

Position Statement

School nutrition: Support for providing healthy food and beverage choices in schools

Jeffrey N. Critch

Canadian Paediatric Society, Nutrition and Gastroenterology Committee, Ottawa, Ontario

Correspondence: Canadian Paediatric Society, 100–2305 St Laurent Blvd, Ottawa, Ontario K1G 4J8. E-mail info@cps.ca, website www.cps.ca

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Abstract

The implementation of nutrition policies and guidelines in Canadian schools has increased the availability and consumption of nutrient-rich foods while reducing access to and consumption of foods and beverages that are high in sugars, sodium, and saturated fats. Positive changes in health outcomes for children and youth, such as improved body mass indices, have been observed. However, observed impacts of school nutrition policies on academic performance have been mixed. This statement reviews key elements of school nutrition policies, with specific focus on nutrition standards. School nutrition policies should align with recommendations in Canada's Food Guide and promote nutrient-rich foods and beverages that are lower in saturated fat, sugar, and sodium.

Keywords: *Comprehensive school health; School nutrition policy; Sugar-sweetened beverages*

BACKGROUND

Good nutrition is important for optimizing health, development, and academic performance. Because children and youth consume a significant proportion of their daily energy intake while in school (1), measures targeting school nutrition may lead to beneficial changes in dietary behaviours, health outcomes, and academic performance. Comprehensive school health (CSH) is an internationally recognized framework for supporting improvements in students' educational outcomes while addressing school health in a planned, integrated, and holistic way (2). CSH encompasses the entire school environment and targets four interrelated pillars: social and physical environment; teaching and learning; healthy school policy; and partnerships and service. CSH engages students, parents, educators, communities, and stakeholders to promote lifelong healthy behaviours (3).

As part of CSH, school nutrition policy (SNP) holds promise to promote healthy weights, reduce chronic disease risk, and support learning (4). SNP provides a framework by which schools

can plan, implement, and evaluate nutrition-related actions that reflect current dietary guidance. SNP may address multiple, related components, including the availability of specific foods or beverages, eating and food environments, health and nutrition education, health services and dietary counselling, and family or community outreach. Possible sub-components include nutrition standards, food programs, contracts, and marketing (4). This statement reviews the evidence for the impacts of SNP, especially the nutrition standard component, in relation to food and beverages provision, availability, and consumption, with focus on improving BMI and academic achievement.

In Canada, provincial/territorial governments and school boards maintain responsibility for the planning and provision of school nutrition policies, programs, and services. Each province/territory either has or is developing an SNP (3), although variations (e.g., the ministry responsible, nutrition standards, implementation) exist. Typically, individual school boards are responsible for implementation.

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NUTRITIONAL CONCERNS IN SCHOOL-AGED CHILDREN AND YOUTH

Child and youth overweight and obesity are major health issues in Canada. In 2015, 30.9% (nearly 1.5 million) of Canadian 5- to 17-year-olds were overweight (18.9%) or obese (12%) (5). These rates increased from 1978/1979, when 15% of 2- to 17-year-olds were overweight (12%) or obese (3%) (6). The increase in overweight and obesity has affected all school-aged children, across all provinces and territories, although data from 2009 to 2011 suggested a plateauing of overweight and obesity rates (7-9).

Obese children and youth have a higher lifetime risk for developing type 2 diabetes mellitus, dyslipidemia, hypertension, and coronary heart disease (10). While the etiologies for increasing obesity are complex and involve multiple, interacting factors, the increased consumption of calorie-dense, nutrient-poor foods is a major contributor. Ready access to calorie-dense, nutrient-poor food and beverages in schools has been shown to contribute negatively to BMI (11,12). Encouragingly, studies have also demonstrated that obese children who lose weight can reduce their risk for type 2 diabetes and hypertension as adults (13). Weight loss can be difficult, which makes measures to increase primary prevention an essential public health focus.

Many observational studies have shown a link between low overall diet quality and poor academic performance. The Avon Longitudinal Study of Parents and Children found that a diet high in fat and sugar at 3 years of age was negatively associated with IQ at 8.5 years of age (14). Furthermore, a high relative intake of nutrient-rich foods at 8.5 years of age was positively associated with IQ. In a prospective cohort of 602 Australian children, higher intake of 'fast' food, red or processed meat, soft drinks, and fried or refined foods at 14 years of age was associated with diminished cognitive performance at 17 years of age (after adjusting for total energy intake, maternal education, family income, and other factors) (15). One cross-sectional survey of 475 Norwegian ninth and tenth-grade students demonstrated that less frequent intake of sugar-sweetened beverages, sweets, chocolate, savory snacks, pizza, and hot dogs, and avoiding skipped meals were associated with lower odds of self-reported learning difficulties (16). Another cross-sectional study of 1,073 Chilean fifth- and ninth-grade students associated consuming unhealthy foods at snack time with being less likely to pass language (odds ratio [OR] 0.44, 95% confidence interval [CI] 0.23 to 0.85) or mathematics courses (OR 0.34, 95% CI 0.19 to 0.64) (17). In a survey of 5,200 Nova Scotian fifth graders, low overall diet quality was associated with poorer performance on a provincial standardized literacy assessment (18). In a survey of 8,544 fifth graders in the USA, higher levels of fast food consumption predicted lower levels of academic achievement in reading, math, and science by eighth grade, after adjusting for fifth-grade scores, socio-economic indicators, physical activity level, and TV watching (19).

Many of Canada's young people are at risk for inadequate food or specific nutrient intake, notably calcium, vitamin D, and

magnesium (20). Often, they are also ingesting too little fibre and potassium and too much sodium (21,22) and sugar (23).

Schools provide important opportunities to increase children's consumption of nutrient-rich foods, limit consumption of calorie-dense foods, and promote healthier dietary choices and behaviours.

SCHOOL NUTRITION POLICY (SNP)

Food and beverages are made available in schools through organized breakfast and lunch programs, vending machines, cafeteria services, packed meals or snacks from home, and fundraising or other special events. SNPs can provide widely varying levels of guidance depending on scope, intent, location, and other factors.

In Canada, SNPs are generally developed and implemented at the provincial/territorial or school board levels. Their development can be a complex process involving multiple stakeholders, including administrators, food service personnel, dietitians, teachers, parents, students, and public health authorities. Their fundamental goal, however, is to have the nutritional quality of foods provided (served and/or sold) reflect the school's daily mission to promote healthy, productive learners. Components of SNP that impact food available in schools include nutrition standards, food programs, and contracts with food producers and proprietary food or beverage companies (4). Comprehensive policies can also address specific food environments, health education, health services and counselling, along with family and community outreach (4).

At a minimum, SNPs should aim to achieve the following:

- Improve the quality of food and beverage intake and choices
- Help students make healthier nutritional choices
- Build skills that enhance healthy dietary behaviours
- Reduce risk for overweight, obesity, and eating or nutrition-related disorders

SNPs should encompass cultural variation and be sensitive to individual social and economic circumstances and environments. Their focus should be on making balanced and healthy life-style choices, not on weight reduction (24,25).

POTENTIAL IMPACTS OF SNPs

Increasing access to nutritious foods and beverages

Introducing SNPs can catalyze improvements in the quality of foods and beverages available to students. California's Statewide School Nutrition Standards increased the overall availability of compliant foods and beverages and decreased access to noncompliant items, especially sugar-sweetened beverages (SSBs), potato chips and candy (26). However, improvements in school food environments and student nutritional intakes were modest, in part because many compliant items were fat- and sugar-modified products of low nutritional value. One systematic review (27) of 18 studies concluded that some school policies were effective

in improving both the nutritional quality of in-school food and beverages and the dietary intake of students. Possible adverse effects of SNPs have not been systematically studied.

Arkansas Act 1220 (2003) was a comprehensive state-wide initiative to combat childhood obesity through school-based change. Annual surveys since implementation revealed a number of positive changes in school environments and policies (28). Schools were more likely to:

- Require that healthy options be provided for student parties (4.5% in 2004, 36.9% in 2008; $P \leq 0.0001$) and at on-site concessions (1.6% in 2004, 19.6% in 2008; $P \leq 0.0001$),
- Ban advertising by food or beverage companies (31.7% in 2005, 42.6% in 2008; $P \leq 0.0001$),
- Offer skim milk alternatives in student cafeterias (white milk: 26.1% in 2004, 41.0% in 2008, $P \leq 0.0001$; chocolate milk: 9.0% in 2004, 24.0% in 2008, $P \leq 0.0001$),
- Limit vending machines access during lunch periods (72.3% in 2004, 37.2% in 2008; $P \leq 0.0001$), and
- Limit access to SSBs (83.8% in 2004, 73.5% in 2008; $P \leq 0.0001$).

Improving dietary behaviours

SNPs are positively associated with improving student dietary choices. One Canadian study (29) measured favourable changes in student food consumption when an SNP was introduced in Prince Edward Island. A review of 42 European studies (30) showed that multicomponent school-based interventions promoting healthy diets were associated with improving (self-reported) dietary behaviours.

Improvements in school nutritional environments may also positively impact individual food choices outside of school. One Finnish cross-sectional survey showed that children eating school meals tended to make food choices that aligned with nutritional recommendations more than those who do not (31). Other factors undoubtedly influence food choices, including family context, nutritional knowledge, and income level.

Increasing access to healthier food choices can align with student preferences: 69% of students in one study reported that it was important to have fresh fruit available for purchase at school (32). However, while students who were served healthy food choices in a school lunch program were more likely to consume them, they also consumed unhealthy items when available. Such findings suggest that both providing healthier food choices and limiting access to unhealthy foods in schools may be acceptable to students.

Lowering body mass index (BMI)

Despite their widespread implementation, very few large-scale SNPs have been evaluated formally. However, there is considerable evidence to support the beneficial impacts of in-school programs and policies on BMI. A survey of 5,200 fifth-grade Nova Scotia students found comprehensive school healthy

eating programs were associated with lower rates of overweight and obesity, and better overall diet quality (33).

A 2008 study (34) evaluated the impacts on first, third, and fifth graders of the Gold Medal Schools program, designed to help schools in Utah provide more opportunities for nutritious food selection and regular physical activity. BMI z-scores increased significantly in the comparison group (0.53 ± 0.38 , $P < 0.05$), but not in the intervention group (0.21 ± 0.47 , $P = 0.484$). Children in the intervention group also reported drinking fewer SSBs per day after one program year ($P < 0.001$). Another assessment, of five million observations in fifth- and seventh-grade students in California, showed a statistically significant decline in the prevalence of overweight among fifth graders in Los Angeles and among fifth-grade boys and seventh graders in the rest of California ($P < 0.005$), comparing the periods before and after introduction of SNPs (35). Additionally, one cross-sectional study of 2,228 US students in grades 1 to 12 indicated that school breakfast participation was associated with significantly lower BMI (36).

Impacts on academic performance

Studies evaluating the association between SNPs and academic outcomes have reported mixed results. One study of 97 students from Boston inner-city schools showed an association between participation in a universal free school breakfast program and significant improvements in student academic performance, psychosocial functioning, and decreased hunger 6 months later (37). A systematic review of 45 studies concluded that eating breakfast was more beneficial for cognitive performance than skipping this meal, though effects were more apparent in nutritionally compromised children (38). School breakfast programs have been associated with improved attendance and decreased lateness rates in school (39). In severely undernourished populations, school breakfast programs appear to improve both academic performance and cognitive functioning. The EATFit program in California, for example, was associated with improved academic performance (40).

In one randomized control trial (RCT) of Jamaican second- to fifth-grade students, 407 undernourished children and 407 adequately nourished children were assigned to breakfast and control groups (41). At 1 year, height, weight, and attendance improved significantly in the breakfast group. Little progress was made in academics for either group, however. A cluster RCT in New Zealand of a free school breakfast program did not show a significant effect on school attendance or academic achievement, although there was a significant effect on short-term satiety (42). Evaluation of a Breakfast in the Classroom (BIC) program in the USA revealed increased attendance but no difference in standardized test performances in math or reading (43).

FACTORS INFLUENCING ADHERENCE

The successful implementation of SNPs depends on a range of factors, including appropriate supports (e.g., funding, healthy

food availability, staff engagement, accountability). One study (44) assessed adherence to food and beverage standards among 56 public high schools in California. Schools were more likely to be fully adherent to beverage standards than to nutrient-based food standards. Because nutrient-based food standards can be difficult to implement, ensuring sufficient resources and involving knowledgeable food service personnel can increase adherence. In one survey of 436 Canadian schools (45), authors described the healthy eating programs, nutrition education, and neighbouring food retail environments. Only 53% of schools had a committee to oversee their healthy eating program, and most schools allowed soft drinks to be sold in on-site vending machines.

While both national and district-level SNPs can catalyze change, evidence suggests that involving school nutrition councils in program oversight may increase effectiveness. One American study demonstrated that schools with nutrition councils made nutrient-poor, energy-dense vending machine fare much less available than schools without ($P=0.03$) (46).

In Canada, one study demonstrated that the implementation and maintenance of CSH nutrition programs in Nova Scotia was associated with only modest public costs (47).

NUTRITION STANDARDS

SNPs can encourage healthier dietary behaviours as part of broader CSH policies. Other CSH components, such as integrating nutrition education into school curriculums, are key to influencing behaviour change. SNPs should align with national initiatives, such as Canada's Food Guide (48), as well as provincial or territorial programs. Specifically, they should limit foods and beverages that are low in nutrients and high in calories, fat, sugar, and/or sodium (including fruit flavoured drinks, soft drinks, sports and energy drinks [49], and sweetened hot or cold drinks). Of note, the American Academy of Pediatrics (AAP) has also recommended reducing excess calories, solid fats, added sugars, and sodium in schools (50). The European Society of Pediatric Gastroenterology, Hepatology and Nutrition has recommended that sugar-containing beverages be replaced with water and that sweetened milk drinks or products be replaced with unsweetened milk drinks or products, with lactose up to the amount naturally present in milk (51).

While multiple factors contribute to childhood obesity, current evidence supports restricting SSBs in schools. One systematic review clearly associated increased consumption of SSBs with weight gain and obesity (52), a result that has been replicated many times since. A meta-analysis of 88 studies reinforced the clear association between increased soft drink consumption, increased energy intake, and body weight (53). In a sub-analysis of 33 studies, the same authors calculated a statistically significant effect size equivalent to 0.08 standard deviation (SD) change in BMI for each SD change in energy from SSBs.

A meta-analysis that included 30 RCTs and 38 cohort studies reported intake of free sugars and SSBs as critical determinants of body weight (54).

Experimental data has demonstrated that educating students around SSBs is associated with lowering consumption and with positive impacts on BMI. A cluster RCT enrolled 644 children (7 to 11 years old) in either a school-based education program to reduce carbonated drink intake (the intervention group) or a control group (55). The intervention group had a lower consumption of carbonated drinks over 3 days of 0.7 glasses (average 250 mL/glass) (95% CI 0.1 to 1.3) compared with the control group. At 12 months, there was a 7.7% (95% CI 2.2% to 13.1%) increase in overweight and obese children in the control group compared with the intervention group. Another study (56) randomized 103 adolescents (13 to 18 years old) who regularly consumed SSBs to intervention and control groups. The intervention group received home delivery of noncaloric beverages to displace SSBs. Consumption of SSBs over 25 weeks decreased by 82% in the intervention group but did not change in the control group. No significant change in BMI was noted between the two groups.

The evidence supports an association between the frequent consumption of SSBs and obesity. Data from 2015 indicated that SSBs contributed the largest proportion of sugar to the diets of Canadian children aged 2 to 8 years (21.8%) and youth aged 9 to 18 years (29.8%) compared with other sources of dietary sugar (23). Furthermore, overconsumption of SSBs among children and youth appears to displace milk, which is rich in calcium and vitamin D (57–60). Because SSBs are calorie-dense and nutrient-poor, there is no reason to support their availability in schools. The AAP has long recommended restricting access to SSBs in schools (60).

There are a range of recommendations and definitions for sugar. The National Academy of Medicine, recognizing that decreases in micronutrient intakes are greatest when added sugars exceed 25% of total calories, has suggested a more liberal, interim recommendation that snacks, foods, and beverages provide no more than 35% of calories from total sugars per packaged portion (59). In 2015, the World Health Organization (WHO) strongly recommended that adults and children limit their daily intake of free sugars (free sugars are added sugars and sugars naturally present in honey, syrups, fruit juices, and concentrates) to less than 10% of their total energy intake (61). In Canada, Nutrition Facts Panels on prepackaged foods and beverages will soon have to state a percent Daily Value (DV) for total sugars. A DV that exceeds 15% of total sugar per serving identifies products that are high in sugars (62).

SNPs should encourage consumption of whole, unprocessed foods in accordance with Canada's Food Guide (48). The aim of these policies is to reduce the presence and consumption in schools of ingredients of public health concern, namely saturated fats, sugars, and sodium (63).

SUMMARY

Schools provide a unique environment for ensuring that children have access to healthy foods. Ongoing development and implementation of SNPs can improve dietary behaviours and health outcomes in children and youth. Academic achievement can also be positively affected, although the data are mixed regarding this benefit.

An overriding principle of SNP should be the optimization of nutrient density (nutrients ingested per calorie) within the recommended calorie ranges. Such a strategy should focus simultaneously on reducing sodium, fat, and sugar as recommended in Canada's Food Guide, as well as promoting the choice of nutrient-rich foods and beverages. This approach will provide optimal energy and nutrient balance to support learning, activity, health, and growth. Aligning SNP guidance with Canada's Food Guide, involving all stakeholders, and ensuring that sufficient supportive resources are available are important for optimal implementation and outcomes.

RECOMMENDATIONS

The Canadian Paediatric Society supports the development and support of school nutrition policies (SNPs) as part of comprehensive school health (CSH) at the individual school, school board, and provincial/territorial level, depending on jurisdiction. The following actions can help lower BMIs, improve nutritional choices, and contribute to academic performance in Canada's children and youth:

- To optimize implementation, a multifaceted approach within a CSH framework is encouraged:
 - Establish a nutrition committee in every school or school board.
 - Increase children's consumption of nutrient-rich foods via targeted on-site programs.
 - Restrict on-site access to sugar-sweetened beverages and energy-dense, low-nutrient foods and beverages.
 - Promote healthier food choices as part of the regular curriculum.
- Apply sound nutritional principles (e.g., increasing nutrient-rich consumption and reducing sodium, fat, and sweetened beverage intake levels) to all on-site breakfast and lunch programs, vending machines, cafeteria food, tuck shops, and special events, such as fundraisers, festivals, concerts, and sport or game days.
- Educate and promote healthy eating behaviours and choices in accordance with Canada's Food Guide, while being sensitive to culture and local socio-economic needs and conditions.
- Involve dietitians, dental professionals, local health care providers, and parents on school nutrition committees and in SNP development and updates, curriculum-related activities, and community outreach.

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Principal author: Jeffrey N. Critch MD