Putting Prevention and Treatment of Childhood Obesity in Context

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Recent past Diabetes Director
Emergency Department Director
Zuni Comprehensive Community Health Center
Zuni Comprehensive Community Health Center

Zuni to nearby cities:
(ground)

Gallup ~30min
**Albuquerque** ~2.5hr
Flagstaff ~2.5hr
Farmington ~2.5hr
Phoenix ~5hr

Patient population:
60–70% Zuni
30–40% Navajo
1–3% non-native
Who am I?

Grew up in Albuquerque, New Mexico
Lived all over but came back to New Mexico for family residency
Have been at Zuni for 7 years: DM Director x 5 years, now ED Director x1

Who am I not?

An endocrinologist, a pediatrician, an academic, a dietician, a DM educator or an MPH
Who am I? (con’t)

• I see kids of all ages (and pregnant moms), and struggle to address overweight and obesity *effectively* in way too little time, way too infrequently, while striving to build—or at least not *harm*—good relationships with these kids and their parents.

• A couple years ago, I took a deep dive into childhood obesity...
Up Next

• Defining childhood overweight and obesity
• The trends—historical context
• Detour into adult obesity/weight loss-physiologic context
• What causes child obesity?—biopsychosocial context
• What’s at stake in childhood obesity?—prevention context
• What really works for childhood obesity?—evidence-based context
• First, do no harm—unintended consequences of obesity counseling?
• Humility in the clinical context
Basic Definitions of Obesity: BMI

BMI is not fool-proof, but it is the agreed-upon standard for diagnosing overweight and obesity.

<table>
<thead>
<tr>
<th>Weight categories for adults and youth</th>
<th>Adults (18 years and older)[1]</th>
<th>Youth (2 to 18 yrs) CDC, AAP, IOM, ES, IOTF[2,3]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Underweight</strong></td>
<td>BMI &lt;18.5</td>
<td>BMI &lt;5&lt;sup&gt;th&lt;/sup&gt; percentile for age</td>
</tr>
<tr>
<td><strong>Normal weight</strong></td>
<td>BMI 18.5-24.9</td>
<td>BMI ≥5&lt;sup&gt;th&lt;/sup&gt; to &lt;85&lt;sup&gt;th&lt;/sup&gt; percentile</td>
</tr>
<tr>
<td><strong>Overweight</strong></td>
<td>BMI 25-29.9</td>
<td>BMI ≥85&lt;sup&gt;th&lt;/sup&gt; to &lt;95&lt;sup&gt;th&lt;/sup&gt; percentile</td>
</tr>
<tr>
<td><strong>Obesity</strong></td>
<td>BMI ≥30</td>
<td>BMI ≥95&lt;sup&gt;th&lt;/sup&gt; percentile</td>
</tr>
<tr>
<td><strong>Severe obesity</strong></td>
<td>BMI ≥35 (class II obesity)</td>
<td>BMI ≥120 percent of the 95&lt;sup&gt;th&lt;/sup&gt; percentile, or a BMI ≥35 (whichever is lower)[4,5]</td>
</tr>
<tr>
<td></td>
<td>BMI ≥40 (class III obesity)</td>
<td>BMI ≥140 percent of the 95&lt;sup&gt;th&lt;/sup&gt; percentile, or a BMI ≥40 (whichever is lower)[5]</td>
</tr>
</tbody>
</table>

AAP: American Academy of Pediatrics; IOM: Institute of Medicine; ES: Endocrine society; CDC: Centers for Disease Control; IOTF: International obesity task force; BMI: body mass index.

* In children, several definitions of severe obesity have been used. The most widely accepted is BMI ≥120 percent of the 95<sup>th</sup> percentile, or a BMI ≥35 (whichever is lower).[3] This corresponds to approximately the 99<sup>th</sup> percentile, or BMI Z-score ≥2.33 (i.e., 2.33 standard deviations above the mean).
Basic Definitions of Obesity: BMI (con’t)

9-year-old boy, Well Child Check

11-year-old boy, Well Child Check
Basic Definitions of Obesity: BMI (more)

9-year-old boy’s BMI
Big Picture: Overall, BMI has Trended up in Native Youth Throughout the 20th Century
Big Picture: But Not Just in Native Youth, of Course


Big Picture: And Not Just in the United States

Changes in prevalence of childhood overweight over time in selected countries

For this figure, the prevalence of overweight children is defined as the percent of children with body mass index (BMI) ≥85th percentile, using the standards from the International Obesity Task Force (IOTF). The countries are selected on the appropriateness and availability of the data. The surveys are not strictly comparable because of differences in age range and methodology. With the limited data available, prevalences are not age-standardized.

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Graphic 68479 Version 5.0
Big Picture: Or Even Just in the Richest Nations

World prevalence of childhood overweight, 1960s to 1990s

Prevalence of overweight or obesity, defined as body mass index ≥85th percentile for age and gender, using reference standards from the International Obesity Task Force (IOTF).

UpToDate. Klish, W.
Big Picture: What is Going on?

*World prevalence of childhood overweight, 2000s*

Prevalence of overweight or obesity, defined as body mass index $\geq$ 85th percentile for age and gender, using reference standards from the International Obesity Task Force (IOTF). Data for most of the countries shown is from 2005 or later.*

UpToDate. Klish, W.
What Happened? New Human Lifestyles

• Less physical work
• Cheap, easy availability of calories/sugar
• Food engineered to be addictive
• Upsizing, changes in perception of food
• HFCS, sugar in everything, etc.
What Happened? Or What Causes Obesity?
What Happened? Revisiting Energy Balance—Not so Simple
What Happened? Old Human Physiology

• 6 men and 8 women (14/16 contestants) from the popular show spent 2-weeks at the NIH 6 years later

• All but one had regained some weight and 5/14 were back to within 1% of pre-show weight

• During the show, despite vigorous exercise, participants’ total energy expenditure dropped as participants’ resting metabolic rate (RMR) decreased in response to weight loss

• “Despite substantial weight regain in the 6 years following participation in “The Biggest Loser,” RMR remained suppressed at the same average level as at the end of the weight loss competition...[amounting to] 500 kcal/day lower than expected....”

Fothergill E et al
What Happened? Old Human Physiology (con’t)

Eureka!

The connection between *food insecurity* and overweight/obesity!

The connection between *yo-yo dieting* and persistence/worsening of obesity!

Significant weight loss flies in the face of millions of years of human evolution
What Happened? Or What Causes Child Obesity?

Known factors

• **Genetics** (may partially explain some group’s higher rates, i.e., ‘thrifty genes’)
• **Environment** (diet, physical activity, parental/family habits, built environment, sleep, our place in human history, i.e., existing in an obesogenic time in history, etc.)
• **Socioeconomics** (poverty + obesity track together—may partially explain some group’s higher rates)

Likely factors

• ‘**Metabolic programming**’ (in utero environment, early infancy exposure/environment)
• **Epigenetics** (genes turned off or on by life events/exposures then passed on in that state-think personal and historical trauma)
Variation in Heritability of Child Body Mass Index by Obesogenic Home Environment

• **BMI at age 4** in identical or fraternal twins: is it **genetics** or **environment**

• Families filled out extensive questionnaire covering diet, physical activity and media use (TV, computer); households divided into **High Risk** or **Low Risk** for obesity

• Lots and lots of fancy math, lots of modeling

“[T]hey detected a heritability estimate for child BMI of **86%** for children raised in homes with higher obesogenic risk, but only 39% for counterparts raised in homes with lower obesogenic risk. The impact of genetic factors thus was curbed by roughly half in a healthier environment....”

“Genetics loads the gun; the environment fires it.” -a genetics and environment researcher

Faith M and Epstein L
Association Between Casino Opening or Expansion and Risk of Childhood Overweight and Obesity

Investigators evaluated the correlation between casino openings or expansions and childhood overweight/obesity within 100 tribal lands in California in the early 2000s

- Used data from California state mandated physical evaluations at 5th, 7th, and 9th grade
- Analyzed public data on tribal casinos, mean per capita tribal member income and % living in poverty

“We found that increasing ‘dose’ of casino was associated with lower risk of overweight/obesity among American Indian children, with every 1 slot per capita gained associated with a 0.19 percentage point reduction in overweight/obesity risk.”

What’s at Stake in Childhood Obesity?

Childhood obesity associated with

- diabetes
- hypertension
- fatty liver disease
- dyslipidemia
- obstructive sleep apnea
- asthma
- orthopedic complications
- anxiety, depression, bullying

- But remember most of these chronic illnesses are also associated with ACE scores, genetics, socioeconomics, geographic location, and a lot of other factors....

UpToDate, Klish, W and Skelton J
"The concept of metabolically healthy people is controversial."

Review of two studies
386,000 participants total, ages 40-50s
Reviewed cardiovascular and all-cause mortality in those with BMI >/=30 in association with other markers for metabolic disease such as HTN

"Participants with BMIs >/=30 whose systolic BP was <130 without BP-lowering medications, who didn’t have diabetes and whose waist-to-hip ratio was [below gender-specific cutoffs] had no excess risk for either cardiovascular disease death or overall mortality."

This exploratory study might help clinicians respond to obese patients who ask about their CVD risk if they have no evident metabolic dysfunction. This study renews the focus on waist-to-hip ratio, which was popular in the past when we talked about a "pear-shaped" body type being associated with lower CVD risk than an "apple-shaped" body type.
What’s at Stake in Childhood Obesity? (con’t)
What’s at Stake in Childhood Obesity? (more)

- 3-year-old without identified primary care provider dx with Stage 2 HTN in Urgent Care
- Peds nephrology referral
- Work up for secondary HTN: negative
- Conclusion: HTN due to childhood obesity
- Treatment: enalapril
- Initial echocardiogram: enlarged left ventricle
- Repeat echocardiogram a year later:
  - Left ventricular hypertrophy resolved
  - Still my primary care patient
What Works to Prevent and Treat Childhood Obesity? (slide 1)


• Population: 105 girls, ages 12-17, BMI>90% (average 97%)

• Intervention(s):
  • 16, 90-minute group meetings over 5 months
  • Participants were weighed and reviewed diet/physical activity q visit
  • Program emphasized standard diet goals and 30-60 min exercise 5x/wk
  • Teens got Dance Dance Revolution game if attended 5/6 initial sessions
  • 12 group sessions for parents (separate from teens)
  • Visit with PCP at beginning of and after completion of study

• Control group: Received printed material on diet, exercise and met with PCP once

• Outcome(s): BMIs in intervention group improved from avg of 97% to 95% (controls went from avg 97% to 96)
What Works to Prevent and Treat Childhood Obesity? (slide 2)


• Population: 8 children, ages 2–5, avg BMI% 98, at least one parent with BMI >/=25

• Intervention(s):
  • 24 sessions over 6 months, ½ group sessions in clinic, ½ at home
  • Concurrent 90-minute parent and child group sessions covering diet physical activity, parenting skills (parent group run by a psychologist; child groups by pediatric psychology postdocs)
  • at 6 sessions, families got a 14-day supply of vegetables for kids to try
  • therapists conducted home “clean outs” of junk food with parents

• Control group: 10 children got one 45-minute visit with PCP discussing BMI, lifestyle

• Outcome(s): BMI % had decreased by 2.4 at 6 months (i.e., 98% to 95.6%) and by 1.1 at 12 months (i.e., 98% to 96.9%) in intervention group and remained unchanged (3 kids) or increased (4 kids) in the control group (differences at 6 and 12 months statistically significant)
What Works to Prevent and Treat Childhood Obesity? (slide 3)

To select the evidence that will support your position and ignore the evidence that does not

Am I just (rotten) cherry picking?
What Works to Prevent and Treat Childhood Obesity? (slide 4)

Cochrane has 6 systematic reviews on childhood overweight/obesity

Diet, physical activity and behavioral interventions for ages **up to 6yr, 6-11yr, 12-17yr plus**

**Parent-only interventions** for ages 5-11 and **drug** interventions or **surgery** for obesity = 6 Cochrane reviews

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**REVIEW ARTICLE**

*Interventions for treating children and adolescents with overweight and obesity: an overview of Cochrane reviews*

Louisa J. Ells¹ · Karen Rees² · Tamara Brown¹ · Emma Mead¹,³ · Lena Al-Khudairy² · Liane Azevedo¹ · Grant J. McGeechan⁴ · Louise Baur⁴ · Emma Loveman⁵ · Heather Clements¹ · Pura Rayco-Solon⁶ · Nathalie Farpour-Lambert⁷ · Alessandro Demaio⁶
What Works to Prevent and Treat Childhood Obesity? (slide 5)

• A lot of diet, exercise, and behavioral interventions have been, or are being, trialed

• **141 trials total were included in the systematic reviews** with 4 ongoing studies noted relevant to <6-year-olds, 30 ongoing for ages 6–11—including 10 targeting parents-only and 20 targeting child-only or parents and child—and 50 ongoing trials addressing 12–17-year-olds

• Many interventions are “multicomponent” including diet and exercise elements and multiple modes of communicating with family or multiple sub-interventions

• “Collectively, the evidence suggests that multi-component behavior changing interventions may be beneficial in achieving small reductions in body weight status in children of all ages....”
What Works to Prevent and Treat Childhood Obesity? (slide 6)

- **USPSTF** recommends that clinicians screen children 6+ for obesity and offer or refer them to comprehensive, intensive behavioral interventions to promote improvements in weight status. (Grade B recommendation, 2017)

- USPSTF evaluated **42 trials of lifestyle-based interventions** to reduce weight in children
- Interventions generally focused on healthy eating, increasing physical activity, parenting skills
- Interventions generally done by study employees: dieticians, health educators, CHWs
- Interventions often connected to primary care but not done by primary care clinicians
What Works to Prevent and Treat Childhood Obesity? (slide 7)

• Common limitations of overweight/obesity studies include:
  • Intensity: **only interventions with >26hrs contact helped**
  • Unclear which specific interventions work (many programs take a “kitchen sink” approach)
  • Strong self-selection bias (the parents who sign up likely most motivated/concerned)
  • Interventions difficult to scale up (massive time/expertise/$ infusions into routine healthcare)
  • Studies measure proxies for health not hard outcomes (BMI, veggies reported eaten, etc. rather than DM dx, MIs, depression dx etc.)

O’Connor et al. Screening for Obesity...USPSTF
What Works in Primary Care Settings?

Start with HUMILITY

- I can not determine all the factors which led this patient to be obese nor understand the child’s or their parents’ experience simply by looking at a growth chart
- Childhood obesity is bigger than this one family, one community or one country
- Medicine does not fully understand overweight/obesity; its not just calories in/calories out
- We simply do not have super-effective interventions; some are only available in studies
- Overweight/obesity is a risk factor, but a child’s health is not simply their BMI
- Obesity is heavily stigmatized both within and outside healthcare; work to be aware of your own biases and assumptions
Preventing Obesity and Eating Disorders in Adolescents

“[Our] aim is to address the interaction between obesity prevention and eating disorders in teenagers and to stress that obesity prevention does not promote the development of eating disorders in adolescents.”

“[In adolescents], initial attempts to lose weight by eating in a healthy manner may progress to severe dietary restriction, skipping of meals, prolonged periods of starvation, the use of self-induced vomiting, diet pills, or laxatives.”

What Works in Primary Care Settings? (con’t)

Start with HUMILITY

• I can not determine all the factors which led this patient to be obese nor understand the child’s or their parents’ experience simply by looking at a growth chart
• Childhood obesity is **bigger** than this one family, one community or one country
• Medicine does not **fully** understand overweight/obesity; its not just calories in/calories out
• We do not have great interventions; the best programs are not available outside a study
• Overweight/obesity is **absolutely** a risk factor, but a child’s health is not their BMI
• Obesity is heavily **stigmatized** both within and outside healthcare; work to be aware of your own biases and assumptions
• **Focus on healthy behaviors rather than numbers and maintain the relationship**
Motivational Interviewing in Primary Care

• MI is a **conversational approach** directed at **encouraging behavior change**; its origins were in treatment of alcohol and substance abuse.

• Explicitly **acknowledges that people tend to be ambivalent** about behavior change.

• Runs **contrary to the prescriptive style of communication common in medicine**: “you need to lose a hundred pounds;” “your blood pressure is high; here’s a medication”

• Yet **is not simply agreeing** with or catering to a patient’s preexisting beliefs: the MI practitioner has a definite agenda of his or her own.

• “MI is not a **technique for tricking people into doing what they do not want to do. Rather, it is a skillful clinical style for eliciting from patients their own good motivations for making behavior changes in the interest of their health.”
Motivational Interviewing in Primary Care (con’t)

Is it effective for obesity in kids, in primary care? The jury is out, but...

We know that ‘usual care’ is not working for patients or providers... and we need to change the conversation.

I still counsel about sugared drinks and recommend exercise but I attempt to do so with humility and avoid even subtle blame/shame.
What Works in Primary Care Settings? (more)

Start with **HUMILITY**

- I can not determine all the factors which led this patient to be obese nor understand the child’s or their parents’ experience simply by looking at a growth chart
- Childhood obesity is bigger than this one family, one community or one country
- Medicine does not fully understand overweight/obesity; its not just calories in/calories out
- We do not have great interventions; the best programs are not available outside a study
- Overweight/obesity is absolutely a risk factor, but a child’s health is not their BMI
- Obesity is heavily stigmatized both within and outside healthcare; work to be aware of your own biases and assumptions
- Focus on **healthy behaviors** rather than **numbers**: ZYEP a community approach
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