Socioeconomic situation and growth in infants and juveniles

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With 2 figures and 3 tables

Abstract: Background: Physical growth of children and adolescents depends on the interaction of genetic and environmental factors e.g. diet and living conditions. Aim: We aim to discuss the influence of socioeconomic situation, using income inequality and GDP per capita as indicators, on body height, body weight and the variability of height and weight in infants and juveniles. Material and methods: We re-analyzed data from 439 growth studies on height and weight published during the last 35 years. We added year- and country-matched GDP per capita (in current US$) and the Gini coefficient for each study. The data were divided into two age groups: infants (age 2) and juveniles (age 7). We used Pearson correlation and principal component analysis to investigate the data. Results: Gini coefficient negatively correlated with body height and body weight in infants and juveniles. GDP per capita showed a positive correlation with height and weight in both age groups. In infants the standard deviation of height increases with increasing Gini coefficient. The opposite is true for juveniles. A correlation of weight variability and socioeconomic indicators is absent in infants. In juveniles the variability of weight increases with declining Gini coefficient and increasing logGDP per capita. Discussion: Poverty and income inequality are generally associated with poor growth in height and weight. The analysis of the within-population height and weight variations however, shows that the associations between wealth, income, and anthropometric parameters are very complex and cannot be explained by common wisdom. They point towards an independent regulation of height and weight.

Keywords: socioeconomic situation; height; weight; variability; community effect

Introduction

Growth of children and adolescents depends on the interaction of genetic and environmental factors of which diet and living conditions are just two examples (Batty et al. 2009; Bogin 1999; Castilho & Lahr 2009). Socioeconomic conditions which are covered by a wide range of indicators e.g. occupational social class, income, education and income inequality (Batty et al. 2009), have been shown to be associated with body height and body weight of adults (Batty et al. 2009; Castilho & Lahr 2009; Floud 1984; Hatton 2014; Komlos & Baur 2004; Rona et al. 2003).

In 1963 Harrison (1963) proposed the environmental adversity hypothesis. He assumed that adverse environmental conditions coincide with small body height but go along with a large variability of height. In line with this idea, socioeconomic inequality and an unequal distribution of the national income are associated with an increased variability of body height in adults (Floud 1984; Komlos 1990; Moradi & Baten 2005). Yet, also the opposite has been described. Income inequality may not be related with national income; e.g. Naguib (2015) described less affluent countries with an even more egalitarian income distribution than wealthy countries. Equality in income just means that people can be equally poor or equally rich. Complementary to measuring income inequality, income level and national income e.g. gross domestic product (GDP) per capita are associated with average body height of a society. Several authors (Deaton & Arora 2009; Eveleth & Tanner 1990; Komlos & Baur 2004; Schmitt & Harrison 1988; Steckel 1983; Steckel 1995; Zong & Li 2014) showed that an increase in family income and GDP per capita is associated with a higher average final height. The effect is even stronger if income inequality is high (Floud 1984).

The association between household inequality, income and gross domestic product, and body height in adults is well known, but there is little information relating body weight with these parameters. In modern times, high socioeconomic...