



In urban South Africa, 16 year old adolescents experience greater health equality than children



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ABSTRACT

Despite the strongly established link between socio-economic status (SES) and health across most stages of the life-course, the evidence for a socio-economic gradient in adolescent health outcomes is less consistent. This paper examines associations between household, school, and neighbourhood SES measures with body composition outcomes in 16 year old South African Black urban adolescents from the 1990 born Birth to Twenty (Bt20) cohort. Multivariable regression analyses were applied to data from a sub-sample of the Bt20 cohort ($n = 346$, 53% male) with measures taken at birth and 16 years of age to establish socio-economic, biological, and demographic predictors of fat mass, lean mass, and body mass index (BMI). Results were compared with earlier published evidence of health inequality at ages 9–10 years in Bt20. Consistent predictors of higher fat mass and BMI in fully adjusted models were being female, born post term, having a mother with post secondary school education, and having an obese mother. Most measures of SES were only weakly associated with body composition, with an inconsistent direction of association. This is in contrast to earlier findings with Bt20 9–10 year olds where SES inequalities in body composition were observed. Findings suggest targeting obesity interventions at females in households where a mother has a high BMI.

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1. Introduction

Despite the strong established link between socio-economic status (SES) and health outcomes across the life-course (Marmot, 2005), the evidence for a social gradient in adolescent health outcomes is less consistent (West, 1997). Based on evidence from developed countries, West (1997) suggests that adolescence may be a period in which health inequalities (defined by SES) may become more equal. He suggests that severe chronic diseases are the exception to this rule because they have their origins in early life when inequalities are stronger.

Adolescence is defined as the period of somatic, psychological, social, and sexual development that occurs in the 5–10 years after the onset of the adolescent growth spurt in height/and or weight and the maturation of the

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hypothalamic-pituitary-gonadal axis. These biological changes are accompanied by increasing engagement in adult social and sexual activities (Bogin, 2013). The explanation for more equality in health outcomes in adolescence has been related to this increasing engagement in adult social activities using a sociological framework, whereby peer or youth culture or sub-culture and school influences become more important during the secondary school years of adolescent life compared to social class or household SES (West, 1997). This suggests that the SES environment external to the household becomes increasingly more important as adolescents spend less time in the home and more time with peers in the school and neighbourhood environments. This is a logical explanation given that adolescence marks the onset of increasing independence from the family, with more time being spent in the community (Allison et al., 1999). Further, West (1997) argues that the school and peer environment could be more important than even the neighbourhood SES environment because adolescents tend to identify more with their peer group culture than with other external forces such as aspects of the household and neighbourhood not relevant to that culture. This means that assessing relevant measures of the school, neighbourhood, and peer environment become more important for assessing inequalities in adolescence. Critics of West's hypothesis argue that more equal health outcomes in adolescence may be an artefact of the data because, for instance, studies use poor measures of adolescent SES (e.g. adult occupation measures have been used as proxies for adolescent SES) (Judge and Benzeval, 1993) and/or use self-report health outcomes, which may themselves be influenced by an individual's SES (Davey Smith et al., 1994). Poorly measured SES and/or health outcome variables have the potential to mask SES effects that may otherwise exist.

Recently, a number of review studies have explored the relationship between SES and adolescent health outcomes (Holstein et al., 2009; Starfield et al., 2002) and found mixed evidence for a relationship, although the balance of the evidence is more strongly towards inequalities existing rather than not existing. More specifically focussing on the relationship between SES and obesity/adiposity, a review by Shrewsbury and Wardle (2008) of 45 child and adolescent studies (9 of which include only adolescents) from developed countries between 1990 and 2005 found an inverse association in 6 out of 9 studies for adolescent boys and 1 out of the 9 adolescent studies for girls (Shrewsbury and Wardle, 2008). Thus, this provides mixed evidence for a link between SES and obesity/adiposity in adolescence. A separate review paper of 15 studies from developed countries (7 adolescent) specifically studied the association between overweight/obesity and factors in the physical environment, such as built environment and population density (Holstein et al., 2009). Whilst this review found evidence of associations between neighbourhood environments and overweight/obesity in childhood, no such relationship was observed for adolescents. There is much less evidence examining inequalities in adolescent obesity within developing country contexts than in developed countries. The limited existing evidence relating SES to adolescent obesity in South Africa suggests no

association or a weak link in boys at the household level (Kruger et al., 2006) and no evidence exists to test the association at the neighbourhood or school level.

Previous researchers studying the link between SES and health outcomes in adolescents have called for a need to use more longitudinal approaches in order to establish how inequalities might develop or become more equal over the early life-course (Starfield et al., 2002). The Bt20 cohort provides a unique opportunity to test West's hypothesis and to study adolescent inequalities in body composition outcomes taking into account the early life course in a transitioning economy because inequalities have already been studied in childhood. It is therefore possible to compare findings from the earlier childhood analysis with analyses that focus on the adolescent years in the cohort. This earlier childhood work with the Bt20 cohort revealed a positive association between household SES measures taken in infancy and later childhood (ages 9–10 years) with body composition outcomes at ages 9–10 years (Griffiths et al., 2008). The findings showed that the infancy SES environment was more strongly associated with lean mass than fat mass and that age 9–10 year household SES measures were more strongly associated with fat mass than lean mass. At ages 9–10 years, there was a low prevalence of overweight and obesity in Bt20, with a higher prevalence of malnutrition, thus indicating that the high SES children were advantaged.

The Bt20 cohort were born in 1990, the year that Nelson Mandela was released from prison. In the four decades preceding Mandela's release, the combined impact of Apartheid and the economic sanctions placed on the South African government by the international community led to extreme inequality (Cameron, 2003). By the late 1990s, inequality in South Africa remained only second to Brazil (May, 2000). Despite these high levels of inequality, South Africa is currently one of the more developed countries in sub-Saharan Africa (UNDP, 2011) with a higher prevalence of chronic disease than most other sub-Saharan African countries. For instance, World Health Organisation (WHO, 2011) data show that it ranks second in sub-Saharan Africa for its male and female adulthood (aged 15+) prevalence of combined overweight and obesity (68.5% females and 41.3% males with a BMI > 25 kg/m²) (WHO, 2011).

The Bt20 cohort present a unique opportunity to test West's hypothesis within a developing country context because of the comprehensive set of SES measures at the household, neighbourhood, and school level, which address some of the earlier concerns of critics of West's argument about the lack of robust measures of SES. These data also offer the opportunity to test West's idea that aspects of the school SES environment might more strongly measure inequalities at this age than more traditional neighbourhood SES measures. Using objectively measured outcomes of body mass, lean mass, and fat mass also overcomes earlier problems of adolescent studies using self report health outcomes. The period of adolescence studied in this paper is limited to age 16 years, which is when participant body composition and community SES assessments were undertaken in the cohort. To test West's hypothesis in an urban South

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