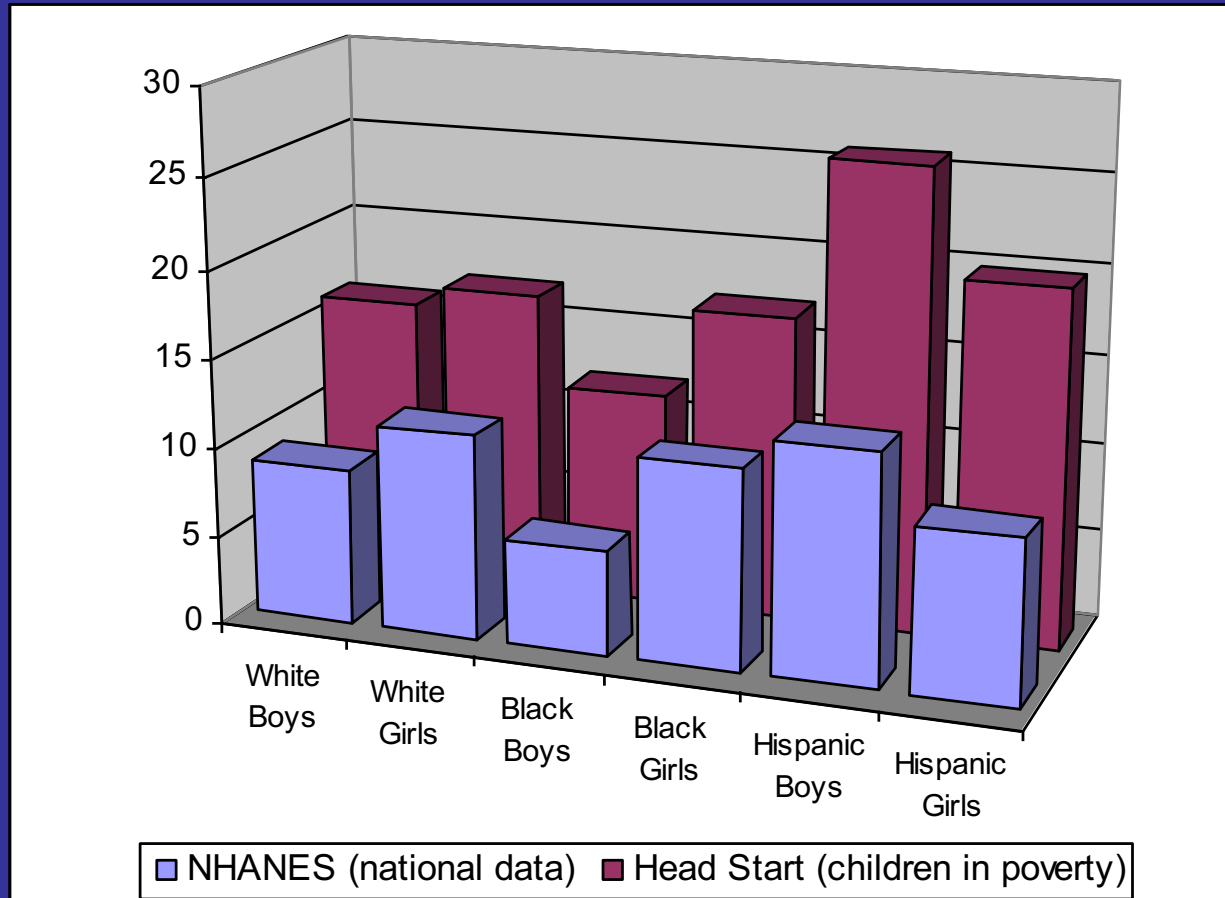


Disparities in Childhood Obesity Prevalence



Strauss RS, Pollock HA, Epidemic increase in childhood overweight, 1986 – 1998. *JAMA* 286(22). 2845-2848, 2001.

Obesity Prevalence Among 3- to 5-year-olds, Poor Children v. National Sample (2003)

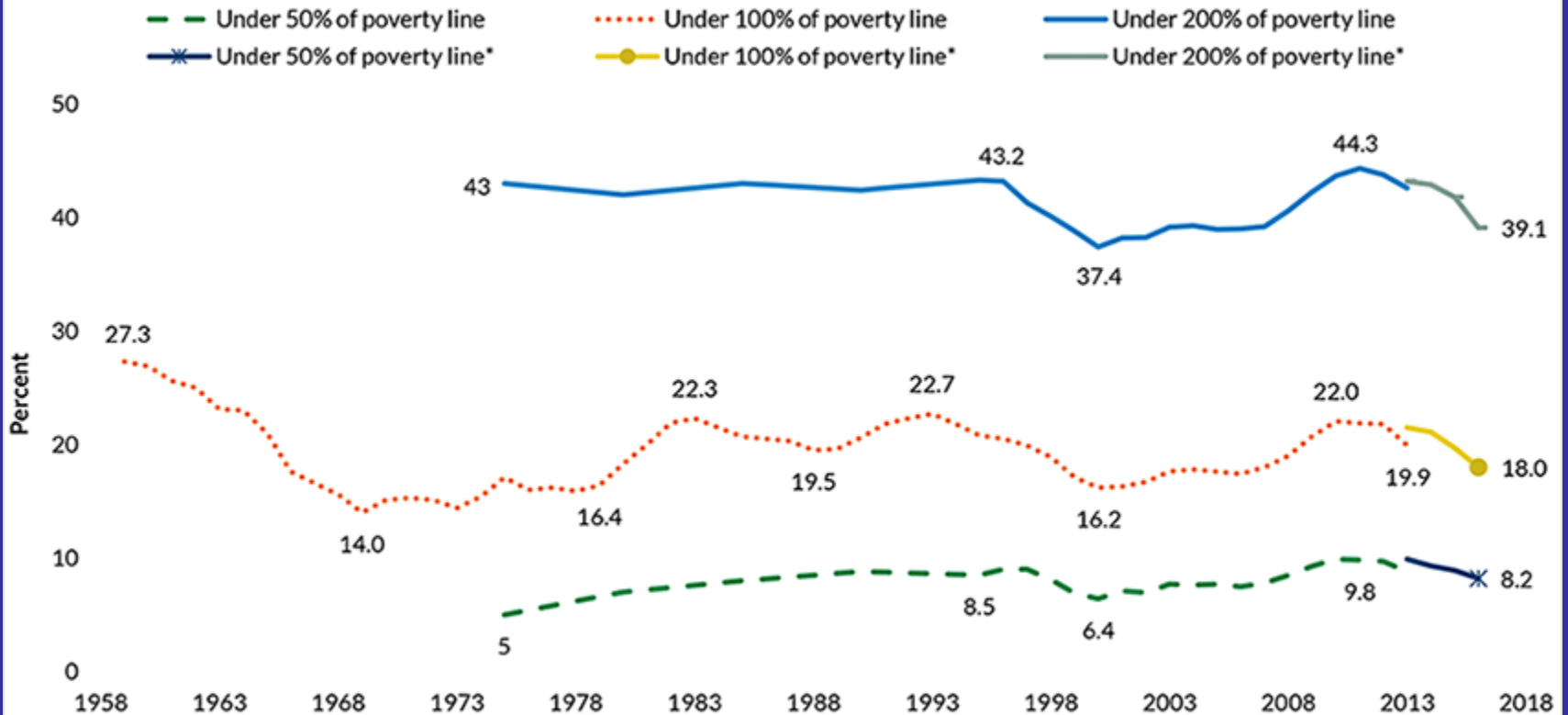


M Feese et al. Prevalence of Obesity in Children in Alabama and Texas Participating in Social Programs. *JAMA* 289. 1780 – 1781; 2003.

How Many Children are Poor?

- 1 in 3 Americans are low-income (<200% FPL)
- 12% of Americans are poor (<100% FPL)
- 43% of preschool-aged US children are low-income
- 21% of preschool-aged children are 'poor'
- Michigan ranked 30th among the states for overall child well-being
- Between 2000 and 2009 the Michigan child poverty rate increased from 14 to 23%

Percentage of Children Living Below Selected Poverty Thresholds: Selected Years, 1959–2016



*In 2014, questions related to income were changed slightly, which reduces comparability with previous data.

Sources: Data for 1995–1997 for non-Hispanic whites, Asians and Pacific Islanders, Mexicans, and Puerto Ricans: U.S. Census Bureau. (1996–1998). Poverty in the United States. *Current Population Reports*. Retrieved from <https://www.census.gov/topics/income-poverty/poverty.html>. All other data for 1960–1997: U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation. (2002). *Trends in the well-being of America's children and youth, 2001* [Table ES 1.2.A]. Washington, DC: Author. Retrieved from <http://aspe.hhs.gov/hsp/01/trends/>. Data for 1998–2001: U.S. Census Bureau. (1999–2002). Poverty in the United States. *Current Population Reports*. Retrieved from <https://www.census.gov/topics/income-poverty/poverty.html>. Data for 2002–2016: U.S. Census Bureau. (2017). *CPS Table Creator [Data tool]*. Retrieved from <http://www.census.gov/cps/data/cpstablecreator.html>.

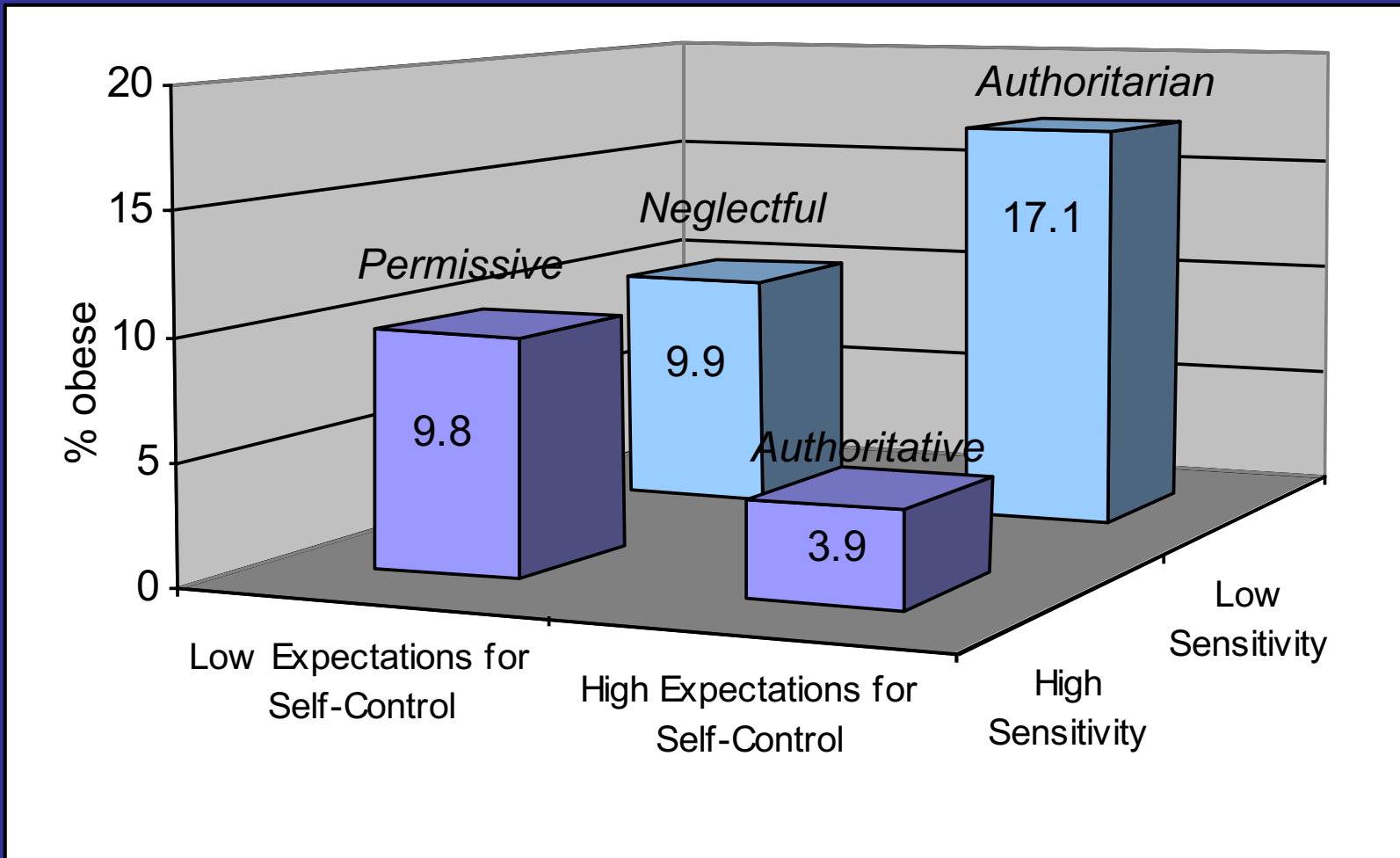
What Causes Childhood Obesity?

“I've long suspected that rapidly growing rates of childhood obesity in the United States may be tied, at least in part, to the fact that American children in general seem more out of control and ill-behaved than ever. And that's because their parents seem more ineffective and less likely to tell their children "no" than ever. You've seen it. The screaming, crying, foot-stomping little kids yelling at their parents and making demands in the mall, the grocery store, and virtually every restaurant one enters. It is not particularly surprising kids try that stuff -- what's stunning is watching the impotent, terrified parents looking like deer caught in headlights as it's happening.”

– one journalist

Parenting Style

	High expectations for self-control	Low expectations for self-control
High sensitivity	Authoritative: Respectful of child's opinions, but maintains clear boundaries	Permissive: Indulgent, without discipline
Low sensitivity	Authoritarian: Strict disciplinarian	Neglectful: Emotionally uninvolved and does not set rules



*Adjusted for income-to-needs ratio and race

K Rhee et al. Parenting Styles and Overweight Status in First Grade. *Pediatrics* (117). 2047-2054. 2006.

Media Response

- “Strict Parenting Raises Risk of Childhood Obesity”
- “How Parents Mold Their Children’s Weight” (NYT)
- “Do Very Strict Parents Raise Fat Kids” (CBS)
- “Insensitive Parents, Chubby Children”
- “Study: Mean, Maniacal Mom Made you Fat”
- “It’s All Our Fault Anyway”

Eating Behaviors of Children in Poverty: Teachers' Descriptions

- They are always worried because they want seconds and thirds. It's like we're holding food back from them. They're afraid the food's going to be gone.
- They're so worried they're not gonna get enough.
- Our children are very anxious and very hungry.
- I think some are from more chaotic homes - the ones that grab two hands into the chicken nuggets trying to make sure they have enough food.
- Sometimes my kids get sick [vomit] because they are that hungry -- shovel, shovel, shovel.

Beliefs about the Role of Parenting in Childhood Obesity among Mothers of Lower Socioeconomic Status

Theme 1. Negative Memories of Being Fed in Childhood

I always make sure my kids have breakfast, lunch, and dinner. My dad never did that, he just, fend for yourself really, so, that's, that's one thing I do. I make sure that they eat and I make sure that we eat together (Mother, obese, child, weight status unknown).

Beliefs about the Role of Parenting in Childhood Obesity among Mothers of Lower Socioeconomic Status

Theme 2. Maternal Emotional Investment in the Child Enjoying the Meal

“You have to give them the best that you can, that is, with that patience because sometimes, [they say] “I don’t want this” [or] “I . . .no, not this.” [And I say to them], “What do you want, dear? If you didn’t like the food today, what do you want?” (Mother, obese and child, overweight).

Beliefs about the Role of Parenting in Childhood Obesity among Mothers of Lower Socioeconomic Status

- Theme 3. Attributing Obesity in Other People's Children to Inept or Neglectful Parenting

“There is people that, like the women that work a lot, sometimes can't take care of their children ” (Mother, obese and child, weight status unknown).

“The mothers give them Twinkies, candy, and ice cream and—everyday, this is an everyday thing—cookies and, you know, to me that's what causes a child to be overweight” (Mother and child, obese).

Stress, Self-Regulation, Eating Behavior, and Obesity

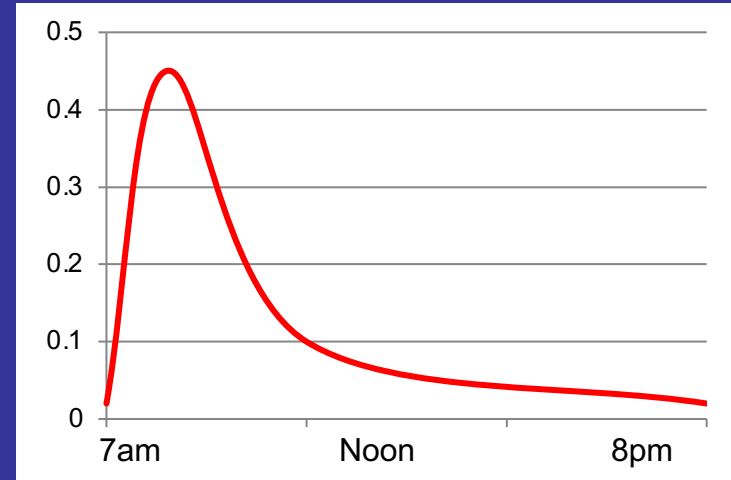
Stress, Cortisol, and Eating

- Stress increases emotional eating and obesity
- Children who are less able to cope with stress are more likely to obese
- Stress increases cortisol
- Cortisol increases appetite
- Stress shifts food preferences to comfort food (foods high in added sugars and fats) via cortisol
- Comfort food dampens the stress hormone axis in the brain thereby making people 'feel better'

Healthy Patterns of Cortisol

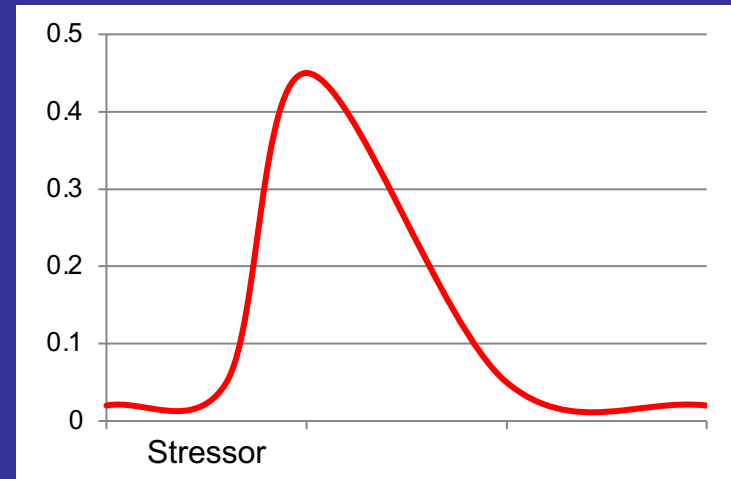
Strong daily pattern

- Peak in the morning
- Decrease through the day

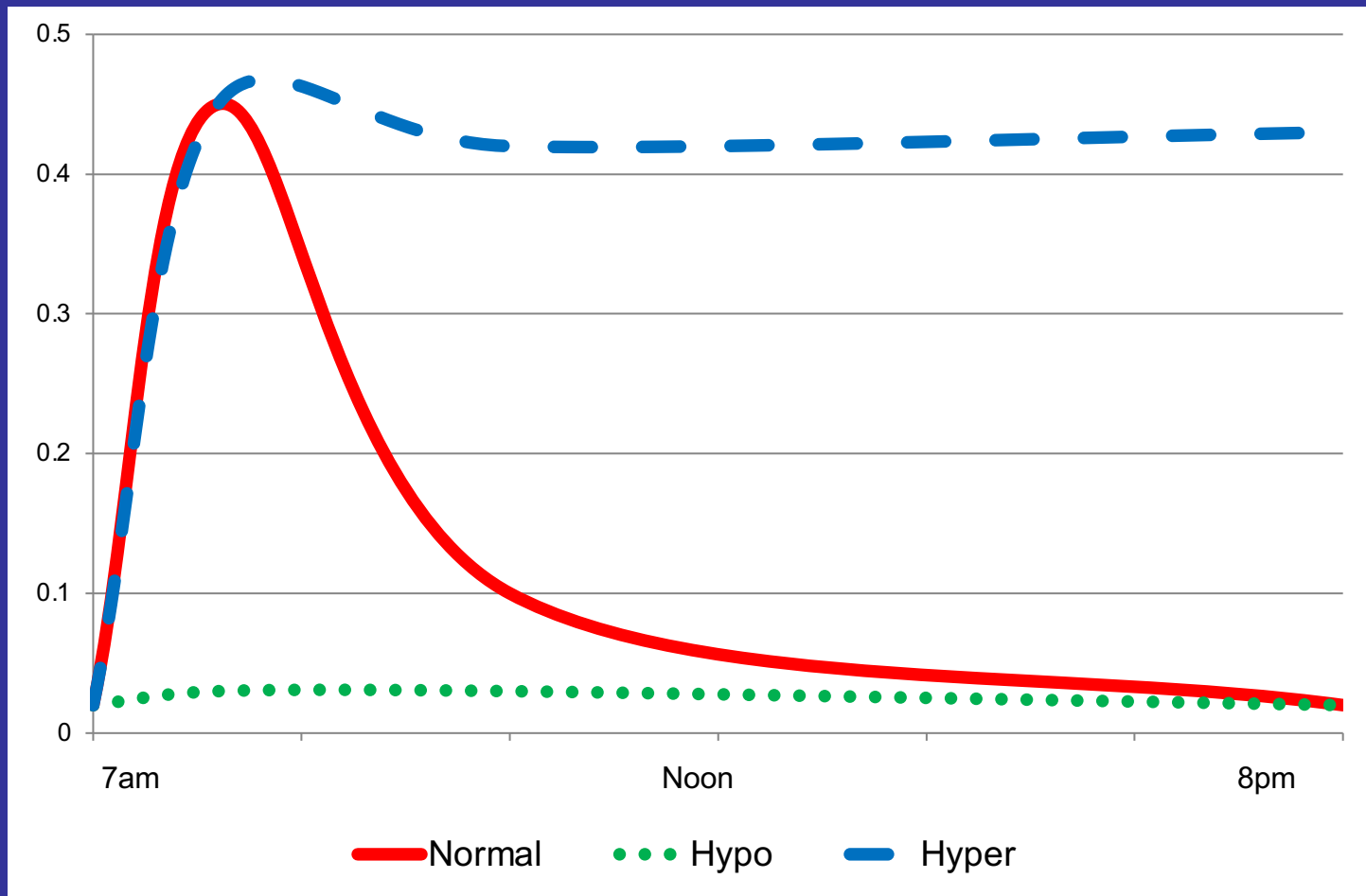


Reactions to stress

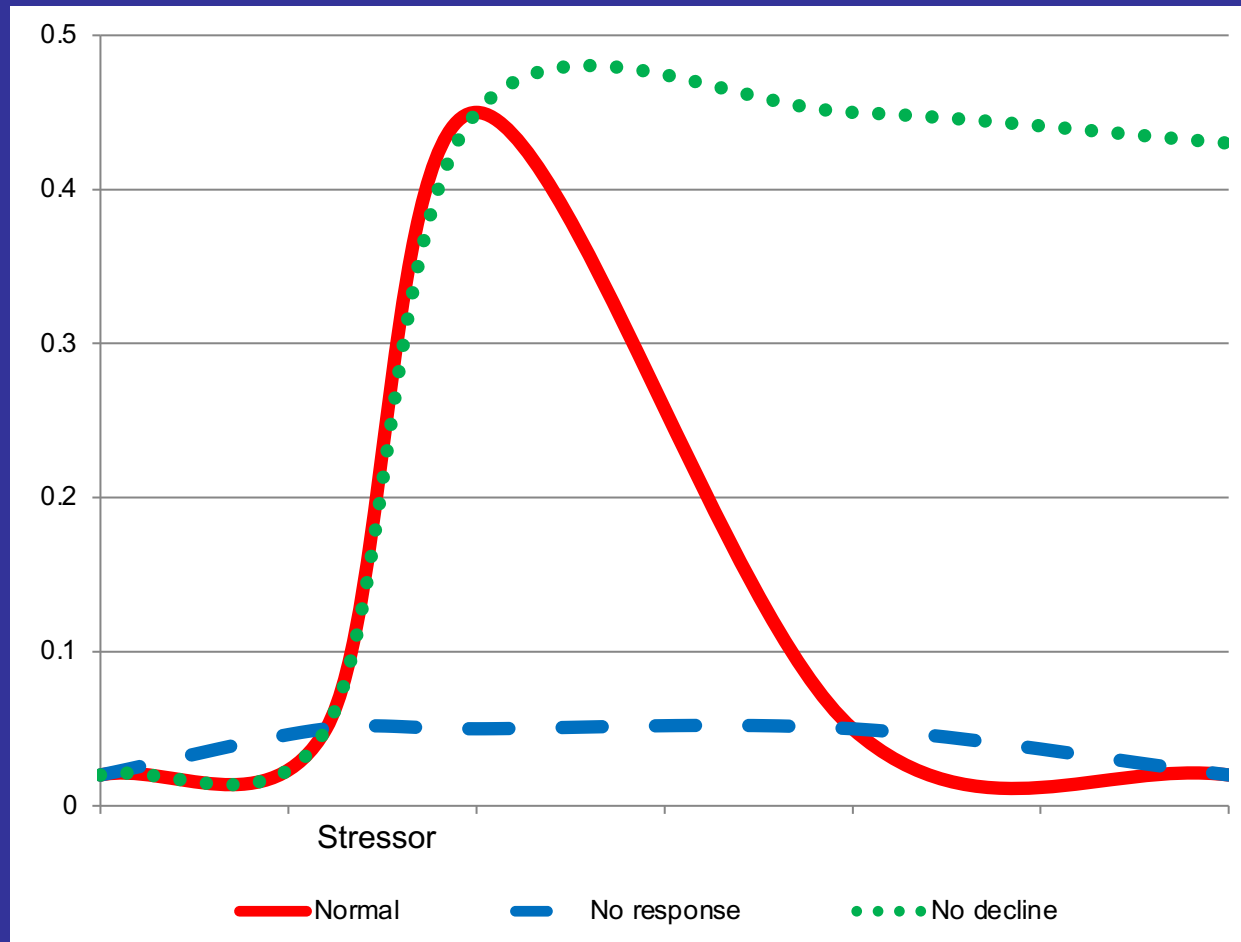
- Peak within about 10-45 minutes
- Decline over about 40-90 minutes



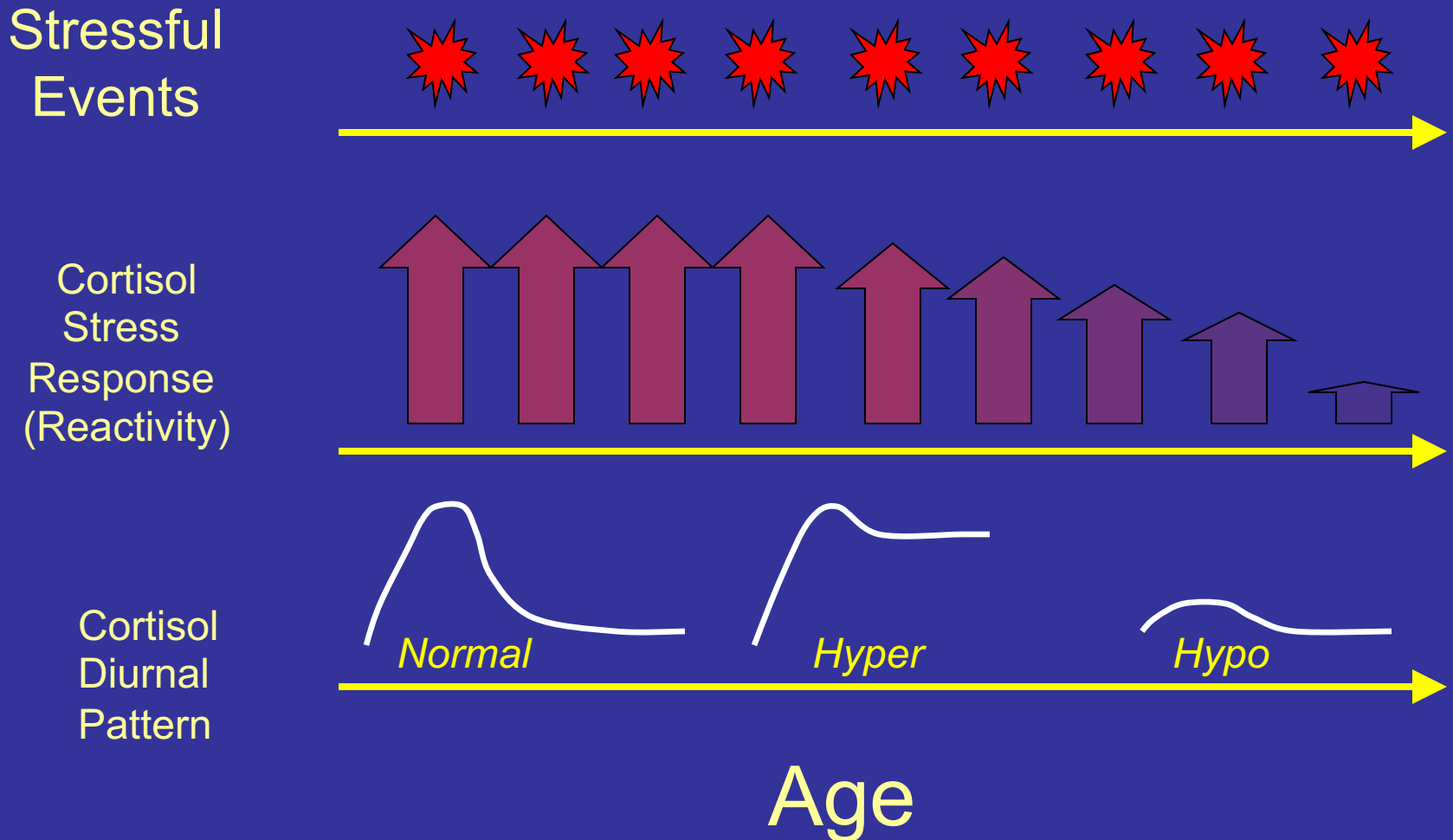
Normal v. Abnormal Patterns of Daily Cortisol



Normal v. Abnormal Patterns of Cortisol Reaction to Stress



Theory of how daily cortisol patterns could become abnormal



Hypothesized Pathways

Stress



Aberrant patterns of cortisol



↑ Obesity-promoting eating behaviors



↑ Obesity

Stress and Eating: Food as Self-Regulation Strategy for Children



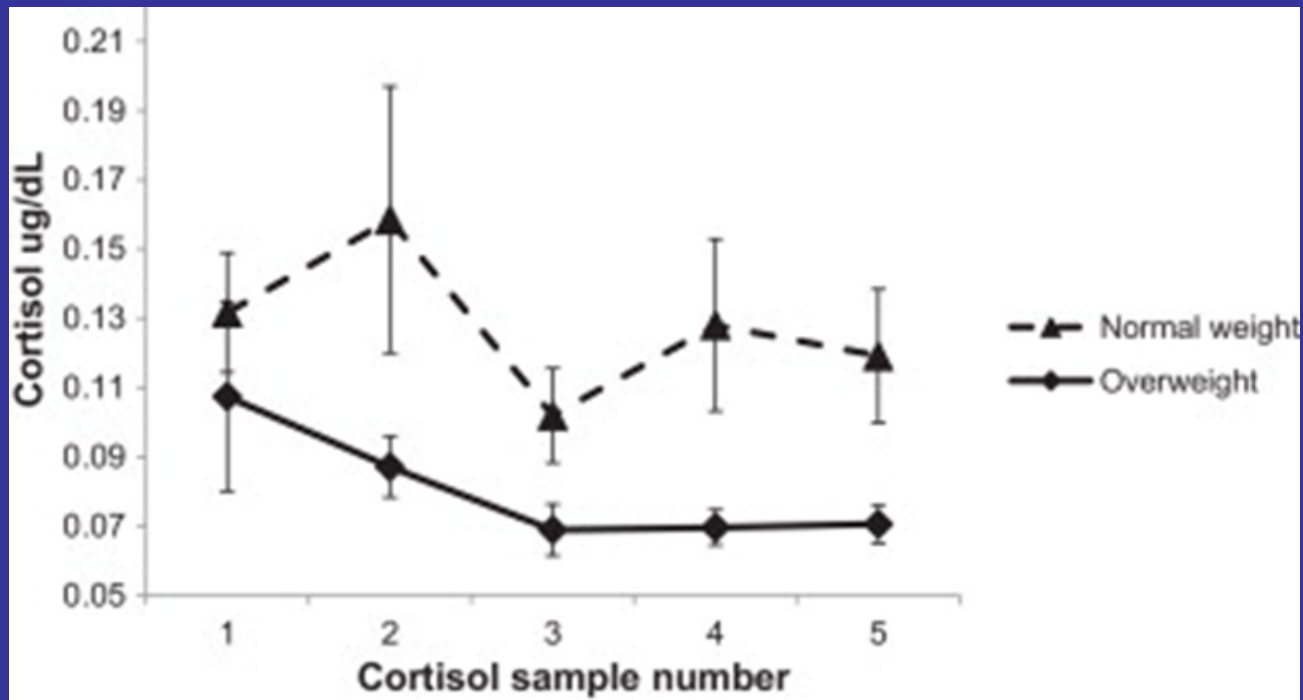
Appetite, Behavior, and Cortisol Study



Self-Regulation in Response to Stress

- Low-income preschoolers with greater psychosocial stress at home had “flatter” patterns of daily cortisol
- This “flatter” pattern was linked with reduced satiety responsiveness and more emotional overeating, which in turn predicted overweight
- Blunted cortisol response to a stressor was also linked with higher BMI

Cortisol Reactivity to Stress: Blunted Cortisol Reactivity to a Stressor in Overweight Children

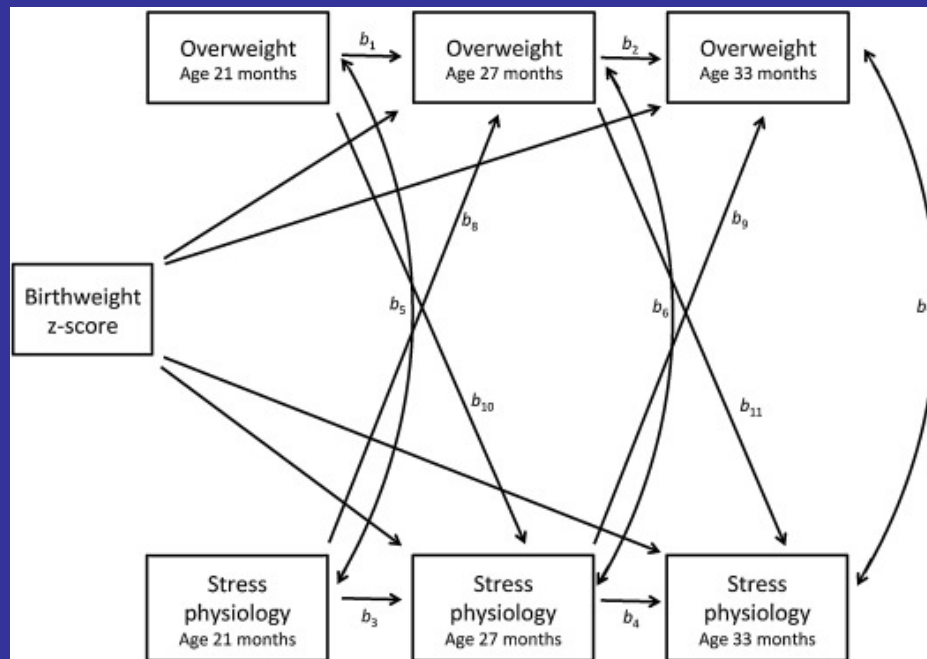


Miller et al, *Psychoneuroendocrinol*, 2013

What is the association in time between stress and weight status?

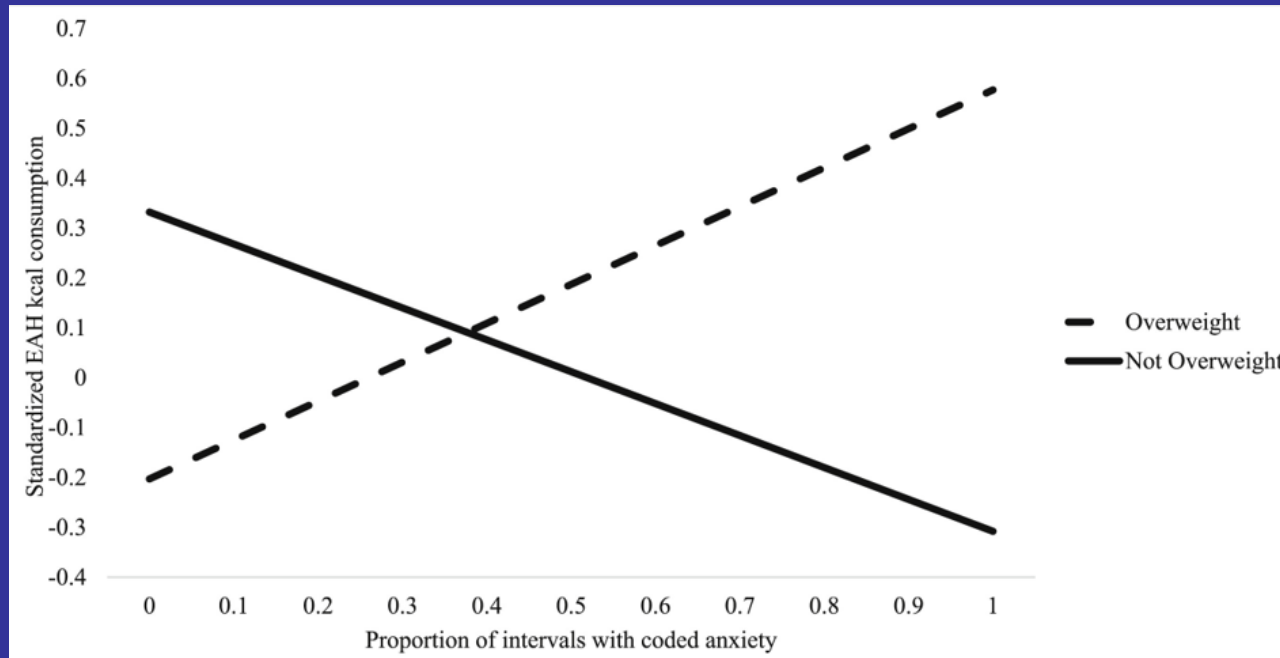
- Overweight/obesity predicted changes in stress biology over time, from early-to-middle childhood,
 - lower morning levels of cortisol and sAA
 - blunted cortisol reactivity
 - lower sAA slope across the day
- Stress biology did not predict increased likelihood of overweight/obesity over this time period
 - Only exception: blunted sAA reactivity to stress in preschool predicted higher likelihood of overweight/obesity in middle childhood.

What is the association in time between stress and weight status?



- Overweight, cortisol, and sAA are stable across ages 21–33 months.
- sAA but not cortisol at 27 months predicted overweight in girls at 33 months of age.
- Overweight at 21 months predicted sAA at 27 months in boys only.

Stress and Eating Behavior



- Children with overweight/obesity consumed more in EAH following stress
- Children without overweight/obesity consumed less in EAH following stress

Miller, Lumeng, *Appetite*, 2019

Stress and Eating Behavior

- Early childhood stress exposure predicted yearly increases in EAH and Emotional Overeating
- Stress exposure was not associated with Food Responsiveness
- All child obesogenic eating behaviors increased with age ($P < .05$).

What Do Low-Income Mothers
Think about the Concept of
Stress Eating?

Emotional- and stress-eating occur as uncommon, extreme episodes in response to life-altering negative events, or occur among people who are out of control and pitiable.

Hayman, *Appetite*, 2014

“I overeat late at night, every night. I am very stressed out. This is the first time I've been a single parent....Their dad just went to prison so it's like, I'm going through so much and it's...everything is on my shoulders now no matter what; you know? If anything happens, it's up to me; and nothing can happen to me because there's no one else to take care of the kids. And, if anything were to happen with me, my kids would go to foster care! So, you know, it's a really scary thing... I think that's why I turn to food instead of just dealing with it...” (obese, White).

In contrast to adults, preschool-aged children do not appear to experience enough negative emotion or stress to result in emotional- or stress-eating.

Hayman, *Appetite*, 2014

““I guess kids are just too happy to be really stressed out and have the time to do that... I don't know – like, kids stressing? Um, preschoolers? Um, I don't know....” (normal weight, Black).

“...I didn't know, like, little kids get stressed out... They might get upset and throw tantrums, but I think that's a little too young. But, I could be wrong; I'm just – I don't know... They get angry, but I don't know about stressed.” (obese, Black).

When preschool-aged children do stress eat, it is primarily due to severe triggers or is a function of bad parenting.

Hayman, *Appetite*, 2014

“A child that's, you know, being abused, might eat too much to fill some kind of void... I don't know. Or, if they're neglected, they will eat too much to maybe make up for that attention, that lack of attention, by eating food. Or, if they're abused, you know, [they may] use food to comfort them.” (normal weight, Black).

“Moms give their child food because they want them out of their face... It's crazy. I'm talking about the younger generation girls. You got some young girls that's havin' these kids and just will do anything – get a kid anything – just to tell ‘em to sit down and shut up!” (obese, Black).

How do mothers manage the presentation of a cupcake to a child with overweight/obesity?



Pesch, Lumeng, *Pediatric Obesity*, 2019

(Child takes a bite of the cupcake, turns and smiles at her mother)

Mother: "*That's your favorite food, huh?*" (Said as she raises her eyebrows skeptically, shifts her head back, slowly shaking her head 'no', then looks back down at the child).

Child: "*Going to actually eat it up.*" (Said as the child happily picks up the cupcake and takes a bite, smiling contentedly. Mother looks directly and disapprovingly at the child as she chews.

Child: "*Yummm!*" (Child looks up at mother and smiles, meeting her mother's gaze. Mother again shakes her head 'no' with a stern expression, then looks away from the child and down).

Mother: *"So she brought you something you like. Is it because Mommy don't buy you that at home?"* (Said in a flat monotone voice as she looks back at the child with irritation in her voice).
"Who buys you that? Your dad!" (Mother shakes her head again in seeming disbelief, sighs with exasperation. Child continues to eat, turns her body away from the mother and gets closer to her cupcake. Child then turns towards her mother with a questioning look and smile).

Mother: *"I'm not saying nothing."* (Said in a sarcastic, disapproving and defensive tone. Mother raises eyebrows and leans away from child, briefly looks up, then back at the child who continues to eat happily).

Child: *"Why are you looking at me?"* (Mother laughs with exasperation and child whines with mild embarrassment).

How do mothers prevent children from eating unhealthy foods?

	Positive	Negative
Direct	“Honey, only eat one cupcake.”	“Don’t eat that, you pig.”
Indirect	“We really ought to only eat one.”	“Cupcakes make us fat!”

- Positive direct statements were most effective in discouraging bites

The Growing Healthy Study

- 697 low-income preschool-aged children and their parents
- RCT
- 3 Head Start agencies



United States
Department of
Agriculture

National Institute
of Food and
Agriculture

The Interventions:

POPS: Parents of Preschoolers Series

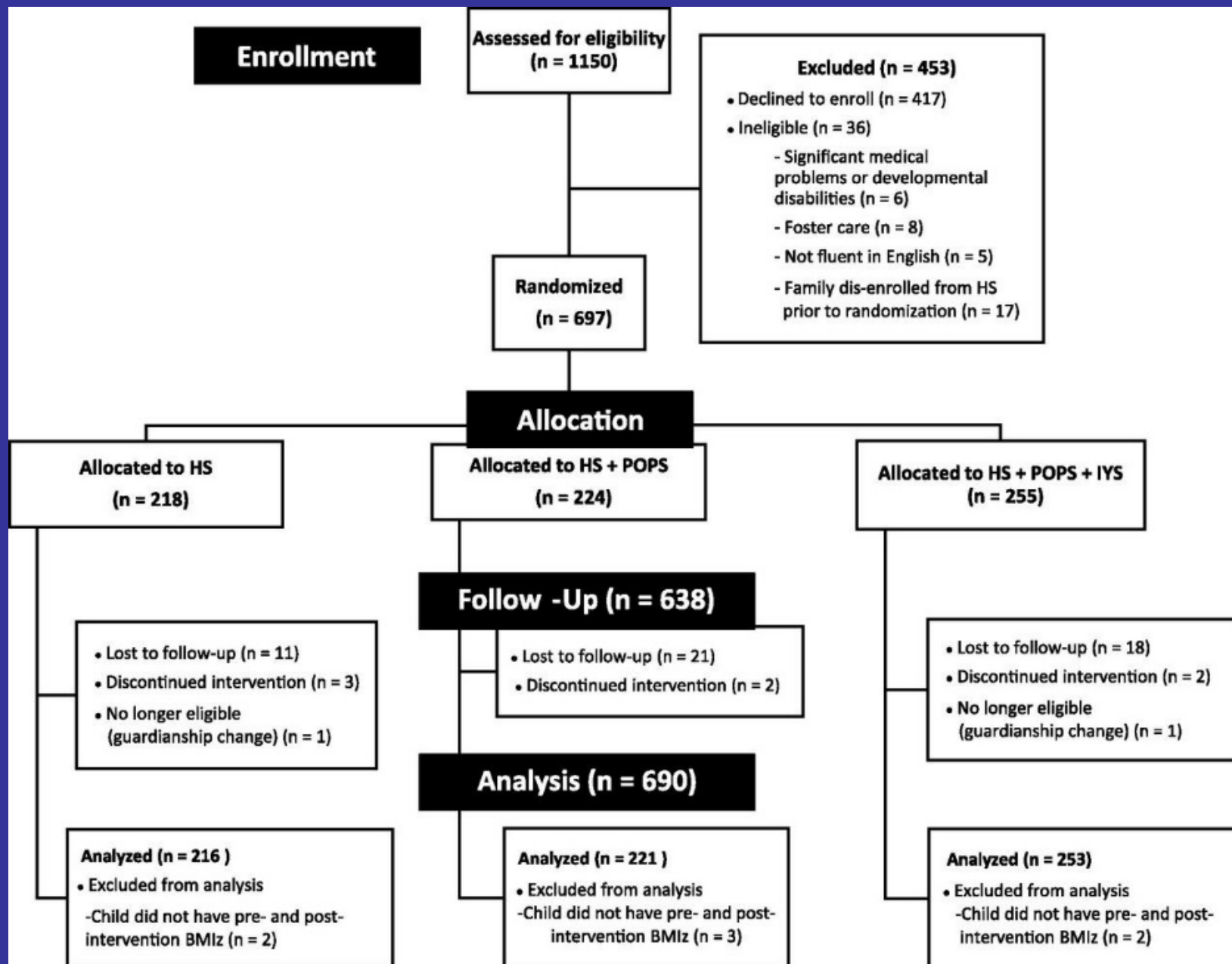
IYS: Incredible Years Series

Incredible Years Series: Goals

- Strengthen social skills and appropriate play skills
- Promote use of self-control strategies
- Increase emotional awareness
- Boost school readiness
- Reduce defiance and aggressive behavior
- Decrease negative cognitive attributions
- Increase child self-esteem, self-confidence, and positive relationships

3 Study Arms

Study Arm	Description
Usual Head Start (HS)	Usual Head Start exposure
HS+POPS	Obesity prevention program for children and their parents
HS+POPS + IYS	Obesity prevention program for children and their parents AND an intensive program around parenting and improving children's ability to regulate emotion and behavior



Participant Characteristics

- Mean age 4.1 years
- 48% white, 29% black, 22% Hispanic or other
- 15% obese, 19% overweight
- 26% of mothers married
- Family income-to-needs ratio 0.88

Results

- Significant improvement in self-regulation
- No significant change in child obesity or overweight
- No significant change in obesity-related behaviors

Conclusions

- Poor self-regulation may not cause obesity
- Parent participation may not have been sufficient
- Follow up period may have been too short
- Trying to improve self-regulation (IYS) and obesity-related behaviors (POPS) may have been too much at one time



Simply Dinner

The Simply Dinner Study

- Two Phases
 - Phase 1: Testing interventions (multi-phase optimization strategy design)
 - 500 children and parents - 2 Head Start Agencies
 - Phase 2: RCT
 - 250 children and parents- 2 Head Start Agencies;
2 Meals on Wheels programs



Simply Dinner

Simply Dinner

Family meals are promoted as an obesity prevention strategy, but...



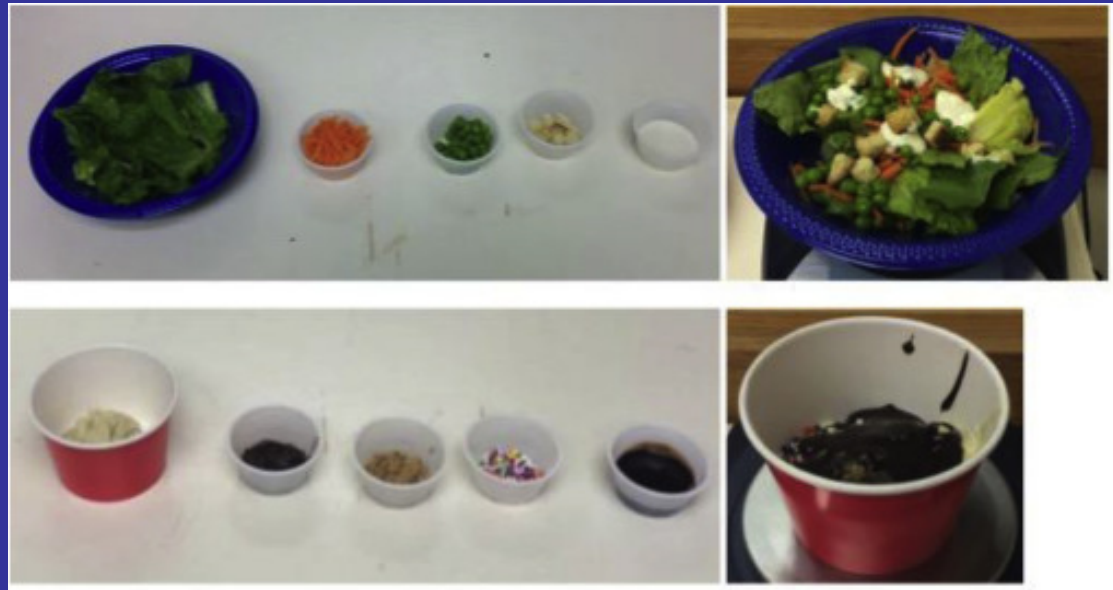
What concrete supports are needed to help families have healthier meals at home?

Simply Dinner

- Cookware/Utensils
- Nutrition Education
- Cooking Demonstration
- Community Kitchen
- Ingredient Delivery
- Meal Delivery

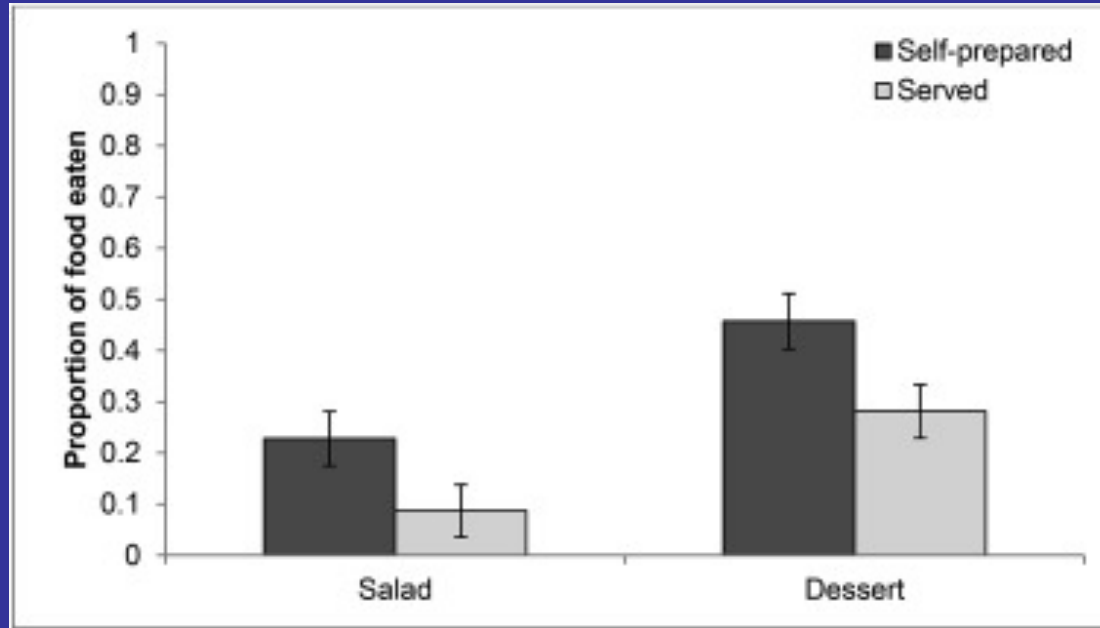
Meal Delivery

Does who makes the food matter?



“Today, you are going to make a [salad/dessert]. Everything you need to make a [salad/dessert] is right here. I will help by reading you the instructions.”

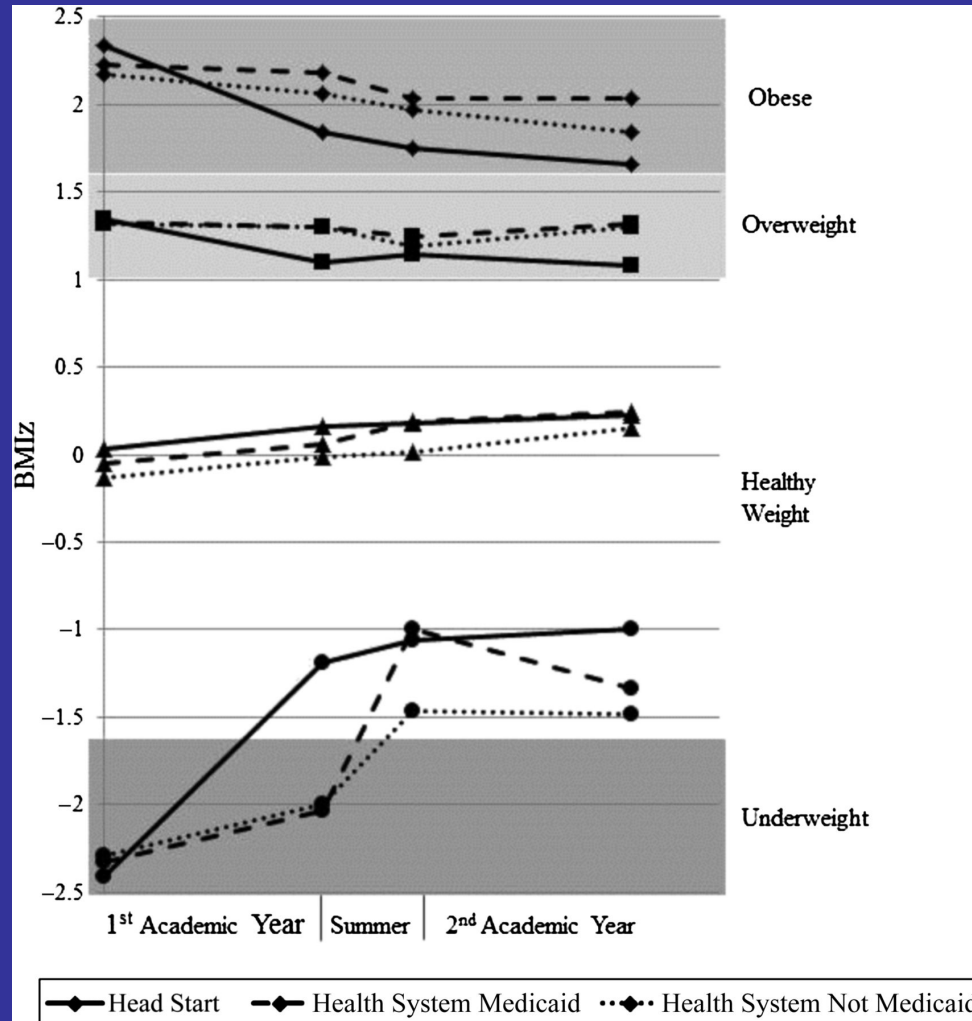
Children Eat More Food When they Prepare it Themselves



- Children eat more of the foods they prepare themselves (even though they did not rate liking for them any differently)

Dejesus, Gelman, Lumeng, *Appetite*, 2019

What happens to children's growth in Head Start?



Lumeng et al, 2014, *Pediatrics*

ABC Baby Study: Infant Eating Behavior

- Overall hypothesis:
 - Infants have differences in appetitive drive detectable from birth
 - These differences in appetitive drive are associated with rapid weight gain
- 284 infants
- 2 weeks, 2, 4, 6, 9, 12 mos
- Questionnaires, anthropometry, behavioral phenotyping

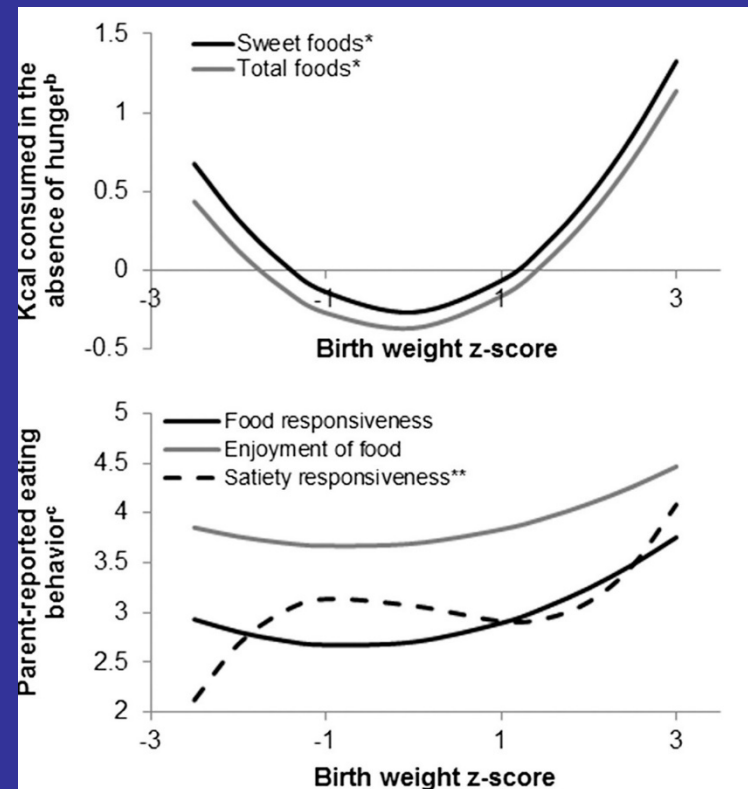
Hedonic Effects of Sucrose Protocol

- Infant begins in quiet, alert state
- Infant given three solutions (counterbalanced)
 - Water
 - 24% sucrose
 - 50% sucrose
- Infant hedonic response coded from video

Hedonic Effects of Sucrose Protocol

Prenatal Predictors of Infant Appetite

- Among low-income girls, but not boys, indicators of adverse prenatal conditions were associated with poor objectively measured appetite regulation during early childhood



Next Steps

- Reduce parent blaming
- Support parents in managing their child's unique obesity risk in a highly obesigenic environment
- Recommend well-known strategies, but recognize that effectiveness in well-done trials is limited or null
- Work to better understand bidirectional relationships between stress and obesity

Acknowledgments

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AUDIENCE QUESTIONS

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SHARMA FELLOWSHIP HIGHLIGHT

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Thank you for attending
the Philip R. Nader
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