Compliance with school nutrition policies in Ontario and Alberta: An assessment of secondary school vending machine data from the COMPASS study

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ABSTRACT

OBJECTIVES: We investigated the extent to which a sample of Ontario and Alberta secondary schools are being compliant with their respective provincial nutrition policies, in terms of the food and beverages sold in vending machines.

METHODS: This observational study used objective data on drinks and snacks from vending machines, collected over three years of the COMPASS study (2012/2013–2014/2015 school years). Drink (e.g., sugar-containing carbonated/non-carbonated soft drinks, sports drinks, etc.) and snack (e.g., chips, crackers, etc.) data were coded by number of units available, price, and location of vending machine(s) in the school. Univariate and bivariate analyses were undertaken using R version 3.2.3. In order to assess policy compliance over time, nutritional information of products in vending machines was compared to nutrition standards set out in P/PM 150 in Ontario, and those set out in the Alberta Nutrition Guidelines for Children and Youth (2012) in Alberta.

RESULTS: Results reveal a decline over time in the proportion of schools selling sugar-containing carbonated soft drinks (9% in 2012/2013 vs. 3% in 2014/2015), crackers (26% vs. 17%) and cake products (12% vs. 5%) in vending machines, and inconsistent changes in the proportion selling chips (53%, 67% and 65% over the three school years). Conversely, results highlight increases in the proportion of vending machines selling chocolate bars (7% vs. 13%) and cookies (21% vs. 40%) between the 2012/2013 and 2014/2015 school years.

CONCLUSION: Nutritional standard policies were not adhered to in the majority of schools with respect to vending machines. There is a need for investment in formal monitoring and evaluation of school policies, and the provision of information and tools to support nutrition policy implementation.

KEY WORDS: School nutrition; policy implementation; school health; built environment

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Obesity is a serious health issue worldwide and remains a leading public health priority. Despite increased investment in obesity-related prevention efforts, rates of obesity and overweight continued to rise between 2005 (19%) and 2014 (23%) among Canadian youth (aged 12–17 years).¹ Excess adiposity places individuals at greater risk of multiple morbidities, including type II diabetes, osteoarthritis, cancer, asthma, gallbladder disease, and chronic back pain.^{2,3} Few Canadian youth meet national nutritional guidelines,⁴ increasing their susceptibility to chronic disease later in life. For example, sugar and sodium intakes commonly exceed recommended levels, and most adolescents fail to consume adequate fruits and vegetables.⁵ Given the strong propensity for obesity and dietary habits to persist into adulthood, and the many adverse consequences, targeted interventions require careful planning and evaluation.⁶

Poor diet in children and adolescents presents itself through high dietary fat and sodium intake; low fibre, protein and low-calorie beverage intake; low frequency of breakfast consumption; skipping meals and purchasing meals away from home.^{7,8} Schools are important settings for health promotion interventions, given the large proportion of waking time youth

spend in school, the consumption of at least one meal and several snacks during the school day, and the potential for teachers and staff to model health behaviours.⁹ In addition, schools provide access to children and youth from all socio-economic backgrounds, including those disproportionately affected by obesity and poor nutrition. In this way, the support of families, schools and peers can help moderate health risk and protective factors within social environments that shape young people's health.¹⁰

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School interventions to promote healthy eating

Policy interventions can shape the circumstances and conditions that act as underlying determinants of health. In schools, nutrition policies aim to improve eating behaviours by using guidelines to elicit positive dietary change in students and improvements to the food environment.¹¹ They represent valuable frameworks to help schools facilitate planning, implementation and evaluation of coordinated nutrition guidelines.¹² However, Story et al.¹³ indicate that stronger nutrition policies are needed to provide healthier food options to students in school, and other strategies are required to limit students' access to low-nutrient, energy-dense foods (e.g., nutrition education curriculum standards, student nutrition programs, farm-to-school programs and school gardens).

A number of Canadian studies support the potential of policies to improve the school food environment and student health. For instance, examining school-level changes in British Columbia, Watts et al.¹⁴ found more elementary schools facilitating access to fruits and vegetables, and fewer secondary schools providing sugar-sweetened beverages, baked goods, French fries, chocolate/candy, etc. Results of a longitudinal study in Prince Edward Island¹⁵ indicated fifth and sixth graders were more likely to consume higher proportions of fruits and vegetables, and milk and alternatives, five years following implementation of a province-wide school nutrition policy. Likewise, in Nova Scotia, Fung et al.¹⁶ found increased reports of milk product consumption, in addition to reduced sugar-sweetened beverage intakes, suggesting a positive impact on energy intake and diet quality.

However, other research evaluating the implementation of school nutrition policies reveals several challenges. In Ontario, Vine and Elliott¹⁷ identified several barriers to successful policy implementation, including the cost of healthy food for sale, school proximity to fast-food outlets, and the role of stigma related to consumption of healthy foods. In response, Vine et al.¹⁸ recommended pricing strategies in school cafeterias to help facilitate access to healthy foods, in addition to supporting the context (e.g., eating spaces, time constraints) in which students eat. Similar barriers to policy adoption were identified in a survey of Alberta schools.¹⁹ While a number of studies across Canada have examined the success of school nutrition policy implementation, as measured by the availability of healthy foods in cafeterias and tuck shops (i.e., school stores), few have evaluated the extent to which school vending machines, specifically, are policy compliant.^{20,21} Further, research on implementation in the secondary school environment (grades 9–12) has been limited, and virtually absent from evaluations of vending machine contents in Ontario.

Given the challenges associated with evaluating province-wide healthy eating and physical activity policies in schools (i.e., based on variability in policy components, policy implementation), Ramanathan et al.²² highlight the value in matching Ontario public schools with out-of-province schools for indicators of overall policy effectiveness, and treatment-control comparisons.

School nutrition policies: Ontario and Alberta

The Ontario School Food and Beverage Policy (P/PM 150)²³ was developed by the Ministry of Education as a mandatory policy implemented across the province. Nutrition standards follow

Canada's Food Guide,²⁴ and are divided into four food groups. Food and beverage products in the *Sell Most* ($\geq 80\%$) category are the healthiest options, with lower amounts of sugar, fat and/or sodium, and higher levels of essential nutrients.²⁵ Foods in the *Sell Less* ($\leq 20\%$) category may have slightly higher levels of sugar, fat and/or sodium than food and beverages in the *Sell Most* category. Food and beverages that have few or no essential nutrients and/or that contain elevated levels of fat, sugar and/or sodium are *Not Permitted for Sale*. Nutrition standards for beverages are specific to secondary schools in Ontario, including that they not include caffeine; a detailed breakdown of nutrition criteria for food and beverages can be accessed online.²⁵ If a product was classified as *other*, or if products with one snack type were classified in multiple ways (e.g., nuts could be *Sell Most* (80% of all products) or *Sell Less* (20% of all products)), digital photographs of vending machines were assessed to code individual products. P/PM 150 guidelines permit schools to sell food and beverages exempt from the nutrition standards up to 10 days per school year.²³ It also advises schools to take into consideration: not offering students food and beverages as incentives, and offering food and beverages produced in Ontario. Schools were required to attest full compliance in 2011, and school boards were said to be responsible for monitoring implementation.

Conversely, Alberta has taken a voluntary approach with their provincial school nutrition policy, Alberta's Nutrition Guidelines for Children and Youth.²⁶ Guidelines are based on Canada's Food Guide²⁴ and were developed for application in: childcare facilities, schools, and recreation facilities and environments. Alberta school nutrition guidelines follow Canada's Food Guide groups,²⁴ including an identification system for: Category #1 – "Choose Most Often"; Category #2 – "Choose Sometimes"; and Category #3 – "Choose Least Often – Eating these foods is not recommended".²⁶ Beverages for sale in Alberta schools must comply with the following guidelines: access to water, refrigerated milk, fortified soy beverages, and 100% vegetable and fruit juices; a long list of beverages including caffeine are not permitted for sale in schools.²⁶

Research objectives

The objective of this research is to examine food and beverages available for sale in vending machines in secondary schools in Ontario (grades 9–12) that are participating in the COMPASS study: Shaping the direction of youth health by evaluating how Changes in policies, programs and resources in the school environment impact Obesity, Marijuana use, Physical activity, Alcohol use, Smoking and Sedentary behaviour of students over time. In doing so, we asked the following question: To what extent are Ontario and Alberta schools being compliant with their respective provincial nutrition policies, in terms of the food and beverages sold in vending machines?

METHODS

The COMPASS study (hereafter referred to as COMPASS) is a 4-year longitudinal study designed to collect hierarchical data from secondary school students and the schools they attend in Ontario and Alberta, Canada. The purpose is to examine youth health behaviour and how school policies, programs, and the built environment within and surrounding schools may affect student

health behaviours over time. The current study examines observational food and drink data from vending machines. A direct observation tool (Co-SEA) was used to measure aspects of the built environment within a school related to obesity, eating behaviour, and physical activity.²⁷ A full description of the COMPASS study and its methods is available in print²⁸ or online (www.compass.uwaterloo.ca). All procedures were approved by the University of Waterloo Office of Research Ethics and appropriate School Board committees.

Drawing on the Analysis Grid for Environments Linked to Obesity (ANGELO) framework²⁹ – a framework to conceptualize the health behaviour environment – the COMPASS study developed an audit instrument (School Policies and Practices Questionnaire (SPP)) to collect observational data in schools (based on the Endorse Study).³⁰ The instrument was designed to assess school facilities, including a pre-structured form with several components: school information, school building, nutrition, physical activity and school environment.³¹ The current study analyzed vending data collected as part of the audit assessment in order to assess policy compliance associated with vending machines.

Data coding

Vending machine contents were coded according to the number and price of each type of snack (e.g., chocolate bars, chips, crackers, cookies, cake products, fruits/vegetables, gum, candy, nuts, 100% fruit snacks, sandwiches, other) and drink (e.g., sugar-containing non-carbonated soft drinks, diet carbonated soft drinks, sport drinks, milk (plain), chocolate or other flavoured milk, 100% juice, water products, other) in vending machines. The number of vending machines and their location within the school were also recorded. Some schools appeared in the database at more than one time point. In other words, some schools participated in the study in Y₁, Y₂ and/or Y₃.

In order to assess policy compliance within and across years Y₁ (2012/2013), Y₂ (2013/2014) and Y₃ (2014/2015), nutritional information of products in vending machines was compared to nutrition standards set out in P/PM 150²³ in Ontario, and to those set out in the Alberta Nutrition Guidelines for Children and Youth (2012) in Alberta.²⁶ An inventory of vending machine items was developed through manual review of the nutrition facts of each product in order to decide into which category a product fit. Policy

compliance was unknown if the product and thus its nutrition facts could not be determined (e.g., photographs were missing from the data base, or blurry).

At Y₁, there were 43 Ontario secondary schools participating in the COMPASS study. At Y₂, the sample expanded to 79 Ontario schools (~9% secondary schools in Ontario), with an additional 10 schools from Alberta (~1% of high schools in the province). At Y₃, 78 Ontario schools and 9 Alberta schools participated, 2 schools having dropped out between Y₂ and Y₃. Of the schools from Ontario, 4 schools in Y₁ and 6 schools in Y₂ and Y₃ were privately funded. As these institutions are not subject to P/PM 150 guidelines, they were removed from the analysis. For additional details on the COMPASS school board and school recruitment, see reference 28 as well as online (<https://uwaterloo.ca/compass-system/publications#technical>).

Data analysis

Analyses were conducted using R version 3.2.3. Policy compliance was determined by aggregating all products being sold in vending machines within each school, and comparing these products with the relevant provincial policy. Compliance was also assessed at the vending machine level, where all products in each vending machine were compared to the associated policy. This method allowed us to understand how many of the vending machines in COMPASS schools were policy-compliant – i.e., containing more than 80% of products meeting the nutrition standards. Analyses were done for vending machines selling snacks, and drinks, at each time point. If a school had no vending machines, they were classified as being compliant with the provincial policy. Given the small number of schools in Alberta ($n = 10$ in 2013/2014 and $n = 9$ in 2014/2015), statistical testing for differences between the provinces could not be assessed. As such, results presented here are descriptive.

RESULTS

School-level results

At the school level, results indicate that the proportion of schools with policy-compliant snacks sold in vending machines in Ontario decreased between Y₁ (25%) and Y₃ (22%) (see Table 1), while the proportion of schools with non-compliant snacks vending machines increased by 10% between Y₁ (67%) and Y₃ (76%).

Table 1. Policy-compliant schools (all snacks and drinks sold in vending machines)

	Ontario			Alberta		
	Compliant <i>n</i> (%)	Non-compliant <i>n</i> (%)	Unknown* <i>n</i> (%)	Compliant <i>n</i> (%)	Non-compliant <i>n</i> (%)	Unknown <i>n</i> (%)
2012/2013						
All snacks	10 (25)	26 (67)	3 (8)	—	—	—
All drinks	12 (31)	27 (69)	0 (0)	—	—	—
2013/2014						
All snacks	19 (26)	54 (74)	0 (0)	4 (40)	6 (60)	0 (0)
All drinks	4 (5)	54 (74)	15 (21)	0 (0)	10 (100)	0 (0)
2014/2015						
All snacks	16 (22)	55 (76)	1 (2)	2 (22)	7 (78)	0 (0)
All drinks	4 (6)	60 (83)	8 (11)	1 (11)	8 (89)	0 (0)

* Unknown schools had no non-permitted products, but the proportion of products in other categories (e.g., "Sell Most") could not be determined with any certainty.

Table 2. Policy-compliant vending machines (snacks and drinks)

	Ontario			Alberta		
	Compliant <i>n</i> (%)	Non-compliant <i>n</i> (%)	Unknown* <i>n</i> (%)	Compliant <i>n</i> (%)	Non-compliant <i>n</i> (%)	Unknown <i>n</i> (%)
2012/2013						
All snacks	11 (22)	35 (68)	5 (10)	—	—	—
All drinks	38 (35)	69 (62)	3 (3)	—	—	—
2013/2014						
All snacks	11 (13)	72 (85)	2 (2)	0 (0)	9 (100)	0 (0.0)
All drinks	58 (32)	122 (68)	0 (0)	4 (15)	23 (85)	0 (0)
2014/2015						
All snacks	10 (12)	76 (86)	2 (2)	0 (0)	12 (100)	0 (0.0)
All drinks	57 (31)	127 (69)	0 (0)	1 (5)	20 (95)	0 (0)

* Unknown vending machines had no non-permitted products, but the proportion of products in other categories (e.g., "Sell Most") could not be determined with any certainty.

In Alberta, similar trends are evident with fewer policy-compliant snacks sold in vending machines between Y_2 (40%) and Y_3 (22%).

Results for snacks are consistent with those for drinks sold in vending machines (see Table 1). Specifically, the proportion of schools selling policy-compliant drinks in vending machines in Ontario declined between Y_1 (31%) and Y_3 (6%). In Alberta, results indicate a reduction in the proportion of non-compliant vending machines between Y_2 (100%) and Y_3 (89%); however, given the small number of schools, this should be interpreted with caution.

Vending machine-level results

At the vending machine level, overall trends are consistent with those at the school level (Table 2). The proportion of compliant snack vending machines in Ontario decreased over time (Y_1 : 22%; Y_3 : 12%), while the opposite is true for non-compliant snack machines, which increased by nearly 18% between Y_1 (68%) and Y_3 (86%). In Alberta, there were no compliant vending machines at either time point.

Results for drink vending machines were relatively consistent over time (see Table 2). There was a slight decrease in compliant drink machines between Y_1 (35%) and Y_3 (31%) in Ontario. In Alberta, there was a 10% increase in non-compliant drink machines between Y_1 (85%) and Y_3 (95%).

DISCUSSION

While schools were required to be in full compliance of provincial school nutrition policies by 2011, results of this study provide evidence that the majority of secondary schools in the COMPASS study remain non-compliant with respect to their vending machine contents, and longitudinal data suggest compliance has continued to decline over time. At the school level, the proportion of Ontario schools with non-compliant snack machines increased by 10% between Y_1 and Y_3 , and the proportion of compliant schools decreased by 3%. Trends were in the same direction among Alberta schools. In terms of school-level compliance for drink vending machines, a substantial decrease (25%) in policy-compliant Ontario schools was evident, while a 14% increase was observed for schools with non-compliant drink machines. In contrast, fewer Alberta schools contained non-compliant drink vending machines and more contained compliant machines over time. At the vending machine level, a 10% reduction in policy-compliant snack vending machines and an 18% increase in non-compliant machines was found in Ontario; whereas, no changes

were evident among vending machines in Alberta. Results exhibit a higher degree of consistency when drink vending machine data are examined. Between Y_1 and Y_3 , the Ontario results indicated a 4% decline in compliant drink machines and a 4% rise in non-compliant drink machines, with similar trends in Alberta. Results have implications for research, policy and practice.

Limitations

While this research provides valuable results and implications, there are two main limitations. First, in Ontario, P/PM 150 refers to "all products" sold in schools and as a result, foods that are sold in school cafeterias and tuck shops are not included in this analysis. This limitation means that we are not presenting the full story about school nutrition policy compliancy in secondary schools in Ontario. Second, given that some schools participated in all years, while others did not, the sample represents a mix of longitudinal and cross-sectional data. The authors are unaware of any statistical test that can handle data structured in this way, and therefore omitted statistical tests from this analysis. This would be an important next step in the future, as school nutrition policies change.

Implications for research

Results of this study signal a need for additional research in the area of vending machine policy compliancy and implementation in Ontario and Alberta. The focus of population health intervention research includes the study of policies or programs that mediate health risk by addressing underlying social, economic and environmental conditions.³² While the current research examines a health policy developed in the education sector, evidence is still unclear about its value and differential effect as a health-promoting intervention.³² Therefore, if these policies are intended to support behaviour change (e.g., healthy eating, reduction in sugar-sweetened beverages) at the school level, an advisable approach would be to embed behaviour change theory at the outset, during policy development.³³ Future qualitative case-study research to explore the policy implementation process would help to clarify the extent to which school nutrition policies are either supporting or hindering behaviour change.

Implication for policy

Not unlike findings from the US (2011)³⁴ and in Ontario^{17,18} that high-school vending machines continue to offer foods high in fat

and calories, these results may indicate that schools and school-level stakeholders are having difficulty interpreting Ontario's P/PM 150 policy. The policy itself appears to be confusing, and simplification and clarification may help to improve compliance in Ontario schools. Given that all publicly-funded schools in Ontario, across all 72 school boards, are required to comply with P/PM 150 in the sale of food and beverages, there is opportunity for policy-makers to provide additional instruction on specific policy subcomponents (i.e., nutrition standards for food and beverages, exemptions for special-event days, additional requirements). However, despite the fact that P/PM 150 is a mandatory policy, there is a lack of enforcement. In this context, it would be useful to bring together school and public health stakeholders for regular facilitated training sessions, in part to develop a strategy for local-level policy implementation, monitoring of implementation, and evaluation of health outcomes. Results are consistent with those of McKenna,¹² who found limited evidence regarding the impact of policy components on implementation and behavioural outcomes. However, findings from the US illustrate success in one school district four years after a healthy overhaul of vending machines to improve food and beverage offerings.³⁵ School and district wellness councils were also found to positively impact vending machine offerings in Minnesota middle and high schools.³⁶ This type of strategy may be useful in the Ontario secondary school environment.

Implications for practice

Findings support the need for school boards and schools to more fully engage public health dietitians in school nutrition planning and policy implementation. For example, teachers and administrators in schools might benefit from professional training in nutrition and nutrition policy implementation, including menu planning, food safety training, access to healthy foods, curriculum planning, and building community partnerships.^{37,38} Recent research³⁹ suggests barriers affecting implementation, including limited resources and volunteers, role/responsibility conflict regarding feeding of children, lack of communication with parents and students, and student food preferences – all of which may be at play in this study. McIsaac and others⁴⁰ report the value in having solid organizational capacity and political leadership, and a “school champion” to support school policy implementation. These types of strategies can be translated more specifically to vending machine policy compliance. Consistent with the World Health Organization's report, *Food and Nutrition Policy for Schools*,⁴¹ five steps for successful nutrition school policy implementation include: assembling a core action group; undertaking baseline assessment of nutrition in the school; developing a nutrition policy; designing an action plan; and implementing, monitoring and evaluating the action plan.

CONCLUSION

Nutritional standard policies were not adhered to in the majority of schools with respect to vending machines. There is a need for investment in formal monitoring and evaluation of school policies, and the provision of information and tools to support nutrition policy implementation.

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RÉSUMÉ

OBJECTIFS : Nous avons étudié la mesure dans laquelle un échantillon d'écoles secondaires de l'Ontario et de l'Alberta respectent la politique de nutrition de leur province respective en ce qui a trait aux aliments et boissons vendus dans des distributeurs automatiques.

MÉTHODE : Cette étude observationnelle a utilisé des données objectives sur les boissons et les collations des distributeurs automatiques recueillies sur une période de trois ans dans le cadre de l'étude COMPASS (années scolaires 2012-2013 à 2014-2015). Les données sur les boissons (boissons sucrées gazeuses/non gazeuses, boissons pour sportifs, etc.) et sur les collations (croustilles, craquelins, etc.) ont été codées selon le nombre d'unités en vente, leur prix, et l'emplacement du ou des distributeurs automatiques dans l'école. Nous avons mené des analyses univariées et bivariées à l'aide du logiciel R-3.2.3. Afin d'évaluer la conformité aux politiques au fil du temps, nous avons comparé l'information nutritionnelle des produits des distributeurs automatiques aux normes de nutrition établies dans la *Note de politique/programme n° 150* en Ontario, et dans les directives *Alberta Nutrition Guidelines for Children and Youth* (2012) en Alberta.

RÉSULTATS : Les résultats indiquent une baisse au fil du temps de la proportion d'écoles vendant des boissons gazeuses sucrées (9 % en 2012-2013 c. 3 % en 2014-2015), des craquelins (26 % c. 17 %) et des gâteaux (12 % c. 5 %) dans les distributeurs automatiques, et des changements incohérents dans la proportions des écoles vendant des croustilles (53 %, 67 % et 65 % sur les trois années scolaires). Par contre, les résultats indiquent des hausses de la proportion de distributeurs automatiques vendant des tablettes de chocolat (7 % c. 13 %) et des biscuits (21 % c. 40 %) entre les années scolaires 2012-2013 et 2014-2015.

CONCLUSION : Les politiques de normes nutritionnelles en ce qui a trait aux distributeurs automatiques n'ont pas été respectées dans la majorité des écoles. Il faudrait investir dans le suivi-évaluation officiel des politiques en milieu scolaire et fournir de l'information et des outils pour appuyer la mise en œuvre des politiques nutritionnelles.

MOTS CLÉS : nutrition en milieu scolaire; mise en œuvre de politiques; santé en milieu scolaire; environnement bâti