

## Beverage intake improvement by high school students in Saskatchewan, Canada

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### Abstract

Certain beverages contribute energy, protein, vitamins, and minerals. North American adolescents have shifted their beverage intake from predominantly milk to predominantly sugary beverages. Intake of these sugary beverages, in sufficient quantity, may increase the risk of bone fractures, may contribute to obesity, and may lead to tooth decay. This study evaluated the effectiveness of a school-nutrition education program (Fluids Used Effectively for Living) on nutrition knowledge, attitude, and self-reported behavior of grade 9 students in Saskatchewan, Canada. Two classes of grade 9 students, 1 (n = 33) in a high school in Saskatoon (n = 33) and 1 (n = 24) in a large high school in Prince Albert, Saskatchewan, received the peer educator intervention. Two other classes in the 2 cities (n = 24 and n = 24, respectively) were controls. Six sessions of Fluids Used Effectively for Living nutrition education were delivered by using 2 peer educator models (multiple and single), and the intervention was delivered in a 45-minute weekly class session over a 6-week period. After the intervention, students in these 2 peer educator classes decreased their sugary beverage intake significantly, which was sustained for 3 months. Students in the control self-taught class increased their juice intake at the end of the year. The significant decrease of juice and sugary beverage intakes in the single model peer educator class disappeared after Bonferroni correction. Carbonated sugary beverage intake of students in the control self-taught classes declined, but it was not sustainable at the 3-month follow-up. A peer educator school-based nutrition education approach can lead to a decrease in sugary beverage intake in high school children.

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**Keywords:** Peer education; Adolescents; Health education; Soft drinks; Sugary beverages; School-based nutrition education  
**Abbreviations:** BFQ, beverage frequency questionnaire; CSD, carbonated soft drink; FUEL, Fluids Used Effectively for Living; NSD, noncarbonated sugary drink.

### 1. Introduction

Adolescents need greater amounts of nutrients than adults to support their growth and development and to prevent chronic disease that may subsequently occur during adulthood [1,2]. Adolescents often do not have

enough knowledge and experience to make appropriate decisions and tend to develop unhealthy eating habits. These include skipping breakfast, replacing lunch meal with snack food, and increasing soft drink intake, all of which can lead to inadequate nutrient intake [1]. Furthermore, adolescents' decision-making processes may be influenced by commercial activities, peers, and environmental factors [3,4], placing adolescents in a nutritionally vulnerable position. Healthy behaviors, including consum-

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Table 1  
Summary of intervention sessions for nutrition education programs

Session	Training curriculum
1	The ABCs of nutrition Increasing student knowledge of human nutrition Helping students make nutritious food and beverage choices using accurate and current nutrition information
2	Understanding nutritional value of beverages Nutritional content of various beverages Health impact of beverage choices
3	Healthy bones Calcium content of beverages/foods Simple ways to incorporate calcium-rich food and beverages in the diet
4	Making fast foods fit Integrating nutrition principles of variety and moderation in daily food habits Ways to reduce sugar, fat, and salt in their fast food
5	Vitality Important role of physical activity and health Social and emotional benefits of active living Importance of healthy weight Simple ways to include physical activity in the daily lifestyle
6	Take a peek Skill development, label reading, and changing behaviors

ing nutritious beverages, are important for adolescents to improve their school performance, growth, and developmental tasks [5-8].

Over the past 25 years, adolescents have changed their beverage intake patterns by doubling their sugary drink intake and decreasing their milk intake [9-11]. This shift has had a negative impact on health by lowering nutritional quality and decreasing micronutrient intake. Consumption of high sugary drink intake may place children at risk for not getting the nutrient they need for optimal health [12] and may contribute to increased risk of bone fractures [12-16], obesity [17,18], and tooth decay [19].

School-based nutrition education represents an important strategy for improving the beverage choices of children and youth. Several interventions using a school-based approach have successfully led to significant or moderate changes in adolescents' dietary habits [20,21]. Studies continue to confirm the influence of peers on adolescent health behaviors [22]. Much of the research in Canada on the impact of sugary drink consumption on the health of adolescents has placed emphasis on bone health. Two of the most influential studies conducted on Saskatchewan children [23,24] provided insights on aspects of adolescent's beverage intake [23] and the relationship between carbonated sugary drinks (CSDs) and bone health [24]. This investigation presents the results of a pilot nutrition education resource Fluids Used Effectively for Living (FUEL), including the program's impact on changing the beverage consumption practices of grade 9 students in Saskatchewan, Canada. The FUEL program intended to decrease students' sugary beverage intake.

## 2. Methods and materials

### 2.1. Design

The overall design was to compare changes in nutrition knowledge, attitude, and self-reported beverage consumption behaviors in a self-administered questionnaire for students who received the FUEL nutrition education resource and for those who did not receive the intervention.

### 2.2. Participants

A total of 113 grade 9 students (average age, 14 years) from 4 high school classes participated in the study. Students from the 2 Saskatoon classes (n = 33 and n = 20, respectively) were selected from ethical living classes in 2 schools in Saskatoon, Saskatchewan, Canada, a large urban center with a population of 206 900 [25], and were assigned as classes A and B. Students (n = 24 and n = 24, respectively) from 2 English classes in a large school in Prince Albert, Saskatchewan, Canada, a suburban center with a population of 41 460 [26], were assigned as classes C and D. Both the ethical living class and the English classes were identified by classroom teachers as appropriate venues for integrating nutrition education into the curriculum. Classes in Saskatoon were assigned as a multiple (older, cross-age, and same age) peer educator class (A) and as self-taught (control) (B). Schools in Prince Albert were assigned as a single (older) peer educator class (C) and as self-taught (control) (D). A purposeful sampling technique was used to select the 3 schools. Schools were selected according to neighborhoods and socioeconomic status, meaning that the classes were made up of students from middle-income households from the Directory of Saskatchewan schools [27] in consultation with the appropriate school divisions. The schools were also chosen because of their diversity and large student population.

Approval for human subjects was obtained from the University of Saskatchewan's Committee on Ethics in Behavioral Science Research. Written permission was obtained from the school divisions; principals of participating schools; teachers, parents, and guardians of eligible participants; and all student participants. Principals, teachers, consenting parents, and students were sent an information package describing the study and protocols. The identity of the participants was not recorded, except to characterize participants by class treatment and to allow sequential recalls and for questionnaires to be tracked. The 1 student who did not participate in the intervention was given alternate activities.

### 2.3. The FUEL intervention

The FUEL program is a 6-session multifactorial nutrition education resource designed to be highly focused and interactive. The intervention was also developed taking into account constructivist theory of learning [28], which is predicated on the assumption that students construct

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