Compliance with 5-2-1-0 Obesity Recommendations among Preschool-aged Children Attending Child Care

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The Association between Caregiver Eating Behaviors and the Styles with which they Feed their Infants

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Early Childhood Education Working Group - Webinar

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Outline

- Attainment of ‘5-2-1-0’ Recommendations in Child Care Setting

- Examining the role of Caregiver Eating Behaviors on Infant Feeding Styles

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PART 1:

Compliance with 5210 Obesity Recommendations among Preschool-aged Children Attending Child Care

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5-2-1-0

- American Academy of Pediatrics (AAP) recommends pediatricians counsel families on preventative measures
- Adopted from “Let’s Go! 5210” and promoted locally and nationally,[1-4] the 5210 message includes:

  5 – Consuming ≥ 5 fruits/vegetables daily

  2 – Viewing ≤ 2hrs of screen time

  1 – Getting ≥ 1 hour of physical activity

  0 – Consuming 0 sugar-sweetened beverages

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1. Tanski 2010; 2. Nemours 2017; 3. Obama 2009; 4. Schweitzer Fellowhsip;

5210 Recommendations

- Few studies have examined adherence with 5210 recommendations in children[1-9]
  - Most studies in school-aged children/adolescents[1-6]
- Most studies based on parent self-reported data[1-3,5,8]
- No known studies examining attainment and predictors of 5210 in children who attend childcare
- Few studies examine association between 5210 adherence and obesity[9-10]

1. Gonzalez 2015; 2. Iannotti 2013; 3. Haughton 2016; 4. Kunin-Batson 2015; 5. Rogers 2013; 6. Foltz 2011; 7. Turer 2013; 8. Briefel 2015 ; 9. Schrempft 2015; 10. Gortmaker 2015

Methods

- Secondary analysis of the Preschool Eating and Activity Study (PEAS)
  - 24-hour observational study of 447 preschool children (36-72 months) from 30 child-care centers in Cincinnati, Ohio
- Data collection started at drop-off on Day 1 and ended at drop-off on Day 2
  - Data over 24hr truncated

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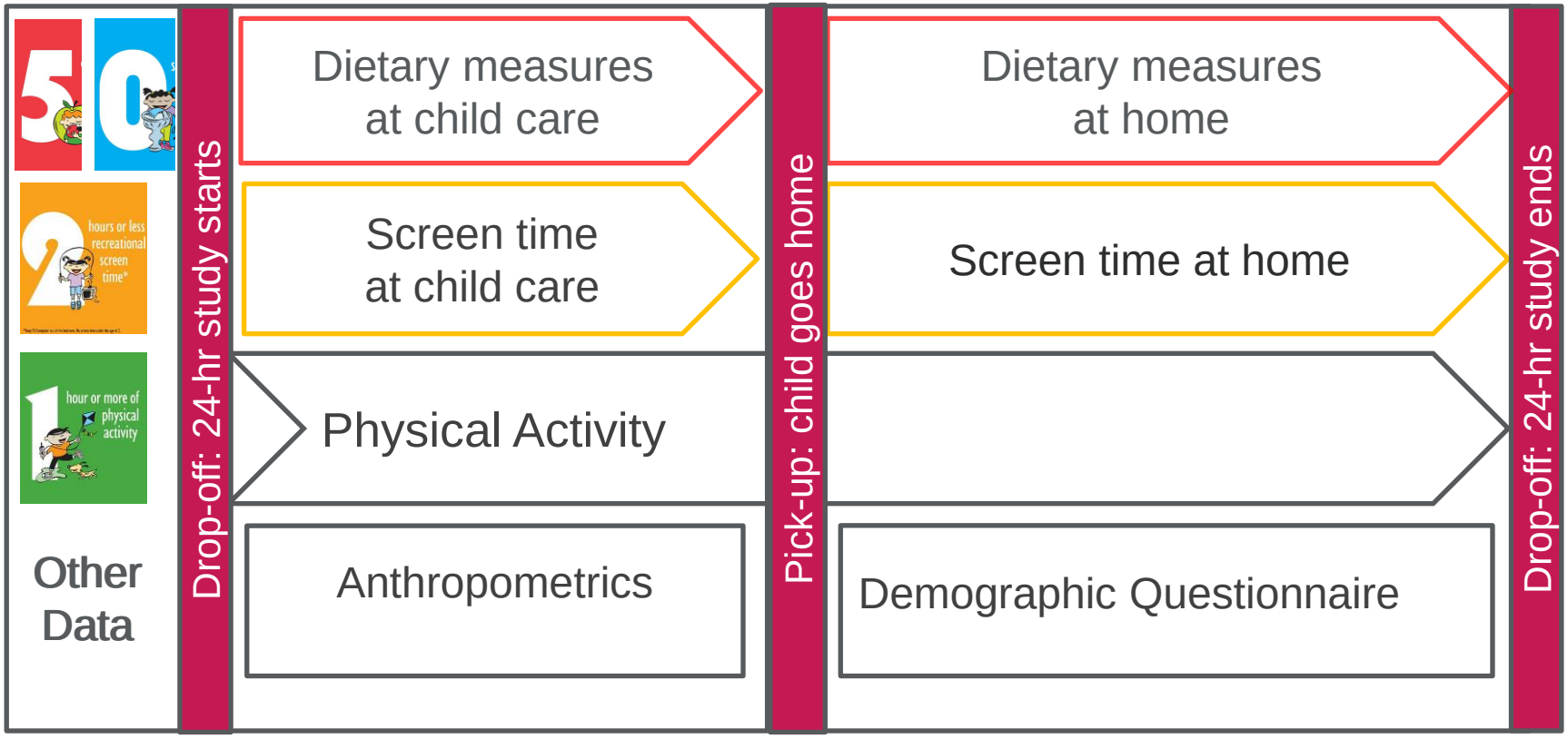
PEAS Study

n=30 child-care centers, n=447 children



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Methods

- At Child Care, trained study staff recorded:
  - Food and beverage intake at meals/snacks
  - Individual and classroom screen time
  - Anthropometric measurements
- At Home, parents recorded:
  - Food/beverage intake via estimated food record
  - Screen time (TV and computer)
- Physical Activity measured via Actical accelerometers
  - Worn at the hip by participants

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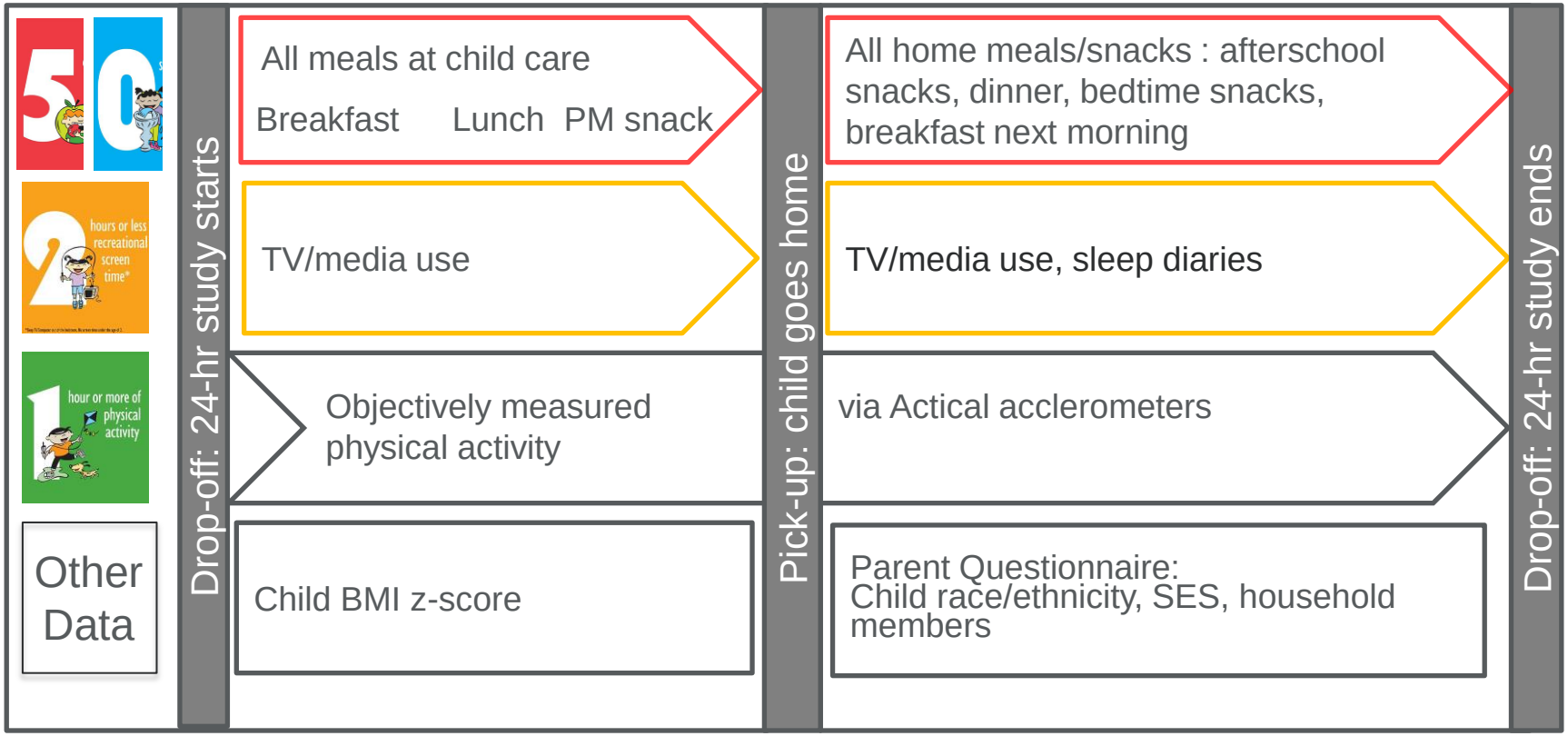

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Definition of Attainment

- 5 – Servings of Fruit & Vegetable Intake

  Consumption of 2.5 cups fruit/vegetable

  - Included 100% fruit juice (AAP 2010)
- 2 – Screen Time

  ≤120 min of Screen Time in 24hrs
- 1 – Physical Activity

  60 min of moderate to vigorous activity (AAP) &
  180 min of light to vigorous activity (NAM)
- 0 – Sugar-sweetened Beverages

  Consumption of 0 servings of sugar-sweetened beverages

AAP, American Academy of Pediatrics; NAM, National Academies of Medicine

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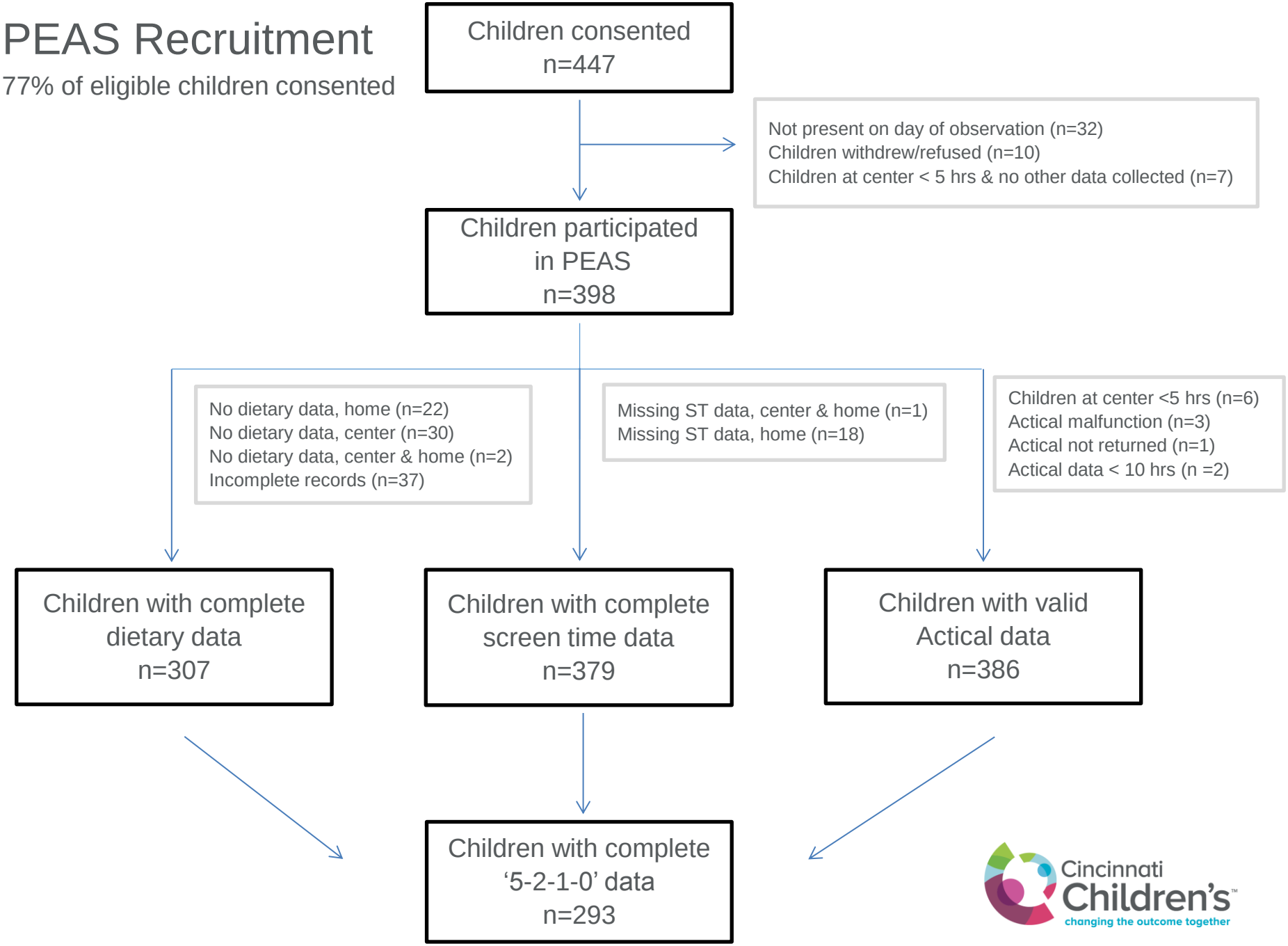
PEAS Recruitment

77% of eligible children consented



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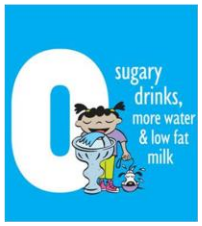
Child Characteristics	Means (SD)	Frequency (%)
Male		195 (49)
Age, years	4.3 (0.7)	
Race		
White		164 (43)
Black		157 (41)
Other*		63 (16)
Hispanic Descent		14 (4)
Child BMI, percentile	64 (27)	
Underweight		7 (2)
Normal Weight		269 (72)
Overweight		52 (14)
Obese		48 (12)

*Other = Asian, American Indian, Mixed Race, or “Other” category

Child Characteristics	Frequency (%)
CACFP eligible	219 (58)
Household composition	
2-parent household	196 (52)
1-parent household	184 (48)
Household income, dollars	
< $25,000	142 (39)
> $25,000 – 50,000	84 (23)
> $50,000 – 100,000	58 (16)
> $100,000	82 (22)
Parent education	
≤ High school	72 (18)
Associate's/Technical Degree	158 (42)
College Graduate/Graduate School	152 (40)

Summary of Findings

	'5-2-1-0' Definition	# of children who met guideline (%)	Demographic Predictors
	Eat ≥ 5 servings of fruits and vegetables	53 (17%)	Children had 0.16 ± 0.08 servings higher intake of fruits and vegetables in households with an annual income between $25-50,000
	View ≤ 2 hours of screen time	308 (81%)	No demographic predictors of screen time attainment
	Partake in 1 hour of physical activity	3 (<1%)	No demographic predictors of moderate-to-vigourous physical activity
	Consume 0 sugar-sweetened beverages	152 (50%)	Children had a 0.31 odds (95% CI 0.10; 0.93) of consuming sugar-sweetened beverages in households with an anuual income > $100K

Associations between '5-2-1-0' Attainment, BMI z-score, & Weight Status

'5-2-1-0' Component (n)	BMI Z-score			Overweight/Obese (BMI ≥85th percentile)
	β	SE	p-value	OR (95% CI)
Fruit/Vegetable/Juice[a] (282)				
Servings	0.057	0.031	0.069	1.04 (0.93; 1.17)
≥ 5 servings	0.017	0.168	0.309	1.03 (0.56; 1.89)
Fruit/Vegetable (282)				
Servings	0.038	0.040	0.340	0.99 (0.85; 1.14)
≥ 5 servings	0.165	0.245	0.501	0.80 (0.30; 2.19)
Screen Time (344)				
Hours	0.112	0.057	0.049	1.22 (0.99: 1.50)
≤120 minutes	-0.119	0.141	0.400	0.84 (0.48; 1.48)
Physical Activity (341)				
MV, hours	−0.040	0.245	0.870	0.36 (0.11; 1.25)
LMV, hours	0.041	0.043	0.335	1.06 (0.88; 1.26)
Sugar-sweetened beverages (282)				
Servings	0.081	0.078	0.301	1.16 (0.79; 1.71)
0 servings	-0.217	0.132	0.101	0.67 (0.35; 1.29)
5-2-1-0 Score (n=268)	-0.085	0.082	0.304	0.71 (0.47; 1.08)

Models adjusted for sex, income, race, and household composition.
Fruit and vegetable intake additionally adjusted for total energy.

Summary of Findings

- Only 1 child met all four 5210 recommendations
  - Consistent with previous studies in children[1-6]
    - < 2% met all 4 guidelines and 1/3 met none[1,5]
- When defining physical activity as 180 min of any activity (including light), 23 (7.8%) met the guideline
- No consistent demographic predictors of 5210 attainment
- Only screen time related to BMI z-score
  - Every hour increase in screen time had a 0.11 ± 0.06 increase in BMI z-score

1. Haughton 2016 2. Iannoti 2013 3. Rogers 2013 4. Briefel 2015 5. Kunin-Batson 2015 Foltz 2011

Limitations

- Data collected only captures 24h of data → can not establish usual dietary habits or physical activity levels
  - However, we had a relatively larger sample size, large representation of children who attend child-care, and objective measures
- A cross-sectional examination of correlation between attainment and BMI & weight status
  - Longitudinal studies are needed

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Significance and Impact

- Many opportunities for improvement
  - Particular areas of improvement could include diet and physical activity
- 5210 behaviors have other health benefits
- Behavior change is difficult in preschooler but paramount given that habits set early
- Food for thought: What setting is the most effective to intervene on these behaviors?

PART 2:

The Association between Caregiver Eating Behaviors and the Styles with which they Feed their Infants

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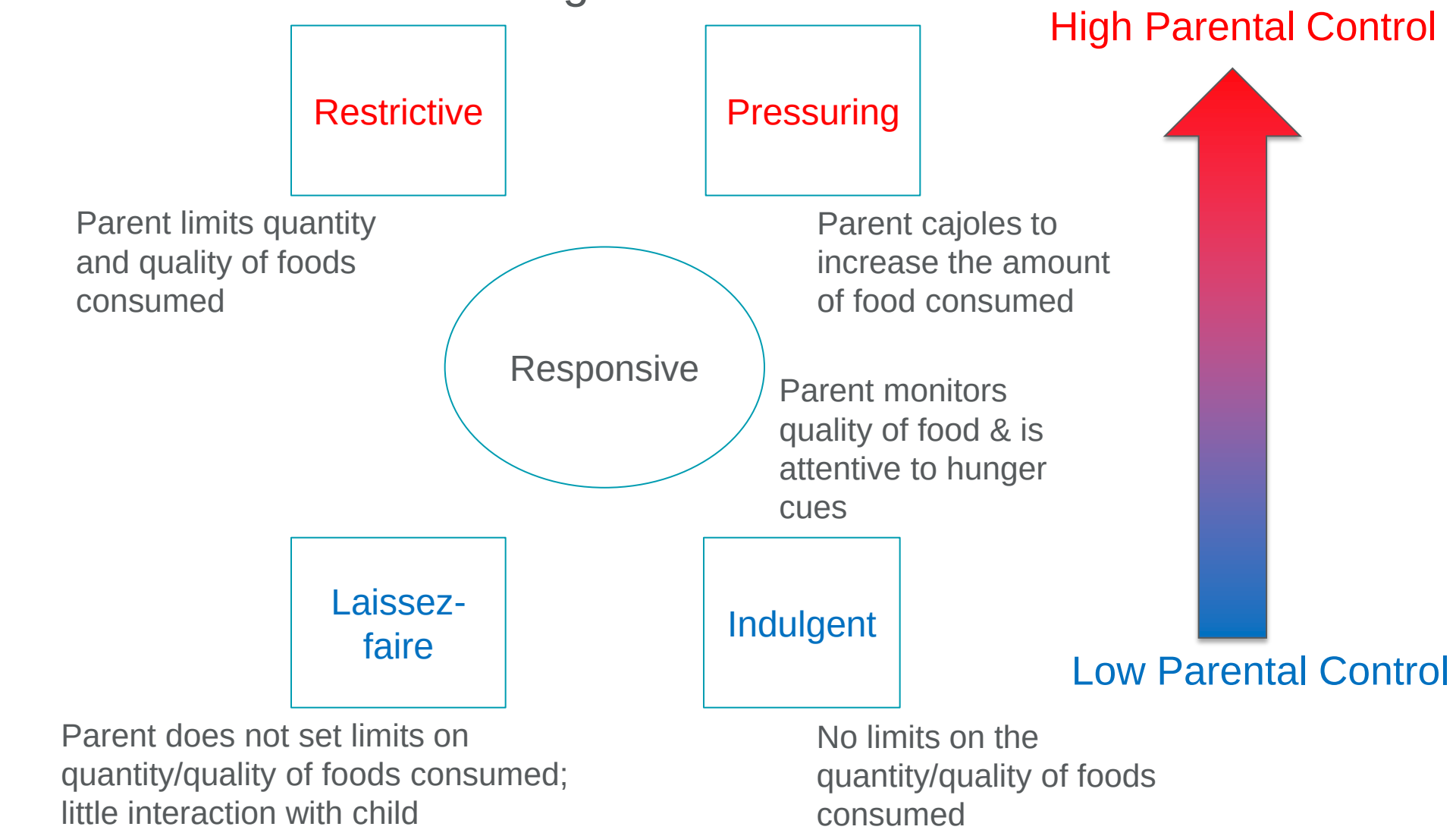
Feeding style: specific goal-directed behaviors that influence a child's eating: [1,2]



1. Shloim 2015 2. Thompson 2009

Feeding Styles

- Controlling feeding styles (Restrictive and Pressuring) in preschool and school aged children are associated with:
  - Increased eating in the absence of hunger[1]
  - Decreased self-regulation of food intake[2]
  - Weight gain and future obesity risk[3,4]

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1. Birch 2003 2. Birch 2014 3. Shloim 2015 4. Hurley 2011

A Predictor of Feeding Styles?

- Maternal Eating Behaviors
  - Maladaptive eating behaviors (like restrictive eating, bulimia, binge eating disorder) associated with restrictive feeding styles
  - Intuitive Eating[1] (mothers who eat when hungry and follow satiety cues) **are less likely** to exhibit controlling feeding practices in their preschool children[2]
  - Less is known about Laissez-faire and Indulgent Infant feeding styles

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1. Tylka 2013 *J Couns Psychol* 2. Tylka 2013 *Eat Behav*

Gap

- Current literature predominately focuses on feeding styles in preschool or school aged children and upper-income families[1,2]
- Few studies have examined role of maternal/caregiver intuitive eating on infant feeding styles
- Infant feeding styles and their correlation with obesity risk are unclear
  - Many cross-sectional studies[2]
  - Two longitudinal ones have contradictory findings[3,4]

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1. Shloim 2015 2. Hurley 2011 3. Blissett 2007 4. Thompson 2013

Specific Aims

- AIM 1: Determine the relationship between *caregiver intuitive eating behaviors* and *infant feeding styles* in infants aged 6-12 months.

- **Hypothesis:** There is an inverse relationship between caregiver *intuitive* eating behaviors and both *controlling* infant feeding styles (*restrictive* and *pressuring)*
  - (e.g. Parents who follow their hunger and satiety cues will be less likely to pressure or restrict their infant when feeding them)

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Specific Aims

- AIM 2: Identify associations between infant feeding styles and BMI z-scores over a 6 month interval.

- **Hypothesis:** Infants (6-12 months) exposed to predominately a *Pressuring* infant feeding style will be more likely to have a higher BMI z-scores after a 6 month interval compared to infants predominately exposed to another feeding style.

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Research design

- Conducted a cross-sectional study with longitudinal follow-up
- Target: primary caregivers and their infants
  - Primary caregiver(primary feeder) at home
  - Infants aged 5.5 – 12.5 months
  - Recruited at pediatric well child visits in two large urban academic primary care clinics
  - Recruited via convenience sampling
- Recruited 210 caregiver-infant dyads

Measures

Multi-part survey

- Caregiver Intuitive Eating Survey-2 (IES-2)[1]
  - Measures intuitive eating behaviors of adults
- Infant Feeding Style Questionnaire (IFSQ)[2]
  - Categorizes predominate infant feeding style:
    - Restrictive
    - Pressuring
    - Responsive
    - Laissez-faire
    - Indulgent
- Other feeding practices Survey
  - Questions on breastfeeding, age child introduced to solid food, if and when child introduced to “junk food”

1. Tylka 2013 2. Thompson 2009

Intuitive Eating Scale-2 (IES-2) Subscales[1]	Definition
Total score	
Unconditional permission to eat	Allowing oneself to eat when hungry
Eating for physical rather than emotional reasons	Eating to satisfy a physical hunger
Reliance on hunger and satiety cues	Trusting hunger and satiety cues
Body-Food choice congruence	Matching food choice to their bodies' needs

Note:

- Scores for each based on 5-pt Likert scale with higher numbers reflecting higher intuitive eating, following hunger and satiety cues and eating nutritiously

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1. Tylka 2013

Prelim Results (n= 201)

Parent characteristics	**Mean ± SD or n (%)**
Sex, female	182 (91)
Primary caregiver, mother	181 (91)
Age, years	27.2 ± 5.7
Race	
Non-Hispanic Black	142 (70.6)
Non-Hispanic White	28 (13.9)
Other	31 (15.4)
Education	
<HS	19 (9.5)
HS/GED	89 (44.7)
Some college	72 (36.2)
College/graduate degree	26 (13)
BMI (kg/m2)	28.6 ± 6.8
Child characteristics	
Sex, female	100 (49.8)
Age, months	8.8 ± 2.0
Gestational Age, weeks	38.8 ± 3.0
Birth Weight, kg	3.26 ± 0.48
Ever breastfed	120 (60.3)
Age introduced solid foods, months	5.2 ± 2.0
Introduced junk foods	102 (51.5)
Age introduced junk food, months	6.7 ± 2.1

Caregiver IES-2 Scores (Range 1- 5)	Mean ± SD
Total score	3.7 ± 0.4
Unconditional permission to eat (allowing oneself to eat when hungry)	3.1 ± 0.7
Eating for physical rather than emotional reasons (eat to satisfy a physical hunger)	3.9 ± 0.7
Reliance on hunger and satiety cues (trusting hunger and satiety cues)	3.8 ± 0.7
Body-Food choice congruence (matching food choice to their bodies' needs)	3.7 ± 0.7

Note:

- Higher scores reflect higher intuitive eating, following hunger and satiety cues and eating nutritiously

Infant Feeding (IFSQ) Scores (Range 1 - 5)	Mean ± SD
Restrictive **(Parent limits quantity and quality of foods consumed)**	3.9 ± 0.6
Pressuring **(Parent cajoles to increase the amt of food consumed)**	2.5 ± 0.7
Responsive **(Parent monitors quality & is attentive to hunger cues)**	4.3 ± 0.4
Laissez-faire **(Parent does not set limits on quantity/quality of foods consumed; little interaction with child)**	1.9 ± 0.6
Indulgent **No limits on the quantity/quality of foods consumed)**	1.4 ± 0.5

Note:

- Higher scores reflect dominate feeding style
- Each caregiver has a score for each infant feeding style, the highest score is the predominate feeding style

Correlations between Caregiver Intuitive Eating Behaviors and Infant Feeding Styles

	Infant Feeding Practices (IFSQ)				
Caregiver Intuitive Eating Behavior (IES-2)	**Restrictive**	**Pressuring**	**Responsive**	**Laissez-faire**	**Indulgent**
Total score	0.13	0.03	0.12	-0.14	-0.13
Unconditional permission to eat	**-0.19**	0.11	-0.04	**0.20**	**0.23**
Eating for physical rather than emotional reasons	0.15	-0.13	0.03	**-0.19**	**-0.19**
Reliance on hunger and satiety cues	0.08	0.02	**0.18**	-0.11	-0.13
Body-Food choice congruence	**0.27**	0.03	0.06	**-0.20**	**-0.21**

Bold entries are significant ($p<0.05$), Values are Spearman correlation coefficients

Association between infant feeding style and three infant feeding practices

Total IFSQ scores	**Ever Breastfed** OR [95% CI][a]	**Introduced Junk Food** OR [95% CI][a]	**Age Introduced Solid Food** β ± SE
Restrictive	**0.53 [0.30, 0.93]**	**0.54 [0.31, 0.94]**	-0.18 ± 0.28
Pressuring	0.61 [0.40, 1.05]	1.31 [0.81, 2.13]	-0.43 ± 0.25
Responsive	1.38 [0.64, 3.00]	1.19 [0.55, 2.56]	0.63 ± 0.40
Laissez-faire	0.86 [0.48, 1.55]	**1.97 [1.07, 3.63]**	-0.09 ± 0.30
Indulgent	0.65 [0.31, 1.35]	**3.19 [1.28, 7.98]**	-0.15 ± 0.37

Bold entries are significant ($p<0.05$)

Odds per 1 unit increase in IFSQ score

Preliminary Conclusions

- Overall, intuitive eating behaviors do not strongly correlate with any particular infant feeding style
- Caregivers who ate unconditionally were more likely to indulge their infants
- Caregivers who ate when hungry and who desired nutritious foods were more likely to restrict their infants' diets

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Limitations

- Both IES-2 and IFSQ are self-reported measures
- Population predominately low-income African American
  - IES-2 not validated in low-income populations
- Direct and interactive effects of other caregivers not included (i.e. fathers, grandparents, child-care)

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Next steps

- Determine the correlation between caregiver intuitive eating(IES-2), infant feeding styles(IFSQ) to anthropometric data
- Determine if both the IES-2 and IFSQ are accurately measuring what parents self-report
  - Direct observation of feeding styles at home
- Determine the relationship between infant feeding styles and nutritional quality
  - Including types and amounts of food offered

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Questions?

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