

# Review of the Evidence of ECE Interventions and Early Childhood Obesity

## A Summary of 4 Systematic Reviews

CDC ECE Networking call  
March 23, 2016

The findings and conclusions in this  
presentation are those of the author and  
not necessarily the CDC

## **Presentation Outline**

- **Present findings from systematic reviews of obesity prevention interventions in child care settings and early child hood**
  - Zhou et al. (2014)
  - Sisson et al. (2016)
  - Woo Baidal et al. (2016)
  - Blake Lamb et al. (2016)
- **Discuss implications and key “take away” messages**
- **Share summaries of select ECE obesity prevention interventions**

# Review of the Healthy Eating Research Issue Brief:

## The Impact of the First 1,000 days on Childhood Obesity

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# Healthy Eating Research (HER) Issue Brief

- **HER is a national program of RWJF**
- **2 papers were published in American Journal of Preventative Medicine (AJPM)**
  - Risk factors for childhood obesity in the first 1000 days
  - Interventions for childhood obesity in first 1000 days
- **An issue brief was created to summarize papers**
  - Taveras EM, Perkins M, Woo Baidal et al. Durham, NC: Healthy Eating Research; 2016. Available at [www.healthyeatingresearch.org](http://www.healthyeatingresearch.org)

Woo Baidal JA, Locks LM, Cheng ER, Blake-Lamb T, Perkins M, Taveras EM. Risk Factors for Childhood Obesity in the First 1,000 Days. A Systematic Review. In Press at *Am J Prev Med*.

Blake-Lamb T, Locks LM, Perkins M, Woo Baidal JA, Cheng ER, Taveras EM. Interventions for Childhood Obesity in the First 1,000 Days. A Systematic Review. In press at *Am J Prev Med*.

## **Background**

- **First 1000 days (conception until age 2) are critical period for development of childhood obesity**
- **Approximately 8% of children under 2 are predisposed to obesity**
- **Hispanic 2-5 year olds have rates of obesity 5x and black children 3x the rates of white children**

# Review Process

- **Systematic review of articles from 1980-2014**
- **Exclusion/Inclusion criteria**
  - Cross sectional studies with only 1 data point
  - No studies that consisted of parent report after child was 2 years
  - Intervention studies had to include a control group
  - Interventions implemented between conception and 24 mos
  - 282 studies for risk factors paper and 34 interventions paper

# Risk Factors

- **Risk factors**
  - Biological
  - Parent and community
  - Environmental
  - Health care delivery
  - Infant behavior
  - Infant feeding

# Risk Factors Conception Through Birth

- **Maternal diabetes**
  - 33 studies; 22 with significant associations
- **Higher maternal pre-pregnancy BMI**
  - 38 articles; 34 with significant associations
- **Excess maternal weight gain in pregnancy**
  - 21 studies; 19 with significant associations
- **Maternal Smoking**
  - 31 studies; 23 with significant associations
- **Maternal stress**
  - 4 studies; 3 with significant associations

## Risk Factors Birth Through Age 2

- **Higher birth weight**
  - 28 studies; 24 with association
- **Rapid weight gain and higher absolute weight for length in first 2 years**
  - 46 studies; 45 with association
- **Sleep (4 studies)**
  - ❖ 1 study with children who got fewer than 12 hours of sleep between 6 – 24 mos had 2x odds of obesity at 3 years
  - ❖ 1 study that insufficient sleep at 6 mos to 7 years had higher odds of obesity
  - ❖ 2 studies no association between infancy sleep duration and obesity

## **Risk Factors Birth Through Age 2**

- **SES during first 1000 days (3 studies)**
  - Higher odds of overweight in middle income vs. high income children
  - Children birth-kindergarten found parent education and household income as risk factor
- **Mother-child relationship**
  - 5 studies; 4 found association with low quality relationships or low maternal sensitivity
- **Child care**
  - 2 large prospective studies examined child care attendance and both found an small increased risk of obesity

# Interventions

- **2 interventions during pregnancy**
  - Not effective in preventing childhood obesity
- **Interventions during pregnancy and after birth**
  - 2 interventions found home visiting to be effective in improving child BMI
  - 1 intervention with community health workers at home and group visits effective in reducing risk of overweight
  - 1 intervention to promote breastfeeding education in hospital setting improved initiation but did not impact BMI

# Interventions

## ■ Infant feeding

- Low-protein formula during 1<sup>st</sup> year was associated with lower BMI and lower mean weight-for-length score than high protein formula

## ■ Mother's behaviors

- Intervention targeting PA and diet in first year had slightly lower BMI than control group
- More frequent family behavioral counseling found lower prevalence in girls at age 10

## Conclusion

- **Most interventions that were effective focused on**
  - Individual or family level changes through
    - ❖ Home visiting, counseling, group visits
- **These studies suggest that programs and efforts focusing on multiple risk factors delivered at multiple levels may help reduce risk of child overweight/obesity**

# Summary of Obesity in the Early Childhood Years: State of the Science and Implementation of Promising Solutions

IOM Workshop October 6, 2015

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## Workshop

- National Academies of Science, Engineering, Medicine held a workshop on obesity in the early childhood years (IOM)
- Workshop powerpoints and video presentations are available at:  
<http://nationalacademies.org/hmd/Activities/Nutrition/ObesitySolutions/2015-OCT-06.aspx>

# Workshop Agenda

- **Session 1: Background**
  - **Prevalence and Trends of Overweight/Obesity**
  - **The Epigenetics of Childhood Obesity**
  - **The Flavor World of Childhood**
  
- **Session 2: Modifiable Factors Associated with Overweight and Obesity Birth to 5**
  - **Pregnancy**
  - **Infant feeding**
  - **Complementary and responsive feeding**
  - **Sleep, activity, and sedentary behavior**

# Workshop Agenda

- **Session 3: Overview of Effective Interventions: What Do We Know Works?**
  - **Pregnancy, 0-2 years of age**
  - **Clinician perspective**
  - **Early care and education**
  - **Home and parenting**
- **Promising and Innovative Cross-Sector Solutions**
  - **Federal programs such as USDA programs**
  - **Nemours**
  - **New York City**

# Interventions in ECE Settings for Childhood Obesity Prevention

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# Childhood Obesity Prevention Interventions in Childcare Settings: Systematic review of randomized and nonrandomized controlled trials

- **Systematic review to assess current state of science regarding efficacy of childhood obesity interventions in childcare settings (2014)**
- **Zhou YE, Emerson JS, Levine RS, Kihlberg CJ, & Hull PC. (2014). Childhood obesity prevention interventions in childcare settings: Systematic review of randomized and nonrandomized controlled trials. *American Journal of Health Promotion*, 28(4), e92-e103**
- **Inclusion criteria was English-language studies:**
  - Peer-reviewed publications
  - Interventions aimed at childhood obesity prevention
  - Childcare facilities
  - Controlled study design
  - Outcome measures included BMI
  - Articles published 2002-2012

Zhou YE, Emerson JS, Levine RS, Kihlberg CJ, & Hull PC. (2014). Childhood obesity prevention interventions in childcare settings: Systematic review of randomized and nonrandomized controlled trials. *American Journal of Health Promotion*, 28(4), e92-e103.

# Study Characteristics

- 15 intervention studies were included in the review
  - 10 were multicomponent (Table 2 in publication)
  - 3 nutrition only (Table 3 in publication)
  - 2 physical activity only (Table 4 in publication)
- Study population children 2-6 years of age
- Variety of ethnic groups and socioeconomic groups included
- Duration of intervention varied
  - 6 months or less (7)
  - 9-18 months (5)
  - 2 years or more (3)
- 8 different countries

# Intervention Strategies

## ■ Nutrition strategies

- Structured, in-class sessions of education
- Games with food
- Healthy cooking classes
- Healthy snack or meal tasting
- Book reading

## ■ Physical activity strategies

- PA education sessions
- Engagement in playful games

## ■ Parent engagement strategies

- Education sessions
- Home assignments
- Internet-based modules
- Printed information
- Cooking classes

## **Long-term Efficacy and Sustainability**

- **4/15 studies evaluated long-term efficacy**
  - Hip Hop to Health Jr. (2 studies) +/-
  - Prevention of overweight in preschool children (POP) +
  - Healthy-Start (2 studies) -/-
- **Five studies addressed the potential for intervention sustainability, features included:**
  - Children enjoyed interventions
  - Easy for preschool to implement w/o extra time, money, or staff capacity
  - Embedded into preschool environment
  - Provided newsletters for parents and children
- **Institutional changes to PA or nutrition environment are potentially sustainable**

# Summary of Review Findings

- Key Results (n=15)
  - Seven studies demonstrated desirable outcome in diet and/or physical activity behaviors and BMI
  - Five studies focused exclusively on diet or physical activity and found significant intervention effects on these targeted behaviors
  - Three interventions modified the nutrition and physical activity environment showed significant impacts on BMI and/or behavior changes
  - Of the 15 studies, 10 combined nutrition and physical activity, more had a significant impact on physical activity behaviors

# Key Take Aways

- Control trials should measure
  - Behavioral outcomes
  - BMI
- Use objective measures and validated measurement tools
- Interventions that incorporate institutional changes are important for sustainability
- Modifications of the built environment within childcare centers
- More research needs to focus on targeting interventions to meet the needs of children from diverse cultural and socioeconomic backgrounds
- Future trials in child care settings should include cost-effectiveness

# Interventions

## ■ Zhou review

- Hip Hop to Health Jr. (Fitzgibbon et al)
- Tiger Kids (Bayer et al)
- Tooty Fruity Veggie (Zask et al)
- Healthy Start (Williams et al)
- Ballabeina (Burgi et al; Puder et al; Niedere et al)
- “It Fits Me” (Nemet et al)

## **Obesity prevention and obesogenic behavior interventions in child care: A systematic review**

- **Systematic review of interventions designed to reduce obesity and improve obesogenic behaviors**
- **Sisson, S. B., Krampe, M., Anundson, K., & Castle, S. (2016). Obesity prevention and obesogenic behavior interventions in child care: A systematic review. *Preventive medicine*, 87, 57-69**
- **97 articles describing 71 interventions met inclusion criteria**
  - Center-based child care settings and included preschool age 3-5 year old children
  - Influenced body weight and/or obesogenic behaviors
  - All experimental designs
  - English and peer-reviewed
  - Papers published up to 2016

Sisson, S. B., Krampe, M., Anundson, K., & Castle, S. (2016). Obesity prevention and obesogenic behavior interventions in child care: A systematic review. *Preventive medicine*, 87, 57-69.

# Summary of Articles

- **13 focused on the ECE environment**
- **Most focused on multi-levels of socioecological model (SEM) (48/71)**
- **Outcomes**
  - 29 included obesity
  - 41 included physical activity
  - 45 included diet
  - 8 included screen time
- **55% were randomized control trials (39/71)**
- **37% were quasi-experimental (26/71)**
- **8% were natural experiments (6/71)**
- **Duration ranged from  $\leq 3$  weeks to 2 years**

# Obesity

- **29 interventions measured obesity as an outcome**
  - 14 interventions demonstrated favorable results
    - ❖ 9/14 randomized control trials
    - ❖ 5/15 quasi experimental methods
  - Mixed results re: sustainability of reducing obesity (e.g., short term success not maintained at 3 yr follow-up)
- **Take aways:**
  - Obesity was favorably affected in half of the interventions
  - Interventions for children at greatest risk
    - Higher weight categories
    - Low SES
  - Interventions may need booster/refresher components to sustain outcomes

# Physical Activity Behaviors

- **41 interventions measured physical activity, 73% favorable results (n=30)**
- **Most included multiple measures of PA**
  - Measurement techniques varied
  - Objective measurement pedometer or accelerometer most common
  - Direct observation
  - Proxy report by parent
- **8 out of the 9 interventions that incorporated environmental changes (e.g., play spaces, practices, and policies) and PA practice and/or policy resulted in favorable outcomes.**
- **Take aways:**
  - Child care center environment can be improved, although providing TA is crucial
  - Center-level improvements did not lead to sustained child-level PA
  - Multi-pronged interventions important for translating policy change to child-level behavior change

# Physical Activity Behaviors

- **Components of physical activity interventions**
  - Structured PA
    - ❖ Led by teachers
    - ❖ Integrated into curriculum
  - Movement during specific segments of the day
  - Parent engagement
  - Staff and teacher training (personal health and wellness)
- **Take aways:**
  - Interventions with structured physical activity, parental engagement, staff training and wellness, and TA facilitated positive changes
  - All five interventions that included addressing child care staff personal health demonstrated desirable outcomes

# Diet

- **45 interventions measured diet**
  - Intake reported by teacher, parent or other methods
- **Interventions measured changes in**
  - Centers and at home
  - Menus and policies
- **Take aways:**
  - Interventions that combine child care center environment and TA and training facilitated positive changes

# Diet

- **Components of interventions focused on child**
  - Educational lessons/books
  - Puppets/games
  - Music/songs
  - Trying novel foods
- **Components of interventions focused on parent behavior**
  - Interest groups
  - Hands-on educational sessions
  - Technical assistance from health professionals
- **Take aways:**
  - Interventions included creative and fun curriculums, enhanced the environment, policies/practices, menu and food preparation
  - Less emphasis on parental engagement, however, sustaining an improvement in young children's dietary intake will likely need to include parental involvement

# Screen Time

- **Eight studies included at least one measure of screen time as an outcome**
- **Intervention strategies focused on the child, parent, and the child care environment**
- **While screen time didn't decrease, researchers believe this was likely due to a high percent of centers engaging in best practices prior to the intervention**
- **Take aways:**
  - **Most interventions reviewed demonstrated a favorable effect on screen time**
  - **Preventing increases in screen time is a successful outcome**

## Conclusions

- **Environment-level only interventions had less impact on behavior**
  - A multi-level intervention focusing on
    - ❖ child care center environment,
    - ❖ staff training,
    - ❖ child and parent engagement
- **Interventions that focus on child care environment and provide TA support are promising**
- **Build on existing materials, evidence-based interventions, and involving parents and staff**

# Contact Information

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

National Center for Chronic Disease Prevention and Health Promotion  
Division of Nutrition, Physical Activity, and Obesity



# **Tooty Fruity Vegie**

- **18 preschools, included nutrition and physical activity**
- **Pre-post intervention evaluation**
- **FMS testing, lunchbox audits and anthropometric measures of children, parents' surveys re: children's food intake, PA, and sedentary behaviors**
- **Sig improvement in movement skills, more fruit and vegetable servings, less likely to have unhealthy food in lunch boxes.**
- **Significant different in waist circumference growth and reduction in BMI Z-scores**

## **Eat Healthy, Stay Active**

- **Convenience sample of six large Head Start agencies in five states**
- **Comparison of within-group pre-post intervention knowledge, behavior, and anthropomorphic measurements**
- **496 staff, 438 parents, and 112 preschool children**
- **Each group of participants demonstrated significant reductions in BMI and in the proportion of obese children and adults. Child weight changes correlated with parent weight changes.**

Herman, A., Nelson, B. B., Teutsch, C., & Chung, P. J. (2012). "Eat healthy, stay active!": a coordinated intervention to improve nutrition and physical activity among head start parents, staff, and children. *American Journal of Health Promotion*, 27(1), e27-e36.