Childhood obesity as a social phenomenon

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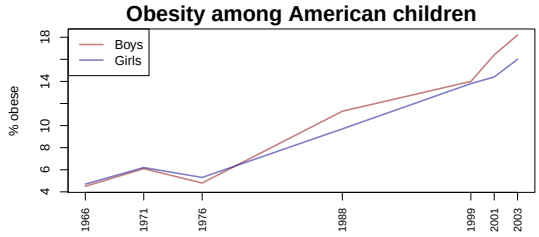
Introduction:

Obesity is a social phenomenon with physical manifestations.

It should come as no surprise that despite massive government efforts, the prevalence of childhood obesity in the United States shows no signs of decline [1] (see below chart). American anti-obesity policies are largely *personal* and/or *medical*, with a focus on self-discipline, exercise, and confusing dietary guidelines.



(Original chart, but data from NIH)

[2]

Though the AMA took a step in the right direction by classifying obesity as a "disease" in 2013, the American public health and epidemiology community should take the next logical step by highlighting the nature of this disease as almost entirely *social*. If we begin to reframe the obesity epidemic in the context of its social determinants, we can begin to understand why medical and behavioral interventions at the individual level have such a poor track record. Non-social solutions to a social disease can hardly be expected to be effective.

What follows is an examination of recent literature on the social components of childhood obesity, followed by a brief personal reflection on the social components of the issue in Alachua County.

Literature:

Obesity, at its core, is the result of simple thermodynamics: when the quantity of energy consumed is greater than energy expenditure the body stores the excess in the form of fat. But studies suggest that both energy consumption and expenditure are largely conditioned by a multitude of social factors, including:

Poverty In the United States, poverty is positvely correlated with childhood obesity, even after adjustment for race [3]. Though the mechanisms by which poverty causes obesity are complex, theories range from the simple and intuitive (obesity-combatting products, such as gym memberships, come with a cost) to the more complex (poverty's correlation with violence creates a culture hositle to outdoor activities) [4].

Race Conversely, even after adjustment for poverty, race is an independent risk factor for childhood obesity in the United States [1]. This relationship is almost certainly not causal; rather, being black or hispanic is correlated with a number of other causal risk factors for obesity such as consumption of sugary bevarages, access to a television in the bedroom, and the introduction of solid foods (in lieu of breastfeeding) at an early age. [5]. In some

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studies, statistically controlling for confounding factors yields no significant correlation between race and obesity [6].

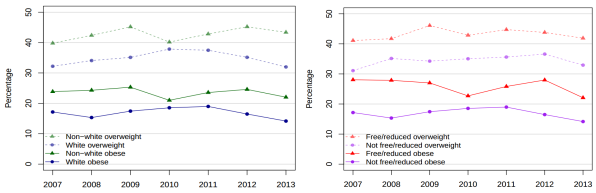
Peers and social norms As anyone who has ever attended a Thanksgiving meal can tell you, our eating habits are conditioned by those around us. A (relatively small) Dutch study found that children modified caloric intake directly as a result of those sitting near them at meal time [7]. As far as caloric expenditure, a New York City public school intervention resulted in increased physical activity during recess, even after the intervention had ended (though this study used highly subjective "visual scans" to quantify activity) [8].

Mistreatment More recent studies shine light on the importance of behavioral and psychological factors in the development of childhood obesity. Maternal depression during pregnancy appears to be an independent risk factor for overweight [5]. Teasing appears to have a significant impact on childhood obesity, but uniquely among girls [9]. The psychological effects of mistreatment may be intergenerational: one study found that women who were maltreated as girls were more likely to undergo excessive gestational weight gain (which in turn is correlated with childhood obesity) [10].

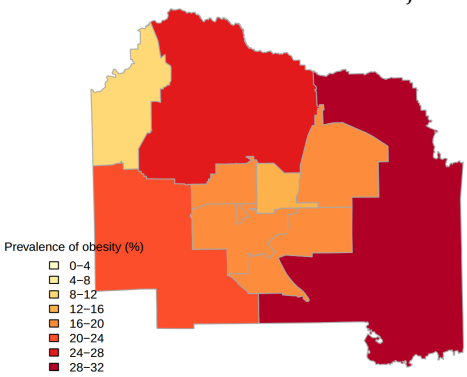
Alachua County

Like other counties throughout the United States, social inequality in childhood health outcomes in Alachua are clear and persistent. Last spring, using Alachua County Public Schools data for an internal FDOH report on childhood obesity in our county, I analyzed the correlation between race, poverty and obesity among area 6th graders.

Though the direction of the result was unsurprising (being black or multiracial or qualifying for free/reduced lunch were risk factors for obesity), the magnitude and consistency of the effect was striking. With every year's new generation of sixth graders, the differences between black/white children (left) and wealthy/poor (right) children were almost identical:



In other words, one could quite easily predict next year's prevalence of obesity by race and socioeconomic status. Clearly these disparities were not the result of unpredictable human "choice" (true choice would have been far harder to predict) but rather underlying social currents to which we are all subject.



Conclusion

The above map shows the prevalence of 6th grade obesity by school zone. Sadly, it looks nearly identical to maps of dental caries, poverty, or absenteeism. Like obesity, these are social illnesses with social solutions. The fetishization of personal responsibility, and the illusion of personal choice (particularly in the context of pediatric health) stand between us (public health practicioners) and effective solutions to the childhood obesity problem. The evidence on obesity's social roots, some of which I have presented in the paper, is clear: our health hinges on the society we build together, not the choices we make alone.

References

[1] Cynthia L. Ogden, Margaret D. Carroll, Brian K. Kit, and Katherine M. Flegal. Prevalence of childhood and adult obesity in the united states, 2011-2012. *JAMA*, 311 (8):806, feb 2014. doi: 10.1001/jama.2014.732. URL http://dx.doi.org/10.1001/jama.2014.732.

[2] Working Group on Future Research Directions in Childhood Obesity Prevention and Treatment. Future research: Childhood obesity prevention and treatment. *NIH*, aug 2007. URL http://www.nhlbi.nih.gov/research/reports/2007-child-obesity/index.htm#postmodel.

[3] Liping Pan, Heidi M. Blanck, Bettylou Sherry, Karen Dalenius, and Laurence M. Grummer-Strawn. Trends in the prevalence of extreme obesity among USpreschool-aged children living in low-income families, 1998-2010. *JAMA*, 308 (24):2563, dec 2012. doi: 10.1001/jama.2012.108099. URL http://dx.doi.org/10.1001/jama.2012.108099.

[4] J. A. Levine. Poverty and obesity in the u.s. *Diabetes*, 60(11):2667–2668, oct 2011. doi: 10.2337/db11-1118. URL http://dx.doi.org/10.2337/db11-1118.

[5] E. M. Taveras, M. W. Gillman, K. Kleinman, J. W. Rich-Edwards, and S. L. Rifas-Shiman. Racial/ethnic differences in early-life risk factors for childhood obesity. *PEDIATRICS*, 125(4):686–695, mar 2010. doi: 10.1542/peds.2009-2100. URL http://dx.doi.org/10.1542/peds.2009-2100.

[6] A Zilanawala, P Davis-Kean, J Nazroo, A Sacker, S Simonton, and Y Kelly. Race/ethnic disparities in early childhood BMI, obesity and overweight in the UKand US. *Int J Obes Relat Metab Disord*, sep 2014. doi: 10.1038/ijo.2014.171. URL http://dx.doi.org/10.1038/ijo.2014.171.

[7] Kirsten E. Bevelander, Doeschka J. Anschütz, and Rutger C.M.E. Engels. Social norms in food intake among normal weight and overweight x. *Appetite*, 58(3): 864–872, jun 2012. doi: 10.1016/j.appet.2012.02.003. URL http://dx.doi.org/10.1016/j.appet.2012.02.003.

[8] John J. Chin and David Ludwig. Increasing children's physical activity during school recess periods. *Am J Public Health*, 103(7):1229–1234, jul 2013. doi: 10.2105/ajph.2012.301132. URL http://dx.doi.org/10.2105/AJPH.2012.301132.

[9] Veronica D. Feeg, Laura M. Candelaria, Susan Krenitsky-Korn, and Judith Vessey. The relationship of obesity and weight gain to childhood teasing. *Journal of Pediatric Nursing*, sep 2014. doi: 10.1016/j.pedn.2014.08.011. URL http://dx.doi.org/10.1016/j.pedn.2014.08.011.

[10] Jill C. Diesel, Lisa M. Bodnar, Nancy L. Day, and Cynthia A. Larkby. Childhood maltreatment and the risk of prepregnancy obesity and excessive gestational weight gain. *Maternal & Child Nutrition*, pages n/a–n/a, aug 2014. doi: 10.1111/mcn.12147. URL http://dx.doi.org/10.1111/mcn.12147.

Details

Technical details

The entirety of this paper was written in Latex and the R programming languages. The code for the production of this paper is available here. Below is information on the R session (in the interests of reproducibility):

```
## R version 3.0.2 (2013-09-25)
## Platform: x86_64-pc-linux-gnu (64-bit)
##
## locale:
##  [1] LC_CTYPE=en_US.UTF-8       LC_NUMERIC=C
##  [3] LC_TIME=en_US.UTF-8        LC_COLLATE=en_US.UTF-8
##  [5] LC_MONETARY=en_US.UTF-8    LC_MESSAGES=en_US.UTF-8
##  [7] LC_PAPER=en_US.UTF-8       LC_NAME=C
##  [9] LC_ADDRESS=C               LC_TELEPHONE=C
## [11] LC_MEASUREMENT=en_US.UTF-8 LC_IDENTIFICATION=C
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
## [1] knitr_1.6
##
## loaded via a namespace (and not attached):
## [1] evaluate_0.5.5 formatR_1.0    stringr_0.6.2  tools_3.0.2
```