

# Growth Faltering in the United States, 1897-2014

Evan Roberts, Sociology and Minnesota Population Center, University of Minnesota

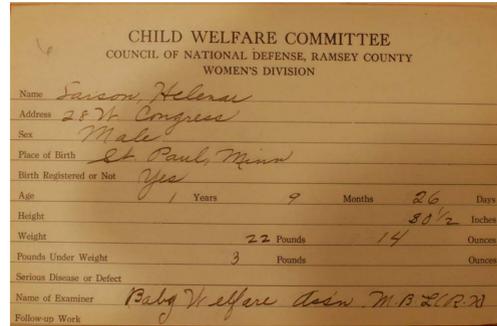
## Introduction and objectives

Childhood growth is now widely used as an indicator of population health and nutrition in lower and middle income countries. Stunting and growth faltering are widespread globally in lower and middle income countries (Victora et al, 2010).

However, growth faltering has only been studied since the 1980s. There is no evidence on long-term trends.

The objective of this paper is to assemble consistent long-term measures of growth faltering, stunting and anthropometric failure for the United States for children aged 0-6.

## Collecting new microdata on growth



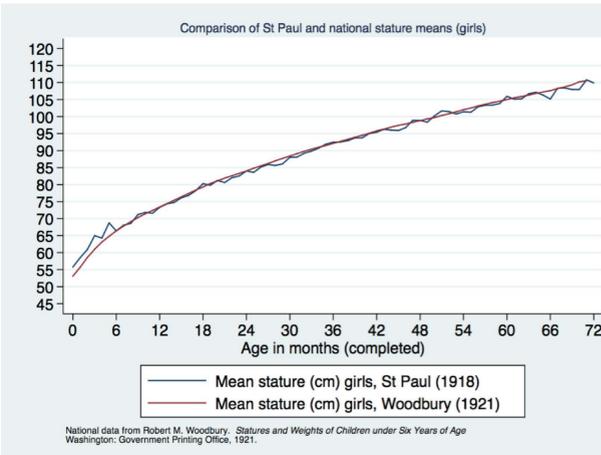
Millions of individual measurements of children were made in the United States before World War II (Baldwin 1921, Burgess 1937).

Very little microdata has survived. We obtained monthly and quarterly growth data from the pediatric literature (Holt 1897, Crum 1916, Woodbury, 1921, Ayres-Burgess, 1937 Jackson and Kelly 1945).

We created a microdata set of height and weight for more than 14,000 children from a 1918 health survey in Saint Paul (Roberts and Warren 2017).

10,000 children were linked to the 1920 census to obtain socio-economic and demographic information.

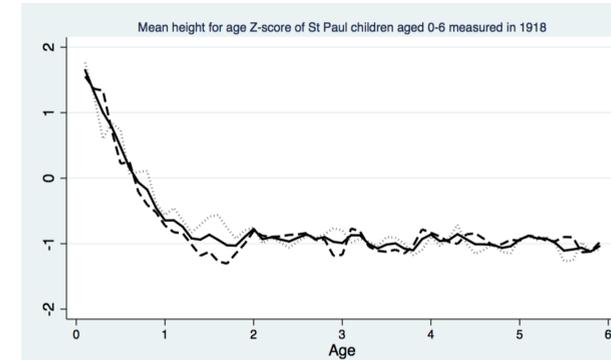
## Nationally representative data



Height and weight for age averages from Saint Paul were nearly identical to national norms from the same survey

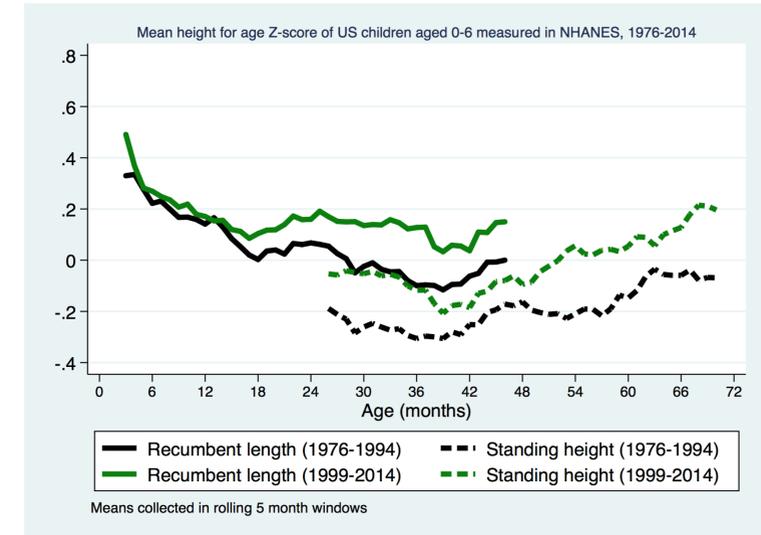
## Growth faltering existed in the past

American children's height and weight scores declined with age in the early twentieth century. However, mean height-for-age and weight-for-age scores were high compared to modern developing countries.



Type of growth failure	Not matched to 1920 (%)	Matched to 1920 (%)	Total
No anthropometric failure (A)	76.13	78.24	77.62
Wasting only (B)	2.78	2.98	2.92
Wasting and underweight (C)	2.91	2.12	2.35
Wasting, stunting, underweight (D)	1.22	0.71	0.86
Stunting and underweight (E)	4.09	3.05	3.36
Stunting only (F)	11.26	11.57	11.48
Underweight only (Y)	1.61	1.33	1.41

## Growth faltering continues today



Stunting and wasting are uncommon in the United States today. However, a pattern of declining height- and weight- for age scores through age 3 is still observed.

Stunting rates have declined from 15% in 1918 to 2% today.

## Contribution and conclusions

- A long-term perspective shows it is possible to reduce stunting, but it may take several generations.
- American children continue to be relatively large in infancy, and smaller as toddlers and pre-schoolers.
- Children in the US have a different growth pattern than international norm growth norms imply.

## References

Baldwin BT. *The physical growth of children from birth to maturity*. Iowa City: University of Iowa Child Welfare Research Station; 1921; Burgess MA. The construction of two height charts. *Journal of the American Statistical Association*. 1937;32(198):290-310; Crum FS. Anthropometric Statistics of Children-Ages Six to Forty-Eight Months. *Publications of the American Statistical Association*. 1916; 15(115): 332-336; Jackson RL, Kelly HG. Growth charts for use in pediatric practice. *The Journal of Pediatrics*. 1945;27(3):215-29; Nandy S, Irving M, Gordon D, Subramanian S, V, & Smith G, D. (2005). Poverty, child undernutrition and morbidity: new evidence from India. *Bulletin of the WHO*, 83(3), 210-216; Roberts E, Warren JR. Family structure and childhood anthropometry in Saint Paul, Minnesota in 1918. *History of the Family*. 2017;22(2-3):258-90; Woodbury RM. *Statures and Weights of Children Under Six Years of Age* Washington: Government Printing Office; 1921.

**Acknowledgments:** I gratefully acknowledge support from the Minnesota Population Center (P2C HD041023), funded through a grant from the Eunice Kennedy Shriver National Institute for Child Health and Human Development (NICHD). Support from the University of Minnesota College of Liberal Arts Freshman Research and Creative Awards program assisted in collection of the Saint Paul children's data.

Growth norms are from the WHO 2009 references, and calculated using -zanthro- in Stata