

# Adolescent Consumption of Sports and Energy Drinks: Linkages to Higher Physical Activity, Unhealthy Beverage Patterns, Cigarette Smoking, and Screen Media Use

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## ABSTRACT

**Objective:** To examine patterns of adolescent sports and energy drink (SED) consumption and identify behavioral correlates.

**Design:** Data were drawn from Eating and Activity in Teens, a population-based study.

**Setting:** Adolescents from 20 middle and high schools in Minneapolis/St Paul, MN completed classroom-administered surveys.

**Participants:** A total of 2,793 adolescents (53.2% girls) in grades 6–12.

**Variables Measured:** Beverage patterns; breakfast frequency; moderate to vigorous physical activity (MVPA); media use; sleep; and cigarette smoking.

**Analysis:** Linear and logistic regression models were used to estimate associations between health behaviors and SED consumption, adjusting for demographics.

**Results:** Over a third of adolescents consumed sports drinks and 14.7% consumed energy drinks at least once a week. Among boys and girls, both sports and energy drink consumption were related to higher video game use; sugar-sweetened beverage and fruit juice intake; and smoking ( $P < .05$ ). Sports drink consumption was also significantly related to higher MVPA and organized sport participation for both genders ( $P < .01$ ).

**Conclusions and Implications:** Although sports drink consumption was associated with higher MVPA, adolescents should be reminded of recommendations to consume these beverages only after vigorous, prolonged activity. There is also a need for future interventions designed to reduce SED consumption, to address the clustering of unhealthy behaviors.

**Key Words:** adolescents, sports drinks, energy drinks, dietary intake, physical activity, sleep patterns (*J Nutr Educ Behav.* 2014;46:181-187.)

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## INTRODUCTION

Adolescent consumption of sugar-sweetened beverages is of concern because consumption is associated with increased risk for dental caries, excess weight gain, and poor diet quality.<sup>1-4</sup> Although recent evidence showed a decline from 1999 to 2008 in the prevalence of soft drink and fruit drink consumption among US adolescents, sports and energy drink consumption tripled.<sup>5</sup> Sports and

energy drinks are considered to be sugar-sweetened beverages along with soft drinks and flavored juice drinks, but their ingredients and purported functions differ. Sports drinks are noncarbonated, flavored drinks that contain added sugars, minerals, and electrolytes to help replenish the body during vigorous exercise.<sup>6</sup> Energy drinks contain high amounts of caffeine, often coupled with other natural stimulants that enhance caffeine's effects, and may also

contain vitamins, minerals, protein, and added sugars. Beverages marketed as energy drinks are purported to increase mental concentration as well as physical performance.<sup>6</sup>

The US Food and Drug Administration considers energy drinks to be dietary supplements not subject to food marketing or ingredient regulations.<sup>7,8</sup> Therefore, whereas the average caffeine content per fluid ounce for the 4 top-selling soft drinks in the US was 3.5 mg from 2002 to 2006, the average caffeine content for the 4 top-selling energy drinks was 9.6 mg.<sup>8</sup> Little information is available on the effects of the supplements or stimulants in energy drinks, especially among children and adolescents. The high caffeine content of energy drinks, as well as the high sugar and calorie content of many sports and energy drinks, has drawn much concern from health

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professionals as their consumption among adolescents has increased.<sup>9</sup>

In June, 2011, the American Academy of Pediatrics (AAP) issued a report examining the marketing, ingredients, and possible negative effects of sports and energy drinks.<sup>9</sup> They concluded that small amounts of sports drinks could be appropriate for young people participating in vigorous physical activity in hot, humid weather. However, for the average young athlete, sports drinks are unnecessary and could contribute to negative health outcomes, such as excess weight gain and tooth decay.<sup>9</sup> With regard to energy drinks, the AAP concluded that there is no benefit provided, and because these drinks create a risk for overstimulation of the nervous system, they should not be consumed by adolescents. Consumption of energy drinks by young people has resulted in cases of seizure, myocardial arrhythmia, and even death.<sup>7-10</sup>

Although soft drink and overall sugar-sweetened beverage consumption among adolescents has been well studied, few studies in adolescent populations have examined the consumption of sports and energy drinks or factors associated with their consumption. One study found that sports and fruit drink consumption were unrelated to weight status and were associated with higher levels of physical activity as well as consumption of milk, fruit, and vegetables, but were also associated with negative health behaviors, such as higher consumption of energy-dense foods and sedentary behavior.<sup>11</sup> In addition, a recent study found that sports and energy drink consumption were lower among black and low-income adolescents.<sup>5</sup> To the best of the current authors' knowledge, no study has specifically examined other factors that may be associated with sports and energy drink consumption among adolescents. To address this gap in the literature, and to inform public health efforts targeting consumption, the current study used data from a population-based survey to describe patterns of sports and energy drink consumption among adolescents, and to examine associations with dietary factors, physical activity, media use, hours of sleep, and cigarette smoking. These factors were selected for consideration based on

their potential for modification to improve overall health if addressed as part of interventions targeting sports and energy drink consumption along with other risk behaviors.

## METHODS

### Study Design and Population

Data were drawn from Eating and Activity in Teens (EAT 2010), a population-based study designed to examine dietary intake, physical activity, weight control behaviors, weight status, and factors associated with these outcomes in adolescents.<sup>12,13</sup> Surveys and anthropometric measures were completed by 2,793 adolescents during the 2009–2010 academic year. The study population included adolescents from 20 public middle schools and high schools in the Minneapolis/St Paul metropolitan area of Minnesota. Consideration was given to enrollment size and diversity as well as involvement in other research studies when recruiting school districts. Personnel at the participating schools reported that no sports or energy drinks were available for purchase on school grounds. The mean age of the study population was 14.4 years (SD, 2.0 years); 46.1% were in middle school (sixth through eighth grades) and 53.9% were in high school (ninth through 12th grades). Participants were equally divided by gender (46.8% boys and 53.2% girls). The racial/ethnic composition of the study population was diverse, with 81.1% of participants reporting a background other than non-Hispanic white. With regard to socioeconomic status (SES), participants were distributed across 5 strata based primarily on parental educational attainment: 38.4% low SES, 21.3% low-middle SES, 16.9% middle SES, 12.4% upper-middle SES, and 7.3% high SES (3.7% did not report SES).

Trained research staff administered surveys and measured adolescents' height and weight during selected health, physical education, and science classes. Measurements were completed in a private area and surveys were administered following a standard protocol during 2 50-minute class periods. After survey completion, participants were given a \$10 gift card.

All study procedures were approved by the University of Minnesota Institutional Review Board Human Subjects Committee and by the research boards of the participating school districts. Adolescents were given the opportunity to assent only if their parent or guardian did not refuse by returning a signed letter that explained the study purpose and procedures. Among adolescents at school on survey administration days, 96.3% had parental consent and chose to participate.

### Survey Development and Measures

The EAT 2010 survey is a 235-item, self-report instrument designed to assess a range of factors of potential relevance to weight status and weight-related behaviors among adolescents. Survey development was guided by expert review and extensive pilot testing with adolescents.<sup>14</sup> The estimates of measure test-retest reliability reported below were determined for a 1-week period in a diverse sample of 129 middle school and high school students.

*Sports and energy drink intake.* The researchers assessed usual past-year intake of sports and energy drinks on the EAT 2010 survey using 2 questions, which separately asked about the frequency of consuming each type of drink (response categories: never or < 1/mo, 1–3/mo, 1/wk, 2–4/wk, 5–6/wk, 1/d, and ≥ 2/d). Popular brand name examples were given for energy drinks (Red Bull, Full Throttle, and Rockstar) and sports drinks (Gatorade and Powerade). Regular consumption of sports and energy drinks was defined as at least 1 drink/wk (test-retest agreement: 81.0% for sports drinks and 83.3% for energy drinks) based on the distribution of intake in the sample.

*Physical activity and sport participation.* Moderate to vigorous physical activity (MVPA) was measured by separately asking participants how many hours they spent doing strenuous and moderate activity in a typical week, with several examples of each level of activity provided.<sup>15</sup> Response categories were: none, < 0.5 hour, 0.5–2 hours, 2.5–4 hours, 4.5–6 hours, and ≥ 6 hours (test-retest

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