

Brief Report

Cardiovascular health among Philadelphia adolescents: analysis of youth risk behaviour data, 2011

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Abstract Improving population-level cardiovascular health is a public health priority. Guided by the American Heart Association's metrics for ideal heart health, we examined the prevalence of behavioural heart health indicators using a representative sample of urban adolescents. Less than 1% (0.6%) of the sample had ideal heart health. The alarmingly low percentage of ideal behavioural heart health suggests that primary prevention approaches to address cardiovascular health in youth are warranted.

Keyword: Adolescent; epidemiology; public health

Received: 24 April 2013; Accepted: 7 July 2013; First published online: 10 September 2013

Background

CARDIOVASCULAR DISEASE IS A LEADING CAUSE OF morbidity and mortality in American adults.¹ Behavioural risk factors for cardiovascular disease such as sedentary behaviours, poor diet, and tobacco use are typically initiated in youth and sustained through adulthood. In 2010, the American Heart Association (AHA) presented the goal of improving cardiovascular health of all Americans by 20% by addressing seven metrics of cardiovascular health: smoking status in the last 12 months, body mass index, levels of physical activity, dietary intake, blood pressure, cholesterol, and glucose.² The metrics are then stratified into ideal, intermediate, and poor cardiovascular health status. The validity of this “heart score” metric has been well established in adults, with 5–7 ideal metrics being associated with significantly lower levels of disease than those with 0–1 ideal metrics.³ To date, the prevalence of ideal heart metrics has been examined in one national sample of adolescents.²

We sought to add to this literature by examining the behavioural heart score metrics – smoking status in the last 12 months, body mass index, levels of physical activity, and dietary intake – in a sample of 9–12th grade students from a diverse metropolitan area.

Methods

Data from the 2011 Philadelphia Youth Risk Behavior Survey were used for this analysis. Sampling procedures and methodology are fully described elsewhere.⁴ The survey is administered biennially using a multiple-choice, self-administered, paper-and-pencil format. Data from 805 high school students who provided complete data for all behavioural heart risk score questions were analysed.

The demographic variables age, gender, and race/ethnicity were examined. A behavioural heart risk score for each student reflecting risk associated with smoking, body mass index, physical activity, and dietary intake was derived from responses to a series of standard Youth Risk Behavior Survey questions and risk level was assigned using the three-tiered system of ideal, intermediate or poor risk (see Table 2). Smoking history was extracted from three questions assessing current use of cigarettes, use within the past year, and use ever.⁵ Age- and gender-specific body mass index

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Table 1. Composition and prevalence of behavioural heart risk score outcome measure.

Health metric	Survey question(s)	Defined risk level	Prevalence in sample
Smoking	Have you ever smoked daily, that is, at least one cigarette every day for 30 days?	Ideal: never smoked or quit >12 months ago	720 (89.4%)
	During the past 12 months, did you ever try to quit smoking cigarettes?	Intermediate: former smoker, quit during past 12 months	19 (2.4%)
	During the past 30 days, on how many days did you smoke cigarettes?	Poor: current smoker	66 (8.2%)
BMI-for-age	How tall are you without shoes on?	Ideal: <85th percentile	534 (66.3%)
	How much do you weigh without shoes on?	Intermediate: 85th–94th percentile Poor: ≥95th percentile	144 (17.9%) 127 (15.8%)
Physical activity	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	Ideal: 7 days	50 (6.2%)
		Intermediate: 2–6 days Poor: 0–1 days	566 (70.3%) 189 (23.5%)
Healthy diet	During the past 7 days, how many times did you drink a can, bottle, or glass of pop (excluding diet soda)?	Ideal: 5-a-day AND soda less than daily	80 (10%)
	During the past 7 days, how many times did you...? <ul style="list-style-type: none"> ● Drink 100% fruit juice ● Eat fruit (not juice) ● Eat green salad ● Eat potatoes ● Eat carrots ● Eat other vegetables 	Intermediate: 5-a-day OR soda less than daily Poor: NEITHER 5-a-day nor soda less than daily	579 (71.9%) 146 (18.1%)

percentiles were computed from self-reported height and weight (kg/m^2).⁵ Past-week days of ≥ 60 minutes of physical activity were classified into risk categories reflecting current national recommendations.⁶ Dietary intake was estimated from past-week consumption of sugar-sweetened beverages, namely, soda, and fruits, and vegetables.⁷ Responses to fruit and vegetable intake were converted to a daily average and dichotomised around achieving five servings-per-day; daily soda consumption (y/n) was also recorded.^{7,8} A behavioural heart risk summary score of ideal reflected an ideal risk profile in each of the four subcategories; intermediate risk indicated at least one subcategory in the intermediate category and none in poor; poor overall heart risk indicated at least one sub-category classified at poor risk.³

Analyses were conducted on weighted data using SAS, version 9.3 (SAS Institute Inc., Cary, North Carolina, United States of America). PROC SURVEY procedures were used to account for the complex sampling design. Taylor series linearisation was used to calculate sampling errors estimated from the primary sampling units and strata. Demographic characteristics and heart health metrics of the sample were summarised with descriptive statistics.

Results

Our sample of 805 students from grades 9–12 represents a population of ≈ 35 thousand diverse,

urban adolescents. The majority of the participants were female (59%) and African American (51%).

Data on the four health metrics showed that most participants (89%) were in the ideal category for smoking and body mass index (66%). The majority was either in the intermediate (70%) or poor (24%) categories for physical activity, and 72% were in the intermediate category for healthy diet (Table 1).

Less than 1% of the sample (0.6%) had ideal, 49% had intermediate, and 50% had poor cardiovascular health. The mean cardiovascular health score for the entire sample was 2.50 (95% CI 2.45–2.54). No significant differences in cardiovascular health scores were observed by gender ($p > 0.3008$), whereas racial differences were observed. Specifically, Asian students had a significantly lower heart score as compared with those self-reporting as African American ($M = 2.40$ (2.32–2.49) versus $M = 2.51$ (2.46–2.56); $p = 0.03$) or mixed race/other groups ($M = 2.40$ (2.32–2.49) versus $M = 2.56$ (2.47–2.66); $p = 0.01$). Differences in mean heart health scores by age were also observed: heart scores increased by 0.33 ($p < 0.04$) as participants got older, indicating that poorer heart health was associated with increased age.

Discussion

Less than 1% of the 9–12th grade students surveyed achieved what we classified as “ideal” heart health based on the behavioural indices of body mass index, smoking status, diet, and physical activity.

Table 2. Behavioural cardiovascular health metrics by demographic characteristics.

	Unweighted count	Population estimate (SD)	Ideal cardiovascular health (%)	Intermediate cardiovascular health (%)	Poor cardiovascular health (%)	Mean cardiovascular health score [Mean (95% CI)]
Overall	805	34,509 (1292)	0.62	49.19	50.19	2.50 (2.45–2.54)
Gender						
Female	476	17,645 (901)	0.63	50.84	48.53	2.48 (2.43–2.53)
Male	329	16,864 (974)	0.61	46.81	52.58	2.52 (2.45–2.58)
Age						
≤ 14	82	3434 (637)	0	58.54	41.46	2.43 (2.33–2.53)
15	204	8540 (1037)	0	49.02	50.98	2.52 (2.44–2.59)
16	199	9312 (941)	1.51	58.29	40.20	2.39 (2.31–2.47)
17	204	7597 (845)	0.49	40.20	59.31	2.58 (2.51–2.66)
≥ 18	116	5626 (816)	0.86	43.11	56.03	2.56 (2.45–2.67)
Race						
African American	409	20,430 (961)	0.73	46.70	52.57	2.51 (2.46–2.56)
Non-Hispanic white	106	5080 (643)	0.94	52.83	46.23	2.45 (2.33–2.58)
Hispanic	63	2407 (315)	1.59	52.38	46.03	2.44 (2.31–2.57)
Asian	90	1948 (235)	0	58.89	41.11	2.40 (2.32–2.49)
Mixed race/other	137	4636 (429)	0	45.99	54.01	2.56 (2.47–2.66)

This very low percentage of ideal heart health in urban adolescents converges with one national study also showing that less than 1% of 12–19-year-olds achieved ideal heart health based on both behavioural and physiological assessments.⁹

From a school and public health perspective, these data should serve as a rallying cry. Risk for cardiovascular disease only increases with age while reversing sub-optimal physiological indicators of poor heart health, including high glucose levels, is atypical in adults.¹⁰ Loss of ideal heart health status in youth typically begins a trajectory of personal and health care system burden to manage and treat risk factors for cardiovascular disease: delaying this loss of “ideal” heart health in all school children should be considered a national priority in tandem with improving the heart health of the nation.⁷ This is especially important considering that late adolescence is a time when many behavioural patterns are established.

Although these findings are based on self-report data and summarise only behavioural metrics of heart health, they nevertheless converge with national data showing that ideal heart health is a rarity in our youth. This reflects a critical health public health problem.

Financial Support

This project was supported in part by Temple University’s Department of Public Health. Data collection was supported by a CDC ARREST grant to the School District of Philadelphia.

Conflicts of Interest

None.

Ethical Standards

Collection of this surveillance data was approved by Temple University’s Institutional Review Board and the School District of Philadelphia; passive parental consent and student assent were obtained before survey administration.

Acknowledgements

The authors are indebted to the students, faculty and staff of the School District of Philadelphia for their support of data collection efforts and to Dr. Katherine W. Bauer, Assistant Professor at Temple University, for her input on the data analysis.

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