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Legacy *of* Health

LECTURESHIP

October 8, 2020

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SCIENTIFIC PRESENTER

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Associate Director, Center for Obesity Research and Education,

Temple University, College of Public Health

TAMING CHILDREN'S SWEET TOOTH: A BIOPSYCHOSOCIAL APPROACH FOR REDUCING ADDED SUGAR INTAKES AMONG CHILDREN

Jennifer Orlet Fisher, PhD
Professor, Department of Social and Behavioral Sciences
Associate Director, Center for Obesity Research and Education

COLLEGE OF PUBLIC HEALTH
Center for Obesity Research and Education

REGULATION OF BODY WEIGHT: A

Environmental Contributions to the Obesity Epidemic

Ogden et al., JAMA, 2020

Hispanic 25%

Black 22%

White 14%

Asian 11%

Race/ethnicity

≤130% FPL 19%

>130% to ≤350% 20%

>350% FPL 11%

Household income

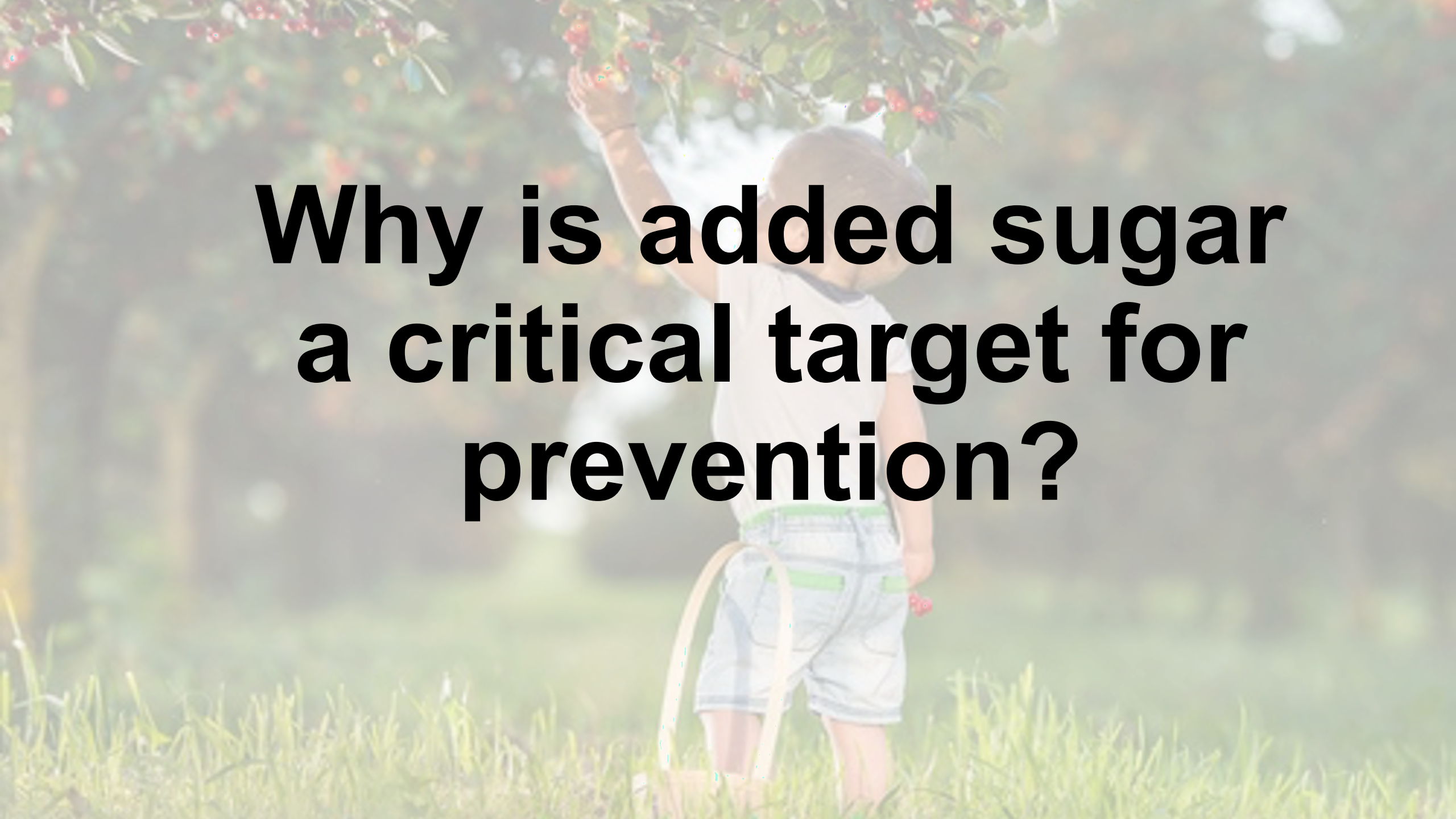
High school or less 22%

Some college 18%

College 10%

HH education

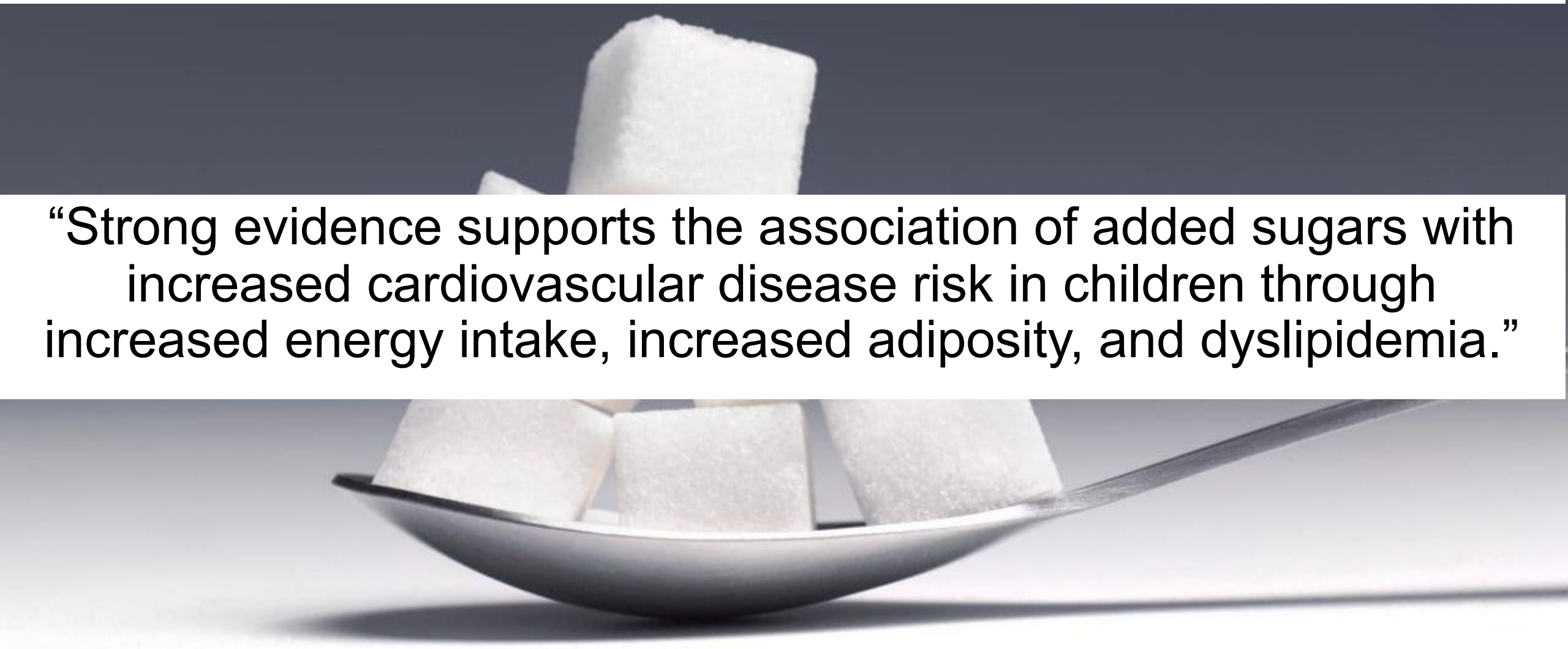
Hales et al. NCHS Data Brief, 2017
Ogden et al., MMWR, 2018



Why is added sugar a critical target for prevention?

Added Sugars and Cardiovascular Disease Risk in Children

A Scientific Statement From the American Heart Association

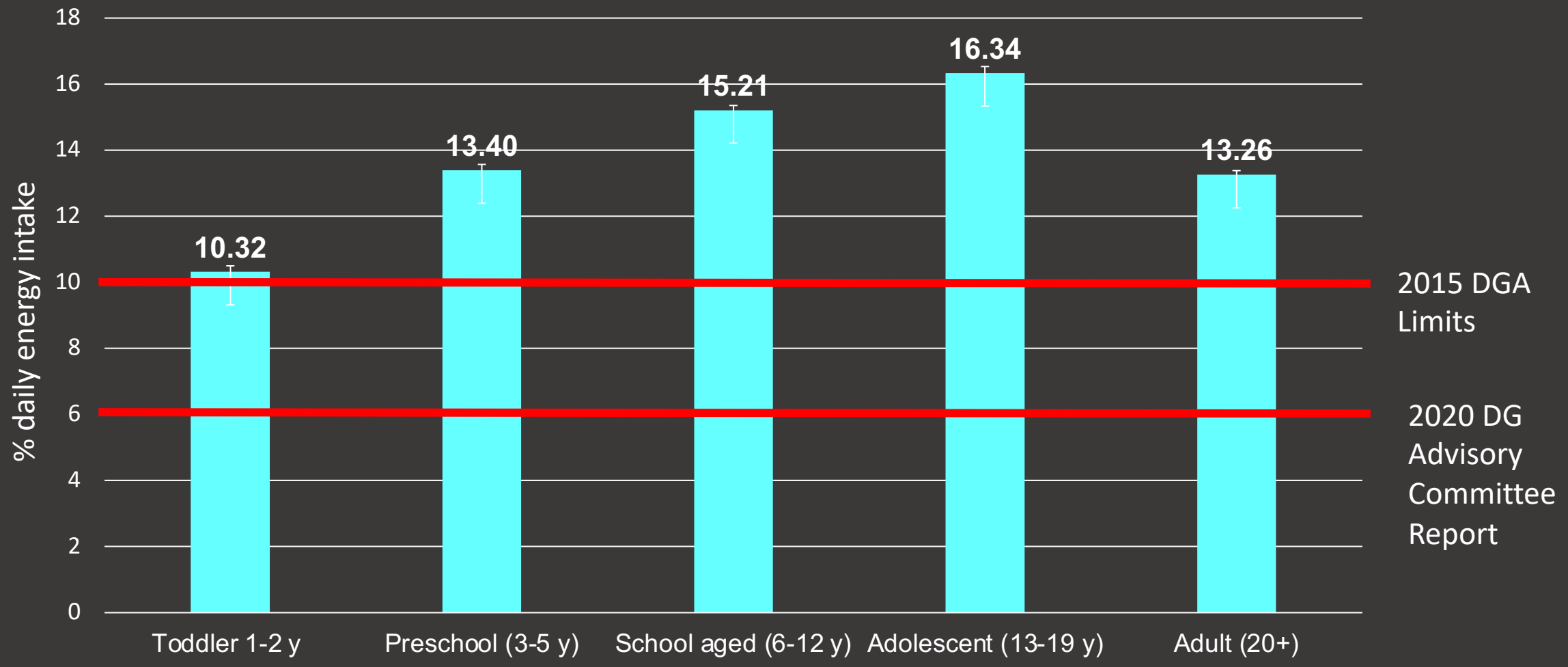


"Strong evidence supports the association of added sugars with increased cardiovascular disease risk in children through increased energy intake, increased adiposity, and dyslipidemia."

Vos et al., Circulation, 2016

Added sugar intake in US population

NHANES 2005-2016 (N = 44,075)



Added sugar intake among US adults
NHANES 2003-2004

Teaspoons per day

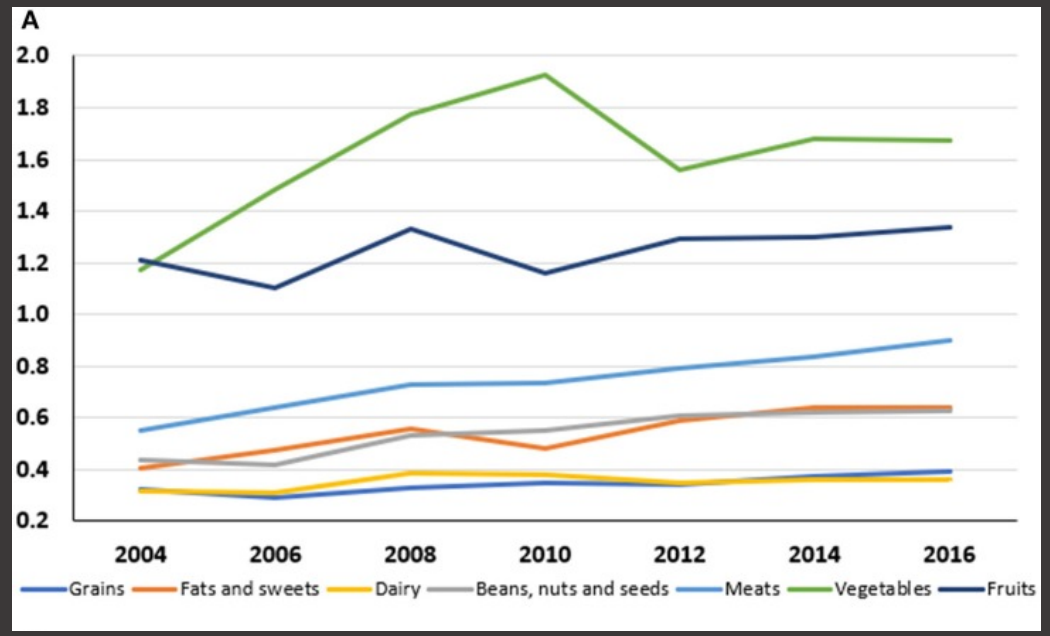
Men			Women		
≤125% FPL	>125% to ≤349%	>349% FPL	≤125% FPL	>125% to ≤349%	>349% FPL
21.4	20.1	18.4	16.3	14.2	13.2

*Adjusted for age, race/ethnicity, and education

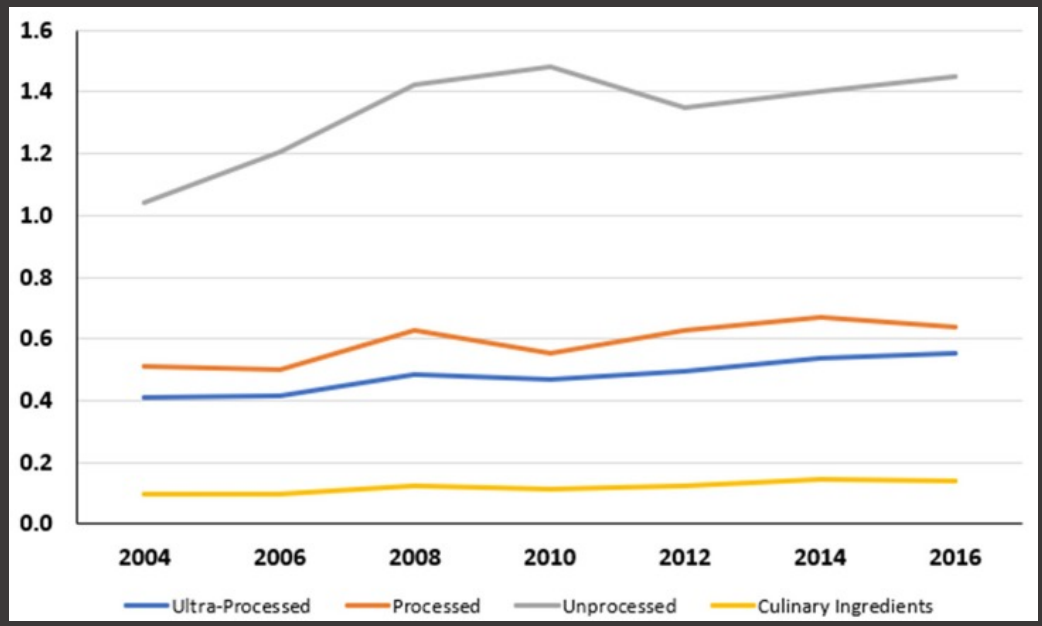
Thompson et al., JAND, 2009

Nutrient content analysis of 384 foods

USDA MyPyramid Food Groups



NOVA food processing categories

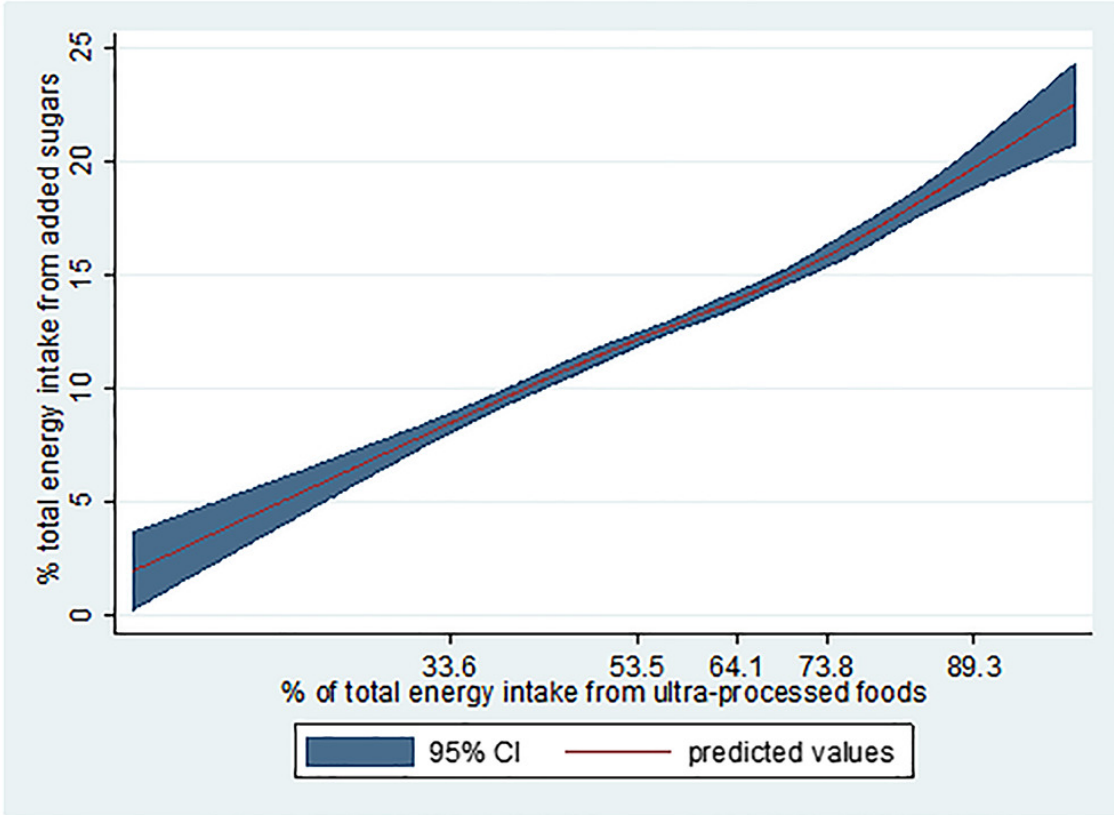


Ultra processed foods more energy-dense, less nutrient-dense and cheaper per calorie than unprocessed ($0.55 vs. $1.45 per 100 kcal)

Gupta, Front Nutr, 2019

US children 2-19 y
NHANES 2009-2014

- 65% of total energy
- 92% of energy from added sugars



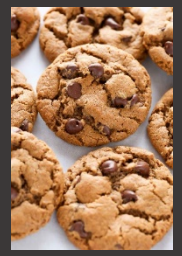
Coefficient for linear term=0.19 (95% CI 0.15 to 0.23). Wald test for linear term p<0.0001. Wald test for all non-linear terms p=0.21

Neri et al., Pediatric Obesity, 2019

Top 5 sources of added sugar vs. saturated fat

US adolescents NHANES 2011-2014

Sugar-sweetened beverages (50%)



Sweet baked goods (12%)

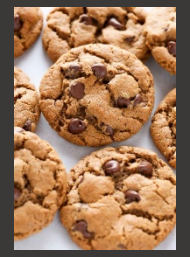
Candy (6%)

Dairy desserts (5%)

Cereal (6%)

79%

Pizza (10%)



Sweet baked goods (8%)

Mixed dishes (8%)

Milk (7%)

Cheese (6%)

39%

Leme et al., Public Health Nutrition, 2018

Are children more vulnerable?

Taste preferences are innate

Preference **Rejection**


Umami


Sweet


Sour


Bitter!

Steiner, Adv Child Dev Behav. 1979
Beauchamp, Pearson, Phys Behav, 1991
Rosenstein, Oster, Child Dev, 1998
Ventura, Mennella, Curr Opin Clin Nutr Metab Care, 2011
Mennela, Bobowski, Phys Behav, 2016

Children live in a different sensory world than adults

Children show heightened sensitivity for some bitters

Children with bitter-sensitive TAS2R38 genotypes were more sensitive to bitter taste of PROP than adults

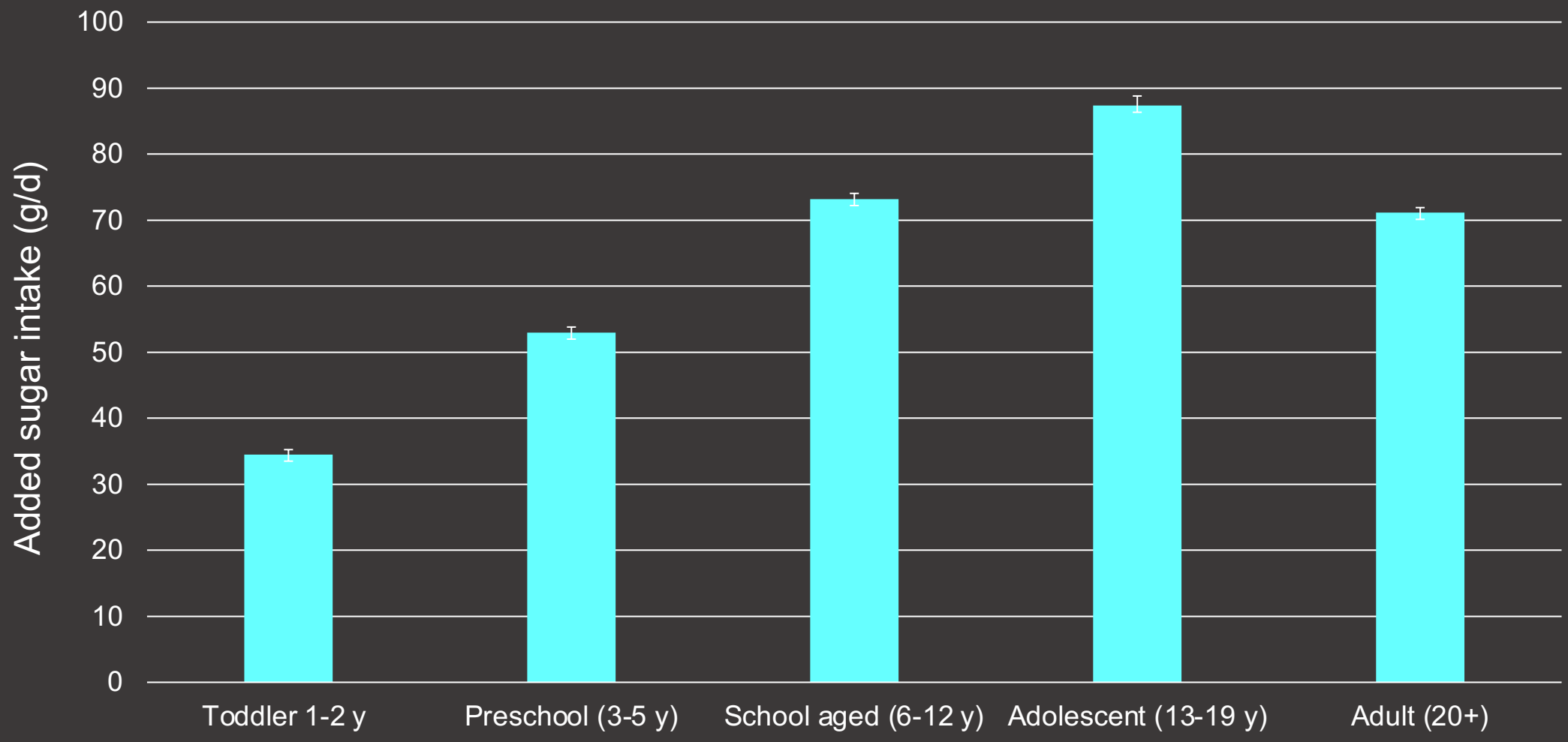
Children have higher preferences for sweetness

Children preferred higher concentrations of sucrose, fructose, and NNS sucralose compared to adults

Beauchamp 1985; Beauchamp 1990; Liem, 2003; Mennella, 2005; Coldwell, 2009; Mennella, 2010; Mennella, 2011; Mennella, 2014; Liem, 2017

Daily added sugar intake in US population

NHANES 2005-2016 (N = 44075)



Daily added sugar intake in US population

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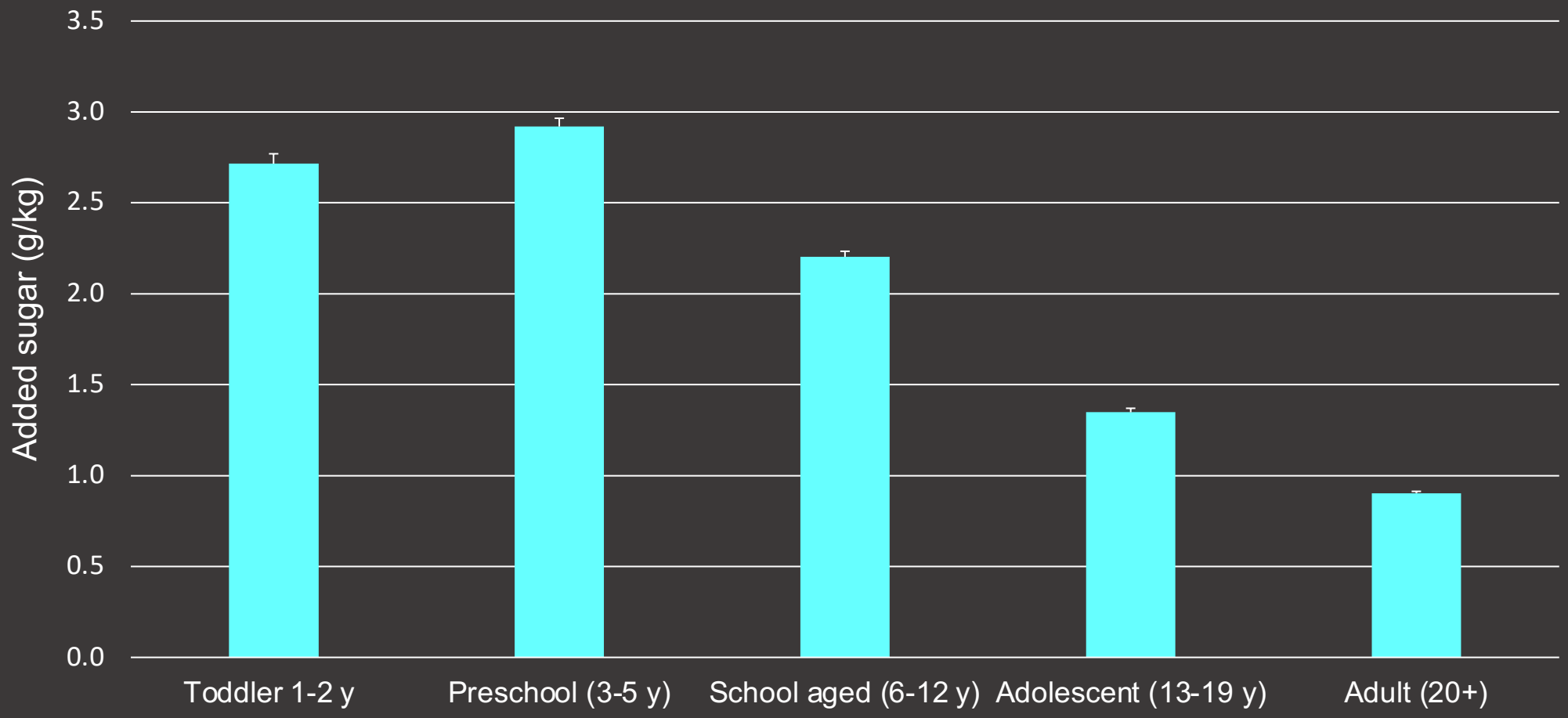
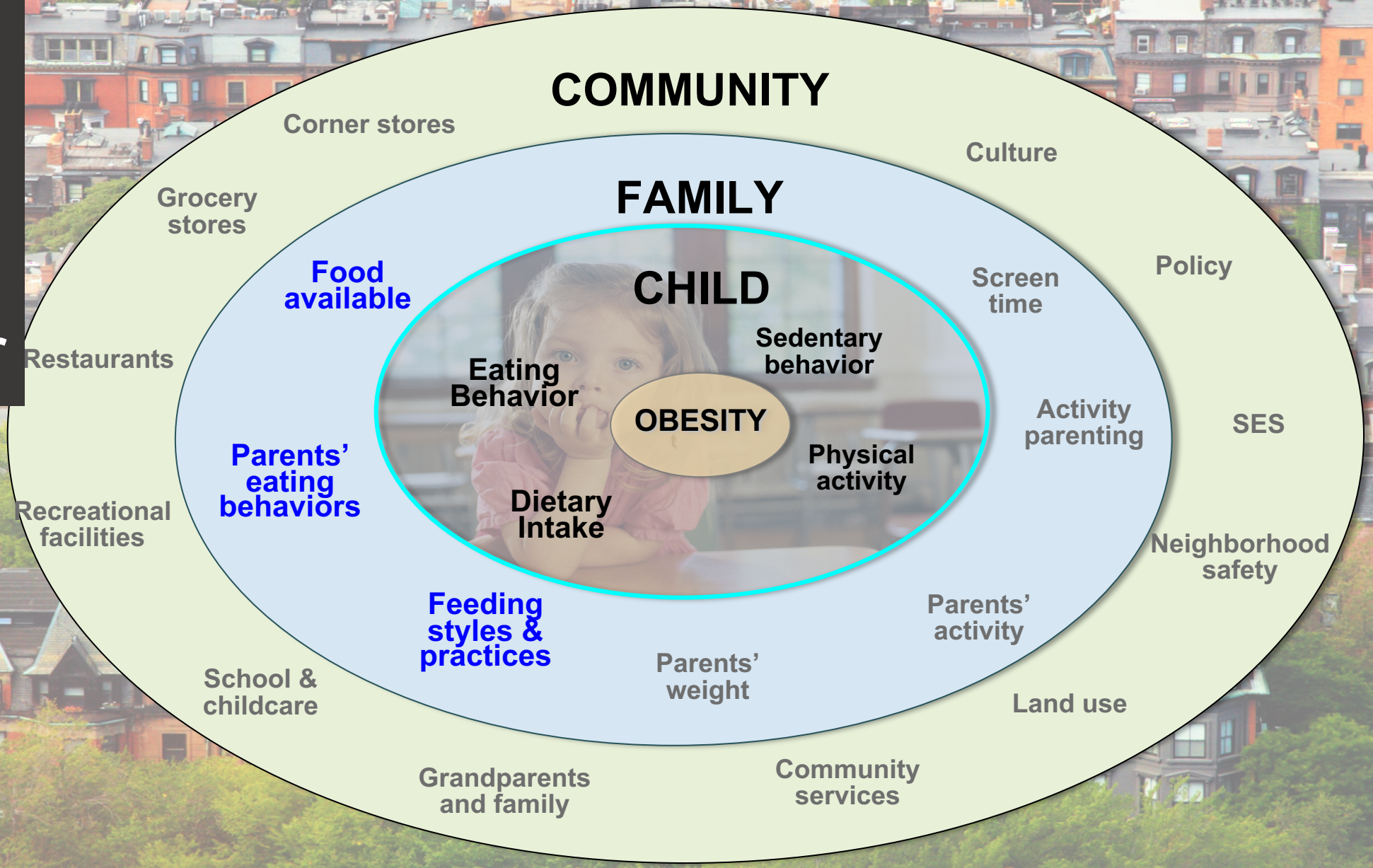


The sensation of sweetness is context dependent and children can acquire meaning through associative learning and familiarization

- Children fed sugar water as infants preferred a more concentrated sugar solution at 2 y and throughout later childhood (6 –10 y)
- Children (4-7 y) whose mothers reported adding sugar to their foods on a routine basis were significantly more likely to prefer apple juices with added sugar and cereals with higher sugar contents
- Children (6-11y) exposed to sweet orangeade for 9 days increased preference for sweet orangeade
- **Children (4-5 y) who were repeatedly exposed to sweetened tofu (an unfamiliar food) preferred that version over salted and plain versions**

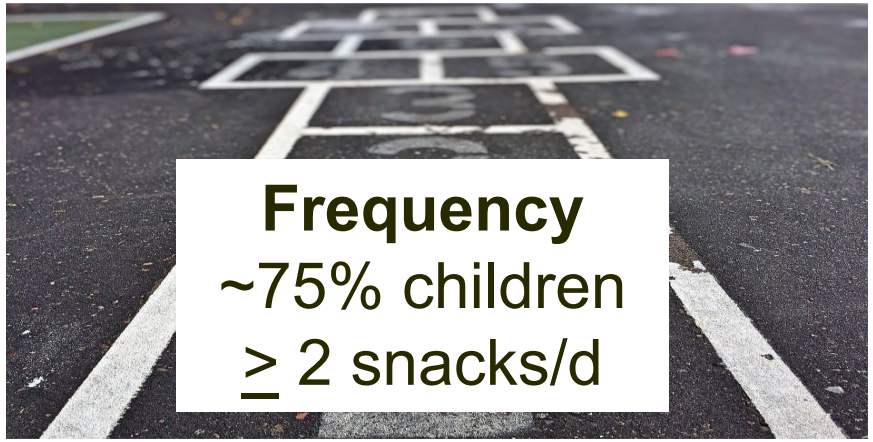
Beauchamp 1982; Beauchamp, 1984; Sullivan, 1990; Liem, 20002; Liem, 2004; Park, 2014; Mennella, 2015; Mennella 2016

Family as a critical context for learning about sugar



Adapted from Davison, Birch, Obes Rev, 2001

Snacking among US children 2-19 y 2018-2018



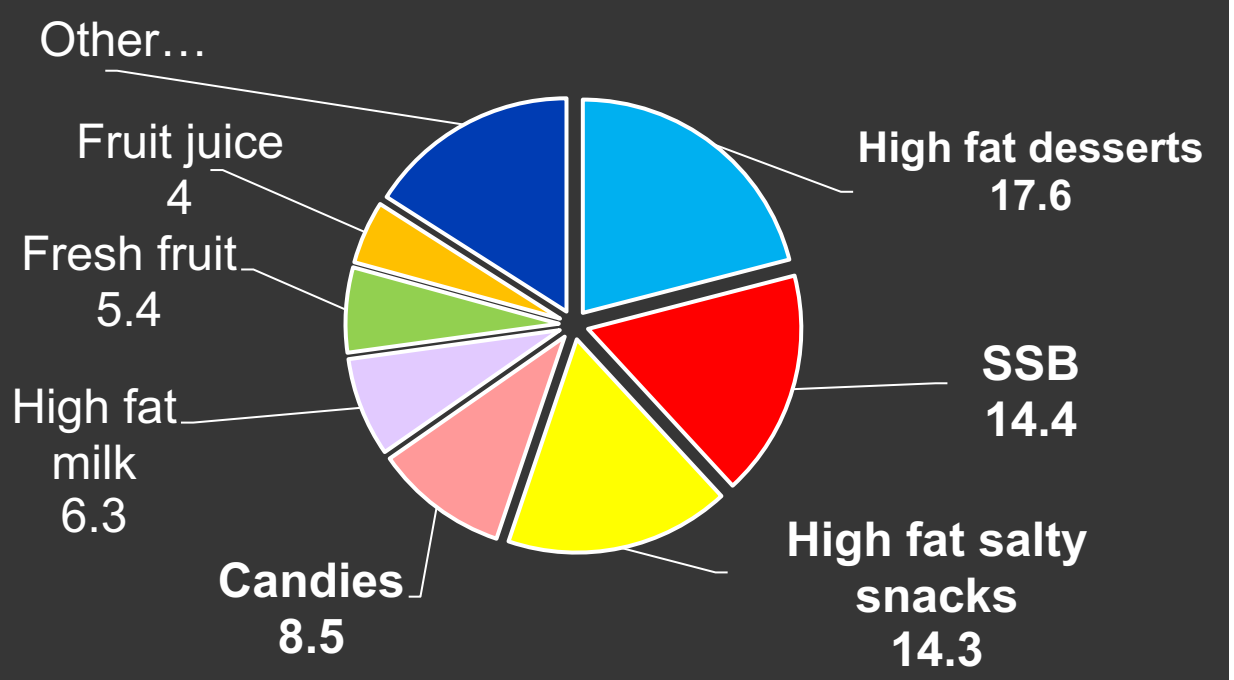
Frequency
~75% children
≥ 2 snacks/d

Energy
24% daily energy
36% total sugars

Adapted from: Piernas, Popkin, Health Aff, 2010
Dunford, Popkin, Pediatric Obesity, 2017
What We Eat in America, NHANES 2017-2018

Quality
55% energy from high SoFAS foods

HNANES 2003-2006



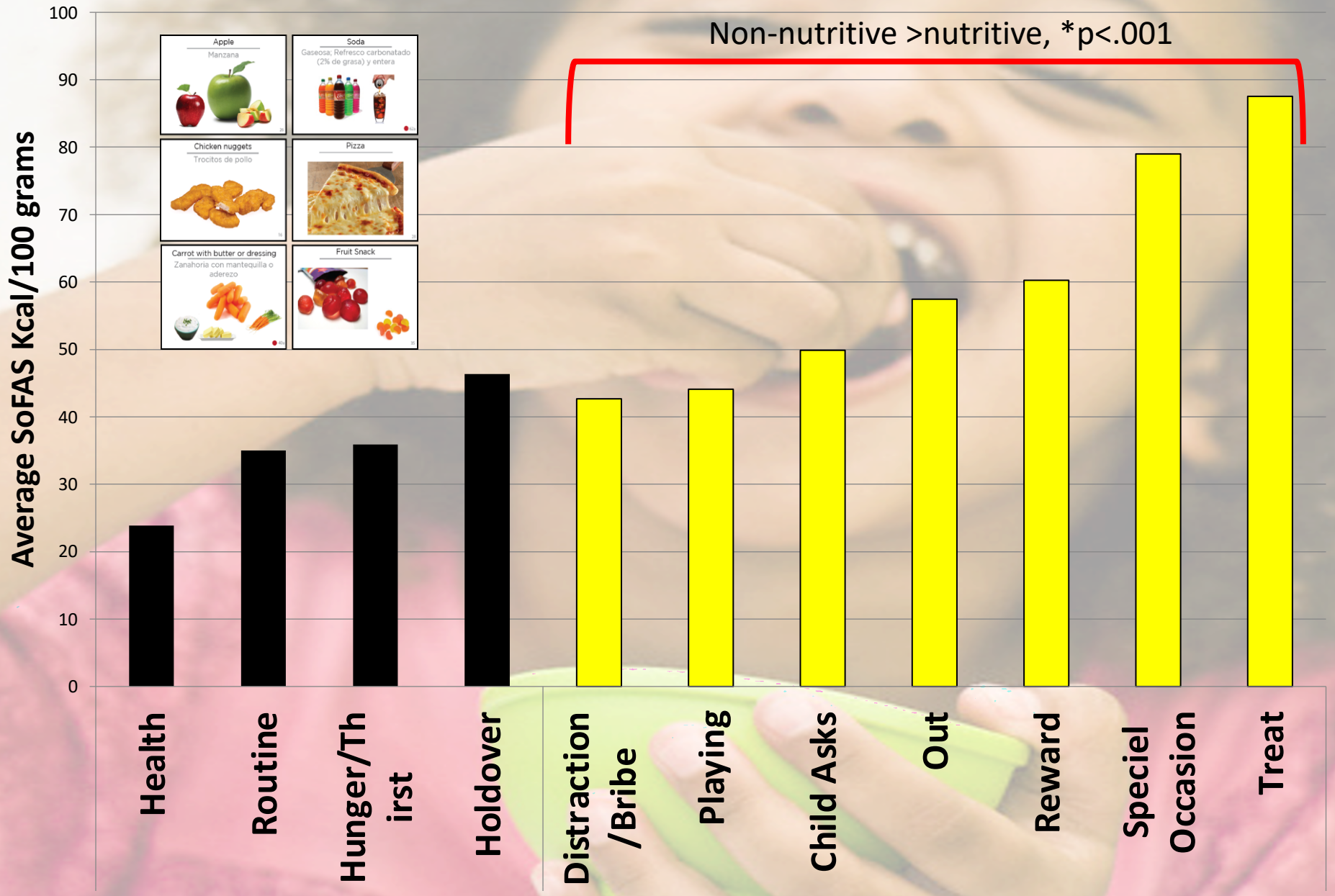
Why does your child get snacks?

59 Hispanic, Black and white parents of preschoolers with low incomes

Completed card sorts with 65 foods/beverages

	# of parents endorsing (n=59)
Child asks-wants it-craves it	32
Reward for good behavior	25
Specific for current hunger or thirst	23
"Hold over" to prevent hunger or thirst	23
Bribe or to stop or prevent bad behavior	15
Part of the daily routine	14
To promote health	13
Part of playing-social activity	13
Special event/ occasion/ celebration	11
Treat for no specific reason	8

Blake, Younginer, Fisher, et al., unpublished



Blake, Younginer, Fisher, et al., unpublished

Odds of meeting obesity dietary recommendations

271 children, 2-12 y with low-income backgrounds

	OR (95% CI)
Nutritive reasons	
To help child grow	1.05 (0.92, 1.19)
Because child is hungry	0.88 (0.77, 1.01)
Non-nutritive reasons	
Reward for good behavior	**0.83 (0.70, 0.99)***
To keep child quiet	0.89 (0.73, 1.08)
Celebrate event or holiday	**0.72 (0.52, 0.99)***
Celebrate child's achievements	**0.82 (0.68,0.98)***

* P < 0.05, adjusted for child race, child age, child sex, child BMI z-score, parent BMI

Blaine, Fisher, Taveras et al., Nutrients, 2015

How can parenting play a supportive role in taming children’s sweet tooth?

Styles

Reflect the emotional climate and broader context within which practices are expressed

vs. Practices

Goal oriented behaviors (e.g. eat vegetables) that are thought to be more amenable to change than styles

Indulgent

Low demandingness, high responsiveness

Authoritative

High demandingness, high responsiveness

Fruit, juice, vegetables, whole grains, and dairy

Energy-dense snacks, added sugar

Overall diet quality

Larger self-served portion sizes

Patrick et al., 2005; Hoerr, IJBNPA, 2009; Hennessy et al., 2012; Fisher et al., Int J Obes, 2013; Tovar et al., Appetite, 2015; Lopez et al., Appetite, 2018; Ip et al., JAND, 2018; Hughes & Power, *APA Handbook of Family Psychology*, 2018

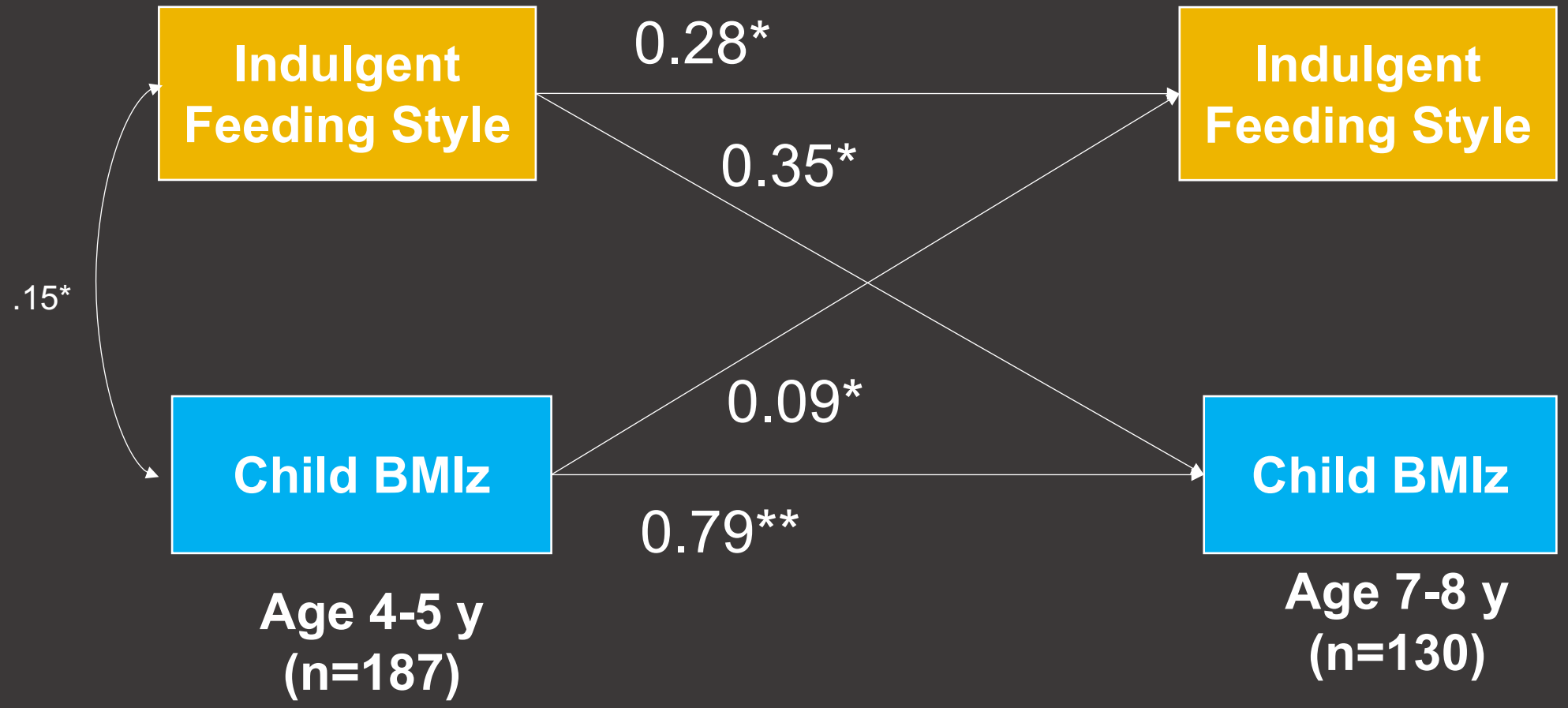
Healthy Eating Index Scores of foods served and consumed by children at dinner meals

145 Hispanic and Black families of preschoolers with low incomes

	Served	Consumed
Authoritative	47.5 ± 9.9	47.6 ± 6.8
Authoritarian	43.6 ± 8.1	41.5 ± 6.2
Indulgent	44.7 ± 7.0	43.6 ± 6.4
Uninvolved	41.2 ± 8.1	41.7 ± 7.8

Arlinghaus et al., AJCN, 2018

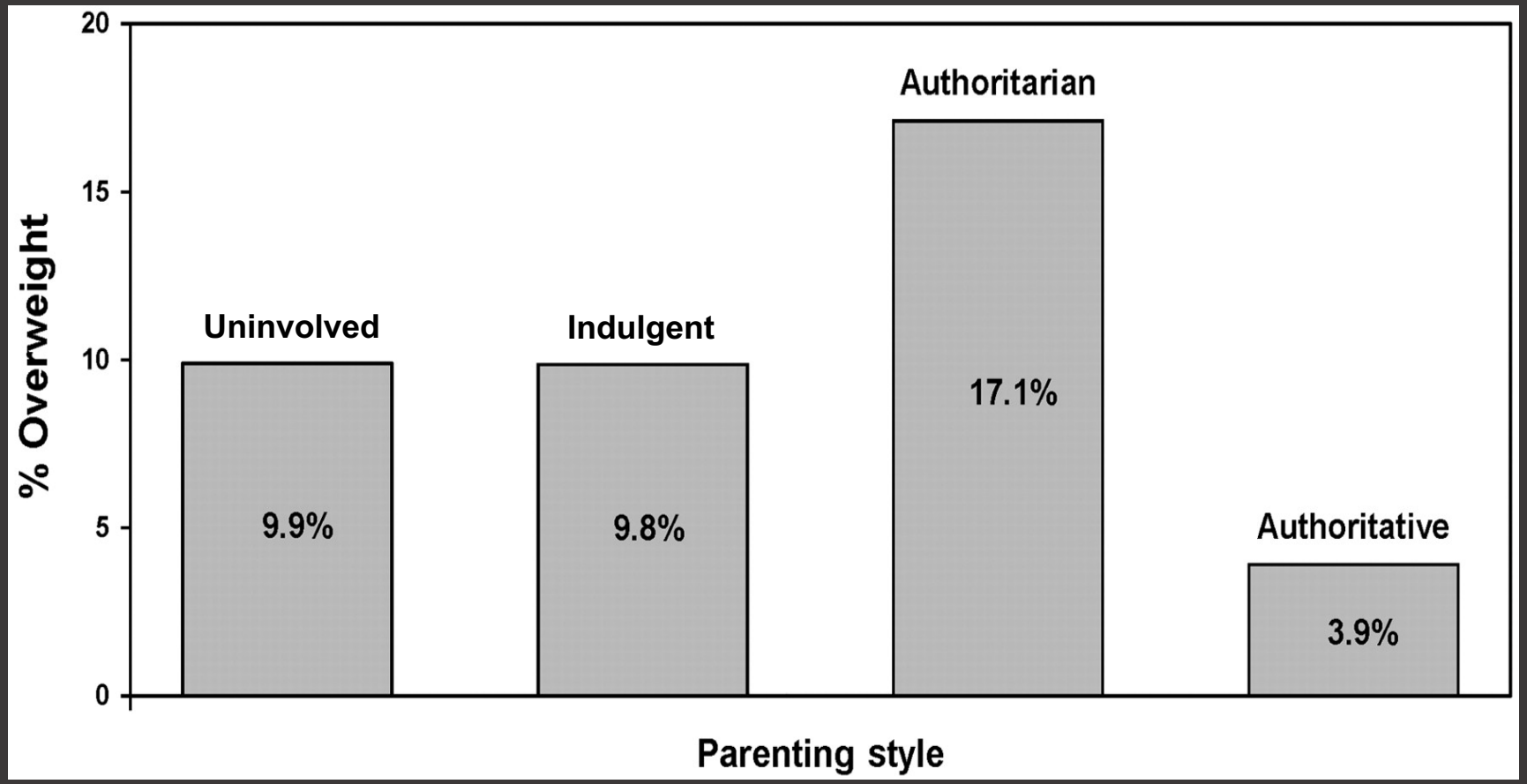
Longitudinal study of 187 Hispanic preschoolers in Head Start



Hughes, Power, O'Conner, Fisher, Micheli, Papaioannou (under review)

General Parenting Style and Child Weight

Over 800 1st grade children studied at 10 sites across the US



*Adjusted for income/needs ratio and race

Rhee et al., *Pediatrics,* 2006

Authoritative food parenting practices

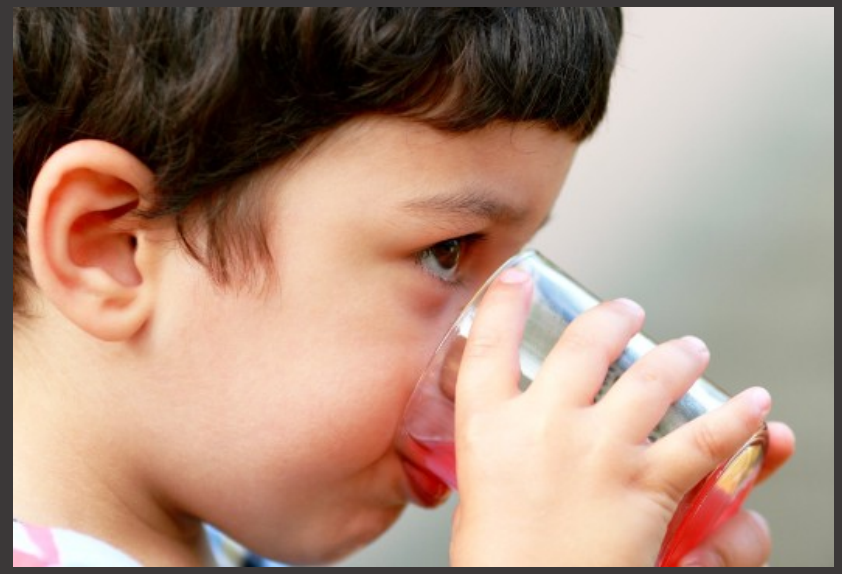
Systematic review of 88 studies of children < 18 y

Structure

- **Availability**
- **Modeling**
- Rules and setting limits
- Monitoring
- Meal and snack routines

Autonomy Support

- Praise
- Active guidance
- Child involvement
- Encouragement



Sugar sweetened beverages and salty snacks

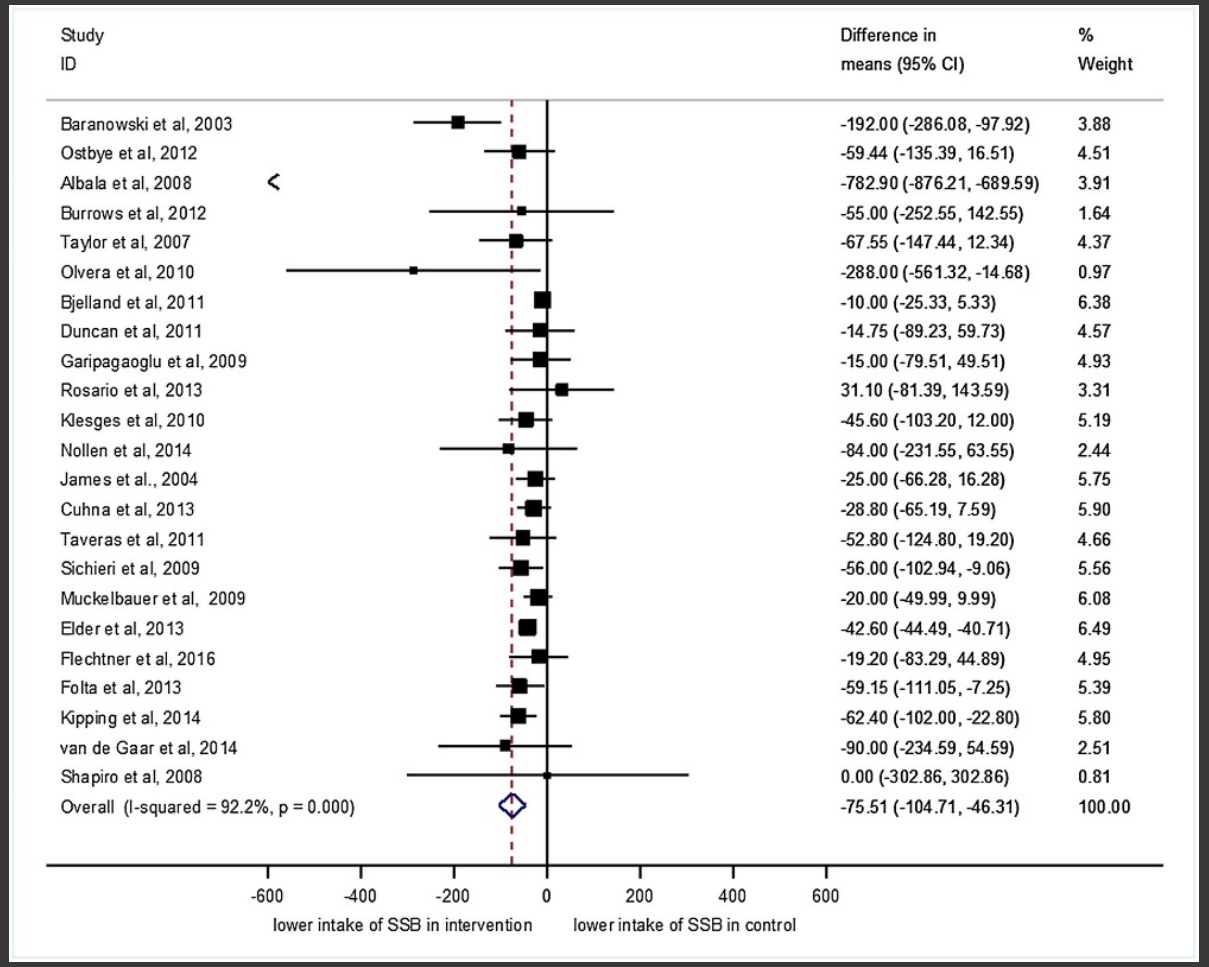
Vaughn, Ward, Fisher et al., Nutr Rev, 2016

Yee, Lwin, Ho, IJBNPA, 2017

Interventions to reduce consumption of sugar-sweetened beverages or increase water intake: evidence from a systematic review and meta-analysis

23 studies of children (n=10,964)

- Interventions reduced SSBs by 76 mL d^{-1} (~2.5 fl oz)
- Medium effect size: −0.48
- Home-based interventions more effective than school
  - 1 of 9 home-based studies addressed parenting



Vargas-Garcia et al., Obesity Reviews, 2017

FFF authoritative food parenting intervention

12 week group-based behavioral RCT (FFF vs. no treatment control) with mothers of preschoolers with low incomes to reduce solid fats and added sugars (SOFAS)

Structure

- Routines
- Limit setting
- Availability
- Child portion sizes

Autonomy Support

- Effective praise
- Responsiveness to cues
- Modeling

Behavioral Change Techniques

- Goal setting
- Problem solving
- Self-monitoring

SSB, dessert, candy, chips

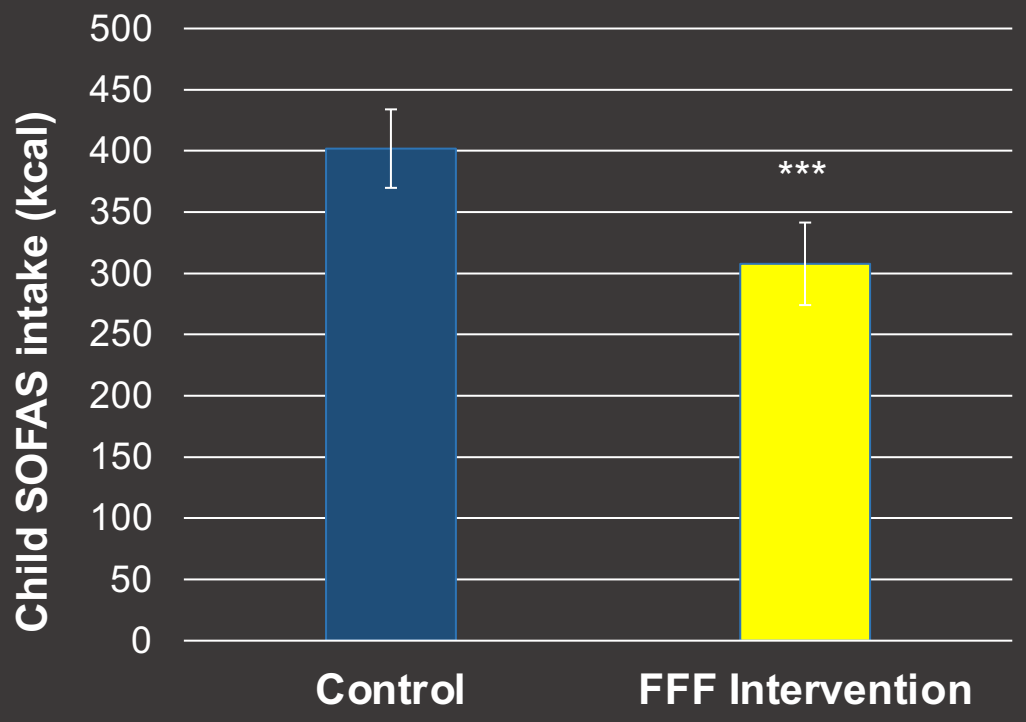
vs

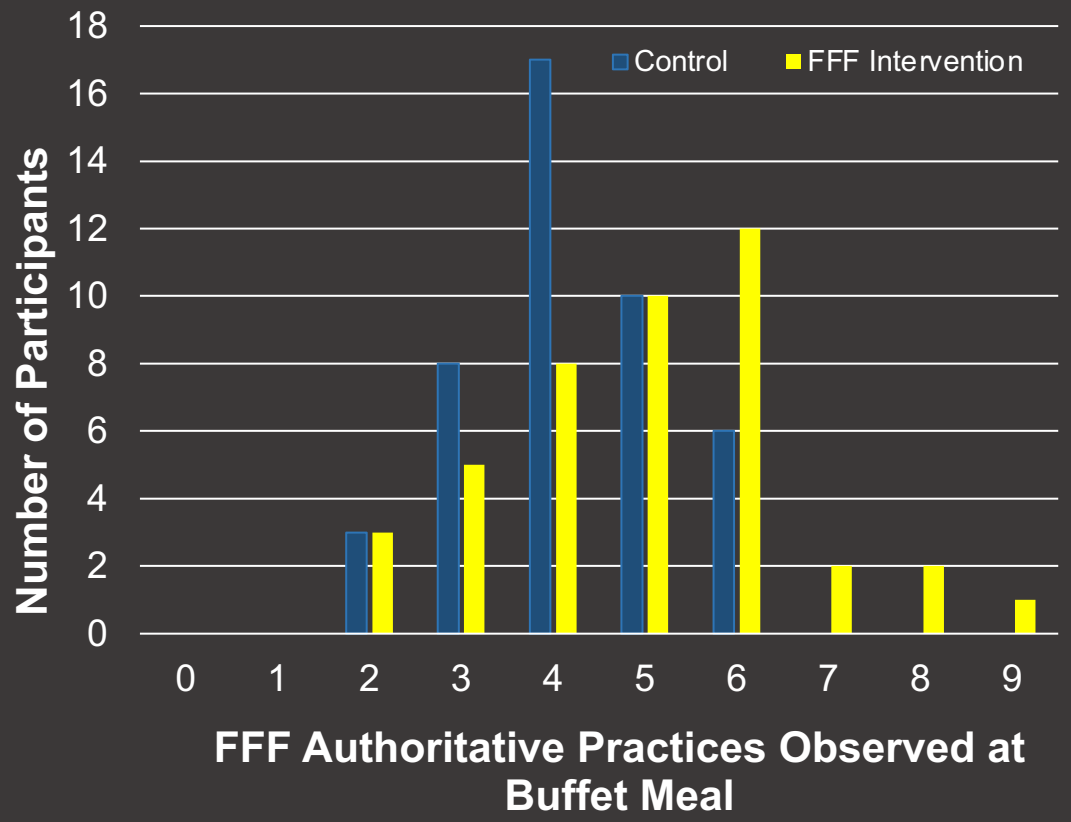
Water, milk, FV, pretzels, yogurt

Focus on SSB, Snacks

Fisher, Serrano, Foster et al., IJBNPA, 2019

FFF decreased children's intake of solid fats and added sugars and increased in maternal authoritative feeding practices (n=119)





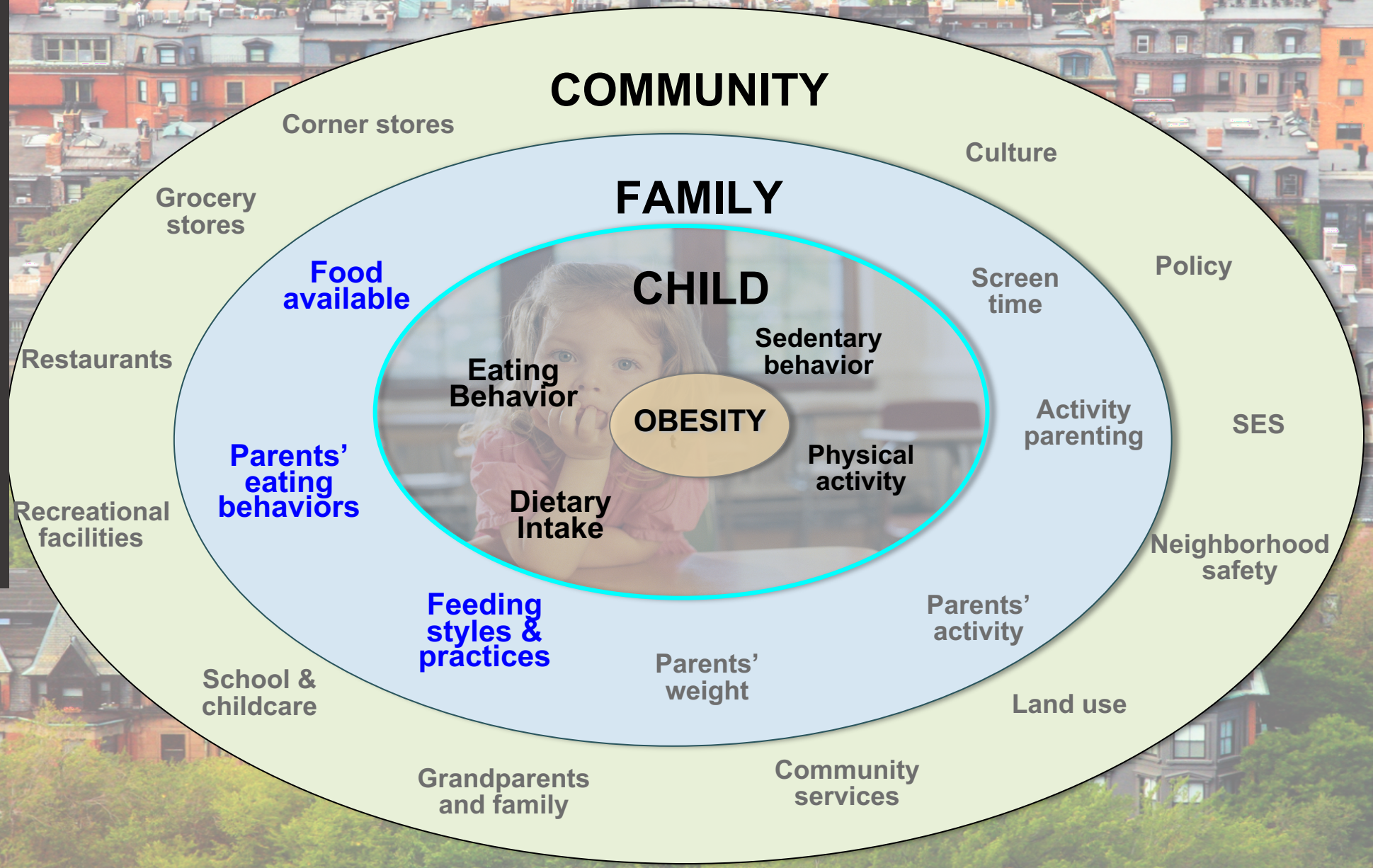
Adjusting for baseline daily SOFAS intake; *** p<0.001

Post-intervention

Fisher, Serrano, Foster et al., IJBNPA, 2019

Taming children's sweet tooth: priorities for family-based prevention

1. Aligning prevention with parental aspirations and challenges



Adapted from Davison, Birch, Obes Rev, 2001

FFF formative research: focus groups of mothers with low-income backgrounds

Building relationships at the table

"There's nothing to me more important than sitting down and having time with your family. So many things you got to fight with out in the world that you shouldn't have to [fight] inside your home. I think it helps when you create a relationship, and when you create a relationship within your own house, it helps you build outside of it."

Teaching life lessons

"It's not hard for me to say no because sometimes, you know, what's good to you is not good for you. So I'm looking out for their well-being by saying no. So you might not like me right now…but you'll love me later".

Preventing hyperactivity and tooth decay

"…he had to get his teeth pulled out at the age of three… And my other two little ones, I was like no, cannot have that done, so that's why I don't give them candy."

Herman et al., IJBNPA, 2012
Malhotra et al, JAND, 2013

FFF formative research: focus groups of mothers of preschoolers with low-income backgrounds

Snacks involve less prep, balance, sustenance	Snacks and meals are distinct	Moms like snacks too	Snacks help manage children's behavior
• "You heat up a meal and a snack you just take out of the wrapper"	• "Well, I'm a snack person, I'm not too big on food." • "He's real skinny…and he don't like to eat - all he like is snacks and cereal."	• "But my thing is snacks, so I can't keep snacks cause I know I'll wanna eat a honey bun and I'll wanna eat some cookies, then I'll want some ice cream, then I'll think about the chips. And I'm like oh, no, this is out of control."	• "Sometimes a snack do help you out…Like if you doin' something and they just like naggin' or won't be still, sometimes you can just like, sit 'em down with a snack."

Fisher, Wright, Herman et al., Appetite, 2015

Semi-structured interviews with parents (n = 40) of preschoolers

Structure and Autonomy Support

- Limit setting
- Schedules/routines
- Monitoring
- Reasoning
- Encouragement
- Child involvement

Momentary influences

- Fatigue/stress (70%)
- Limited time (65%)
- Child mood (47%)
- Activities/special events (25%)
- Schedule changes (22%)

Indulgence and Coercive Control

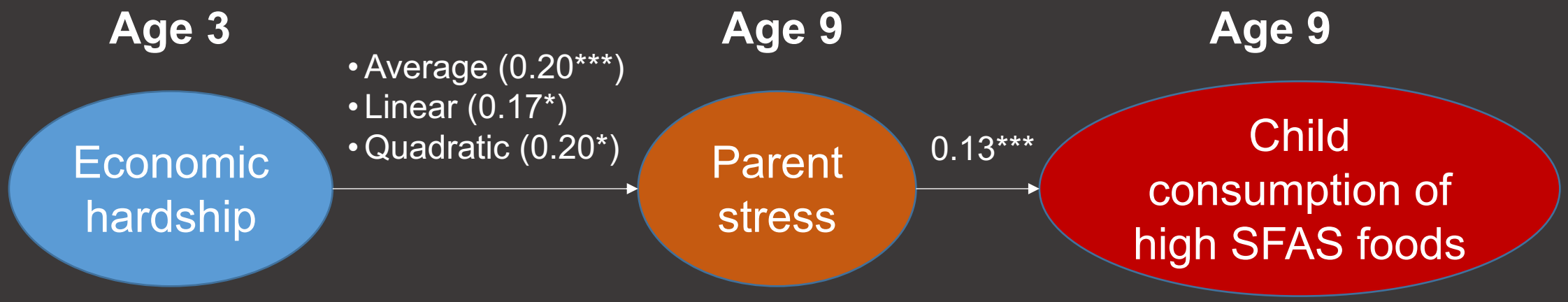
- Restriction
- Pressure to eat
- Bribes/threats
- Food to manage behavior

Loth et al., Appetite, 2018

Fragile Families & Child Wellbeing Study
PRINCETON | COLUMBIA

Fragile Families & Child Wellbeing Study

~5,000 children born in 20 U.S. cities between 1998-2000



Controlling for race and education

Schuler et al., Public Health Nutrition, 2020

FFF authoritative food parenting intervention

12 week group-based behavioral RCT (FFF vs. no treatment control) with 119 mothers of preschoolers with low incomes to reduce solid fats and added sugars (SOFAS)

Structure

- Routines
- Limit setting
- Availability
- Child portion sizes

Autonomy Support

- Effective praise
- Responsiveness to cues
- Modeling

SSB, dessert, candy, chips

vs

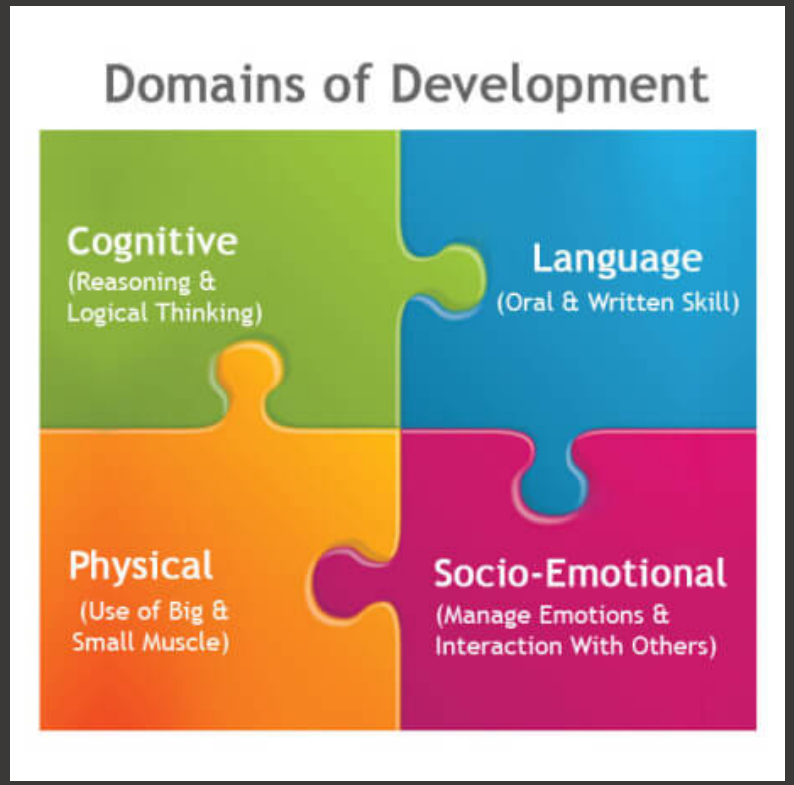
Water, milk, FV, pretzels, yogurt

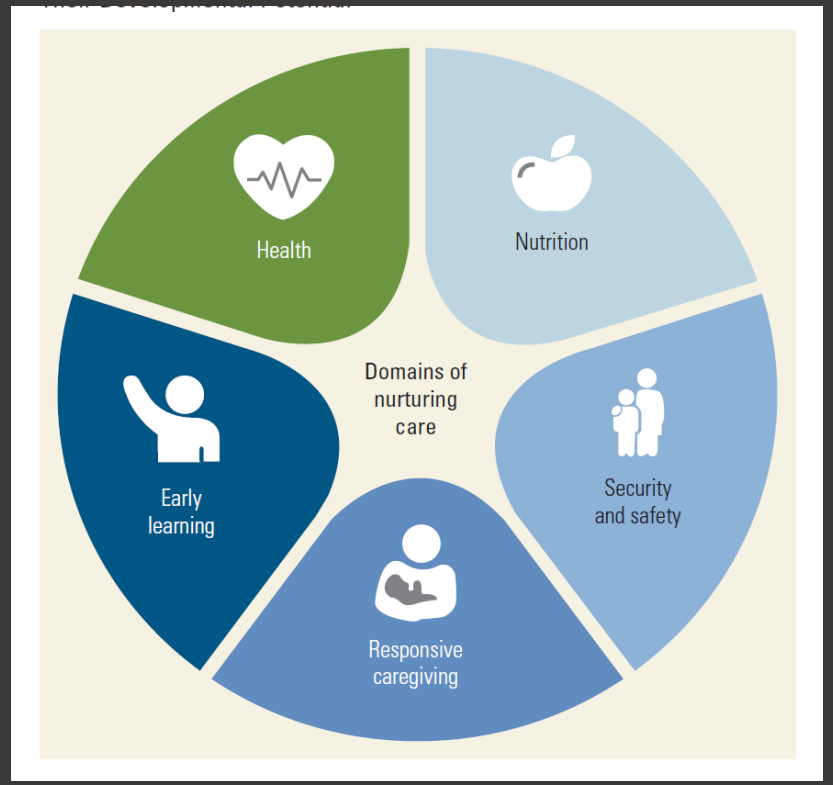
Focus on Snacks

Weekly Topic	FFF prevention goals	Parenting goals
Eat with your child	Better nutritional outcomes	Building relationships, being responsive
Limiting is loving	Reduce solid fats and added sugars	Life lessons, saying no is loving
Start small	Age appropriate portion sizes	Reduce waste
Scheduled snacks	Reduce grazing	Reduce nagging, building relationships (mini meals)
Water breaks	Hydration, reduce solid fats and added sugars	Reduce cavities
Fewer sweets	Reduce solid fats added sugars	Life lessons, preventing tooth decay

Fisher, Serrano, Foster et al., IJBNPA, 2019

2. Approach added sugar within a broader context of development





Black, Gove, Merseth. Platforms to Reach Children in Early Childhood, 2017

INSIGHT Obesity Prevention Trial

Responsiveness in multiple behavioral domains

Sleep

- Sleep recommendation: total hours
- Consistent bedtime routines
- Drowsy but awake
- Bedtime between 7-8pm
- Sleep disruptions (e.g,. milestones, fears, separation anxiety)
- Opportunity to self soothe

Feeding

- Bottle feeding tips
- Identifying hunger & fullness cues
- Repeated exposure
- Shared responsibility of feeding
- Age appropriate foods
- Portion size
- Mealtime routines

Emotional/Social Regulation

- Baby's temperament
- **Alternatives to food to soothe**
- Positive reinforcement
- Emotion coaching
- Routines/expectations to reduce temper tantrums

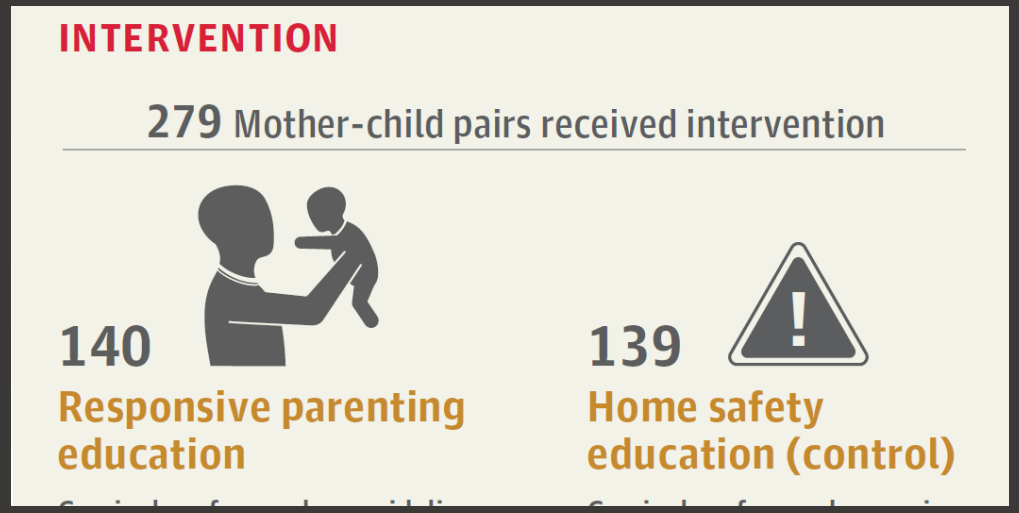
Interactive Play

- Tummy time tips
- Activity, game and toy suggestions
- Spend time outdoors
- Limit restrictive devices
- AAP screen time recommendations
- **Motor, social, cognitive & language developmental milestones**

Paul IM et al. *JAMA*, 2018

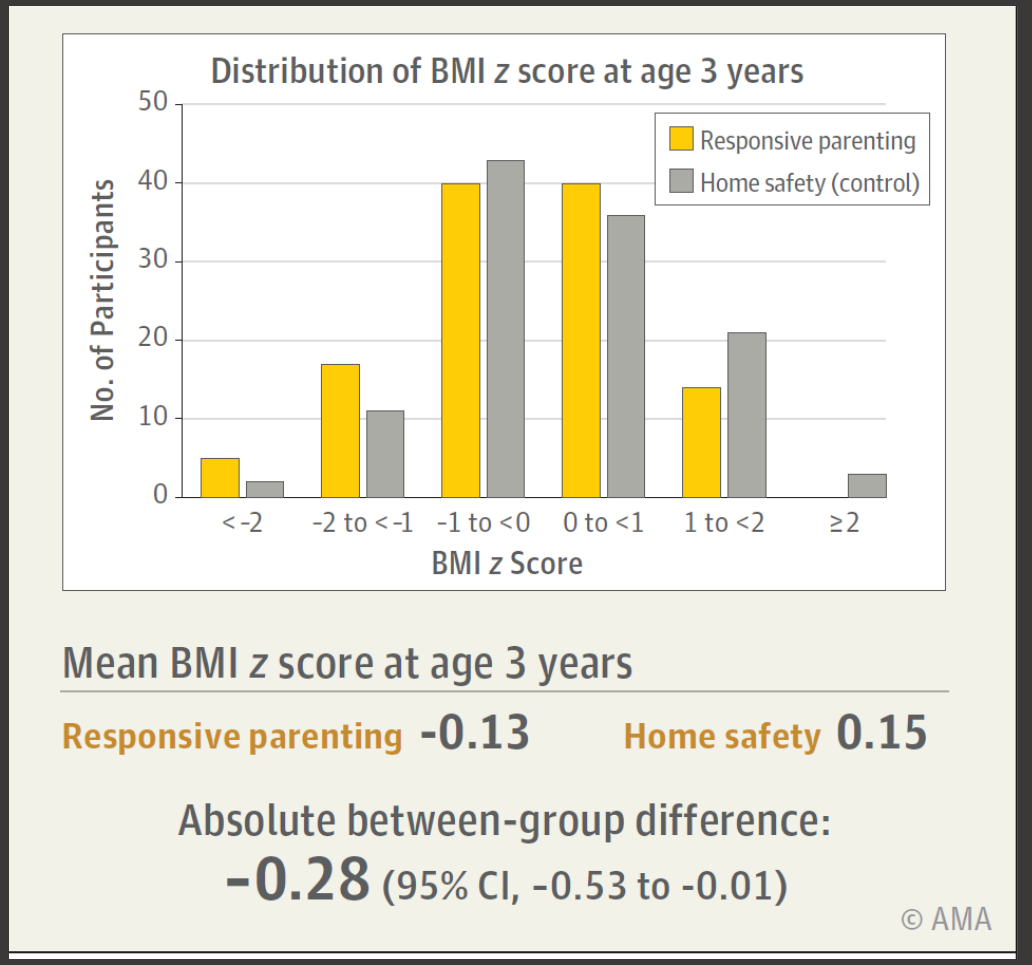
EarlyInsight for new parents

INSIGHT



Full-term singleton infants born to primiparous mothers

BMI z-score at 3 years



Paul IM et al. *JAMA*, 2018

3. Address individual differences in children's eating behaviors

Food avoidance

- Food fussiness
- Food neophobia
- Picky eating
- Satiety responsiveness
- Slowness in eating
- Emotional undereating

Food approach

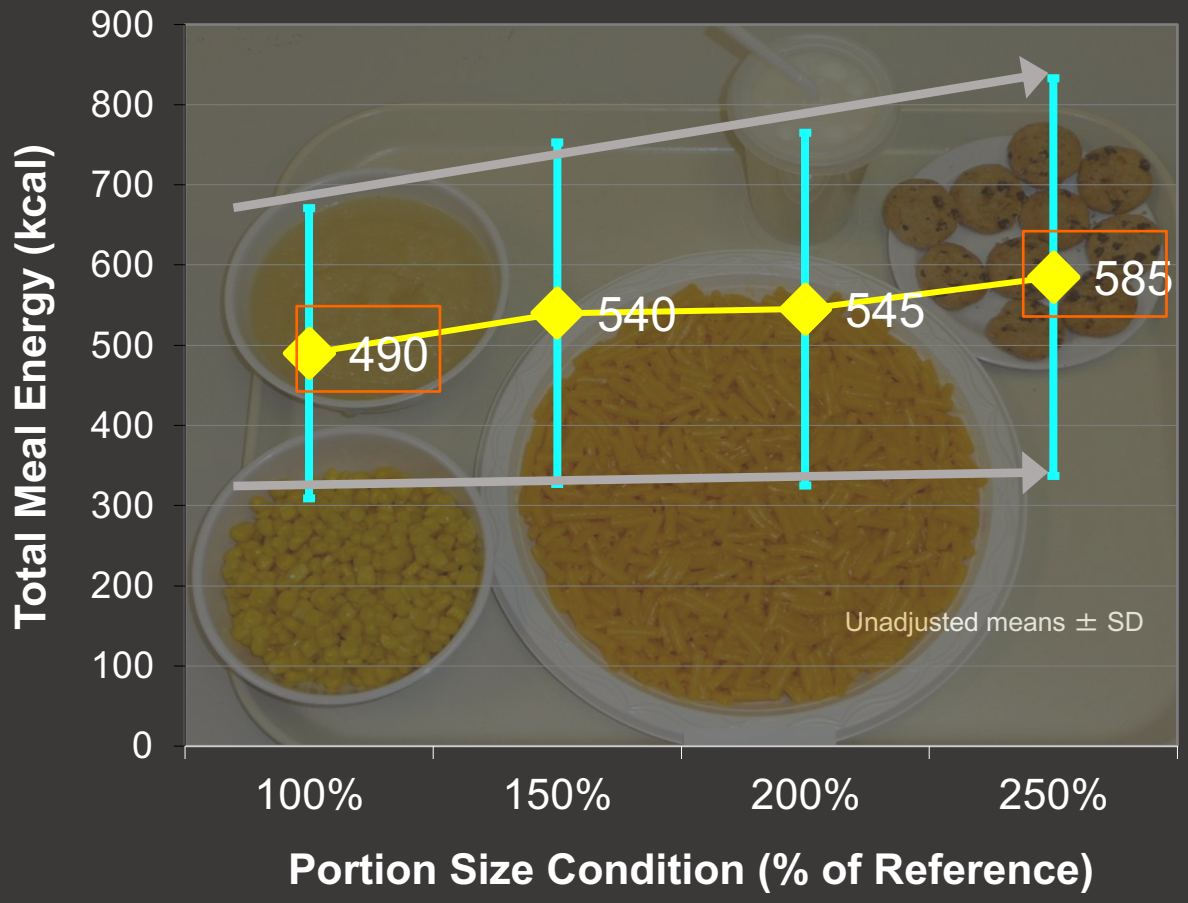
- Enjoyment of food
- Food responsiveness
- Relative reinforcing value of foods
- Emotional overeating
- Eating in the absence of hunger
- Loss of control eating
- Faster eating rate
- Larger bite size

French, Epstein, Jeffery, Blundell, Wardle, Appetite, 2012
Carnell, Benson, Pryor, Driggin, Phys Behav, 2013
Fogel, Goh, Fries et al., Phys Behav, 2017
Fogel, Fries, McCrickerd et al., Appetite, 2018

100 Black children seen at dinner in 4 portion size conditions

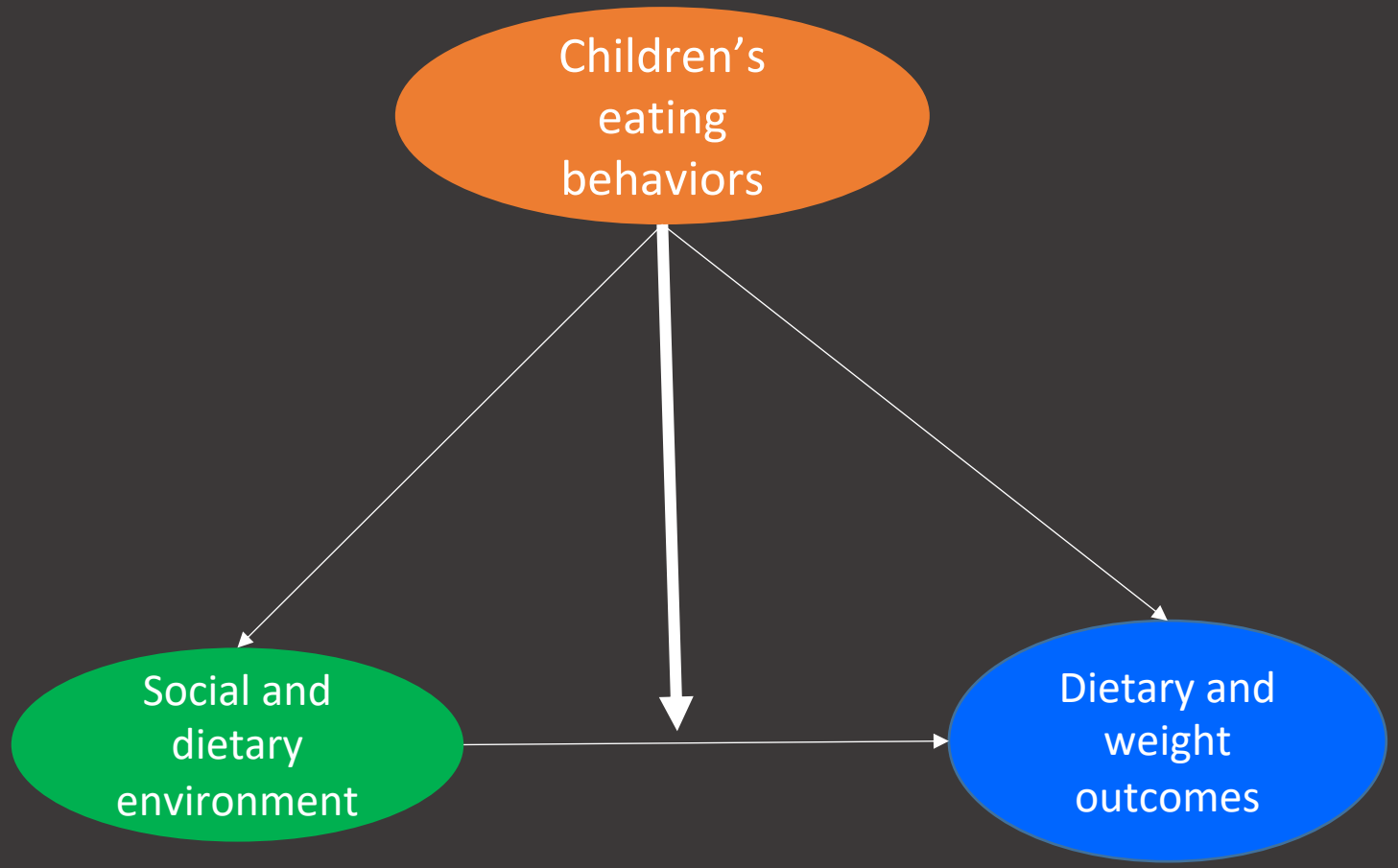
34 children with obesity, 66 children with normal weight

Predictors	
Weight status	ns
Satiety responsiveness	-
Food responsiveness	+
Enjoyment of food	ns



Mooreville, Davey, Orloski et al, Obesity, 2015

Individual differences influence the way children interact with and are influenced by their environments



- Home, childcare, school
- Food parenting, caregivers, peers

"Informing parents …may reduce any feeling of "blame" and empower parents to implement intervention recommendations"

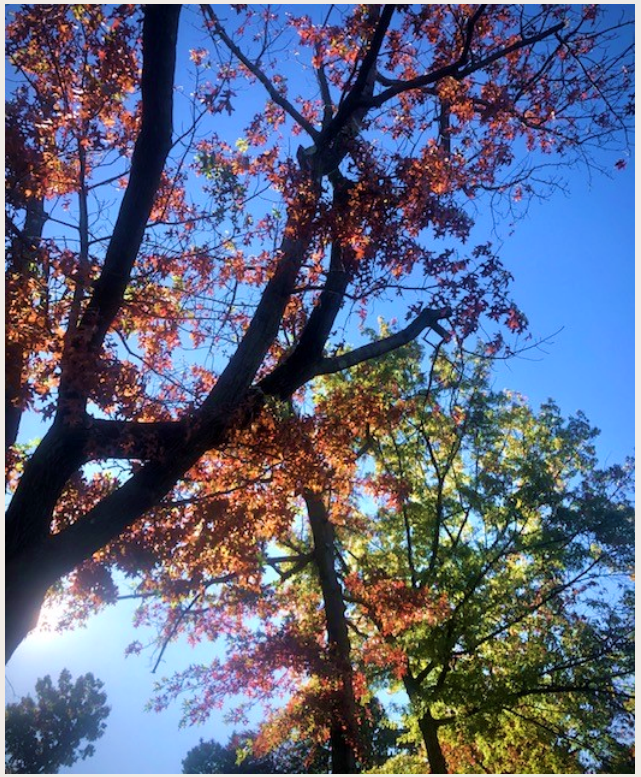
Miller, Curr Nutr Rep. 2018

Conclusions

- High levels of added sugar consumption among children pose a threat to health and reflect both innate and learned influences.
- Authoritative approaches that provide structure and a healthful model of eating are important dimensions of food parenting for added sugar intake, particularly around snacking.
- Priorities for family-based approaches:
  - Understand contextual influences and parental aspirations
  - Address added sugar broader context of development
  - Highlight individual differences among children

Thank you!

Questions?



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