

Exercise and Sports Medicine Issues in Underserved Populations



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KEYWORDS

• Exercise • Underserved • Sports medicine • Socioeconomic status

KEY POINTS

- Primary care providers can make a strong argument for exercise promotion in underserved communities.
- The benefits are vitally important in adolescent physical, cognitive, and psychological development as well as in adult disease prevention and treatment.
- In counseling such patients, we should take into account a patient's readiness for change and the barriers to exercise.

EXERCISE IN UNDERSERVED COMMUNITIES

As discussed in other articles in this issue, the untoward health effects brought on by lower socioeconomic status (SES) and higher allostatic load (AL) can be significant. In this article the authors briefly recap the effects of low SES on adolescent development (both physical and psychological) and on adult burden of disease. The authors then examine how exercise might help to ameliorate these untoward health effects in underserved populations.

DEMOGRAPHICS

The World Health Organization and the American College of Sports Medicine recommend 150 minutes per week of moderate to vigorous physical activity (MVPA) in adults and 60 - minutes per day in children and adolescents.^{1,2} (MVPA is any activity whereby one is breathing harder than usual but can still carry on a conversation.) In the United States,

Disclosure: The authors of this work report no direct financial interest in the subject matter or any material discussed in this article.

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Prim Care Clin Office Pract 44 (2017) 141–154

<http://dx.doi.org/10.1016/j.pop.2016.09.015>

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only 42% of children and 8% of adolescents meet these modest recommendations,^{3,4} with underserved children (black and Hispanics) exhibiting the lowest levels of physical activity. The lowest levels of physical activity are seen in children with poorly educated mothers, those living in high-crime neighborhoods, those from low-income families, those with few adult role models, those in schools lacking sufficient physical education (PE) classes, and those living in communities with low community-based physical activity opportunities.^{5,6} In addition, as children age from 9 to 15 years, the time spent in MVPA drops significantly, again with the greatest declines seen in children of low-income families (and girls).⁷ Contributing to the problem is the fact that in 2014 only 3.6% of elementary schools, 3.4% of middle schools, and 4.0% of high schools nationwide required daily PE for all students (US DHHS, Centers for Disease Control and Prevention. Results from the School Health Policy and Practices Study 2014. Available at: www.cdc.gov/healthyouth/data/shpps/pdf/shpps-508-final_101315.pdf. Accessed November 8, 2016.), thus, disregarding the recommendations of the nation's Healthy People 2020 goals.⁸

Among adults, less than 50% of US adults meet current exercise recommendations (less than 15% in some studies); those of low SES have even lower levels of compliance.⁹ African American women have the lowest exercise rates (only 34% exercise) of any race/sex demographic group.¹⁰⁻¹²

PHYSICAL DEVELOPMENT IN UNDERSERVED POPULATIONS

Normal Adolescent Physical Development, the Effects of Low Socioeconomic Status and the Role of Exercise

Adolescence, the developmental stage leading to physical, sexual, and psychosocial maturation, is mediated by hormonal, genetic, and environmental factors. Whether or not socioeconomic factors affect physical development and maturation is the topic of this section of inquiry.

The normal child to adolescent transition is mediated by neuroendocrine changes. Gonadotropin-releasing hormone (GnRH), essentially dormant since birth, is activated (by largely unknown triggers) leading to an increased secretion of gonadotrophs: follicle-stimulating hormone and luteinizing hormone from the pituitary. Increased secretion, in turn, promotes the production of androgens and estrogens from the ovaries and testes. Concomitantly, the same triggers that stimulate GnRH secretion also incite corticotrophin-releasing hormone secretion from the hypothalamus, which then stimulates the anterior pituitary to secrete adrenocorticotrophic hormone, acting on the adrenal glands to increase the secretion of the *adrenal* androgens dehydroepiandrosterone and androstenedione. The elevated levels of estrogens and gonadal and adrenal androgens begin to initiate sexual development and simultaneously stimulate an increase in the release of growth hormone from the pituitary. Together these well-orchestrated changes lead to an increase in physical stature, the development of secondary sexual characteristics, and the ultimate transition into adulthood.¹³⁻¹⁶

The questions before us are as follows: (1) Are there any untoward effects if this normal developmental cascade is altered? (2) Can SES or AL affect this cascade and contribute to these untoward effects? (3) If so, can exercise favorably influence or mitigate such alterations? In answer to the first question, if normal development is altered, there are possible untoward effects. Early menarche has been associated with an increased risk of breast cancer,¹⁷ heart disease,¹⁸⁻²⁰ asthma,^{21,22} insulin resistance,²³ metabolic syndrome,²³ coping strategies,²⁴ and all-cause mortality.²⁵ No similar data regarding future health risks in boys could be found.

The second question, positing if SES can increase the likelihood of early menarche and its untoward effects, can be answered by reviewing epidemiologic data.

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