

# Middle School Student Attitudes About School Drinking Fountains and Water Intake



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## ABSTRACT

**OBJECTIVE:** To describe middle school student attitudes about school drinking fountains, investigate whether such attitudes are associated with intentions to drink water at school, and determine how intentions relate to overall water intake.

**METHODS:** Students ( $n = 3211$ ) in 9 California middle schools completed surveys between 2009 and 2011. We used multivariate linear regression, adjusting for school sociodemographic characteristics, to examine how attitudes about fountains (5-point scale; higher scores indicating more positive attitudes) were associated with intentions to drink water at school and how intentions to drink water at school were related to overall water intake.

**RESULTS:** Mean age of students was 12.3 (SD = 0.7) years; 75% were Latino, 89% low income, and 39% foreign born. Fifty-two percent reported lower than recommended overall water intake (<3 glasses/day), and 30% reported that they were unlikely or extremely unlikely to drink water at school.

Fifty-nine percent reported that school fountains were unclean, 48% that fountain water does not taste good, 33% that fountains could make them sick, 31% that it was not okay to drink from fountains, and 24% that fountain water is contaminated. In adjusted analyses, attitudes about school drinking fountains were related to intentions to drink water at school ( $\beta = 0.41$ ;  $P < .001$ ); intentions to drink water at school were also associated with overall water intake ( $\beta = 0.20$ ;  $P < .001$ ).

**CONCLUSIONS:** Students have negative attitudes about school fountains. To increase overall water intake, it may be important to promote and improve drinking water sources not only at school but also at home and in other community environments.

**KEYWORDS:** adolescents; hydration; nutrition; obesity prevention; schools

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## WHAT'S NEW

Although most schools provide water via fountains, little is known about student attitudes about fountains. In this study, middle school students had negative attitudes about fountains; such attitudes were associated with lower intentions to drink water at school.

DRINKING WATER INSTEAD of sugar-sweetened beverages (SSBs) may be associated with a number of health benefits for children and adolescents. Cross-sectional data suggest that children and adolescents could reduce their caloric intake by 235 kcal per day if they drank water in place of 100% fruit juice and SSBs.<sup>1</sup> Several randomized controlled trials focused on reducing SSB intake among children and adolescents increased their intake of water,<sup>2–8</sup> decreased their intake of SSBs,<sup>4,5</sup> and reduced their prevalence of overweight and obesity<sup>3–5</sup> as well as dental caries.<sup>9</sup>

According to the 2011 Institute of Medicine's Dietary Reference Intakes, adequate intake levels for water in any form are 2.1 L per day for adolescent girls and 2.4 L

per day for adolescent boys.<sup>10</sup> According to these cutoffs, nearly two-thirds of adolescents report low water intake (<3 glasses of water per day),<sup>11</sup> and a quarter do not drink any plain water.<sup>12</sup> Although tap water provides a low-cost, noncaloric beverage that is readily available in most settings, many youth do not drink tap water, with the majority opting for bottled water instead.<sup>12–16</sup> Tap water intake is lowest among Latino adolescents, a group that is at higher obesity risk than are white adolescents.<sup>12,16</sup>

Schools, where youth spend the majority of their time, offer a potential setting for increasing water intake. If students increase their water intake in schools, they can maintain a healthy weight, reduce dental caries, and improve their readiness to learn.<sup>17–19</sup> Studies suggest that students may begin their school day in a state of dehydration;<sup>20</sup> provision of water to students in schools may improve their cognitive function.<sup>17–19</sup>

Most US schools offer water via drinking fountains,<sup>21–23</sup> but qualitative studies suggest that students do not drink from fountains because they consider the fountains unclean or the water unpalatable or unsafe.<sup>24,25</sup> Although there are a few studies regarding student attitudes of

school drinking fountains,<sup>24,25</sup> there are no studies of Latino student attitudes of school fountains. In previous studies, mainly of adults, perceived health risks, taste preferences, and convenience have been cited as reasons why individuals may not drink tap water but opt for bottled water or other drinks instead.<sup>26–28</sup>

According to social-cognitive theories of behavior change, such as the theory of planned behavior, an individual's attitude toward a behavior in part influences his or her intention to perform the behavior, and that intention is in turn related to the behavior.<sup>29</sup> In order to inform school-based interventions to increase water intake, we sought to examine whether middle school student attitudes about school drinking fountains are associated with intentions to drink water at school. We then explored whether student intentions to drink water at school were associated with their overall daily water intake. Because adolescents who are Latino are more likely to drink SSBs<sup>30</sup> and be overweight and obese<sup>31</sup> than are adolescents who are white, we focused on middle school students in a predominantly Latino school district.

## METHODS

### STUDY DESIGN AND PARTICIPANTS

Participants were students taking part in a randomized controlled trial of Students for Nutrition and eXercise (SNaX), an obesity prevention intervention delivered to students in 9 middle schools in Los Angeles, California, from 2009 to 2011.<sup>8</sup> Seventh grade students from the intervention and control schools were eligible to complete surveys at baseline before the implementation of SNaX at the intervention schools. Among 4022 eligible students in these schools, 80% ( $n = 3211$ ) completed baseline surveys. The most common reasons why students did not complete surveys were parental refusal and student absences, including those related to school field trips. Parents provided consent for their child's participation; students provided assent. The RAND institutional review board, the Boston Children's Hospital institutional review board, and the Committee for External Research Review at the Los Angeles Unified School District approved the study.

### PREDICTOR AND OUTCOME VARIABLES

In order to test our hypotheses, informed by social-cognitive theories of behavior change, we first examined whether student attitudes about school drinking fountains were related to their intentions to drink water at school. We then assessed if intentions to drink water at school were associated with overall daily water intake among students. We developed these outcome and predictor variables based on previous qualitative studies of drinking water access we conducted in California schools and cognitive interviews that we conducted with 10 middle school students in the Los Angeles region.<sup>24,32</sup> (Cognitive interviewing is a technique used to decrease response error for surveys in which we asked students to reflect on their understanding of survey questions and their thought processes for answering questions in a particular way.)

To examine attitudes about drinking fountains at school, students were asked whether they "strongly agreed," "agreed," "neither agreed nor disagreed," "disagreed," or "strongly disagreed" with the following statements: "It is fine for me to drink water from fountains at my school," "The water that comes out of the fountains at my school could make me sick," "The drinking fountains at my school typically have dirt, gum, paper, or other trash in them," "The water that comes out of the fountains at my school tastes good," and "The water that comes out of the fountains at my school contains unhealthy chemicals like lead." For these 5 drinking fountain attitude items, we conducted exploratory factor analyses. Using a factor loading cut off of 0.60,<sup>33</sup> we retained all items except the item, "The drinking fountains at my school typically have dirt, gum, paper, or other trash in them," which had a factor loading of 0.53. On the basis of these analyses, responses from the 4 remaining items were averaged to create a scale in which higher values indicated more positive attitudes toward drinking water ( $\alpha = 0.70$ ).

To assess student intentions to drink water at school, we asked students to report, "How likely is it that you will drink water the next day you are at school?" Response options included "extremely likely," "likely," "neither," "unlikely," or "extremely unlikely." The wording of this question was slightly different for the first pair of schools: "How likely is it that you will drink tap water or water from a drinking fountain the next day you are in school?" When we conducted sensitivity analyses in which we dropped the first 2 schools and tested the same regression models, results were consistent. Thus, here we present only the findings from the complete set of schools.

To examine daily water intake, we asked students to estimate their daily water intake: "Yesterday, how many glasses of water did you drink? Include tap water (from a sink or fountain) or bottled water like Aquafina. Do not include flavored sweetened water." Response options for this question included "4 or more glasses," "3 glasses," "2 glasses (1 bottle = 2 glasses)," "1 glass (1 cup = 1 glass)," "less than 1 glass (for example, a sip or a few sips from a fountain)," and "I did not drink water yesterday." Students were also asked whether they were at school on the day before the survey; analyses for the water intake outcome variable were restricted to students who answered "yes." Surveys were not administered on Mondays so that students would report daily water intake for a school day.

Sociodemographic covariates included student age in years, gender, race/ethnicity (African American, Latino/Hispanic, and other, which consisted predominately of whites), eligibility for free and reduced-price meals through the US Department of Agriculture's National School Lunch Program (a proxy for low-income status), primary language spoken at home (English vs not English), and foreign-born status (US born vs foreign born). Covariates for this study were selected on the basis of their association with water intake patterns in previous studies.<sup>14–16</sup>

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