

Putting Prevention and Treatment of Childhood Obesity in Context

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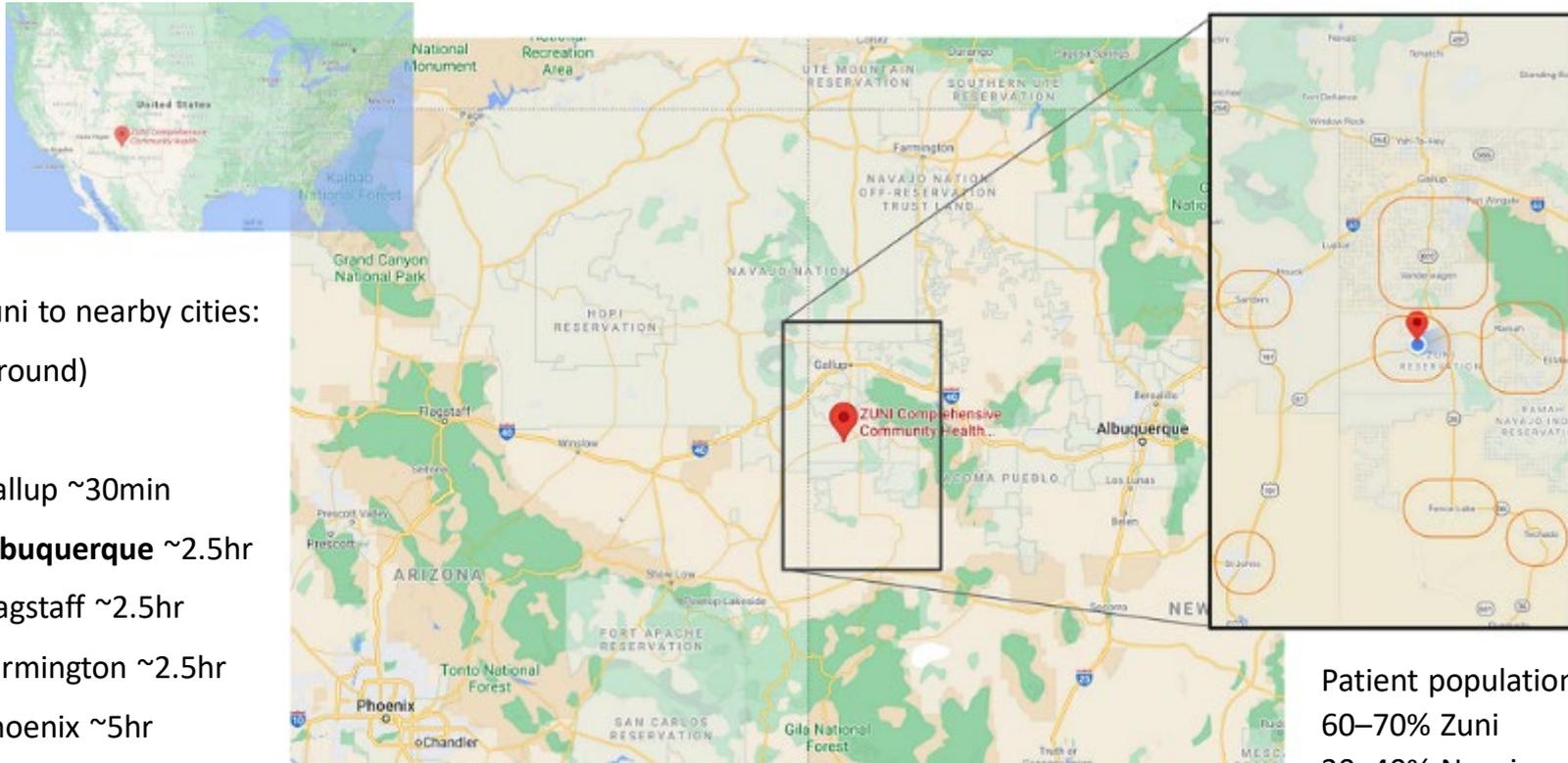
Family Medicine

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

Weight categories for adults and youth

Category	Adults (18 years and older) ^[1]	Youth (2 to 18 yrs) CDC, AAP, IOM, ES, IOTF ^[2,3]
Underweight	BMI <18.5	BMI <5 th percentile for age
Normal weight	BMI 18.5-24.9	BMI ≥5 th to <85 th percentile
Overweight	BMI 25-29.9	BMI ≥85 th to <95 th percentile
Obesity	BMI ≥30	BMI ≥95 th percentile
Severe obesity	BMI ≥35 (class II obesity)	BMI ≥120 percent of the 95 th percentile, or a BMI ≥35 (whichever is lower) ^{*[4,5]}
	BMI ≥40 (class III obesity)	BMI ≥140 percent of the 95 th percentile, or a BMI ≥40 (whichever is lower) ^[5]

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 95th percentile, or a BMI ≥35 (whichever is lower).^[3] This corresponds to approximately the 99th percentile, or BMI Z-score ≥2.33 (ie, 2.33 standard deviations above the mean).

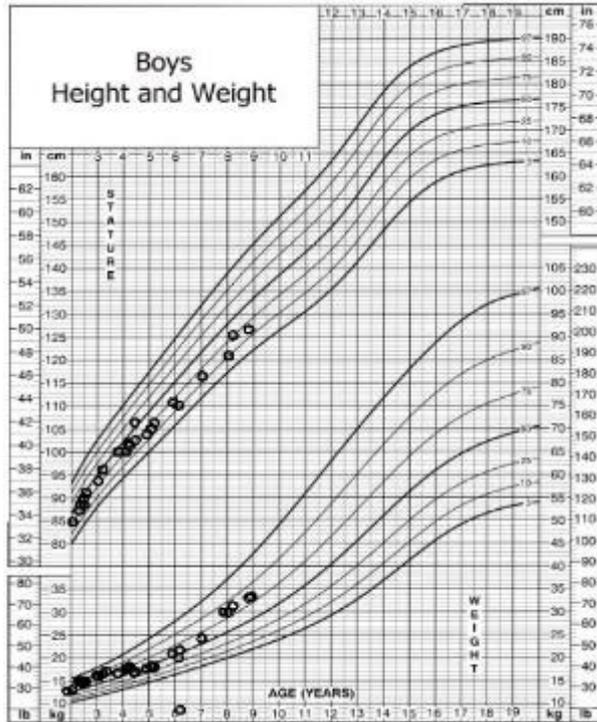
% body fat
waist-to-hip
functional metrics

← all about the %

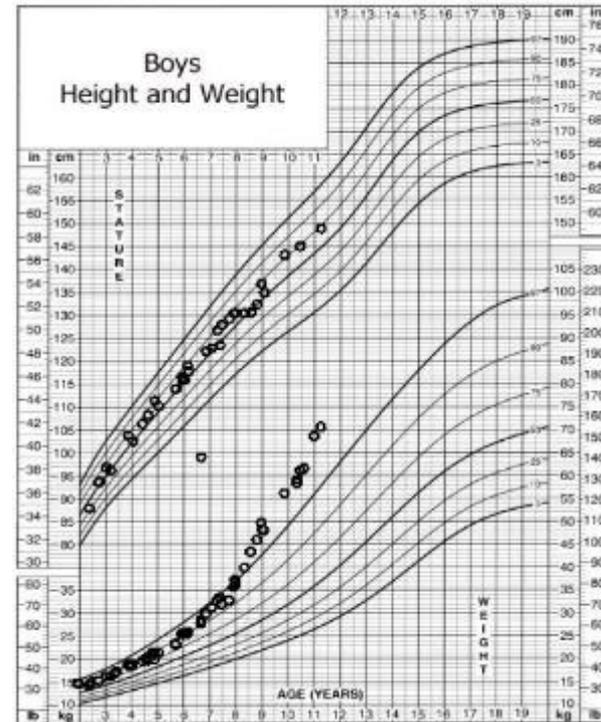
BMI is not fool-proof, but it is the agreed-upon standard for diagnosing overweight and obesity.

Basic Definitions of Obesity: BMI (con't)

9-year-old boy, Well Child Check

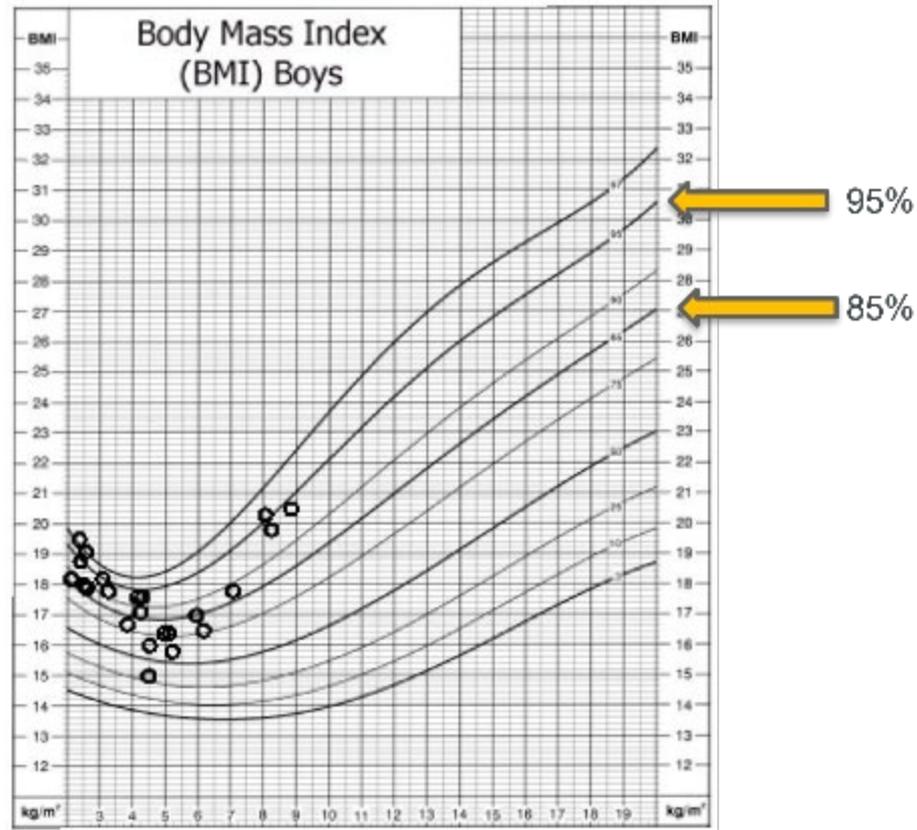
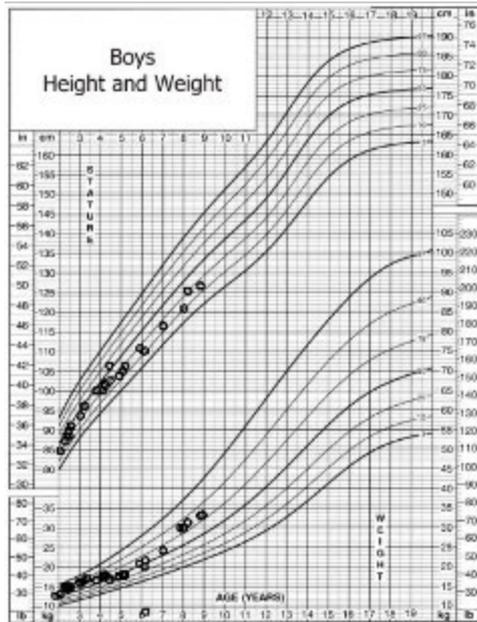


11-year-old boy, Well Child Check



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

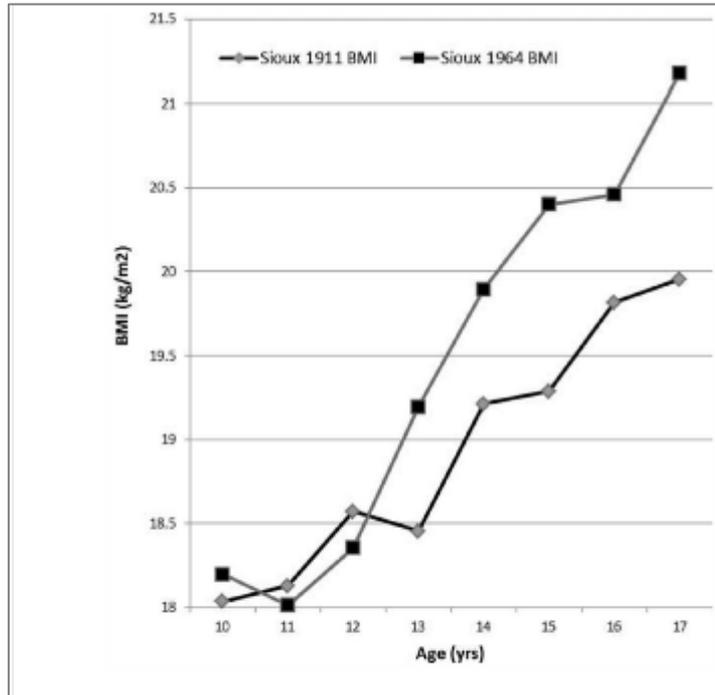


Fig. 3.
Changes in BMI among US Sioux from 1911 to 1964.

Schell and Gallo, 2012.

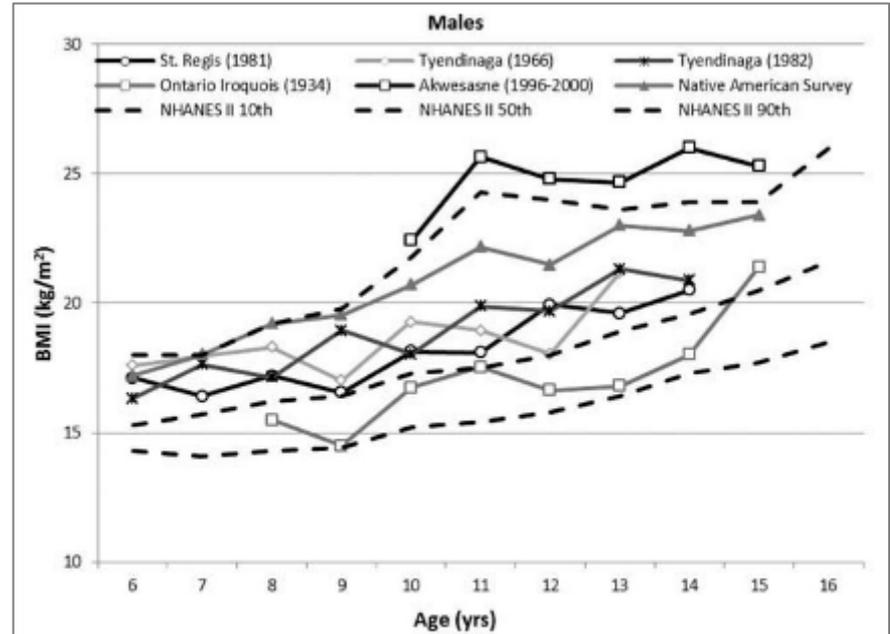
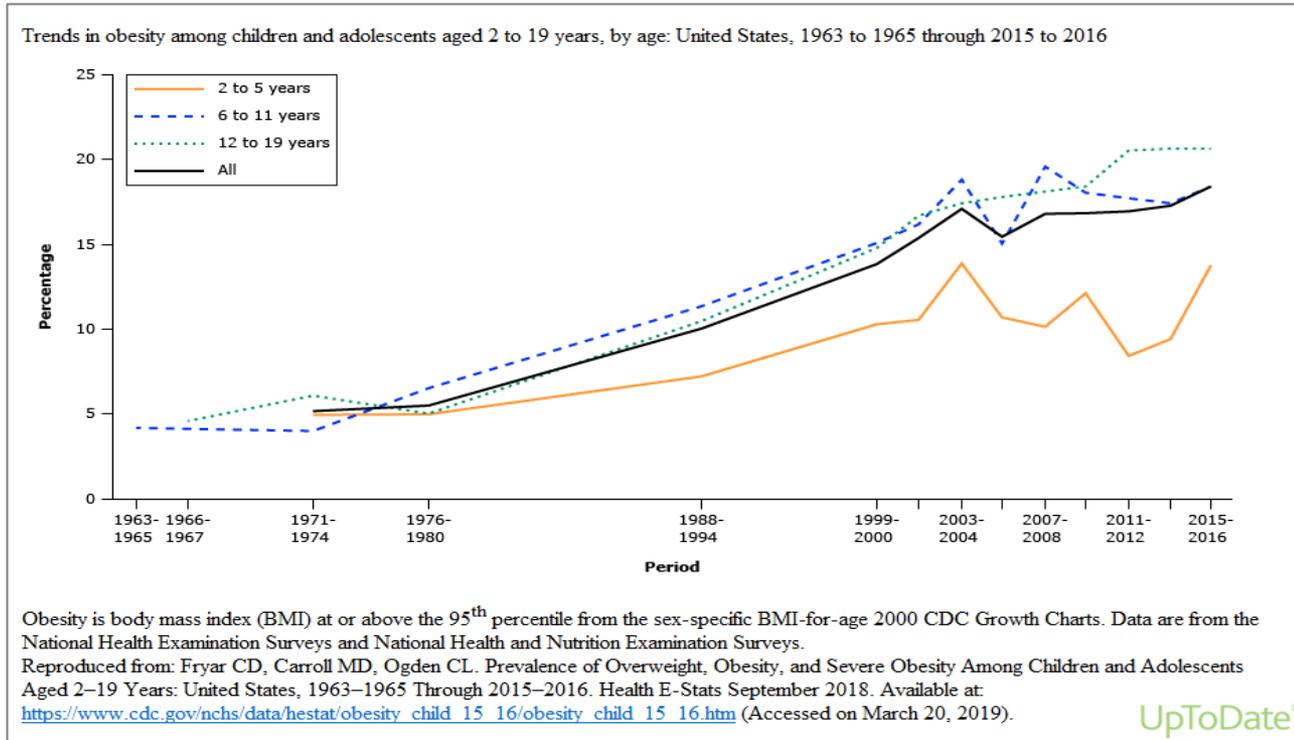


Fig. 4.

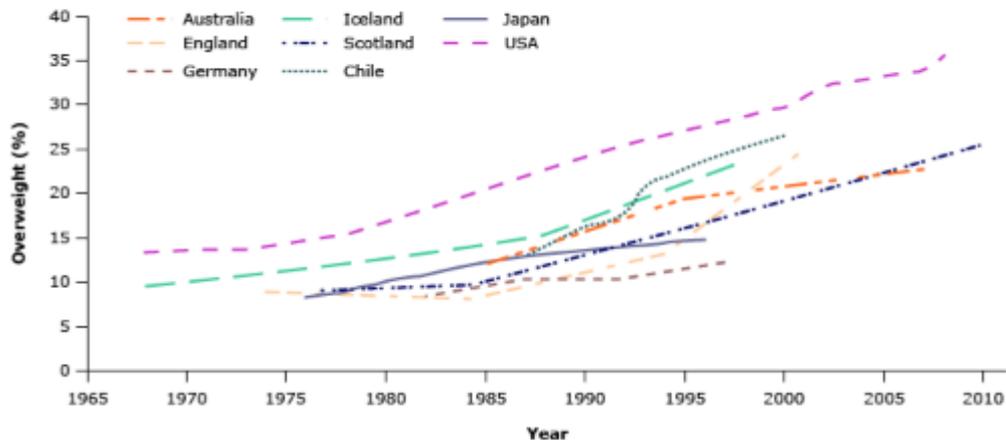
(a, b) BMI of Haudenosaunee males measured between 1934 and 2000 with NHANES II 10th, 50th, and 90th percentiles. Citations are found in the text.

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



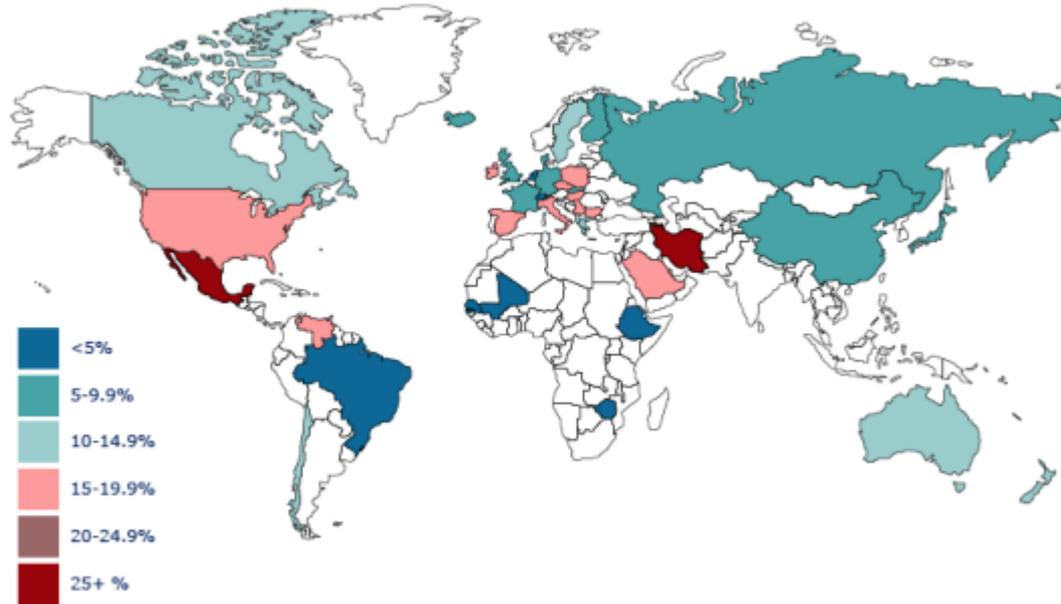
For this figure, the prevalence of overweight children is defined as the percent of children with body mass index (BMI) ≥ 85 th percentile, using the standards from the International Obesity Task Force (IOTF). The countries are selected on the appropriateness and availability of the data. The surveys 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

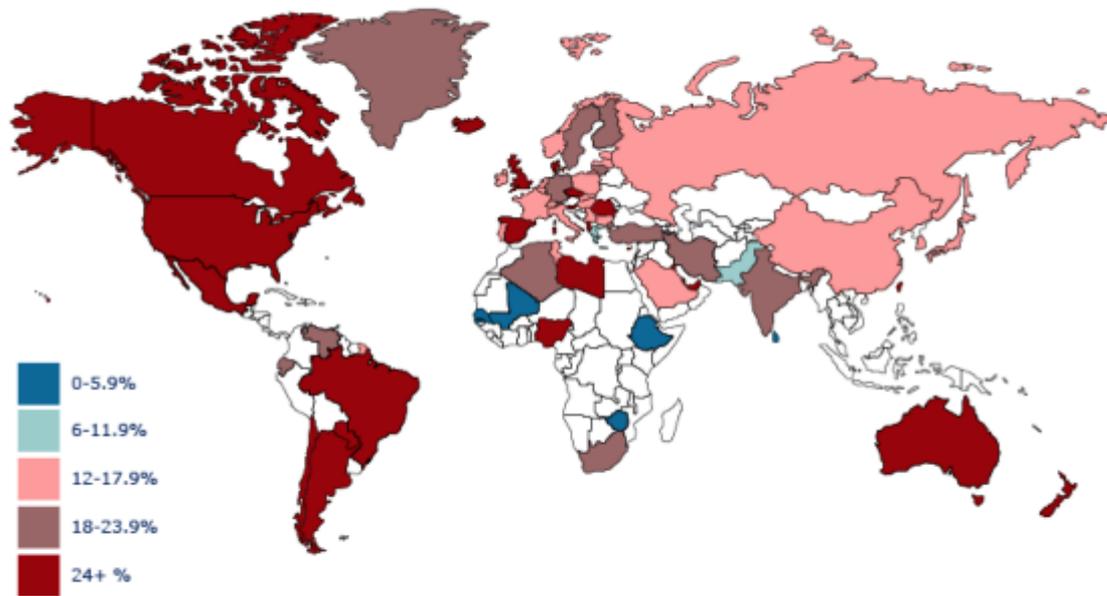


Prevalence of overweight or obesity, defined as body mass index ≥ 85 th percentile for age and gender, using reference standards from the International Obesity Task Force (IOTF).

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 ≥ 85 th 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.*

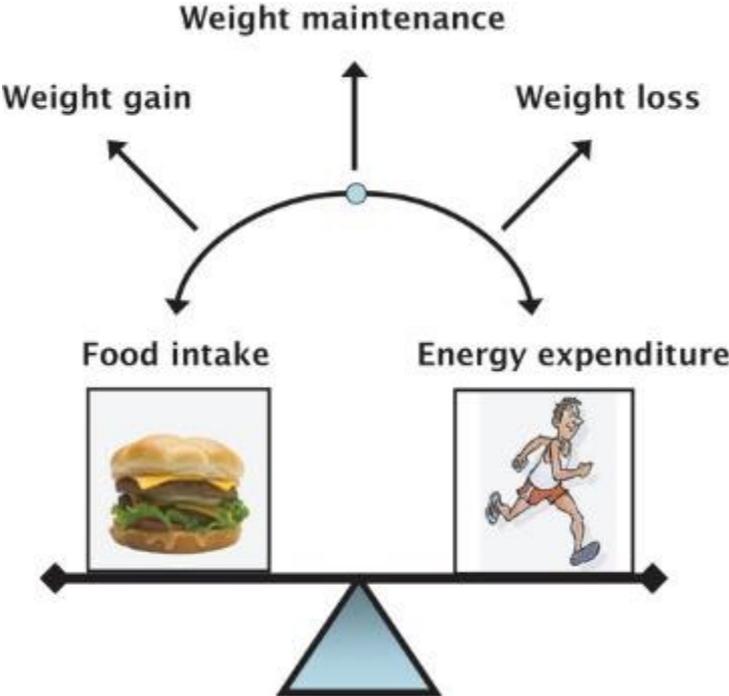
UpToDate. Klish, W.

What Happened? New Human Lifestyles

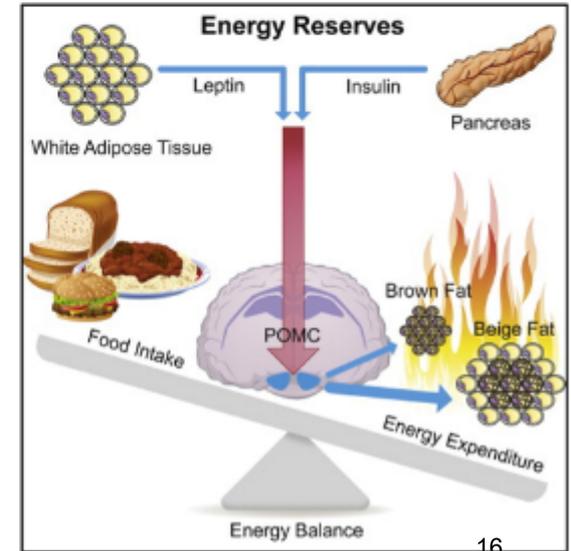
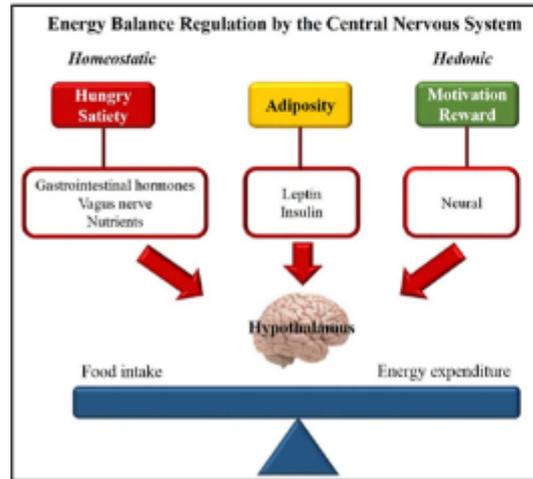
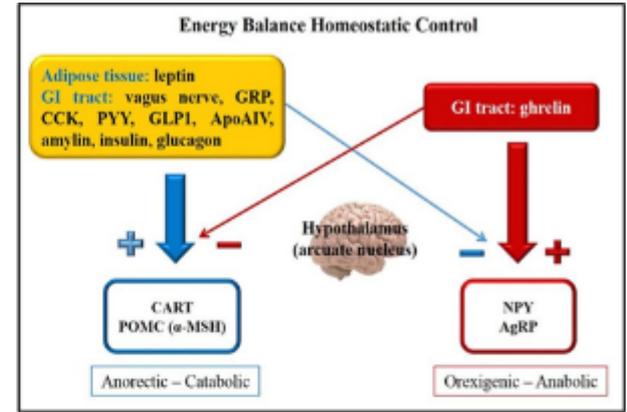
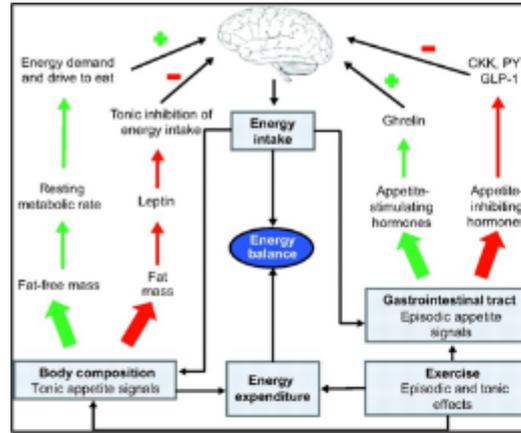
- Less physical work
- Cheap, easy availability of calories/sugar
- Food engineered to be addictive
- Upsizing, changes in perception of food
- HFCS, sugar in everything, etc.



What Happened? Or What Causes Obesity?



What Happened? Revisiting Energy Balance—*Not* so Simple



What Happened? Old Human Physiology

Persistent Metabolic Adaptation 6 Years After “The Biggest Loser” Competition

Erin Fothergill¹, Jian Guo¹, Lillian Howard¹, Jennifer C. Kowal², Nicolas D. Knut², Robert Brocchi², Kong F. Chen², Maria C. Scarselli², Mary Walker², Peter J. Walker², and Kevin D. Hall²

Objective: To measure long-term changes in resting metabolic rate (RMR) and body composition in participants of “The Biggest Loser” competition.

- 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

JAMA Pediatrics | Original Investigation

Variation in the Heritability of Child Body Mass Index by Obesogenic Home Environment

Stephanie Schrepft, PhD; Cornelia H. M. van Jaarsveld, PhD; Abigail Fisher, PhD; Moritz Herle, PhD; Andrea D. Smith, PhD; Alison Fildes, PhD; Clare H. Llewellyn, PhD

Association Between Casino Opening or Expansion and Risk of Childhood Overweight and Obesity

Original Investigation

Association Between Casino Opening or Expansion and Risk of Childhood Overweight and Obesity

Jessica C. Jones-Smith, PhD, William H. Dow, PhD, Krystal Chachkowska, PhD

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....

Healthy Obesity: A Backlash Against Fat Shaming

SUMMARY AND COMMENT | GENERAL MEDICINE, CARDIOLOGY

May 13, 2021

New Definition of Metabolically Healthy Obesity

Thomas L. Schwartz, MD, reviewing Zambic A et al. *JAMA Netw Open* 2021

May 7

In obese people, blood pressure, diabetes, and waist-to-hip ratio were the variables associated most closely with cardiovascular risk.

The concept of metabolically healthy obesity is controversial. In this study, researchers developed a new definition by using data from two large population-based prospective cohort studies of health behavior and outcomes (386,000 participants; mean ages, 42 and 56; mean body-mass index [BMI], 27 kg/m²).

The two cohorts were followed for means of 8 and 15 years, during which 2600 CVD-related deaths occurred. In adjusted analyses, participants with BMIs ≥ 30 kg/m² whose systolic blood pressure (BP) was <130 mm Hg without BP-lowering medications, who didn't have diabetes, and whose waist-to-hip ratio was <0.94 (women) or <1.03 (men) had no excess risk for either CVD or overall mortality. The prevalence of metabolically healthy obesity was 41% in one cohort and 19% in the other.

COMMENT

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.

“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.***”

What's at Stake in Childhood Obesity? (con't)

SUBJECTIVE:

3 yo F brought by parents for rhinorhea, cough x a few days. Otherwise well, no fevers, n/v/d. No c/o ST, otalgia. Mom requested BP as elevated in past.

PMH:

Term delivery, no NICU, no neonatal complications. No serious childhood illness, no chronic meds or hospitalizations. Parents w/ borderline, low grade HTN in 20s.

PHYSICAL EXAM:

HT:99.25 (99.70 cm), TMP:97.88 (36.6 C), PU:124, RS:24, WT:41.45 (18.82 kg), BMI:18.91, BMIP:100, PA:2, O2:100[],

BPs TODAY:

BP:160/111 (auto)

Manual BPs by MD w/ appropriate sized cuff, child quiet/cooperative:

150/90 Left arm

148/98 Right arm

150/100 Left calf

148/? Right calf

PRIOR BPs:

2/2/15: "BP recheck: 150/100 both arms with machine"

1/5/15: "BP: 179/121 (Jan 05, 2015@15:49)crying

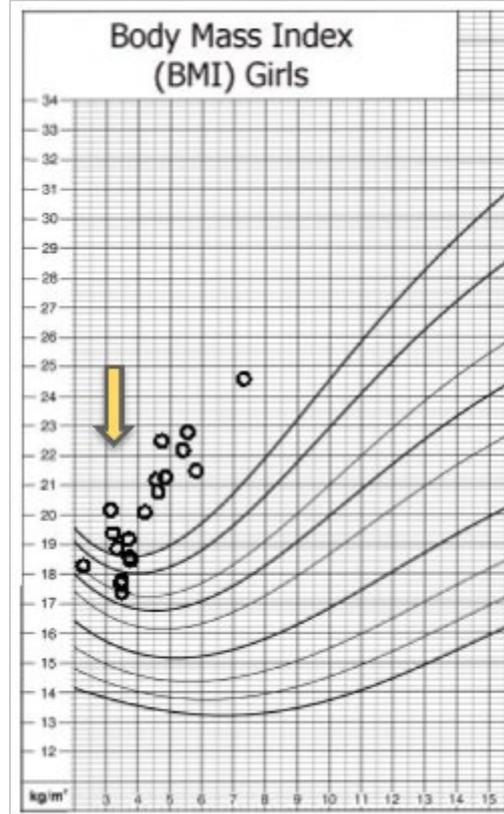
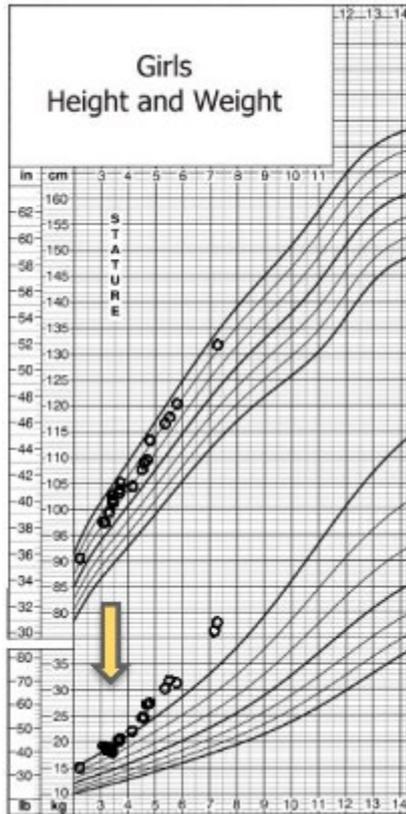
164/118 (Jan 05, 2015@15:37)

manual BP recheck: 120/? (could not hear bottom number)"

3 year old girl
brought in for a cold

Stage 2 Hypertension

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)

- A primary care-based, multicomponent lifestyle intervention for overweight adolescent females. DeBar et al. Pediatrics. 2012; 129(3): e611-e620.
- 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)

- A pilot randomized controlled trial of a clinic and home-based behavioral intervention to decrease obesity in preschoolers Stark L et al. *Obesity* (Silver Spring). 2011;19(1):134-141.
- Population: 8 children, ages 2–5, avg BMI% 98, at least one parent with BMI ≥ 25
- Intervention(s):
 - 24 sessions over 6 months, $\frac{1}{2}$ group sessions in clinic, $\frac{1}{2}$ 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)



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

International Journal of Obesity (2018) 42:1823–1833
<https://doi.org/10.1038/s41366-018-0230-y>

REVIEW ARTICLE



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

Louisa J. Ellis¹ · Karen Rees² · Tamara Brown¹ · Emma Mead^{1,3} · Lena Al-Khudairy² · Liane Azevedo¹ · Grant J. McGeechan¹ · 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)

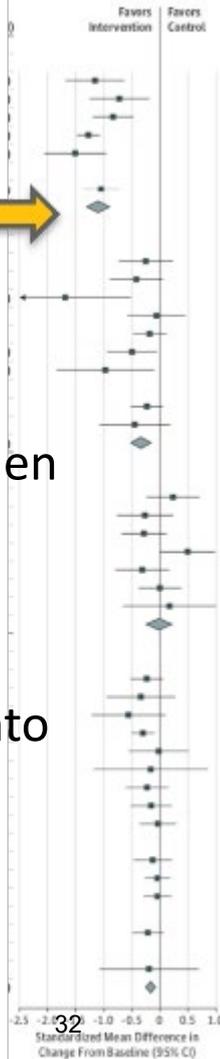
Recommendation Summary		
Population	Recommendation	Grade (What's This?)
Children and adolescents 6 years and older	The USPSTF recommends that clinicians screen for obesity in children and adolescents 6 years and older and offer or refer them to comprehensive, intensive behavioral interventions to promote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

- 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: dietitians, 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.”

Golden N and Schneider M. Preventing Obesity and Eating Disorders in Adolescents. Pediatrics. 2016; 138(3): e2016649

Preventing Obesity and Eating Disorders in Adolescents

Neville H. Golden, MD, FAAP, Marcie Schneider, MD, FAAP, Christine Wood, MD, FAAP,
COMMITTEE ON NUTRITION, COMMITTEE ON ADOLESCENCE, SECTION ON OBESITY

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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