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## **Authors**

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# Fruit, Vegetable and Beverage Consumption in Duval County Middle School Students: Youth Risk Behavior Survey 2009-2013

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## ABSTRACT

*Public health professionals have the opportunity to impact middle school students' dietary behaviors to combat childhood obesity. The purpose of this study was to investigate the dietary behavior results from the YRBS taken by middle school students in Duval County in 2009, 2011 and 2013. A two-stage cluster design was used and the survey was completed by 6<sup>th</sup> through 8<sup>th</sup> grade students following parent notification. Compared to other health zones, Health Zone 1 had the lowest intake of fruits and vegetables in 2009 ( $2.66 \pm 1.65$ ) and 2011 ( $2.77 \pm 1.60$ ) and the second lowest intake in 2013 ( $2.92 \pm 1.70$ ). In 2009, 2011 and 2013, Health Zone 1 students' response for soda intake was consistently higher compared to other health zones ( $2.39 \pm 1.54$ ;  $2.40 \pm 1.47$ ;  $2.29 \pm 1.54$  respectively). Health Zone 1, the urban core of Jacksonville, consistently had the lowest intake of fruits and vegetables and the highest intake of soda. Public health strategies should focus on improving fruit and vegetable intake and reducing soda intake within the school environment particularly focusing on Health Zone 1.*

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## BACKGROUND

In 1990, the Centers for Disease Control and Prevention (CDC) developed the Youth Risk Behavior Surveillance System (YRBSS). The YRBSS collects and monitors national data about behaviors related to the leading causes of mortality and morbidity among youth. Analysis of these data can facilitate assessing how health behaviors change over time and discern the correlation between behaviors and morbidity and mortality. The Youth Risk Behavior Survey (YRBS), one of the elements of the YRBSS, was developed in 1991 in collaboration with representatives from state and local departments of education and health, other federal agencies, and national education and health organizations.

Questions from six categories of identified health risk behaviors are included in the YRBS. These are: (1) sexual risk behaviors; (2) tobacco use; (3) alcohol and substance use; (4) safety, violence, and unintentional injury; (5) diet, nutrition, and weight, including physical activity; and (6) chronic conditions such as obesity and asthma (Brener et al., 2015). The survey can be conducted by states, territories, and urban school districts (Foti et al., 2011) but if used by local agencies (such as the

Florida Department of Health in Duval County, also known as Jacksonville, FL) they must keep the standard national core questions and, if applicable, questions required by a grant. Upon discussion and approval from the CDC, local agencies may include other validated questions.

## Duval County Health Zones

This paper presents the analysis of the dietary behavior data of Duval County middle school students for the years 2009, 2011 and 2013. The data are analyzed based on the county's six designated health zones (HZs). These six health zones are created from the county's 35 zip codes and are based on their similar organization, economic, educational, geographic, political, and social demographics. This structure increases the statistical reliability of the zip code data, and facilitates sub-county analyses, surveillance and program planning. Data indicated that educational level, poverty, race or ethnicity differences were associated with specific health zones. Mortality rates, chronic diseases rates and health behaviors also vary among different Health Zones (Duval.floridahealth.gov, 2015). Mortality rates are higher in health zones with the lowest income and rates of poverty were significantly higher

in blacks (27.2%) and Hispanics (18.6%). Health Zone 1, the area's urban core, had the lowest household income and highest rate of homicides. The rate of poverty for children in Health Zone 1 is 43%, much higher than the county's (25.5%) or the state's (25.1%). Health Zone 1 adolescents had a rate of sexually transmitted diseases (STDs) 2.5 times higher than the next highest (health zone 4). Health Zone 3 had the highest rate of unintentional injuries for persons less than 24 years of age (<http://duval.floridahealth.gov/PlaceMattersAddendum>). Health Zones 3 and 6 need to address mental health issues and Health Zone 4 had the highest cancer mortality and second highest STD rate (Duval.floridahealth.gov 2013). These sub-county health variations demonstrate the need for area-specific surveillance, programs, and evaluations.

Adolescent overweight and obesity (defined by BMI  $\geq$ 95th percentile) is 20.5% for adolescents (CDC.gov Child Obesity Facts; Klish). Although there has been a decrease in the prevalence of overweight and obesity in children 2-5 years of age, the rate has not improved in older children. Obesity and overweight also differ among ethnic groups and are of particular concern as it relates Hispanic and non-Hispanic black youth, where the prevalence is higher for Hispanics (22.4%) and non-Hispanic Blacks (20.2%), compared to non-Hispanic Whites (14.1%) and also Asian-American children (8.6%) (CDC.gov Child Obesity Facts). In Florida, 11.8% of high school youth self-described as obese and 17.4% self-described as overweight ([www.cdc.gov/mmwr](http://www.cdc.gov/mmwr)). The prevalence of overweight and obesity is higher "among children from families with an income-to-poverty ratio of 100% or less" indicating that socio-economic status is a factor influencing obesity (CDC.gov Child Obesity Facts; Eagle et al., 2012). Child and adolescent overweight and obesity are public health concerns because they are major risk factors for chronic diseases such as diabetes mellitus, CVD and certain types of cancers. (CDC.gov Child Obesity Facts). The increased prevalence of type II diabetes mellitus, hypertension, and hyperlipidemia in children is associated with trends in increased weight of children. Medical complications related to weight are prevalent in obese or overweight children who carried their excess weight into adulthood.

Adequate consumption of fruits and vegetables is associated with positive health status and healthy weight. Overall good health can be promoted and chronic diseases such as cancer, heart disease, type 2 diabetes and obesity can be prevented or delayed by an overall healthy diet pattern that includes adequate consumption of fruits and vegetables. Inadequate nutrition is related to consumption of high calorie, nutrient poor foods and beverages and low consumption of fruits and vegetables. The CDC has published guidelines to establish strategies to

promote consumption of fruits and vegetables and increase access to fruits and vegetables in workplaces and schools (<http://www.cdc.gov/obesity/>). Adequate intake of fruits and vegetables is promoted not just for the prevention of obesity or to limit calorie intake; it also increases fiber intake and the consumption of nutrient dense foods and snacks. However, the role of beverage consumption related to obesity and health risks is not clear due to the wide variety of beverages with a wide spectrum of calorie and nutrient content.

The purpose of this study was to determine the relationship between fruit, vegetable, and beverage consumption in Duval County middle school children and the risk of obesity by analyzing the 2009, 2011 and 2013 Youth Risk Behavior Survey data.

## Literature Review

The YRBS concentrates primarily on high school students. However, YRBS results consistently confirm that health-risk behaviors often develop during middle school years (Fetro et al., 2001). There have been several studies published that analyze YRBS data specific to middle school students. Some have focused on the reliability and validity of the data, specific years, or health behaviors. Troped et al. (2007) found that the YRBS underestimated moderate physical activity in middle school students. Moore et al. (2013) specifically analyzed 2009 YRBS middle school students' responses regarding sexual behaviors by middle school students from 16 locations. Massachusetts has conducted a survey similar to the YRBS, the Youth Health Survey, which includes questions about "body weight perception, involvement in bullying, and depressive symptoms" as part of their investigation of a broad range of disordered eating risk factors (Gonsalves, 2014).

In 1995, the Youth Risk Behavior Survey for Middle School (YRBS -M) students was created, and several studies using YRBS data have been published focusing on factors that affect health risks and dietary behaviors in this population (Fetro et al., 2001; Foti et al., 2011; Moore et al., 2013; Snelling et al., 2015).

Other studies have shown that physical inactivity and dietary habits play a major role in adolescent obesity in the United States. In a cross sectional study, Snelling et al (2015) explored the relationship between television viewing time, physical activity level, food consumption patterns, and academic performance in adolescents. The study utilized the 2010 YRBS data from a large urban school district serving over 77,000 students. The results indicated that students that earned A and B grades consumed significantly less soda and fast food. The reverse was true for vegetables; as higher student grades were correlated with increased vegetable consumption.

Also as grades decreased, the consumption of soda and fast food increased (Snelling et al., 2015).

In another study conducted by Fetro et al. (2001), data were utilized from the 1997 YRBS-M which included survey's completed by 1,783 students in 19 middle schools in the US. The results indicated that young adolescents (ages 11-14) were engaging in multiple health risk behaviors. In the dietary behavior responses, more than one in four students (27.3%) described themselves as overweight. The percentage of females trying to lose weight (46.9%), was much higher compared to males with (21.4%). Also most middle school students (54.2%) reported exercising to lose weight or prevent weight gain<sup>1</sup>. In the responses to food intake on the previous day, slightly over half (51.3%) of the students reported eating fruit at least twice. More than half of students reported consuming French fries, potato chips (56.4%) and cookies, doughnuts and pies at (54.2%) (Fetro, et al., 2001).

A study conducted in 2005 by Wang et al. (2013), looked at the dietary and physical activity factors related to disordered weight control behaviors (DWCB) among middle school youths. DWCB refers to methods of weight control or management that are considered disordered. Methods include taking laxatives, vomiting, and taking diet pills without prescription. A sample of 15,260 sixth to eighth grade students from Massachusetts public middle school participated in this study. The findings revealed that weight management behaviors such as healthy dietary and physical activity practices correlated with DWCB among boys and girls and these patterns were consistent across race/ethnicity and weight status (Wang et al., 2013).

These YRBS studies demonstrate that there is an increasing need to address the health risk and dietary behaviors in middle school youths. With the rise of childhood obesity, obese children are more likely to become obese adults, and are at increased risk of developing chronic diseases including type 2 diabetes, heart disease, stroke several cancers and osteoporosis. Adolescence has been identified as a period in which physical and dietary habits change and may result in an increased risk of obesity (Snelling et al., 2015).

## METHODS

The Youth Risk Behavior Survey (YRBS) is an anonymous and confidential survey, and since 2001 had been jointly administered in odd numbered years by the Florida Department of Health and Education. The purpose of YRBS is to identify and monitor priority health risk and dietary behaviors in middle school students that utilizes parental notification. This analysis is based on 2009, 2011 and 2013 YRBS dietary behavior data collected from a sample of middle school sixth and eighth grade students in

Duval County, Florida. Oversampling was done to allow attainment of weighted data. Weighing was done by the CDC at the county level and by the Florida Department of Health in Duval County by health zones based on CDC guidelines for weighing (<http://www.cdc.gov/growthcharts>).

## Sampling

For the representative sample, YRBS used a two-stage, cluster design (Foti et al., 2011). There were a total of 24 public middle schools from Duval County and 100% of the county's middle schools participated (charter schools were excluded). Intact second class periods were randomly selected from all the schools. All students in the selected classes were eligible to take the survey. Institutional Review Board approvals were obtained for passive parental permission and student assent. Letters were sent to parents/guardians informing them of the study, the method used to obtain student permission, and potential study risks. Students responded to the voluntary self-administered on a questionnaire Scantron form during the designated class.

## Survey Instrument

The CDC has determined that the validity of the self-reported individual data is not threatened by cognitive and situational factors (Brener, et al., 2015). This anonymous, 54 item questionnaire uses a cluster sample design with the classroom as the unit of measurement. The questionnaire has been tested twice (1992, 2000) by the CDC for reliability. In this study, only questions related to diet were analyzed.

Questions related to diet and nutrition were analyzed and questions include:

- Yesterday, how many fruits and vegetables did you eat?
- Did you eat 5+ fruits and vegetables yesterday?
- Yesterday, how many times did you drink a can, a bottle or glass of soda, pop such as Coke, Pepsi or Sprite?
- Yesterday, how many times did you drink a can, bottle or glass of energy drink, such as Monster, Red Bull, Full Throttle or Rock Star?

Many of the students do not attend school in their neighborhood, however students did enter the zip code group (health zone) they live in most of the time. The information where a student lives cannot be assumed to represent school locations.

## Results

In 2009, 2011 and 2013, the YRBS was completed by 3,138, 4,513 and 4,832 students in 30, 28 and 28, respectively, public middle schools in Duval county Florida in spring of the corresponding years. The schools' response rates were 100% and the students'

response rate was 85% with an overall response rate of 85%, providing a representative sample based on demographics related to age, grade, sex, and race/ethnicity. The results are representative of all students in sixth through eighth grade and the demographic characteristics are presented (Table 1). Students reported the zip code group they lived in most of the time but some students did not attend their neighborhood school so information on where a student lives cannot be assumed to represent school location.

The results for the question, “*Yesterday, how many fruits and vegetables did you eat?*” was significantly different among health zones in 2009, 2011 and 2013 (all  $p$  values  $< .001$ ) (Table 2). In 2009, the self-report of fruits and vegetables consumption was lower on average in Health Zone 1 compared with Health Zone 3 and 6 and it was lower in Health Zone 4 compared with Health Zone 6. The effect size ranging from 0.21 to 0.35 showed a practical significant difference among health zones in 2009. In 2011, Health Zone 1 was significantly lower in fruit and vegetable consumption compared with Health Zones 2, 3, and 5. Health Zones 4 and 5 were significantly lower in fruit and vegetable consumption compared with Health Zones 3 and 2. Health Zone 3 was significantly higher than Health Zones 4, 5 and 6. The difference between Health Zone 3 and 1, 4 and 5, was practically significant effect size ranging from 0.2 to 0.27. In 2013, Health Zone 3 was consistently higher compared with Health Zone 1, 4 and 5. Moreover, Health Zone 4 was significantly lower in fruit and vegetable consumption than Health Zone 6. In 2013, the difference between Health Zones 3 and 4 was practically significant with an effect size 0.24.

The results for the question “*Did you eat 5+ fruits and vegetables yesterday?*” showed no significant difference among health zones in 2009 and 2013 (Table 3). However, in 2011, Health Zone 1 was significantly higher compared with Health Zones 2 and 3 and Health Zone 2 was significantly lower compared with Health Zone 4 and 6 ( $p < .005$ ) (Table 3). Moreover, Health Zone 3 was significantly lower than Health Zone 4. In spite of significant differences among Health Zones in 2011, the small effect size ranging from 0 to 0.06 showed no practical significant difference among health zones.

The results from the question, “*Yesterday, how many times did you drink a can, bottle or glass of soda or pop, such as Coke, Pepsi or Sprite?*” (Does not include diet soda or diet pop) (Table 4) showed a significant difference in middle schools located in different health zones ( $p < .001$ ) in 2009, 2011 and 2013. Soft drink consumption was significantly higher in Health Zones 1 and 4 compared with Health

Zone 5 in 2009. In 2009, the difference between Health Zone 1 and 5 was practically significant with an effect size of 0.24. In 2011, Health Zone 1 was significantly higher compared with all other Health Zones ( $p < .001$ ) (Table 4). Health Zone 3 was significantly lower than Health Zones 4, 5 and 6. In 2011, the difference between Health Zone 1 and Health Zones 2 and 3, was practically significant with effect sizes of 0.21 and 0.34, respectively. In 2013, Health Zone 1 was significantly higher compared with Health Zones 2, 3 and 6. Health Zone 2 was significantly lower than Health Zone 5. Health Zone 3 was significantly lower than 4 and 5. Additionally, Health Zone 5 was significantly higher when compared to Health Zone 6. These results indicate Health Zone 1 was consistently higher in consumption of sugar sweetened beverages than some other Health Zones through 2009, 2011 and 2013. In 2013, the only practical significant difference was between Health Zone 3 and 4 with a size effect of 0.2. These results indicate that soda consumption among middle school students was significantly increased in 2013 compared with 2009 ( $p < .001$ ) (Table 4).

The results for the question, “*Yesterday, how many times did you drink a can, bottle or glass of energy drink, such as Monster, Red Bull, Full Throttle or Rock Star?*” (Table 5) showed a significant difference among Health Zones. In 2009, Health Zone 1 had the highest response. No other results were observed among Health Zones (Table 5). In 2011, Health Zone 6 followed by Health Zones 4 and 1 had the highest observed response. Health Zone response 6 was higher compared with Health Zones 2, 3, 4 and 5 (Table 5). There is no significant difference observed among Health Zones in 2013 however Health Zones 1 and 4 had the highest response. There was no practical significant difference among Health Zones at any given year for this question (Table 5).

## DISCUSSION

Geographic analysis of the YRBS data facilitates data-driven decision-making, policy changes, targeted programming, and more effective use of resources. The results enable stakeholders involved with youth health to identify populations and county areas at high risk for poor health and allocate resources appropriately. This paper is an analysis of self-reported questions from the YRBS that focused on fruit, vegetable, soda and energy drink intake in middle school students in Jacksonville, Florida. There were significant differences and practical significance among health zones and by year for most of the survey questions analyzed.

**Table 1.** Demographic characteristics across years

	2009	2011	2013
<b>Sex</b>			
Female	48.9% (1534)	48.5% (2189)	49.5% (2392)
Male	51.1% (1604)	51.5% (2324)	50.5% (2440)
<b>Grades</b>			
6th	34.3% (1076)	34.3% (1547)	33.3% (1609)
7th	32.7% (1026)	33.0% (1489)	33.3% (1609)
8th	32.2% (1010)	32.3% (1458)	33.1% (1599)
Other	0.9% (28)	0.4% (18)	0.3% (145)
<b>Ethnicity</b>			
Asian	*	2.9% (131)	*
Black	42.6% (1338)	43.4% (1959)	43.9% (2121)
Hispanic/Latino	6.9% (217)	7.8% (352)	8.4% (406)
White	42.5% (1334)	41.1% (1855)	38.5% (1860)
Other Races	4.7% (148)	1.8% (81)	5.2% (251)
Multiple Races	3.3% (104)	3.1% (140)	4.0% (193)

\*In 2009 and 2013, Asian ethnicity was not reported.

Fruit and vegetable intake is an important component of a healthy diet and an integral part in the prevention and treatment of obesity. Health Zone 1 had the lowest daily intake of fruit and vegetables in 2009 and 2011 and the second lowest intake in 2013 compared to the other Health Zones. Health Zone 1 is known as the urban core of Jacksonville and has the highest minority population, lowest level of education, one of the highest unemployment rates, and the highest mortality rate from heart disease and diabetes related conditions.

This study found that the overall consumption of fruits and vegetables in the previous day in all health zones was low. However in 2011, the consumption of fruits and vegetables was significantly different among Health Zones with Health Zones 1, 4 and 6 having the lowest rate of consumption. These results are congruent with national statistics that children and adolescents do not meet the recommendation of consuming a minimum of 5+ fruit and vegetables a day for the reduction in risk of cardiovascular disease and certain cancers (Young, et al., 2004). This observation is consistent with our results from the question, “*Yesterday, how many fruits and vegetables did you eat?*” for Health Zone 1.

Moreover, the results for the question, “*Yesterday, how many times did you drink a can, bottle or glass of soda or pop, such as Coke, Pepsi or Sprite?*” indicates that Health Zone 1 was consistently higher compared with other Health Zones in 2009, 2011 and 2013. Poor consumption of fruit and vegetable intake

in Health Zone 1 was accompanied by the higher consumption of the soda intake compared with other health zones indicating poorer quality of food intake. In spite of the significant results for the fruit and vegetable consumption and soda intake, no consistent results were observed in response to the question about energy drink consumption. The average intake was the highest in Health Zone 1 among health zones in 2009 while Health Zone 6 had the highest average in 2011.

#### **Implications for Health Education through Public Health and Community Initiatives**

Timely interventions can be effective in promoting healthy behaviors and outcomes. The Healthy Choices Study (2015), geared to middle school students concluded that a multi-component approach provided three-year “improvements in weight-related behaviors and weight status” and that a team building approach was important to program success. Given the prevalence of food deserts, food insecurity, and low income levels in the northeast Florida region, there are opportunities for a variety of initiatives that can support greater access to healthy food by children and families. This access can take the form of community gardens, mini grocery stores, school gardens, traveling fruit and vegetable vendors, etc. In addition, existing stores can increase access to healthier choices, such as lower prices for nutrient dense beverages, fruits and vegetables, more whole grains, leaner cuts of meat, low fat dairy, etc.

**Table 2.** Middle school times ate fruit and vegetables yesterday by health zone and year

Health Zones	2009				2011				2013			
	n	M ± SD	95% CI	p	n	M ± SD	95% CI	p	n	M ± SD	95% CI	p
1	386	2.66 ± 1.65	2.50, 2.83		578	2.77 ± 1.60	2.72, 2.82		556	2.92 ± 1.70	2.78, 3.06	
2	792	2.94 ± 1.57	2.83, 3.05		745	3.12 ± 1.66	3.08, 3.16		1005	3.08 ± 1.65	2.98, 3.18	
3	317	3.06 ± 1.56	2.89, 3.24		711	3.21 ± 1.61	3.16, 3.26		506	3.24 ± 1.63	3.09, 3.38	
4	634	2.75 ± 1.58	2.63, 2.88		580	2.87 ± 1.61	2.82, 2.91		616	2.84 ± 1.65	2.71, 2.97	
5	352	2.83 ± 1.71	2.65, 3.01		663	2.95 ± 1.63	2.89, 3.01		775	2.93 ± 1.62	2.82, 3.05	
6	157	3.24 ± 1.62	2.99, 3.50		576	2.90 ± 1.52	2.82, 2.98		342	3.16 ± 1.70	2.98, 3.34	
Overall	2638	2.87 ± 1.61	2.81, 2.93	< .001	3850	2.99 ± 1.63	2.97, 3.01	< .001	3800	3.02 ± 1.66	2.96, 3.07	< .001

**Table 3.** Middle school ate 5+ yesterday by health zone and year

Health Zones	2009				2011				2013			
	n	M ± SD	95% CI	p	n	M ± SD	95% CI	p	n	M ± SD	95% CI	p
1	386	1.88 ± 0.33	1.85, 1.91		578	1.89 ± 0.31	1.88, 1.90		556	1.87 ± 0.34	1.84, 1.89	
2	792	1.89 ± 0.31	1.87, 1.91		745	1.86 ± 0.35	1.85, 1.87		1005	1.86 ± 0.35	1.84, 1.88	
3	317	1.89 ± 0.32	1.85, 1.92		711	1.87 ± 0.34	1.85, 1.88		506	1.85 ± 0.35	1.82, 1.88	
4	634	1.89 ± 0.31	1.87, 1.92		580	1.89 ± 0.31	1.88, 1.90		616	1.88 ± 0.33	1.85, 1.90	
5	352	1.86 ± 0.34	1.83, 1.90		663	1.87 ± 0.33	1.86, 1.89		775	1.89 ± 0.32	1.87, 1.91	
6	157	1.87 ± 0.34	1.81, 1.92		576	1.89 ± 0.31	1.87, 1.91		342	1.84 ± 0.37	1.80, 1.88	
Overall	2638	1.88 ± 0.32	1.87, 1.90	.07	3850	1.88 ± 0.33	1.87, 1.88	< .001	3800	1.87 ± 0.34	1.86, 1.88	.27

Perhaps positioning community activists at locations in high visibility areas could increase residents’ awareness about the resources that are available in the communities. With some strategic emphasis, health promoters can collaborate with after school programs and parks and recreation leaders to

provide opportunities for safe physical activities and nutrition education and to provide access to services such as blood pressure checks and information about health conditions that affect individuals in those areas. Health Fairs in strategic locations around the city can encourage community spirit and engagement.

**Table 4.** Middle school soda consumed yesterday by health zone and year

Health Zones	n	2009			n	M ± SD	2011		n	M ± SD	2013	
		M ± SD	95% CI	p			95% CI	p			95% CI	p
1	394	2.39 ± 1.54	2.24, 2.54		1972	2.40 ± 1.47	2.35, 2.44		554	2.29 ± 1.54	2.16, 2.42	
2	812	2.12 ± 1.44	2.02, 2.22		1062	2.10 ± 1.37	2.07, 2.14		999	1.92 ± 1.22	1.85, 2.00	
3	325	2.04 ± 1.40	1.89, 2.20		626	1.93 ± 1.28	1.89, 1.97		506	1.86 ± 1.19	1.76, 1.97	
4	642	2.32 ± 1.51	2.20, 2.44		369	2.21 ± 1.48	2.17, 2.25		615	2.10 ± 1.40	1.99, 2.21	
5	361	2.04 ± 1.37	1.90, 2.18		118	2.30 ± 1.55	2.24, 2.35		771	2.15 ± 1.39	2.05, 2.24	
6	162	2.03 ± 1.35	1.82, 2.24		271	2.19 ± 1.41	2.11, 2.26		340	1.86 ± 1.24	1.73, 1.99	
Overall	2696	2.18 ± 1.46	2.13, 2.24	<.001	4418	2.18 ± 1.43	2.16, 2.19	<.001	3785	2.04 ± 1.34	1.99, 2.08	<.001

**Table 5.** Middle school energy drink consumed yesterday by health zone and year

Health Zones	n	2009			n	M± SD	2011		n	M± SD	2013	
		M± SD	95% CI	p			95% CI	p			95% CI	p
1	554	2.29±1.54	2.16, 2.42		597	1.41±1.01	1.38, 1.44		545	1.36±0.95	1.28, 1.44	
2	999	1.92±1.22	1.85, 2.00		1004	1.35±1.03	1.33, 1.37		992	1.29±0.87	1.23, 1.34	
3	506	1.86±1.19	1.76, 1.97		571	1.38±1.03	1.35, 1.41		500	1.29±0.96	1.20, 1.37	
4	615	2.10±1.40	1.99, 2.21		660	1.43±1.08	1.40, 1.46		606	1.39±1.07	1.30, 1.47	
5	771	2.15±1.39	2.05, 2.24		576	1.39±1.07	1.35, 1.43		761	1.34±0.98	1.27, 1.41	
6	340	1.86±1.24	1.73, 1.99		296	1.56±1.14	1.50, 1.62		336	1.35±1.04	1.23, 1.46	
Overall	3785	2.04±1.34	1.99, 2.08	< .05	3704	1.40±1.05	1.38, 1.41	< .001	3740	1.33±0.97	1.30, 1.36	.32

### Implications for Health Education in Schools

The practical implications of these results are the need for health and education professionals to examine how to support students and caregivers in becoming more aware of behavior change to incorporate a variety of healthy food choices and develop weight management practices. Adolescence is a critical stage in life when habits become more established in lifelong choices. Having consistently appropriate models and experiences are paramount in shaping these decisions. Consequently, adolescents who do not practice healthy habits are more likely to grow into obese teenagers who could likely experience negative social interactions with peers during the middle school years. For example, teenagers who are obese could be bullied and teased by peers. In addition, given the natural hormonal changes that occur as children grow and mature, it is likely that sensitivity to others' perceptions is heightened during this stage of physical development. Furthermore, the evident growth spurts in these youth may stimulate appetite, which is often satisfied by choices from available snacks in the school's vending machines. Generally, these choices are made impulsively to satisfy a need and although students may be concerned about their physical appearance and food consumption, rationalizing the appropriateness of choices is not generally a priority when they are hungry. Therefore, school officials should select vendors who provide healthy food and beverage options for students. More specifically, a more systematic approach to providing healthy food options ought to be considered for breakfast and lunch choices served throughout the school.

Additionally, children like adults, often require help in weight management. Adolescents need to see appropriate models and opportunities to practice healthy choices in schools. Given that students spend a minimum of six hours in schools during a school day, the influence of the adults around them is strong, regardless of the community and the habits noted in that setting or home. Therefore, educators and school personnel can take advantage of this time to promote and purposely exaggerate health and wellness initiatives that students could find difficult to ignore. For example, in many classrooms, it is not unusual to find a jar of candy on display to reinforce positive behaviors. Perhaps instead of sweet treats, teachers could consider fresh fruits, nuts, water, etc., as appropriate incentives for students. Furthermore, each school can create a culture of movement to promote the importance and benefits of physical activities and an active lifestyle. Additionally, because learning is interactional, it is important for educators to employ flexibility for student engagement in the learning process. Designing lessons to allow adolescents to be up and moving while learning is a practical consideration. More

specifically, school personnel can encourage adolescents to engage in activities that stimulate the brain and body periodically throughout a school day. It is also important that the adults lead by example and demonstrate the behaviors they expect students to emulate.

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