

Lessons Learned From Australia: Social Disadvantage and Pubertal Timing

Marcia E. Herman-Giddens, PA, MPH, DrPH

In the past 70 or so years, the tempo and substance of cultural and environmental changes influencing the health and development of children have increased. In many parts of the world, children are entering puberty earlier than ever before. This is associated with a range of adverse health outcomes later in life. To that end, and in an effort toward determining public health interventions to reverse this phenomenon, Sun et al¹ in this issue of *Pediatrics* prospectively examined the cumulative effects of family and neighborhood domains among a birth cohort of 5107 Australian infants followed until they were 10 to 11 years old. Cumulative exposure to extremely unfavorable socioeconomic position (SEP) was associated with 4 times the risk of early puberty in boys and 2 times the risk in girls. A brief historical perspective may help inform the results.

When this journal published the study by Pediatric Research in Office Settings (PROS) on the age of onset of puberty in US girls in 1997,² a firestorm ensued. In contrast to the widely used norms published by Marshall and Tanner in the late 1960s, we reported that girls in the United States were starting puberty 6 months to 1.5 years earlier depending on race. The decrease in the pubertal age of onset was startling enough. That we found a considerable difference in age of onset between whites and African Americans not previously recognized added more to the storm of questions and criticism. A panel was summoned to Chicago to debate the existing data.³ Later, further studies corroborated our findings.⁴

Fifteen years after the girls study, another PROS study found that US boys were also entering puberty earlier and had similar racial differences.⁵ The influence of prematurity, endocrine disruptors, stress, SEP, family constellation, epigenetics, and a myriad of other factors now known to affect the age of onset of puberty were largely unknown. Conditions such as famine, war, chronic infections, and poverty have been known since the Middle Ages to delay puberty. As the environment in developed and certain less developed countries began to change in the last few decades of the 20th century to one where high physical activity was not required for life maintenance and high-calorie food served in ever-increasing portions became inexpensive and abundant, overweight ensued. This decline in physical activity and increase in intake of nonnutritious, high-calorie foods, along with the decrease of malnutrition and infectious disease, is thought to be the principal factor in the last century's reversal of the relationship between deprivation and later pubertal age to the current advanced pubertal age onset in low-SEP households as demonstrated in this study.

This study's findings offer some tantalizing aspects to consider. The dose-response relationship shown in Fig 3 on the ever-lowering age of pubertal onset with worsening household SEP is convincing. The models adjusting for confounding factors known to affect the age of pubertal onset were not particularly different from one another. Neither was a neighborhood effect found when family SEP was taken into account.

Department of Maternal and Child Health, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina

Opinions expressed in these commentaries are those of the author and not necessarily those of the American Academy of Pediatrics or its Committees.

DOI: 10.1542/peds.2017-0837

Accepted for publication Mar 20, 2017

Address correspondence to Marcia E. Herman-Giddens, PA, MPH, DrPH, Department of Maternal and Child Health, Gillings School of Global Public Health, CB #7445, Chapel Hill, NC 27599-7445. E-mail: mherman-giddens@unc.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2017 by the American Academy of Pediatrics

FINANCIAL DISCLOSURE: The author has indicated she has no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The author has indicated she has no potential conflicts of interest to disclose.

COMPANION PAPER: A companion to this article can be found online at www.pediatrics.org/cgi/doi/10.1542/peds.2016-4099.

To cite: Herman-Giddens ME. Lessons Learned From Australia: Social Disadvantage and Pubertal Timing. *Pediatrics*. 2017;139(6):e20170837

The authors point out that current adiposity was strongly correlated with early pubertal onset, though proportions cannot be determined from their analytic approach.

Why boys would have twice the proportion of increase in early puberty as compared with girls is intriguing. Boys have not been considered as sensitive to environmental influences as girls, but that may be because they have been studied less. This is further intriguing when one considers that the boys were presumably much further along in puberty as compared with girls. Although the authors use “early puberty” for both sexes, the derived Pubertal Development Scale largely defines early puberty for girls (eg, breast growth, growth spurt) and mid-to-late puberty for boys (eg, growth spurt, facial hair). Parents are not highly accurate in assessing the pubertal stage of their children; however, their response to questions like these should be sufficiently reliable for this study.⁶ Although the reader has no way of knowing the proportions of these characteristics for a given group of boys, this study suggests that many Australian boys are entering puberty early. The first pubertal sign in boys is testicular

enlargement, which this study had no way of measuring. Therefore, finding that ~12% of boys from favorable households up to 35% from deprived households are probably in midpuberty at ages 10 to 11 suggests earlier development than among US boys. It also implies they are starting puberty at least as early as girls, if not earlier, a finding suggested by the PROS boys study.⁵

Teasing out causes and associations for these findings will help with what we need to know to stem the tide of early pubertal onset, now agreed to be unhealthful. In the meantime, the complexities and controversies of life history theory aside, the money appears to be in efforts to increase physical activity and plant foods and decrease intake of cheap, calorie-dense, high-carbohydrate foods. Twenty-seven percent of Australian children ages 7 to 15 are now overweight or obese, and their prevalence of severe and morbid obesity is increasing.⁷

ABBREVIATIONS

PROS: Pediatric Research in Office Settings
SEP: socioeconomic position

REFERENCES

1. Sun Y, Fiona K, Azzopardi P, et al. Childhood social disadvantage and pubertal timing: a national birth cohort from Australia. *Pediatrics*. 2017;139(6):e20164099
2. Herman-Giddens ME, Slora EJ, Wasserman RC, et al. Secondary sexual characteristics and menses in young girls seen in office practice: a study from the Pediatrics in Office Settings (PROS) network. *Pediatrics*. 1997;99:505–512
3. Euling SY, Selevan SG, Pescovitz OH, Skakkebaek NE. Role of environmental factors in the timing of puberty. *Pediatrics*. 2008;121(suppl 3):S167–S171
4. Biro FM, Greenspan LC, Galvez MP. Puberty in girls of the 21st century. *J Pediatr Adolesc Gynecol*. 2012;25(5):289–294
5. Herman-Giddens ME, Steffes J, Harris D, et al. Secondary sexual characteristics in boys: data from the Pediatric Research in Office Settings network. *Pediatrics*. 2012;130(5). Available at: www.pediatrics.org/cgi/content/full/130/5/e1058
6. Rasmussen AR, Wohlfahrt-Veje C, Tefre de Renzy-Martin K, et al. Validity of self-assessment of pubertal maturation. *Pediatrics*. 2015;135(1):86–93
7. Garnett SP, Baur LA, Jones AM, Hardy LL. Trends in the prevalence of morbid and severe obesity in Australian children aged 7-15 years, 1985-2012. *PLoS One*. 2016;11(5):e0154879

Lessons Learned From Australia: Social Disadvantage and Pubertal Timing

Marcia E. Herman-Giddens

Pediatrics 2017;139;

DOI: 10.1542/peds.2017-0837 originally published online May 23, 2017;

Updated Information & Services

including high resolution figures, can be found at:
<http://pediatrics.aappublications.org/content/139/6/e20170837>

References

This article cites 6 articles, 4 of which you can access for free at:
<http://pediatrics.aappublications.org/content/139/6/e20170837#BIBL>

Subspecialty Collections

This article, along with others on similar topics, appears in the following collection(s):
Endocrinology
http://www.aappublications.org/cgi/collection/endocrinology_sub
Puberty
http://www.aappublications.org/cgi/collection/puberty_sub

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Lessons Learned From Australia: Social Disadvantage and Pubertal Timing

Marcia E. Herman-Giddens

Pediatrics 2017;139;

DOI: 10.1542/peds.2017-0837 originally published online May 23, 2017;

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/139/6/e20170837>

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2017 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

