Poverty, food insecurity and toddler health: Statistical models to inform health promotion

> Bridget Armstrong, PhD & Maureen M. Black, PhD





University of Maryland School of Medicine

University of South Carolina Arnold School of Public

Poverty & Food Insecurity

 47% percent living in low-income families with, including 25 percent living in poor families.¹

Children under 5 experience higher poverty rates than other children



U.S. child poverty rates by age group, 2019

Chart: Center for American Progress ·

Source: Authors' calculations are based on the official poverty measure using the 2020 Current Population Survey, Annual Social and Economic Supplement. See Steven Ruggles and others, "Integrated Public Use Microdata Series, 2019 Current Population Survey, Annual Social and Economic Supplement" (Minneapolis: Minnesota Population Center, 2020), available at https://doi.org/10.18128/D010.V10.0.

 16.4% of US households with children under 6 were food insecure at some point in 2017²

² Coleman-Jensen (2018) Household Food Security in the United States in 2017, ERR-256, U.S. Department of Agriculture, Economic Research Service.

¹ https://www.nccp.org/publication/basic-facts-about-low-income-children-children-under-3-years-2013/

Poverty and Child Health & Development

- Poverty linked with child development and health
- Mechanism(s) are less clear
 - Financial capital model
 - Family process or parental socialization model



• Understanding mechanisms informs interventions and expected benefits from poverty reduction efforts

Guo, G., & Harris, K. M. (2000). The mechanisms mediating the effects of poverty on children's intellectual development. *Demography*, *37*(4), 431-447. Aber, J. L., Bennett, N. G., Conley, D. C., & Li, J. (1997). The effects of poverty on child health and development. *Annual review of public health*, *18*(1), 463-483.

What is the role of **sleep** in the link between SES and overweight/ obesity?

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REGULAR ARTICLE

Longitudinal Associations Among Diet Quality, Physical Activity and Sleep Onset Consistency With Body Mass Index z-Score Among Toddlers in Low-income Families

Lauren Covington, PhD, RN^{1,0} · Bridget Armstrong, PhD^{2,0} · Angela C. B. Trude, PhD³ · Maureen M. Black, PhD^{3,4}

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Abstract

Background Habits surrounding health behaviors (i.e., sleep, physical activity, diet) are developed in toddler-hood. Lack of consistent health habits may increase obesity risk among toddlers in low-income families.

Purpose To compare the role of sleep onset consistency, physical activity and diet quality as mediators between household poverty and toddler weight.

Methods Two hundred and seven toddlers (mean age = 20.2 months, 46% female, 68.1% Black) participating in an obesity prevention trial were assessed at three time points over 12 months. Using Actical accelerometers, we assessed sleep and physical activity at each time point for up to 1 week. We defined sleep onset consistency as the standard deviation of sleep onset across all days. We calculated the Healthy Eating Index-2015 from a 24-hr dietary recall. We used WHO standards to calculate BMI-for-age z-scores from toddlers' weight/length, and calculated poverty ratio from parentreported income and family size. Multilevel mediation models tested toddler sleep onset consistency, physical activity, and toddler sleep MI z-score.

Results Toddlers from households with higher poverty ratios had more inconsistent sleep onset times. Toddlers with more inconsistent sleep onset times had higher BMI *z*-scores across all timepoints, even when accounting for

physical activity and diet quality. Sleep onset consistency indirectly explained the association between household poverty and BMI z-score.

Conclusions Inconsistent sleep schedules could help explain the association between poverty and BMI. Future research should examine strategies to support low-income families to develop and maintain routines as a mechanism to prevent obesity and reduce disparities. *Trial registration number* NCT02615158.

Keywords Toddlers · Bedtime · Obesity · Poverty · Physical activity · Diet quality

Introduction

Routines surrounding healthy behaviors are developed in toddlerhood (12–36 months) [1, 2], and are established into habits that are carried on into adolescence

and adulthood [3]. Families have the establish daily lifestyle habits in conjun dler developmental milestones. Childrer at the start of toddlerhood, allowing t in daily physical activity [4]. Food p autonomy in eating begin in the secor making toddlerhood an opportune tim



Research Question



Methods & Sample

- 277 Mother/Toddler dyads from Baltimore
- WIC eligible
 - 70% at or below poverty line
- Toddlers:
 - 12-32 months (*M* = 27 months)
 - 44% Female
- Assessed at 1, 6 and 12 months
 - Sleep & Activity: Actical Accelerometer
 - 7 days 24-hour wear protocol
 - SD of bedtimes over 7 days
 - Diet: 24-hour recall (HEI index)
 - **Poverty**: Needs to income ratio based on income & family size
 - BMI z-score
- NICHD R01-HD056099; NHLBI F32-HL138963;

Black et al (2021) Toddler obesity prevention: A two-generation randomized attention-controlled trial. Maternal & Child Nutrition, 17(1), e13075.



2% Hispanic or Latino



Multilevel Model



Multilevel Mediation Model

Level 2: Between-Person Effects



Results: Within-Person Mediation





Takeaway: When poverty increased MVPA increased

Results: Between-Person Mediation



Indirect effect = (- 6.822) [95% CI -13.936, -1.274]

Takeaway: Only bedtime consistency mediated the link between poverty and BMI z-score

Conclusions

- The children with routines have lower BMI z-scores over a year
 - We don't have evidence that *changes* in bedtime consistency are linked with *changes* in weight status
- Limitations
 - Measure of poverty
 - Underpowered with 3 time points
- Broader routines might be explaining this association



Next Steps: How to support families to create and maintain routines?

Supporting Parents

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SPECIAL ISSUE ARTICLE



Hunger in the household: Food insecurity and associations with maternal eating and toddler feeding

Bridget Armstrong¹ | Allison D. Hepworth² | Maureen M. Black^{3,4}

¹Department of Exercise Science, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, US ²Department of Social Work, University of Maryland School of Social Work, Baltimore, Marvland, US

³Department of Pediatrics, University of Maryland School of Medicine, Baltimore, Maryland, US

⁴RTI International, Research Triangle Park, North Carolina, US

Correspondence

Funding information

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Bridget Amstrong, PhD, Address Department of Exercise Science, Arnold School of Public-Health, University of South Carolina, 921 Assembly Street, Room 132, Columbia, SC, 29208. Email: ba12@mailbox.sc.edu

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Abstract

Background: Research is needed to identify how food insecurity affects maternal eating behavior and child feeding practices, factors that may pose intergenerational risks for obesity.

Objectives: This longitudinal study investigated whether maternal restrained eating mediated the association between household food insecurity and feeding practices. **Methods:** Participants included 277 WIC-eligible mothers (69% below the poverty line, 70% African American) and their toddlers (M_{age} = 20.11 months, SD = 5.50) participating in a childhood obesity prevention trial. Maternal reports of household food insecurity, restrained eating, and child feeding practices (restrictive and responsive) were collected at baseline, 6 and 12 months and analyzed using multilevel mediation.

Results: Forty percent of mothers reported some degree of household food insecurity over 12 months. Within-person analyses showed that relative increases in household food insecurity were indirectly related to increases in restrictive and decreases in responsive child feeding practices, mediated through increases in mothers' own restrained eating.

Conclusions: Relative change in household food insecurity (rather than overall severity) appears to have indirect effects on toddler feeding practices, through mothers' own eating. Stable household food security without transient food insecurity may improve health and wellbeing for both mothers and children.

KEYWORDS

African American, child feeding practices, food insecurity, health disparities, restrain toddler



Food Insecurity

Links with maternal eating and toddler feeding

- Food insecurity linked with
 - Cognitive stress
 Diet quality
- \rightarrow Parent's capacity to respond to feeding cues
 - Child hunger, satiety or preference







Research Question





Methods & Sample

- 277 Mother/Toddler dyads from Baltimore
- WIC eligible
 - 70% at or below poverty line
- Toddlers:
 - 12-32 months (*M* = 27 months)
 - 44% Female
- Assessed at 1, 6 and 12 months
 - Food Insecurity [6-item USDA Household Food Security Scale]
 - Child Feeding Practices [Toddler Feeding Behavior Questionnaire]
 - Maternal Restrained Eating [Dutch Eating Behavior Questionnaire]



Black et al (2021) Toddler obesity prevention: A two-generation randomized attention-controlled trial. Maternal & Child Nutrition, 17(1), e13075.



Sample Discriptives

	Baseline	Baseline (n=277)		6 Months (n=186)		12 Months (n=219)	
	Mean	SD	Mean	SD	Mean	SD	
Mothers Age (Years)	27.28	6.17	28.11	6.52	28.95	6.49	
Mother's BMI	31.80	9.47	31.72	9.79	32.61	9.54	
Toddler BMIz-score	0.54	1.13	0.57	0.99	0.60	1.16	
Restrained Eating	0.94	0.78	1.02	0.79	1.04	0.86	
Food Insecurity	1.20	1.76	1.16	1.83	1.05	1.80	
Restrictive Feeding	1.37	0.58	1.41	0.59	1.43	0.57	
Responsive Feeding	4.14	0.57	4.15	0.58	4.15	0.54	





Conclusions

- Relative increases in food insecurity (rather than overall severity) has indirect effects on toddler feeding practices, through mothers' own eating
 - Even within a year, changes in food insecurity are linked with meaningful changes in parents' own attitudes, which subsequently impacts their parenting behaviors
- Limited by self-report measures
- Importance of stability in food security



Public Health Implications

- <u>Stable</u> household food security without transient food insecurity may improve health and wellbeing
- <u>Predictability</u> in bedtimes appears beneficial for children, but just intervening on bedtime may not be enough



Biden's Stimulus Plan What to Know About the Bill Senate Passage What the Senate Changed \$15 Minimum Wage Child Tax Credit

In the Stimulus Bill, a Policy Revolution in Aid for Children

The \$1.9 trillion pandemic relief package moving through Congress advances an idea that Democrats have been nurturing for decades: establishing a guaranteed income for families with children.

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Center on Poverty and Social Policy, Columbia University. 2021. "A Poverty Reduction Analysis of the American Family Act." Poverty and Social Policy Fact Sheet. https://www.povertycenter.columbia.edu/news-internal/2019/3/5/the-afa-and-childpoverty

Center on Poverty and Social Policy at Columbia University

Table 1. Estimated reduction in child poverty by the American Family Act

	Poverty Rate: Current Law	Poverty Rate: Under AFA	Percentage point reduction	Percent change
All children < 18	13.6%	7.5%	6.1%	44.9%
All children < 6	14.4%	7.7%	6.7%	46.5%
Child's race and ethnicity				
Asian American & Pacific Islander	13.0%	8.6%	4.4%	33.7%
Black, non-Hispanic	28.0%	14.9%	13.1%	46.8%
Hispanic	23.1%	12.8%	10.3%	44.6%
Multiracial & all other groups	13.9%	7.0%	6.9%	49.4%
Native American	20.4%	11.5%	8.9%	43.5%
White, non-Hispanic	8.3%	4.9%	3.4%	40.7%
Family Characteristics				
1-parent family	30.0%	16.9%	13.1%	43.6%
2-parent family	8.8%	4.9%	3.9%	44.2%
1-2 children	13.2%	8.8%	4.4%	33.1%
3 or more children	20.0%	8.4%	11.6%	57.8%
Child and/or parent with a disability	22.9%	12.0%	10.9%	47.8%
All children < 3	15.7%	8.9%	6.8%	43.1%

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- Maureen Black, PhD
- Erin Hager, PhD







Arnold Childhood Obesity Initiative (ACOI)







Michael Beets, PhD

Glenn Weaver, PhD weaverrg@mailbox.sc.edu

Bridget Armstrong, PhD BA12@mailbox.sc.edu



UNIVERSITY OF SOUTH CAROLINA





@ACOlatUofSC

Arnold Childhood Obesity Initiative (ACOI)

Interested in a Masters/Doctoral Degree focused on Childhood Obesity?

Contact:

BA12@mailbox.sc.edu weaverrg@mailbox.sc.edu

