



Original article

Associations of health disparities and physical activity with children's health and academic problems

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Abstract

This study was aimed at examining the associations between health disparities and physical activity, and their contributions to health and academic problems in schoolchildren.

Pertinent data from a community-wide survey were analyzed, which included 2930 households with schoolchildren aged 7–14 years. Associations between the parents' self-reported race/ethnicity, parental education, household income, children's health status, physical activity, and academic problems were determined by Chi-square and logistic regression analyses. Contributory factors for children's health status, physical activity, and academic problems were predicted by logistic regression fitting.

Within white/Caucasian children, 86.0% had very good/excellent health and 77.9% were physically active, values higher than those in Latino/Hispanic (77.8%, $p < 0.0001$ and 71.9%, $p = 0.0030$) and black/African American children (80.0%, $p = 0.0409$ and 73.1%, $p = 0.0973$). White schoolchildren were less likely to have academic problems (8.9%) than Latino (12.5%, $p = 0.0256$) or black (26.1%, $p < 0.0001$) schoolchildren. Health status was reciprocally ($p < 0.0001$) inter-related to physical activity and was the most significant factor ($p < 0.0001$) associated with academic problems.

Children's health status determined by both healthy lifestyles and sociodemographic factors is the most significant contributory factor associated with academic problems. Physical activity should be considered as an intervention to reduce health disparities and academic problems among schoolchildren.

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Keywords: Community medicine; Environmental factors; Epidemiology; Race/ethnicity; Socioeconomic status

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Introduction

Health status influences neurocognitive development and function in childhood. Children who have high body mass¹ and elevated blood pressure² show decreased neurocognitive function. By contrast, children who have better aerobic fitness or physical performance tend to have better neurocognitive function^{3,4} and standardized test scores.⁵ Children's health is affected by socioeconomic status and racial/ethnic background or inequality in access to health care,⁶ preventive services,⁷ neighborhood environment,^{8–10} and health-related knowledge or information.^{11–13} Children's health disparities are evident by differences in overweight–obesity rate^{14–16} and socioeconomic status, and disparities coexist with decreased neurocognitive^{2,17} and academic performance.^{5,18} Furthermore, health disparities in childhood are associated with physical disability, low cognitive function,¹⁹ and high mortality rate²⁰ in adulthood, which seem to form a vicious cycle between health status, school success, and future socioeconomic disparities.

Little is known, however, about the interaction of socio-demographic and racial/ethnic characteristics with physical activity on children's health status and academic problems at school. We hypothesized that both physical activity and sociodemographic factors could influence children's health and academic performance positively. In order to test this hypothesis, we analyzed a large database of the *Community-wide Children's Health Assessment and Planning Survey*, conducted within six counties of north Texas by Cook Children's Health Care System. Participants included 7439 households that had children of 0–14 years of age. The focus of the survey was to identify children's health needs, implement solutions, and improve the quality of children's health programs and services in the community. The purpose of this study was to examine the associations between sociodemographic factors and healthy lifestyle in school-aged children and to identify associations between children's health disparities and academic problems at school.

Methods

Study participants

The current study focused on 2930 households that had schoolchildren of 7–14 years of age (1559 boys and 1342 girls). Among these children, 69.7% were white/Caucasian ($n = 2042$), 19.2% Latino/Hispanic ($n = 563$), 5.5% black/African American ($n = 160$), 2.1% Asian/Pacific Islander ($n = 61$), 0.5% American Indian/Alaska Native children ($n = 15$), and 3.0% multiraces or unknown races ($n = 89$). Data for American Indian/Alaska Native and multiraces/unknown groups of children were analyzed, but not discussed here due to small sample size (i.e., Native group) or difficulty in categorizing children (i.e., multiraces or unknown race group). This study was approved by the Institutional Review Board for the Protection of Human Subjects at the University of North Texas Health Science Center, Fort Worth, TX, USA.

Study design

The procedure of the Community-wide Children's Health Assessment and Planning Survey has been described previously.²¹ Briefly, the survey questionnaire was produced after having obtained input and acceptance from community leaders and groups that included county judges, local mayors, the Texas Department of State Health Services, county health departments, the Center for Community Health, the United Way of Tarrant County, and parent focus groups (a total of 8 groups, with 7–10 parents in each group). The survey was administered by a combination of mail, telephone, and the Internet in both English and Spanish. If no response was received to the initial mail survey, the household was then contacted and given the opportunity to participate through the telephone. The survey was conducted from September 22, 2008 to January 9, 2009.

Study variables

The current analysis focused on the following variables: children's "health status" as reported by parents: (1) poor, (2) fair, (3) good, (4) very good, and (5) excellent; "body mass index percentile" calculated from the reported height and weight of the children, with considerations of individual age and gender; "physical activity": (1) none, (2) 1–3 days, (3) 4–6 days, and (4) 7 days with ≥ 30 -minute physical exercise during the past 7 days; "academic problems" (yes or no); children's race/ethnicity; the highest level of education parents had completed; and total annual household income. Neighborhood environmental factors were also included, which were assessed by the following questions: "are there grocery stores in your neighborhood that supply fresh fruit and vegetables? (yes or no)" and "are there safe parks/outdoor areas for your child to play in the neighborhood where you live? (yes or no)". Academic problems at school were based on parents' impression of their children's school grade or academic performance. After preliminary analyses, multiple categorical groups were merged to simplify data analysis and interpretation, without changing the study outcome or conclusion. Based on the health status, three groups were formed: "poor/fair", "good", and "very good/excellent". Body mass index (BMI) percentiles were categorized as "normal weight" (BMI <85th percentile) and "overweight–obese" (BMI ≥ 85 th percentile). According to physical activity, children were grouped into "sedentary" (no exercise during the past 7 days), "physically inactive" (exercise for 1–3 days), and "physically active" (exercise for ≥ 4 days) groups. The categories for "parental education" were merged into four groups: "less than high school" (<HS), "high school graduate" (HS), "more than high school or some college", including 2-year college/technical certification program (>HS), and " ≥ 4 -year college" (\geq college). The categories of total annual "household income" were merged into five groups: <\$35k (i.e., from <\$14,000 to \$34,999), <\$60k (i.e., from \$35,000 to \$59,999), <\$80k (i.e., from \$60,000 to \$79,999), <\$100k (i.e., from \$80,000 to \$99,999), and ≥ 100 k (i.e., $\geq 100,000$).

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