Treating Obesity and Overweight: Learning What Works for Children and Adolescents

Ihuoma Eneli MD, MS, FAAP

Associate Director, AAP Institute for Healthy Childhood Weight

Director, Center for Healthy Weight and Nutrition,
Nationwide Children's Hospital
Columbus, Ohio

American Academy of Pediatrics
Institute for Healthy Childhood Weight

Nationwide Children's
When your child needs a hospital, everything matters.

The Ohio State University
College of Medicine

Treatment for childhood obesity & overweight

Overweight
&
Obesity
24.5 million
children

Treatment

Weight Loss Surgery
1,200 Children

Lifestyle
Intervention/Medical
Treatment/No Treatment
24.5 million Children

**Steele KE. Why isn't bariatric surgery for adolescents catching on? JAMA Surg. 2013 Apr;148(4):314-5 (Extrapolated)

Health Conditions Associated with Childhood Obesity

Psychosocial (Mood)
Poor self-esteem
Depression
Body image disorders
Eating disorders

Neurological (Brain
Pseudotumor cerebri

Cardiovascular (Heart)
Dyslipidemia
Hypertension
Chronic inflammation
Endothelial dysfunction

Pulmonary (Lungs)
Sleep apnea
Asthma

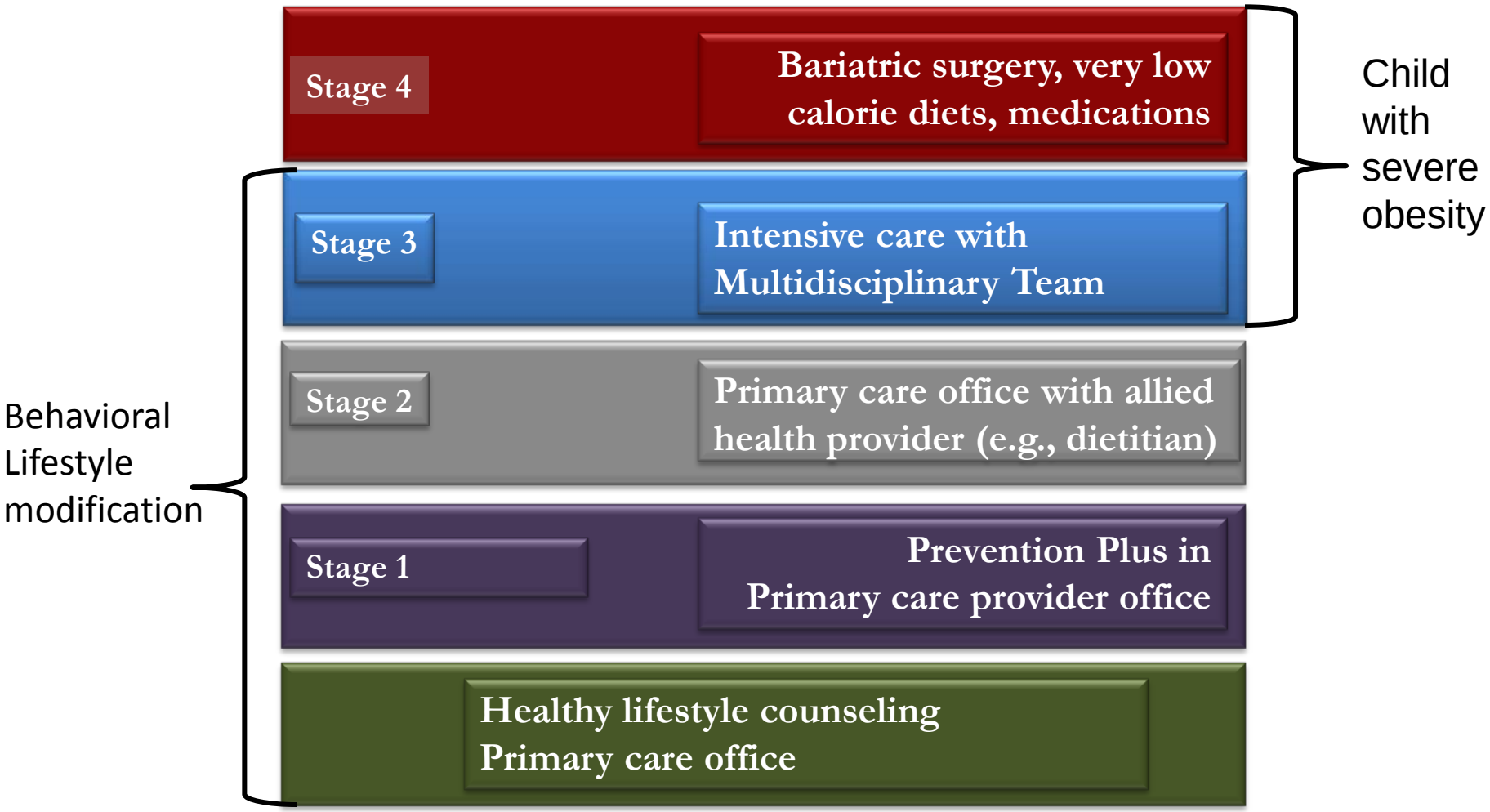
Endocrine
Type 2 diabetes
Precocious puberty
Polycyctic ovary syndrome

Gastrointestinal (stomach and gut)
Gallstones
Steatohepatitis
Gastro-esophageal reflux

Kidney
Glomerulosclerosis

Musculoskeletal
Slipped capital femoral epiphysis
Blount's disease
Flat feet

Translating the 2007 Expert Committee Stages for Childhood Obesity Management



Learning what works

Excess weight Categories

- Crossing weight percentiles rapidly
- Overweight ≥ 85th-94th%tile
- Obesity ≥95th%tile
- Severe Obesity 120% of 95th %tile

Type of Treatments

- Lifestyle behavior modification
- Medication
- Specialized diets
- Weight loss surgery

Settings

- Preschool/School
- Community/Home
- Primary Care Clinics
- Tertiary Care Center

Stakeholders

- Family
- Child
- Healthcare Providers
- Insurance
- Public

2016 Summary of U.S. Preventive Services Task Force Recommendation

Summary of Recommendation and Evidence

Population	Recommendation	Grade (What's This?)
Children aged 6 years and older	The USPSTF recommends that clinicians screen children aged 6 years and older for obesity and offer them or refer them to comprehensive, intensive behavioral intervention to promote improvement in weight status.	B

Screening test	Body mass index (BMI)
Screening interval	No recommended interval
Intervention	Refer patients to comprehensive moderate- to high-intensity programs that include dietary, physical activity, and behavioral counseling components.
Harm vs. benefits	Modest benefit Harm of screening minimal

Whitlock et al. P*ediatrics* 2010;125:361-367
U.S. Preventive Services Task Force, AHRQ Publication, Nov 2016

What is a measure of effective treatment?
Statistically vs. Clinically significant

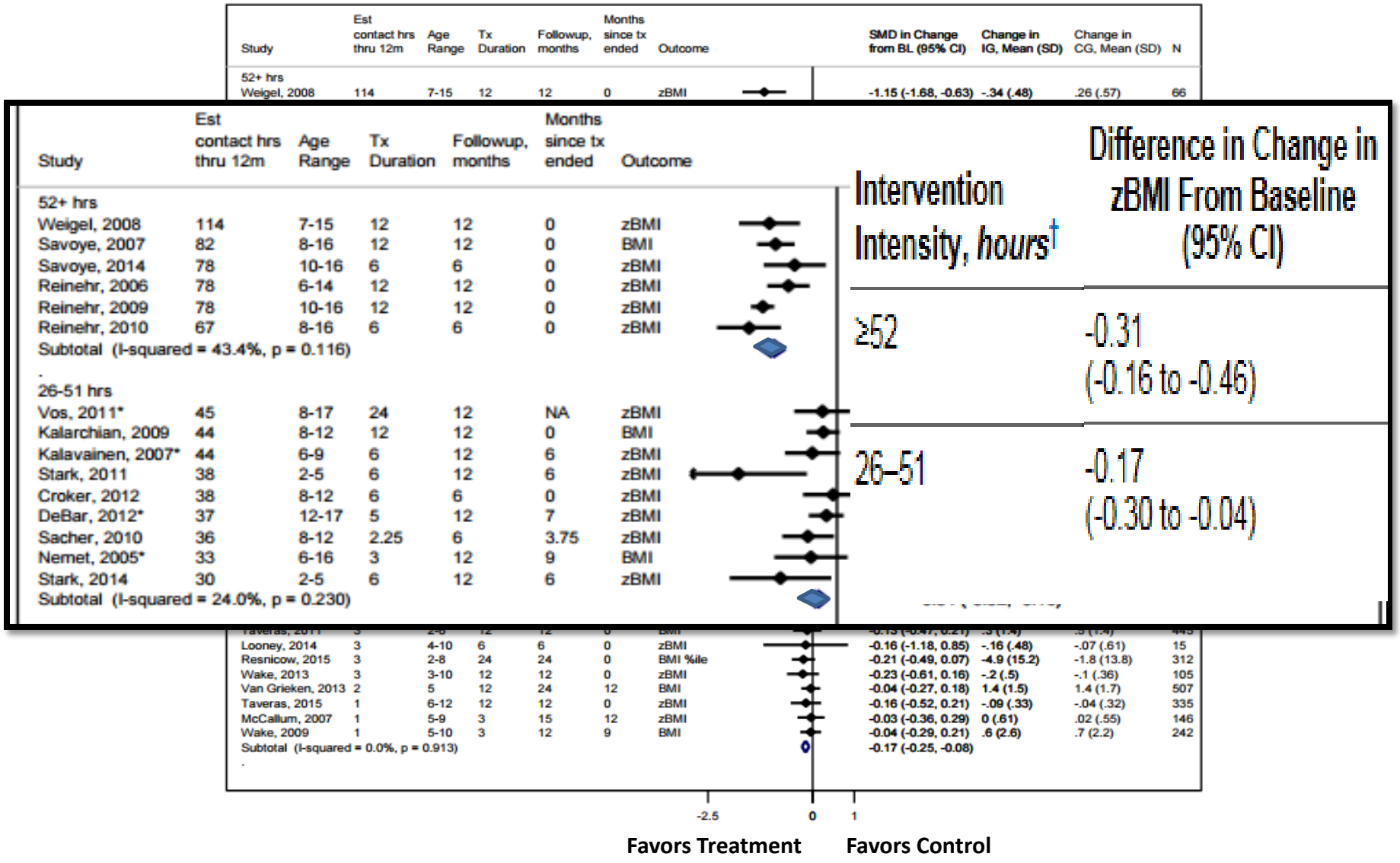
- Standardized measure: BMI z-score

- Reduction of 0.15-.25 zBMI associated with improved cardiometabolic outcomes

- Reduction in zBMI score of 0.2 roughly equivalent to 5% decrease in body weight

O'Connor EA et al., 2016 U.S. Preventive Services Task Force. Evidence Synthesis No. 150. AHRQ Publication No. 15-05219-EF-1.
Wiegand S et al. *Horm Res Paediatr*. 2014;82(6):380-7

2016 USPSTF Draft Summary: Forest Plot of Change in Weight in Behavior-Based Weight Loss Intervention Trials



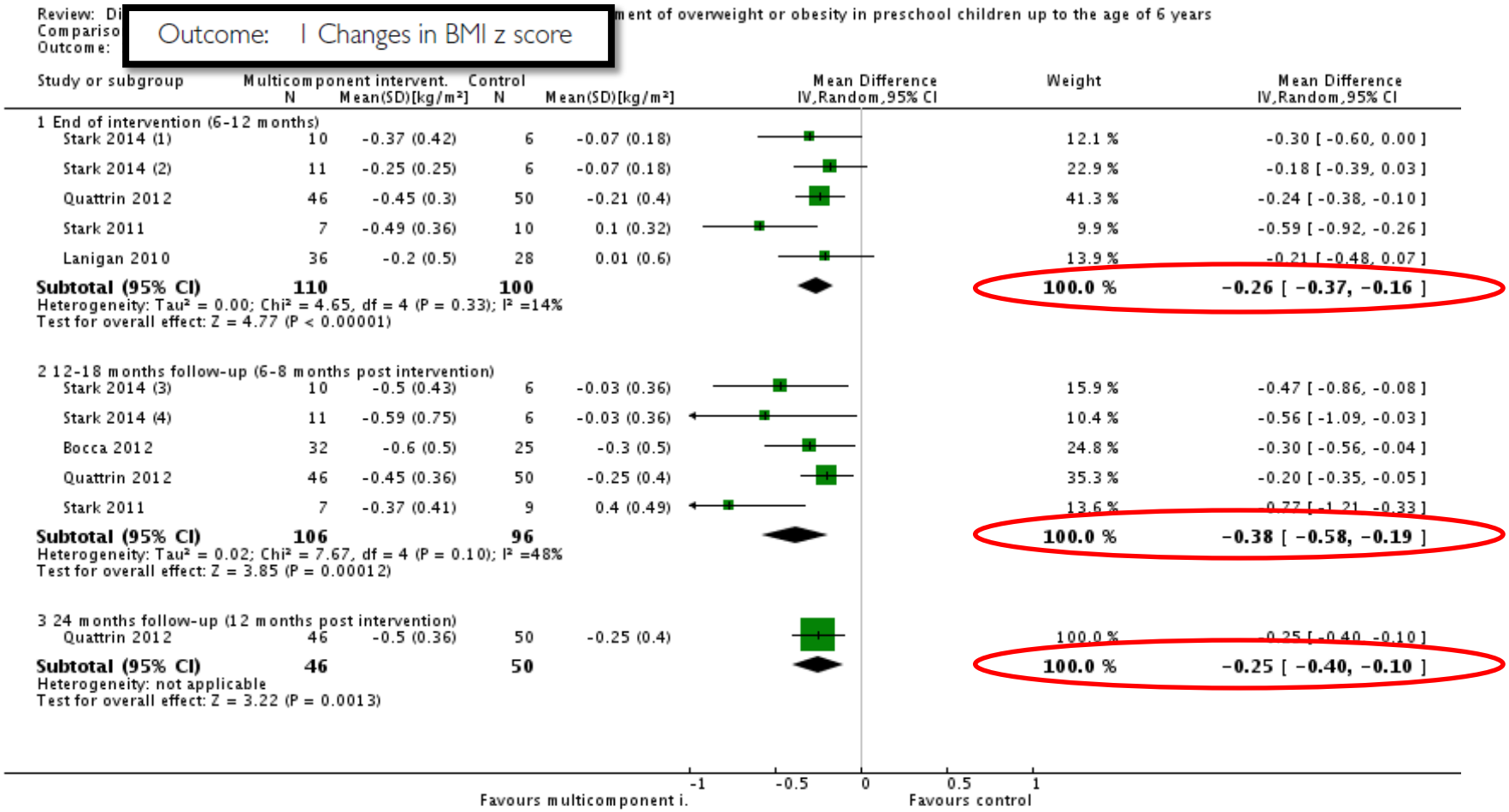
2016 USPSTF Summary
Components of Behavioral Interventions

Contact Time	Number of Trials (N)	Trials With Physical Activity Sessions	Intervention Approach and Target
≥52 hours	7 (1,252)	100%	• Group sessions +/- individual sessions • Parent-only + child-only + family sessions • Referral/specialty clinic setting • Frequently provided sessions on healthy eating, safe exercising, and reading food labels; encouraged the use of stimulus control (e.g., limiting access to tempting foods and screen time), goal setting, self-monitoring, contingent rewards, and problem solving
26–51 hours	9 (838)	56%	
[illegible] hours	[illegible]	[illegible]	• Referral/specialty clinic setting
1–5 hours	15 (3,781)	0%	• Individual sessions • Usually targeted parents + child together • Frequently conducted in primary care settings • Used motivational interviewing

* Behavioral interventions with ≥26 contact hours were found to be effective.

U.S. Preventive Services Task Force, 2016
https://www.uspreventiveservicestaskforce.org/Page/Document/draft-recommendation-statement165/obesity-in-children-and-adolescents-screening1#table-1-components-of-behavioral-interventionsa-hrefnotetable1-a

2016 Cochrane review: Lifestyle interventions for the treatment of overweight or obesity in preschool children

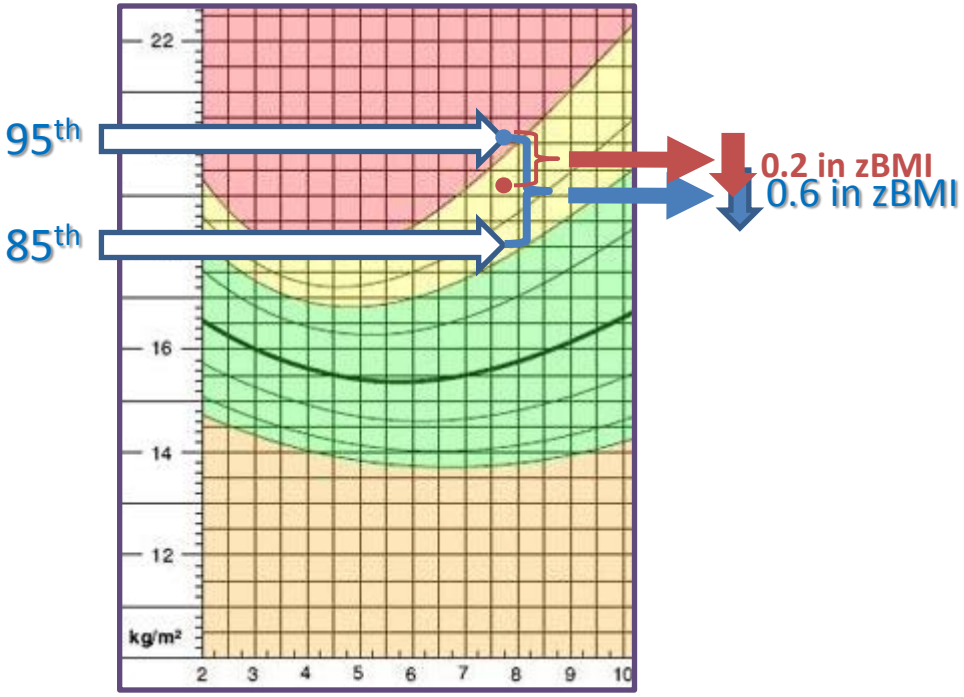


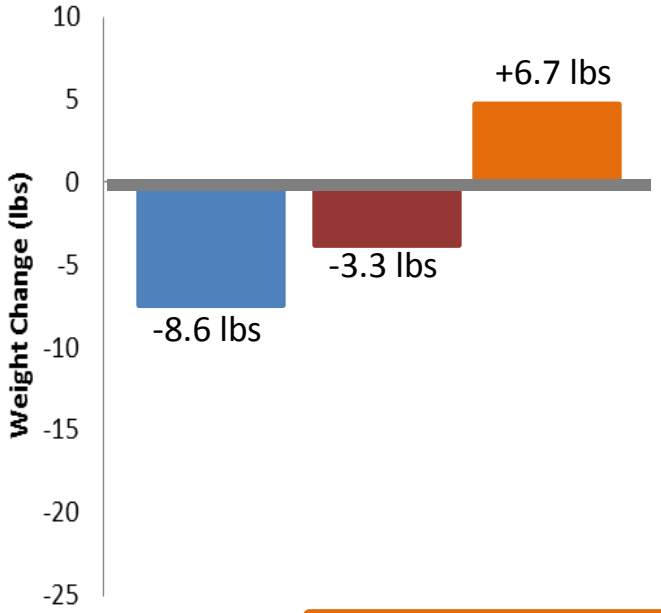
(1) LAUNCH with home visits vs control (control n halved) at end of intervention
(2) LAUNCH clinic only vs control (control n halved) at end of intervention
(3) LAUNCH with home visits vs control (control n halved) at 12 months follow-up
(4) LAUNCH clinic only vs control (control n halved) at 12 months follow-up

Cochrane Database of Systematic Reviews
10 MAR 2016 DOI: 10.1002/14651858.CD012105
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD012105/full#CD012105-fig-00101

Translation of zBMI difference to weight change

For an 8 year old Girl **Height 50th percentile

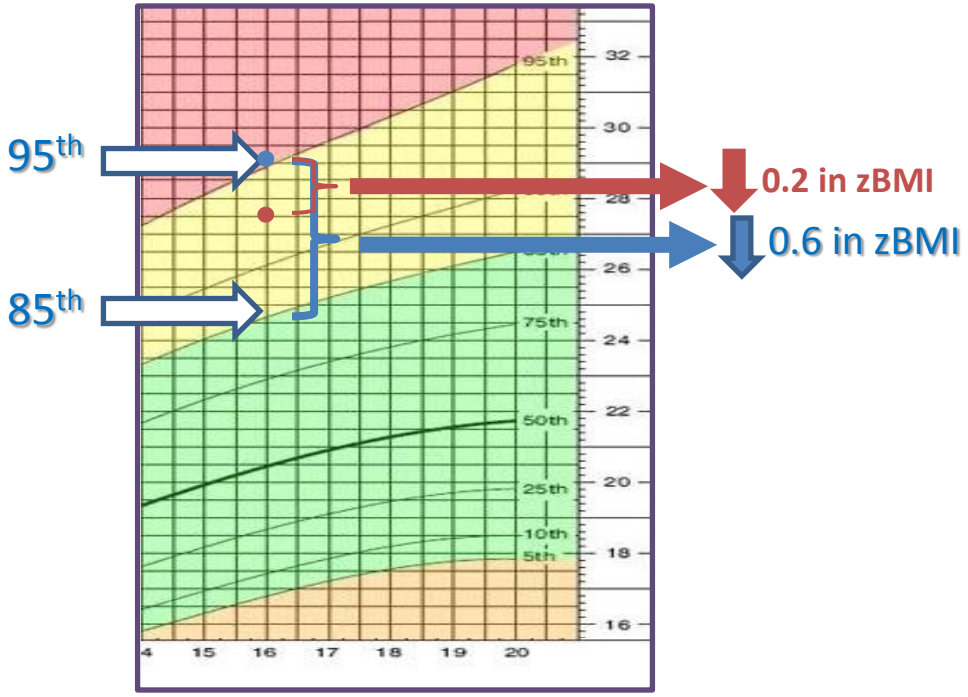


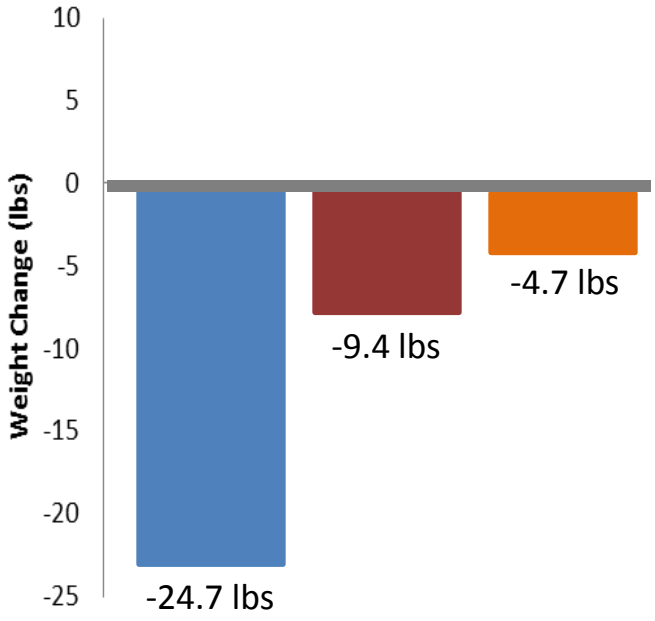


BMI z score decrease of **0.2 units** over 12 months

Translation of zBMI difference to weight change

For an 16 year old Girl **Height 50th percentile





BMI z score decrease of **0.2 units** over 12 months

Cardiometabolic and Psychosocial Outcomes

- **Cardiometabolic outcomes**
  - 2016 USPSTF- mixed results
  - Ho M et al. 2012, 2013- positive results on lipid panel, fasting glucose
  - Bariatric surgery – positive results
- **Psychosocial outcomes**
  - **No consistent difference in quality of life, self esteem or depression**
  - **No increase in Disordered eating between treatment and control**

U.S. Preventive Services Task Force, 2010 & 2016
Ho M et al. Pediatrics 2012 Pediatrics. 2012 Dec;130(6):e1647-71.
Ho et al. JAMA Pediatr. 2013 Aug 1;167(8):759-68

Learning what works

- Does intervention dose matter?
- Does the sample ethnicity matter
- Does sample age matter?
- Does intervention length matter?
- Does the structure e.g., parent only vs. parent and child matter?
- Does the effectiveness measure matter?

Wifley et al. Obesity (Silver Spring). 2017 Jan;25(1):16-29
2016 U.S. Preventive Services Task Force, AHRQ publication
Epstein et al. Health Psychol. 2007;26(4):381-91

Meta-analysis of primary care interventions vs usual care or active control on z-BMI

- **Mitchell et al. Health Psychol 2016,(18 studies)**
  - The overall effect size for change in body mass index was d = 0.26, 95% CI [.14, .38]
  - Larger effect size for more treatment contact, contact with pediatrician and treatment duration

- **Sim L et al. Pediatrics 2016, (14 studies)**
  - Marginal effect zBMI -0.04 [95% CI -0.08 to -0.01] with regard to BMI reduction
  - Highest decline in zBMI score 0.17

Community-based intervention

- **2016 Community Preventive Community Taskforce**

  Insufficient evidence to support multicomponent interventions to increase availability of healthier foods and beverages in *schools to decrease BMI z-score*

- **Mind, Exercise, Nutrition, Do it (MEND) Program**
  - Dose >52 hours
  - Compared to the controls:
  - BMI *z*-score −0.24; $P < 0.0001$) at 6 months
  - BMI *z*-scores −0.23 ($P < 0.0001$) at 12 months

https://www.thecommunityguide.org/sites/default/files/assets/Obesity-School-Interventions.pdf

Sacher P et al. Obesity. Volume 18: suppl 1, 2010

Medications

- Orlistat
- Metformin
- Phentermine (≥ 16 years)
- Topiramate
- Exenatide
- Locaserin
- Phentermine-Topiramate
- Bupropion-Naltrexone
- Liraglutide

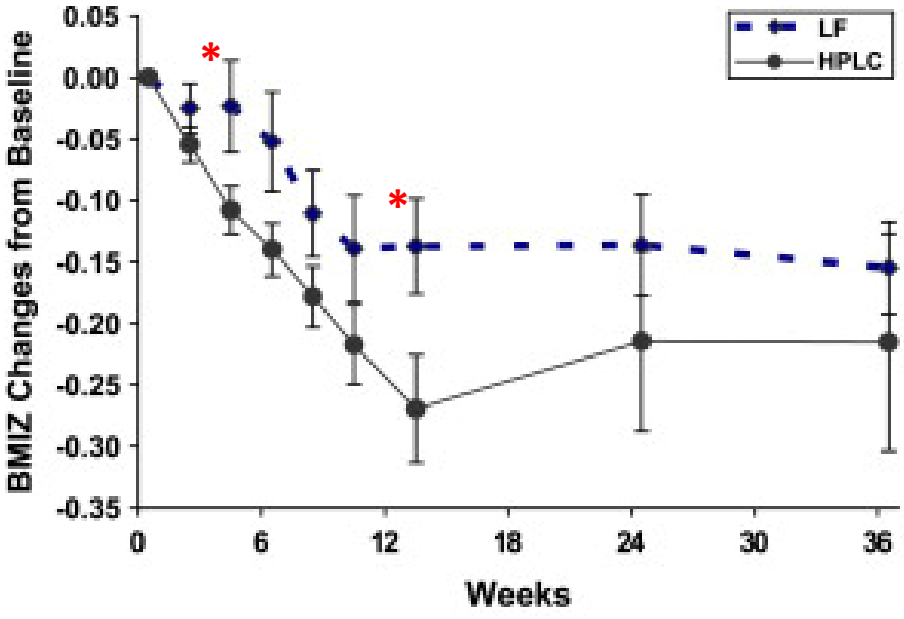
Meta-analyses of Metformin trials:
zBMI -0.10 [95% CI -0.17 to -0.03]

Systematic Review of the Benefits and Risks of Metformin in Treating Obesity in Children Aged 18 Years and Younger. JAMA Pediatr. 2014;168(2):178-184.

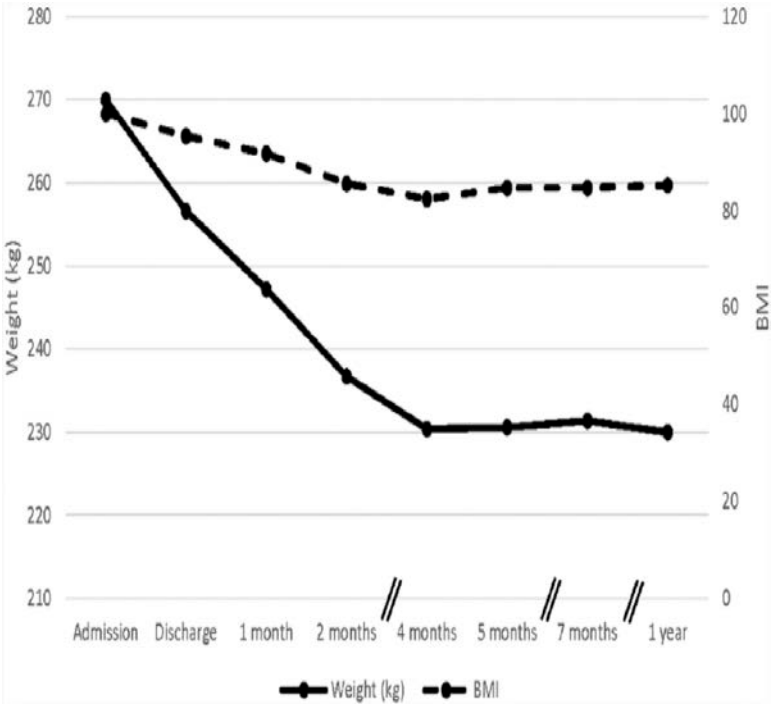
Mead E et al. Cochrane Database Syst Rev. 2016 Nov 29;11:CD012436

Specialized diets

High Protein, Low Carbohydrate Diet vs. Low fat diet

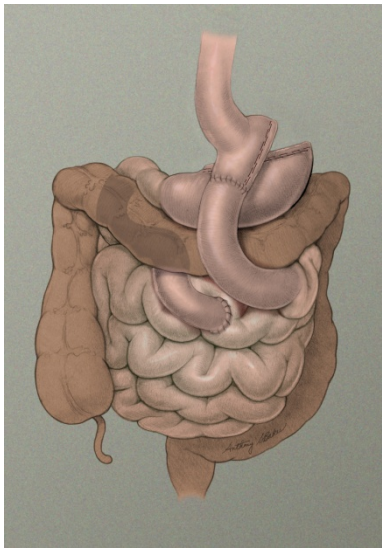


Protein Sparing Modified Fast Case Study: Weight and Body Mass Index (BMI) in one year



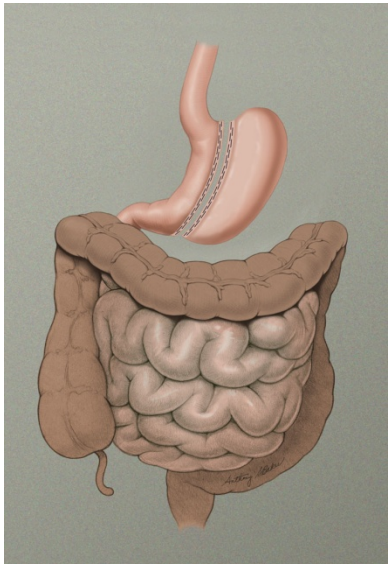
Krebs NF et al. J Pediatr. 2010 Aug;157(2):252-8. Ebbeling et al. Arch Pediatr Adolesc Med. 2003 Aug;157(8):773-9, Kirk et al. J Pediatr. 2012 Aug;161(2):320-7.e1., Suskind RM et al. Pediatr Diabetes. 2000 Watowicz, Tindall, Eneli. ICAN 2015;7:233-241, Schwingshackl L et al. Nutr J. 2015 Aug 25;14:87.

Weight loss surgery



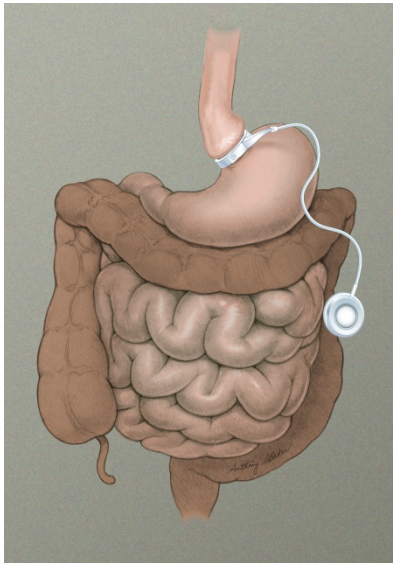
Gastric Bypass

Restrictive and Malabsorptive



Gastric Sleeve

Restrictive Only

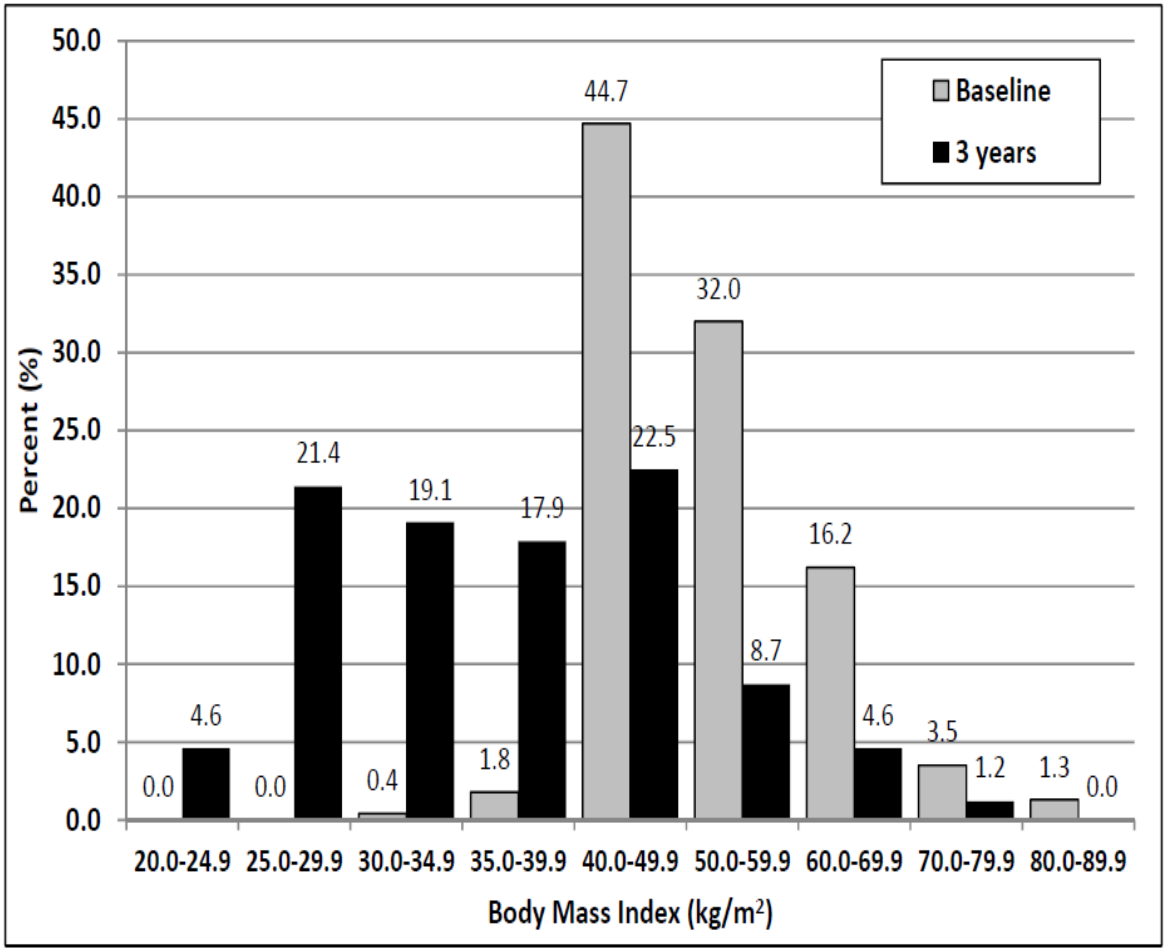


Adjustable Gastric Band

Restrictive and Adjustable

Weight loss three years after adolescent bariatric surgery

Figure S3, Panel B: Categorical BMI at Baseline and 3 years



Baseline: 97.7% of subjects with BMI at 40 or higher

3-year: 37% of subjects with BMI at 40 or higher

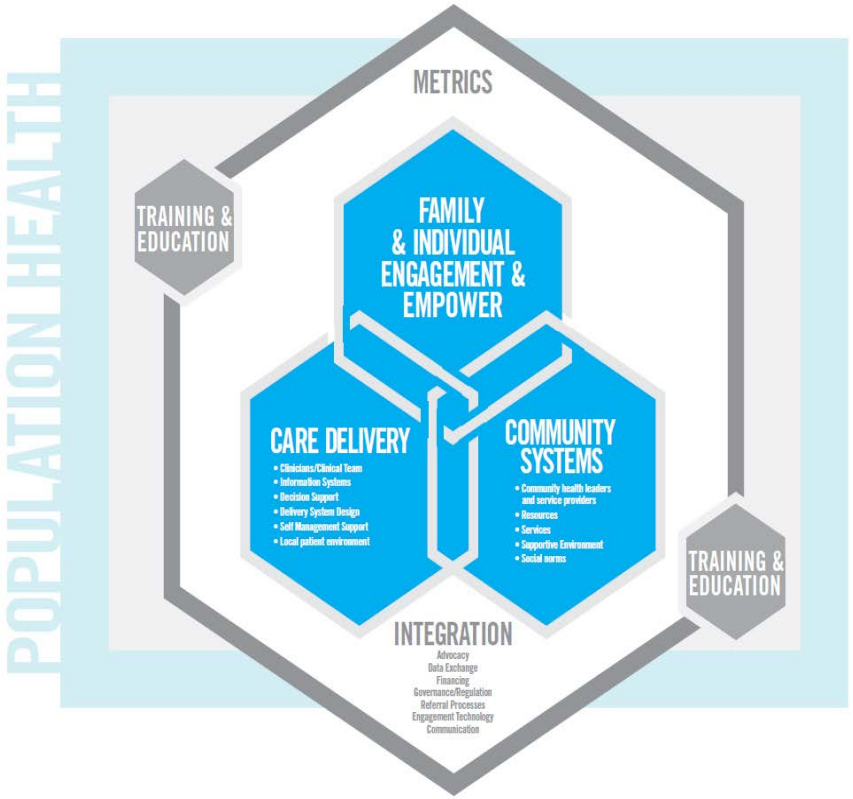
Inge TH et al (TEEN-LABS) N Engl J Med 2016; 374:113-123

Learning what works

- Does intervention dose matter
- Does implementation setting matter?
- Does age matter?
- Does intervention type matter?
- Does intervention length of follow-up matter?

Opportunities

- Are we using the *right effectiveness* measure?
- Are we training the right people?
- How do we support care delivery and community systems?
- Is there a mismatch between intervention and outcomes?
  - Crossing percentiles
  - Applying stage 3 programs to children who are overweight

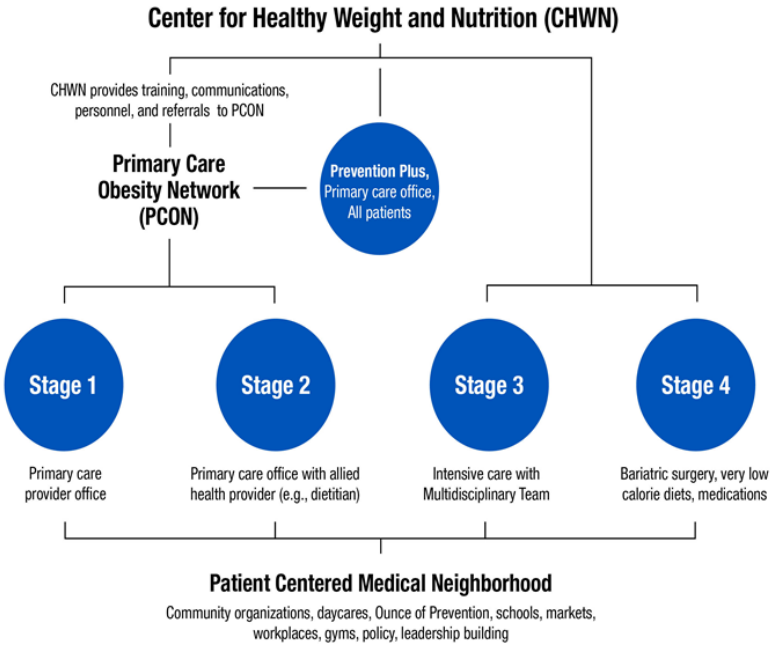


Dietz et al. Health Affairs 34,NO. 9 (2015): 1456–63

Opportunities

- Integrating interventions in different settings
  - Patient-centered medical neighborhood
  - Childhood Obesity

  Research Demonstration (CORD) projects



Eneli et al. National Collaborative on Childhood Obesity Research (NCCOR) http://www.nccor.org
Foltz J, Belay B et al. Child Obes. 2015 Feb;11(1):4-10.

Opportunities

- Provider training
- Defining benchmarks for effectiveness
- Research funding
- Integrating technology
- Improving efficiencies and effectiveness
- Linking outcomes to policy on reimbursement and population health

Thank you