

A collection of red apples, some in sharp focus and others blurred, scattered across a white background.

**REPORT FOR**



Alberta Project Promoting  
active Living & healthy Eating

A collection of red apples, some in sharp focus and others blurred, scattered across a white background.

**June 2008**

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## Introduction

Our 10 talented APPLES Schools Health Facilitators were trained and prepared for their new jobs in November and December of 2007.

As of January 2008, the Health Facilitators were positioned full-time in 10 schools in the Edmonton area. In the first months they worked with a low profile to learn about the school community, staff and students, and to develop a strategic plan specific to their school. Following the pre-intervention evaluation in March 2008, the Health Facilitators were strategically and effectively implementing changes that lead towards a healthier school environment.

This report for April to June 2008 starts with a financial overview of the project and subsequently describes a few of the many highlights of the past months. Among the highlights is the APPLE Schools launch in April which was attended by an array of high profile attendees and garnered broad media attention. Shortly after the launch, Premier Ed Stelmach was present at the APPLE Schools launch at Lamont Elementary School in May 2008. As the project gains attention across the country, there also has been an increase in the partnerships developed across Canada and within each partnering school jurisdiction. The report concludes with examples of the exceptional work being done in each school.

## Progress to date:

Estimate Progress Towards Goal	~40%
Time Lapsed	~30%
Resources Consumed	~25%
Resources Committed	~76%
Consequential Financial Contributions	<ul style="list-style-type: none"> <li>• \$175,000 Government endowment for student scholarships (Alberta Advanced Education and Technology)</li> <li>• \$400,000 REAL Kids Evaluation (Alberta Health and Wellness)</li> <li>• \$100,000 to be spent from the Alberta Healthy School Community Fund to transfer knowledge between APPLE Schools and other school health projects</li> </ul>
Other Contributions	<ul style="list-style-type: none"> <li>• ~\$15,000 in donations from business, churches and parent groups</li> <li>• Office space and supervision of Facilitators in each school</li> <li>• Volunteers to support food preparations</li> <li>• Advisory committee involvement by 14 top researchers in Alberta</li> </ul>



## Launch of the APPLE Schools Project

On April 28, 2008 Holy Cross Académie Internationale hosted the launch of the APPLE Schools Project. Banners, a new logo, background information documents and other materials were prepared for this event in partnership with the communications department of the School of Public Health. This well-attended launch provided a forum for Edgar Schmidt, Superintendent of Edmonton Public Schools to speak on behalf of the five participating school jurisdictions and Palma Covelli, Principal of Blessed Kateri School, to speak on behalf of the 10 APPLE Schools. Roger Palmer, Dean of the School of Public Health, brought an inspirational message to the standing-room-only event and reminded the facilitators of their role as agents of social change.

Students are the centre of all that is done at APPLE Schools, so a highly personable Grade 6 student from Blessed Kateri School acted as the master of ceremony for the launch. Students from Grades 1 and 5 were selected by Holy Cross to participate in a healthy snack activity. The launch was intended to increase the profile of the project in the media. This was accomplished with excellent coverage provided through a front page article in the Edmonton Journal newspaper; news casts on CFRN, Global, CBC and City TV; and a two-part CBC Radio interview. Many local papers also have published articles highlighting the APPLE School in their region and copies can be provided upon request.

*"...kids come to school with either too little or too much energy."*

EDGAR SCHMIDT  
Superintendent, Edmonton Schools



*"... it is so easy to eat unhealthy when unhealthy foods are all around us."*

PREMIER ED STELMACH



Premier Ed Stelmach attended and spoke at the APPLE Schools launch project at Lamont Elementary School that is located in his riding. The Premier appeared well informed and spoke publicly in support of APPLE Schools. He requested that his office be updated on the project's progress and specifically indicated that he was interested in a cost-effectiveness analysis whereby program costs are weighted against reduced future health care costs. We are committed to honor his requests.

## Increased Profile

We are honored by the number of requests that have been received by Dr. Paul Veugelers and Marg Schwartz to meet with partners such as Participaction, Dr. Mark Tremblay from Statistics Canada, Active Healthy Kids Canada and Dr. Claire Leblanc from the Stollery Children's Hospital. As well, there have been presentations requested, and made, at national and international conferences such as the School Health Conference hosted by the Canadian Association for School Health in Gatineau/Ottawa and the International Society of Behavioural Nutrition and Physical Activity in Calgary. We are booked to make presentations at the Greater Edmonton Teachers' Convention and various professional development days in neighboring school jurisdictions. We have received requests from Prince Edward Island, New Brunswick, Manitoba and British Columbia to partner with other research interventions or to provide program information. The APPLE Schools Project has certainly made an impression in Canada.

The Alberta government understands the exceptional work the School of Public Health is doing in the school community to address children's nutrition and health. As a result, they have provided a \$175,000 endowment for student scholarships.

The APPLE Schools Project is the impetus to a development of knowledge and expertise surrounding childhood nutrition within the School of Public Health. As such it directly influences \$3 million of government funding by having Ms. Schwartz represent the School of Public Health on the Alberta Healthy School Community Fund Selection Committee. Over \$2.7 million have been allocated over the past year to school communities across Alberta. The most

recent result of Ms. Schwartz's involvement includes a \$100,000 allocation to bring together all of the comprehensive school health projects in Alberta, including APPLE Schools, to learn and share from one another. This learning experience will build increased capacity across all school-related projects in Alberta and is a value-added event for APPLE Schools.

### **Evaluation Expansion: REAL Kids Alberta**

Due to the outstanding research Dr. Veugelers has conducted in the area of school nutrition and health, Alberta Health and Wellness awarded him \$400,000 to study the developments in APPLE Schools relative to that in a sample of 200 randomly selected schools across the province. The schools will be considered control schools for the evaluation and form the pool of candidate schools for the future expansion of the APPLE Schools project. The evaluation was administered parallel to that of the APPLE Schools and involved over 3500 Grade 5 students, their parents and school principals.

Alberta Education values the work of Dr. Veugelers and, in particular, his recent publications on diet quality and school performance (see appendix 1). The Ministry has approached Dr. Veugelers to collaboratively study the impact of the APPLE Schools projects and other provincial initiatives on student learning.

### **A Prestigious Initiative**

The strength of the partnership between the APPLE Schools Project and the participating school jurisdictions has increased over the past few months. This was demonstrated by:

- Requests by the school trustees to have Dr. Veugelers and Ms. Schwartz present at board meetings. The presentations provided an opportunity to:
  - increase the boards' knowledge related to Dr. Veugelers's work (i.e., his most recent work showing proper nutrition not only benefits health but also learning. See Appendix 1),
  - share the rationale for the project,
  - keep the boards abreast with what is happening in each school, and
  - demonstrate the project commitment to the schools in each jurisdiction.
- The four Principals of the schools in Edmonton Public Schools have noted that their annual presentations to the school board members now include a great deal of discussion related to APPLE Schools. The board members are very keen to hear of the positive work resulting from this project.
- Edmonton Public Schools has recently passed a motion to implement a no junk food policy. The manager tasked with developing and implementing the policy has asked to partner with APPLE Schools to help provide examples of promising practices to support the policy and act as leaders within their school jurisdiction.
- School jurisdictions have requested presentations from APPLE Schools be made at their district professional development days in the fall to share promising practices with other schools within their jurisdictions.



## Individual School Successes

There is a lengthy list of activities happening in the 10 schools. The featured activities are focused on healthy eating, but an equal number of physical activity examples can be found in the reports submitted by the Facilitators and are available upon request.

At the launch, each school was presented with an APPLE vase full of fresh apples. The vase sits in a prominent location in the schools and usually 25 – 30 apples are consumed each day. This means over 1250 students, parents and staff are receiving additional fruit on a weekly basis. The success of this small gesture is impressive and many of the principals have been amazed at the number of students who are regularly eating apples as a result of our program.





# EDMONTON PUBLIC SCHOOLS



## Lee Ridge Elementary School

This very high needs school is situated in an older section of Millwoods in Edmonton. A large portion of the school population is socioeconomically-disadvantaged and the school provides support for students having both emotional and learning challenges. Jenn Patrick is housed in her “Healthy Living Headquarters” at Lee Ridge and has developed a very positive working relationship with the Principal. Together, they have done an outstanding job of reaching parents, students and teachers at this special school. Examples of nutrition-focused activities include:

- Reaching parents through “Sugar Shocker” and “Portion Wise” displays provided by the local health authority, monthly newsletter articles, presentations at the Kindergarten open-house, and handouts provided for parents on how to prepare affordable healthy snacks and lunches.
- Connecting with the local school nurse and health unit staff, Big Brothers/Sisters Coordinator, Kids in Action Coordinator and the snack food Coordinators. The School Health Nurse was included at the “Mission Nutrition Team Hunt”, that replaced a traditional Easter egg hunt.
- The school chose the theme of “Feed Your Brain” for Education Week. Activities included messaging about healthy eating and active living displayed through a door decorating contest for each classroom and a twist on the “DEAR concept” – Drop Everything and Read which became Drop Everything and Run.
- Tracking lunches through a “catch a kid eating healthy” campaign. This was positively received and prizes for participation a nutritious snack sampling day for the class who had the most children bringing fruits and vegetables in their lunches.
- Receiving donations from local churches and businesses to provide a snack and hot lunch program.
- Replacing unhealthy snacks like sugared drinks and ‘freezies’ with frozen yogurt tubes and 100% juice at school events, such as the track meet.

*“The excitement around nutrition and health continues to grow as the school becomes more involved in the project.”*

TEACHER





## **Bannerman Elementary School**

Bannerman is a K – 6 School with an all-girls academy for Grade 7 – 9 students. The location of the school in North East Edmonton draws students from the catchment area of Clareview in one of the most multi-cultural, socioeconomically-disadvantaged communities in Edmonton. The school has embraced their Facilitator, Sara Brown, who was recently met at the door of the gymnasium with chants of “MISS SA-RA, MISS SA-RA”. Samples of initiatives include:

- A nutritious snack day with an all green snack on St. Patrick’s Day (a skewer of pea pods, spinach leaves, honeydew melon, avocado and green apples).
- Using frozen yogurt tubes instead of ‘freezies’, as a snack during the Jump Rope for Heart event.
- Providing a health snack before Grade 3 and 6 Provincial Achievement Test exams.
- The Principal expressing an interest in offering fresh fruit smoothies to students who are celebrating their birthday at school. Blenders will be purchased for this purpose.
- A strong focus on physical activity including a weekly Fitness Wednesday event for all classes to participate in a 30 minute motivating fitness circuit.
- Creating a Healthy School staff committee that meets regularly to help set direction for activities within the school.
- A descriptor of APPLE Schools is included within next year’s student agenda.

*“I cannot get over the number of apples consumed on a daily basis in our school. This project is helping to teach and feed our students.”*

PRINCIPAL



## 3 Sifton Elementary School

This growing North East Edmonton School is a multi-cultural school with a strong, child-centered approach to learning. Lisa McLaughlin has provided a spark in this unique school that is appreciated by all. The Principal is extremely committed to his students and supports Lisa at every opportunity. Highlights of the activities at Sifton include:

- Monthly bulletin boards focused on a variety of healthy living topics.
- Daily announcements include a “health tip” or nutrition trivia with weekly prize draws for classes who answer each day’s trivia correctly.
- A monthly column in the school newsletter called “A Bite of Health” providing information for parents on topics such as healthy portion sizes and ideas for healthy snacks and lunches.
- Collaboration with the local health authority to provide the “Sugar Shocker” and “Portion Wise” displays at the school’s Celebration for Learning as an activity to reach parents.
- Creating the resource “Pizza: A Grate Family Activity” with tips for parents on how to make healthy, whole-wheat pizza in a variety of creative ways.
- Developing “Healthy Eating on a Shoestring” handout for parents.
- Providing popsicles made from pure, unsweetened applesauce as a fundraiser for the Breath of Hope walk/run.
- Organizing a school-wide “Walk to the Olympics” challenge to encourage daily physical activity among students and staff, and their families.
- Initiating a playground program in which student leaders teach games to other students during recess.

*“Many of our Behavioural Learning students now bring healthy lunches and are avid label-readers. We have a policy of no junk food in our classroom.”*

TEACHER



## 4 Belmead Elementary School

Belmead is a relatively small school in the west end of Edmonton serving a high-density and large aboriginal population. There is an autism program and several behaviour classes at Belmead. Erin Wright is the Facilitator and her warm and caring personality has provided support to this school in many ways. APPLE Schools projects at this school include:

- Recipes and healthy messages in all school newsletters.
- All students, staff and parents received copies of Canada's Healthy Eating Guidelines and Physical Activity Guides.
- A free breakfast and activity break offered to grade 3 and 6 students during their provincial exams.
- Charting students' lunches focusing on a different food group each month.
- Grade 1 and 2 students receiving a fruit tasting prize. This event was implemented by exploring the fruits using a variety of senses; e.g., smell, touch
- Cool Treats on Friday's has been changed from Dairy Queen Dilly Bars to smoothie popsicles made from yogurt, fruit and 100% juice. They are sold out each week and students are requesting more!

*"My favorite moments include the red shining faces of students as they come in from recess after using their new playground equipment, seeing the reaction and facial expressions of a Grade 1 student trying star fruit for the first time and watching the grade 6 students lead the whole school in activities. These are all really positive images for me and movements in the right direction."*

FACILITATOR



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## St. Benedict School

St. Benedict School shares a playing field and demographics with Belmead School. This close proximity allows Billy Smale, the Facilitator at St. Benedict to work closely with Erin Wright on various projects, including staff wellness events. A few highlights from St. Benedict include:

- A special event day focused on the banana! This day included banana-inspired games and bananas and yogurt served to every student. The banana theme reached the homes as well and parents have reported increased incidence of banana consumption.
- Creation of a Health Hut to provide students with healthy snacks that they could purchase during recess.
- Students purchased over 500 healthy items each week and the Health Hut was open 4 recesses per week.
- Newsletter articles and bulletin boards dedicated to healthy eating and active living.
- Billy is an accomplished competitive skipper and there is a noted increase in physical activity opportunities at St. Benedict School.
- Monthly inservicing of teachers at each staff meeting has allowed an increased understanding of quality curriculum materials available to the teachers.
- Displays for parents were created to increase knowledge about low-nutrient foods as well as distributing the *My Amazing Little Cookbook* from Alberta Health and Wellness to parents.



*“During the first recess the Health Hut was open we sold everything that we prepared for four recesses! It was mayhem! Kids waited in line for 15 minutes to get carrot sticks, snap peas, yogurt tubes and cheese strings! It was pretty great.”*

FACILITATOR





## Blessed Kateri

Blessed Kateri is a beautiful school in the south east corner of Millwoods in Edmonton. The school is very active and was very keen to support the project. The staff and students at this school have embraced their Facilitator, Tina Kunec with open arms and supported a wide array of activities in the past 5 months. Some examples of activities in this school include:

- Newsletter articles sent to parents including topics on Fantastic Fibre, Milk Spirit Week, Healthy Recipes, Summer Active idea, Healthy Snack suggestions, as well as school wide events.
- Displays for parents during the Demonstration of Learning events at the school. Canada's Food Guides to Healthy Eating and Physical Activity were distributed, *My Amazing Little Cookbook*, parent-focused handouts and materials regarding APPLE Schools were also disseminated.
- Discussing and planning for the implementation of the new Alberta Health and Wellness Nutrition Guidelines at the Parent Advisory Council.
- Creating a teacher-directed physical activity video featuring chair aerobics lead by the teachers. Very positive feedback was provided by students and teachers. Video is available upon request.
- Fat Wise Lesson was presented to Grade 4 students.
- Healthy snacks replaced junk food at the family dance; e.g., 100% juice instead of pop, air popped popcorn, fruit smoothie pops instead of chocolate bars and chips.
- Milk Spirit week to increase the milk and milk products consumed by students (74% of students do not consume the recommended number of daily servings.)
- A three thousand dollar donation from the parent council to support healthy activities in the school.

*"The schools annual Fun Day will have a lunch with whole wheat buns, vegetables, frozen yogurt, milk and 100% fruit juices instead of donuts, candy and pop."*

FACILITATOR







## Holy Cross

Holy Cross is a K – 9 Catholic French Immersion school currently undergoing accreditation to become an International Baccalaureate school. The catchment area for this specialized school covers a large portion of the west side of Edmonton and provides the opportunity to engage a diverse school community in this initiative. Andrew McCloskey was selected for Holy Cross because he speaks French well enough to participate in this French immersion environment. All staff meetings are conducted in French and bulletin boards, displays or class materials must be produced in French. Andrew has risen to the additional challenge of working in a second language and samples of the good work being done at Holy Cross include:

- Working with the local vending machine companies in partnership with the school jurisdiction staff to try to ensure that only healthy food choices are available in the vending machines. This is a complicated issue that is being addressed as a district and Andrew has been very involved in the process.
- Preparing a presentation for the parent fundraising group that includes alternative means of raising funds that do not involve junk food.
- Holding a Snack Shack event for the Junior High School students that featured 100% healthy food items and was extremely successful, receiving ample media coverage. See attached menu example.)
- Hosting the APPLE Schools launch with the School of Public Health. This included organizing the Facilitators to prepare all of the food, coordinating the student nutrition activity, and arranging and student ambassadors to assist with the event.
- Creating a Family Health Extravaganza event which brought together over 200 families to participate in 8 activity stations with a final station being a “make-your-own smoothie” station. Resource tips sheets on healthy snacks and lunches, as well as other nutrition resources were provided for parents. All facilitators came to the school to help Andrew organize this very successful event.
- The Student Council regularly holds bake sales to raises funds for various projects. In the letter home to parents requesting baked goods for the April bake sale, parents were requested to consider using recipes that contained whole wheat flour, rolled oats, or fruit. One parent sent fresh strawberries!

- A section of next year’s student agendas will be dedicated to the APPLE School project.

*“I think the school should have healthy food choices so that you aren’t forced to buy unhealthy things.”*

GRADE 9 GIRL



## Lamont Elementary School

Lamont Elementary School is about 50 minutes outside the Edmonton city limits situated east of Ft. Saskatchewan. This small town of 1500 people hosts the site of a very vibrant school. The Facilitator, Chandra Smith, has not only integrated beautifully into the school, she has also integrated into the community with partnerships including the town council and Elk Island National Park. The Principal of the school has been exceptionally welcoming and the relationship between Chandra and her Principal is quite amazing. Chandra is moving from her office into a classroom in the near future where her progressive nutrition-oriented programs can be expanded. Activities to date include:

- Creating a Green eyed Monster event on St. Patrick's Day where students got stickers for bringing green snacks.
- Healthy snack passports were created for Division 1 students who got a sticker for each healthy snack they brought to class. Once the passport was filled they entered it into a draw. The Division 2 students had a tougher passport that challenged them to complete their passport by meeting specific criteria; (e.g., my snack was a dark orange vegetable).
- Instead of a DEAR program (Drop Everything and Run or Read), Lamont School chose to Drop Everything and Snack.
- The Facilitator is trying to implement a "reverse lunch" program which allows students to go outside for activity prior to eating their lunch. This has proven to be a positive program in other areas of the country and one that supports healthy eating habits as well as an increase in physical activity.
- The breakfast program that was run at the school prior to the inception of APPLE schools lacked nutritional focus. With Chandra's help, the breakfasts now contain two to three food groups per meal.
- Instead of chocolate and candy on the staff room tables, you are more likely to find hummus and fresh veggies; hot dog days have been changed and even active field trips snacks of apples and cheese strings are being provided.
- An at-risk female student at the school wrote the following poem which was presented over the intercom (see insert).



**APPLE Schools Rock**

**A**pples are healthy  
**P**reparing for a healthy future  
**P**retty good tasting ideas  
**L**earning how to make healthy choices  
**E**asy to follow

**S**pecial people involved  
**C**reative ideas  
**H**elping us students  
**O**n going service  
**O**n the internet  
**L**ife Style choice  
**S**mart thing to do

**R**eal people helping out  
**O**ff the charts cool  
**C**ompliments I give to you  
**K**ids for the future



## Lamont Elementary School...continued

Chandra conducted some in-house surveys as a reflection of her work. Survey results from Lamont Schools indicated that parents feel student have become more aware of what they eat at all times. Staff members reported that students are bringing healthier food to school and that more of the food is being consumed with less garbage being created. The students are very aware of healthy snacks and can critique each others snacks. Staff also reported that students are more focused in the afternoon, more active at recess and demonstrate more excitement about nutrition education in class. The biggest reported challenge for the program at Lamont remains reaching parents.





**ELK ISLAND  
CATHOLIC SCHOOLS**

Elk Island Catholic Separate Regional Division No. 41

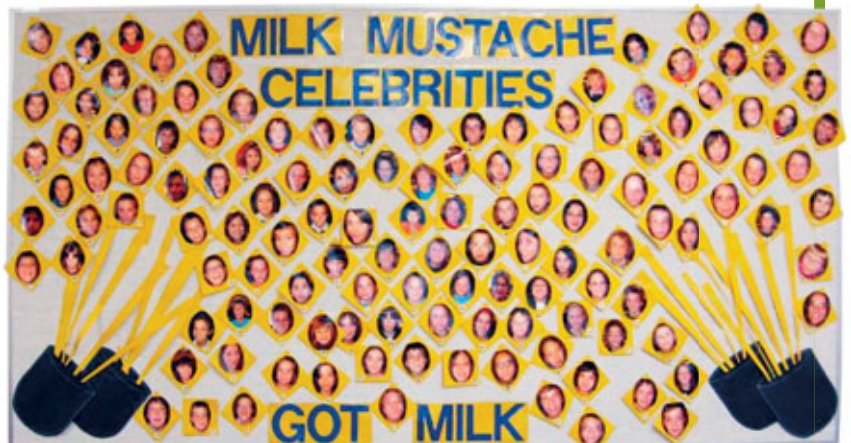


## St. Luke School

St. Luke is a small rural K-9 school located close to the shores of Cooking Lake. The school is unique in design and has provided a welcoming home for Kristi Jones. Kristi and her Principal, Gordon Marshall are quite a team and it was very difficult to narrow the list of accomplishments at this school to a few bullets. So far, one article has been published in the local newspaper with more articles and media coverage to come, as there is great interest in what is happening at St. Luke!

The school has:

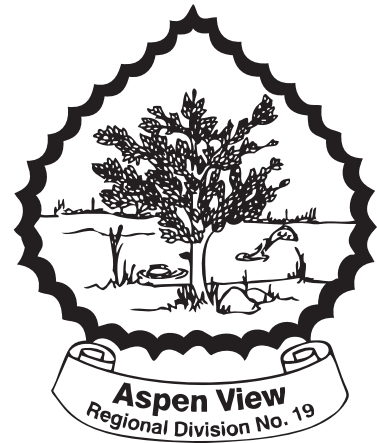
- Introduced the Power to Play nutrition education program developed by Alberta Milk. As part of this program, Kristi had the classes create a cartoon with a healthy food superhero defeating a junk food nemesis as a fun way to engage the students.
- Monthly bulletin board displays were supported with classroom materials and mini-lesson plans so the teachers could provide supportive lessons during a Health or Physical Education class.
- The Positive Parenting Program offered by the Guidance Counselor will now contain healthy eating and active living components.
- Dietetic Interns from the University of Alberta, Department of Agriculture, Food and Nutritional Sciences will be providing support to the APPLE Schools project over the summer and into the fall. The interns will be working in other APPLE Schools as well as St. Luke.
- Kristi is very connected to the School Health Team at the Strathcona Health Unit. Together, they are developing a Health Fair for the St. Luke School community on a variety of health topics to run in the upcoming school year (and as an annual event).
- A Milk Mustache Contest was open to any student or staff member who was willing to make the biggest milk mustache possible while drinking their milk. Pictures of each participant were displayed on a bulletin board in the lunch room for all to vote on the best mustaches!
- Changes in attitudes of staff have been evidenced in their requests for healthy foods to be served at all school events.
- The Alberta Centre for Active Living is creating an article in response to the Alberta Health and Wellness Nutrition Guidelines and has asked Kristi to be interviewed as part of this article. This interview will take place in early fall.





## Landing Trail Intermediate School

Landing Trail houses a large population of over 400 students from Grades 4 – 7 located in Athabasca, Alberta. Carey Lee Gordon is exceptionally qualified for the role of facilitator and holds a degree in Education and is a registered Dietitian. There is opportunity for growth in this school community and Carey Lee has been busy implementing the following initiatives:



- Monthly newsletter topics for parents include building healthy lunches, the importance of providing breakfast and nutrition considerations for sporting activities.
- Nutrition Month bulletin boards that included comparisons of fat and sugar in store-bought and home made lunches.
- Tracking charts were situated in each classroom (18 classes) so students and teachers could increase awareness and reinforce the messages from the bulletin boards.
- Conducting nutrition lessons for health classes using interactive, stimulating activities.
- Presenting nutrition information for parents at Parent Advisory Committee meetings.
- Organizing a Grade 5 *Make your Own Snack* following a swimming activity. An article featuring this activity appeared in the Athabasca Advocate.
- Created a Healthy Apples Committee comprised of parents, students, community stakeholders, teachers and administrators to help develop a healthy active school.
- A morning snack program has been very successful in feeding between 100-120 students each day.
- Wednesday have been declared Parfait Days with yogurt, fresh fruit and granola. Staff are even bringing money to buy any extra parfaits.

*“Students are asking to volunteer to help with the snack program.”*

TEACHER





## Summary

APPLE Schools are well on their way to success. There has been great excitement across the province for the project over the past few months. Because there were a large number of provincial stakeholders involved in the training of the Facilitators, this leads to a great increase in awareness across the province and indeed the country. The Facilitators were sent to their respective schools after their extensive six-week training program and were well received in each school. The pre-intervention research was completed, a very successful launch occurred and much media has been generated as a result of the launch.

The uniqueness and importance of the APPLE Schools Project both provincially and nationally has been demonstrated through requests for presentations, participation on committees, research agendas, as well media requests. The Facilitators have all become respected staff members who are valued by the entire school community. Comments by parents, principals, school trustees, MLA's and students are overwhelmingly positive.

We can expect outstanding events in the future as the schools begin the process of assessing the health of their school community through the Healthy Assessment Tool for Schools (HATS) and then developing an action plan based on the results. The HATS tool has been developed in partnership with Ever Active Schools, Alberta Education, the School of Public Health and the Alberta Regional Professional Development Consortia.

This project is unique in Canada and is being watched across the country. There has never been another project that provides every support necessary to the schools in order to implement change. We anticipate a very productive summer and an outstanding start to the school year in September 2008. APPLE Schools are definitely making the healthy choice the easy choice.



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## RESEARCH ARTICLE

# Diet Quality and Academic Performance\*

MICHELLE D. FLORENCE, MSc, PDt<sup>a</sup>  
MARK ASBRIDGE, PhD<sup>b</sup>  
PAUL J. VEUGELERS, PhD<sup>c</sup>

## ABSTRACT

**BACKGROUND:** Although the effects of nutrition on health and school performance are often cited, few research studies have examined the effect of diet quality on the academic performance of children. This study examines the association between overall diet quality and academic performance.

**METHODS:** In 2003, 5200 grade 5 students in Nova Scotia, Canada, and their parents were surveyed as part of the Children's Lifestyle and School-performance Study. Information on dietary intake, height, and weight and sociodemographic variables were linked to results of a provincial standardized literacy assessment. Diet Quality Index—International was used to summarize overall diet quality. Multilevel regression methods were used to examine the association between indicators of diet quality and academic performance while adjusting for gender and socioeconomic characteristics of parents and residential neighborhoods.

**RESULTS:** Across various indicators of diet quality, an association with academic performance was observed. Students with decreased overall diet quality were significantly more likely to perform poorly on the assessment. Girls performed better than boys as did children from socioeconomically advantaged families. Children attending better schools and living in wealthy neighborhoods also performed better.

**CONCLUSIONS:** These findings demonstrate an association between diet quality and academic performance and identify specific dietary factors that contribute to this association. Additionally, this research supports the broader implementation and investment in effective school nutrition programs that have the potential to improve student access to healthy food choices, diet quality, academic performance, and, over the long term, health.

**Keywords:** nutrition and diet; child and adolescent health; public health.

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\*Indicates CHES and Nursing continuing education hours are available. Also available at: [www.ashaweb.org/continuing\\_education.html](http://www.ashaweb.org/continuing_education.html)

## LITERATURE REVIEW

The academic performance of children impacts their future educational attainment and health and has therefore emerged as a public health concern.<sup>1</sup> Generally, as levels of education increase, there is an associated increase in income and social status.<sup>2</sup> This associated increase in socioeconomic status affects health by influencing access to health care, quality of housing, work environment, lifestyle factors, such as nutrition and recreation, and social psychological factors, such as self-esteem and health awareness.<sup>3</sup> Given the demonstrated importance of academic performance and resulting educational attainment to future health, it is imperative to understand the determinants of school performance. A number of factors are recognized as affecting school performance including gender, ethnicity, quality of school and school experience, nutrition, child health, and socioeconomic factors.<sup>4</sup> This paper focuses on the importance of nutrition, specifically overall diet quality, to academic performance.

In past decades, poor diet, characterized by excess intake of dietary fat and refined sugars and inadequate intake of fruits, vegetables, and whole grains, has been identified as one of the primary mechanisms underlying the rising prevalence of overweight and obesity in school-age children.<sup>5,6</sup> The prevalence of childhood overweight and obesity is particularly high in North America and more specifically in the province of Nova Scotia where the prevalence of childhood overweight is significantly higher than the national average.<sup>7-9</sup> Examination of the prevalence of overweight among grade 5 students in Nova Scotia indicates that 32.9% of students were at risk for overweight, with 9.9% being overweight.<sup>10</sup> The diminishing diet quality and increasing body weights among children draw renewed public health attention to the effects of diet on academic performance and future health.

The relationship between diet and academic performance is often stated; however, few studies have examined the effects of diet quality on academic performance. Studies of nutrition and academic performance have typically focused on hunger, malnutrition, and micronutrient deficiency.<sup>11-13</sup> Undernourished children have been shown to have decreased attendance, attention, and academic performance as well as experience more health problems compared to well-nourished children.<sup>11,14</sup> More recently, studies have examined the impact of breakfast on cognition, behavior, and academic performance of school-age children.<sup>11,15-17</sup> This research suggests some positive effect of breakfast on performance of specific cognitive tasks.<sup>11,16,17</sup> However, gaps exist in the literature examining the long-term effects of breakfast on school performance and how the observed effects of breakfast

on cognition are modified by age, sex, and nutritional status.<sup>11,17</sup> The single study not restricted to breakfast demonstrated a positive association between the consumption of regular meals and school performance.<sup>18</sup>

The predominant approach to studying diet has focused on the role of individual nutrients or foods.<sup>19</sup> However, individuals do not consume single nutrients but combinations of foods.<sup>20</sup> In recognition of the multidimensional nature of diet, studies of the interrelations of nutrition and health have examined the effects of overall diet quality using summary measures of food and nutrient intake.<sup>20,21</sup> The current study employs such an approach to investigate the association between diet quality and academic performance in a sample of 5200 grade 5 students in the province of Nova Scotia, Canada.

## METHODS

### Subjects

The 2003 Children's Lifestyle and School-performance Study (CLASS) is a large study of health, nutrition, physical activity, school performance, and socioeconomic determinants among grade 5 students in Nova Scotia, Canada, where 98.4% of students attend public school.<sup>22</sup> Of the 291 Nova Scotia public schools with grade 5 classes, 282 (96.9%) participated in the recruitment of participants by distributing a consent form and short survey to parents. Parental consent was received for 5517 students, giving an average response rate of 51.1% per school. Trained CLASS representatives visited participating schools during school hours to administer a survey on children's activities and a modified version of the Harvard Youth/Adolescent Food Frequency Questionnaire (YAQ).<sup>23</sup> Height and weight of participating students were also measured by CLASS representatives in a discreet manner behind a mobile screen in student classrooms. Height was measured to the nearest 0.1 cm after students had removed their shoes and body weight to the nearest 0.1 kg on calibrated digital scales. Generally, the administration of the surveys and measurement of heights and weights took less than 45 minutes to complete. Further details on the conduct of the CLASS are provided elsewhere.<sup>10,24,25</sup>

**Ethics Approval.** This study, including the informed consent procedure, was approved by the Health Sciences Human Research Ethics Board of Dalhousie University. Informed consent was obtained from parents before the participation of their children.

### Instruments

**Assessment of Diet Quality.** The YAQ is a validated food frequency questionnaire suitable for grade 5 students. Information obtained from the YAQ allows calculation of student's intake of foods from

recommended food groups as well as energy and nutrient intakes. On the basis of the latter, we calculated the Diet Quality Index—International (DQI-I), a composite measure of diet quality.<sup>26</sup> A composite measure of diet quality is preferable to multiple analyses of nutrients and food groups.<sup>20,21</sup> The DQI-I overall score ranges from 0 to 100, with higher scores indicating better diet quality. Further information on the development, validation, and scoring of the DQI-I is available elsewhere.<sup>21,26,27</sup>

The DQI-I has been demonstrated as an effective means of cross-national comparisons of diet quality.<sup>26</sup> However, it has been suggested that DQI-I scoring is more in line with US recommendations, and therefore, DQI-I interpretations should be carefully interpreted in other countries where dietary recommendations are based on existing food patterns that are different from those in the United States.<sup>28</sup> In order to provide a comparative measure of overall diet quality, the Healthy Eating Index (HEI), an alternative measure of diet quality, was also calculated based on YAQ responses.<sup>29</sup>

In addition to examining the association between overall diet quality and academic performance, it is also valuable to determine which specific aspects of diet quality are most important to academic performance. The DQI-I was chosen as it encompasses adequacy, variety, balance, and moderation as components of diet quality and provides a score for each.<sup>26</sup> The association between each of these DQI-I component scores and academic performance was examined independently. The dietary adequacy component of the DQI-I represents the intake of foods and nutrients essential to a healthy diet such as fruits, vegetables, grains, dietary fiber, protein, iron, calcium, and vitamin C. Intake of less healthful dietary components such as saturated fat, salt, and “empty calorie foods” is reflected in the DQI-I moderation score. The DQI-I variety score reflects the diversity of foods in the diet, whereas overall dietary balance, in terms of the proportion of energy intake from carbohydrate, fat, and protein, is indicated by the DQI-I balance score.<sup>26</sup>

Increased consumption of fruits and vegetables and moderate fat intake are considered as indicative of high-quality diet and are emphasized as part of the total diet approach to improving nutrition among children.<sup>5,20</sup> In order to determine their specific associations with academic performance, the number of servings of fruits and vegetables and percentage of caloric intake from dietary fat were examined independently. With the exception of DQI-I balance component score, which had a skewed distribution, diet quality indicators were considered as tertiles.

**Assessment of Academic Performance.** The Elementary Literacy Assessment is a standardized test administered by the Nova Scotia Department of Education in the fall of 2003. The assessment was administered approximately 6 months following the CLASS

survey when participating students were enrolled in grade 6. Completion of the assessment required students to read a variety of materials and answer written questions based on those readings. Materials included a short story, information texts, a poem, and a visual media text. Reading and writing assessments were marked centrally by a team of experienced grade 6 teachers under the supervision of the Nova Scotia Department of Education. Both individual- and school-level test results were linked to the CLASS database and were considered in the present study. Data available from the Nova Scotia Department of Education included individual results as a dichotomous outcome (pass/fail) for both the reading and the writing assessments. At the student level, academic performance was treated as a dichotomous variable with good academic performance defined as passing both the reading and the writing assessments and poor academic performance as failing either the reading or the writing assessment or both. Of the 4966 grade 5 students remaining after exclusion for outlying observations for energy intake, 4589 (92.4%) were successfully linked with the Elementary Literacy Assessment. At the school level, the percentage of students passing both assessments was a marker of performance.

**Assessment of Other Covariates.** At risk for overweight and its more severe form, overweight, were defined using the international body mass index cutoff points established for children and youth by the World Health Organization’s International Obesity Task Force.<sup>30</sup> The Nova Scotia public school system is administered through 7 school boards, 1 of which did not allow height and weight measurements to be taken. For the 816 students without these measurements, weight status was considered as a missing category. Sociodemographic factors including student gender, urban or rural residency, parental marital status, education, and income were assessed using the questionnaire completed by parents of the participating students. Age was not considered as a covariate as the vast majority of grade 5 students were either 10 or 11 years old at the time they completed the CLASS survey. School neighborhood income was estimated by averaging postal code-level estimates of household income, available through Census Canada, of students attending that particular school. School neighborhood average income was divided into tertiles for analysis.

#### Data Analysis

Multilevel logistic regression was used to examine the associations between indicators of diet quality and academic performance. Multilevel methods account for the clustering of student’s observations within schools and allow for quantification of second-level factors such as neighborhood income and school-level



academic performance. Gender of the student and parental marital status, income, and educational attainment were considered as first-level covariates. Odds ratios and 95% confidence intervals are presented for all analyses. Missing values for all covariates were considered as separate categories, but their estimates are not presented here.

Of the 5517 children who received parental consent, 5200 completed the YAQ. We excluded 234 (4.5%) students with outlying observations based on energy intakes less than 500 kcal or greater than 5000 kcal/day in accordance with established recommendations for outliers in nutritional research.<sup>31</sup> Following established recommendations, all analyses involving dietary factors were adjusted for energy intake.<sup>31</sup> Examination of cross-level interactions revealed no significant effects. All analyses were performed using the HLM6 (Scientific Software International, Inc., Lincolnwood, IL) software program.

**Response Weights.** Evaluation of nonresponse was conducted using postal code–level estimates of household income available through Census Canada for participating and nonparticipating grade 5 students. As participation rates were slightly lower in residential areas with lower postal code–level estimates of average household income, weighting factors were constructed to adjust for this difference. These weighting factors were used in all statistical analyses in order to adjust for nonresponse and provide provincial estimates.

## RESULTS

Information on the sociodemographic characteristics of study participants is presented in Table 1. Of the 4589 students with complete information on diet quality and school performance, 875 (19.1%) failed 1 or both of the components of the literacy assessment. Table 2 presents unadjusted results for DQI and other dietary indicators on school performance. The overall diet quality scores ranged from 26.0 to 86.0, with an average score of 62.4. Students reporting increased diet quality were significantly less likely to fail the literacy assessment. Relative to students in the lowest DQI-I tertile, students in the second and third tertiles were 26% and 41% less likely to fail. Variety and adequacy rather than moderation and balance were the DQI-I components most significantly associated with academic performance. Students with an increased fruit and vegetable intake and lower caloric intake of fat were significantly less likely to fail the assessment. Analysis of HEI, an alternative summary measure of diet quality, yielded results similar to the association between DQI-I and academic performance.

Relative to girls, boys were twice as likely to fail their literacy assessments (Table 3). Increased parental income and educational attainment were sig-

**Table 1. Weighted Prevalence Estimates of Sociodemographic Characteristics of Participants in the CLASS\***

Independent Variable	No. of Students	%
Gender		
Female	2386	52.1
Male	2193	47.9
Urban/rural residence		
Rural	1485	32.4
Urban	3094	67.6
Parental marital status		
Married or common law	3415	74.4
Separated or divorced	491	10.7
Single or widowed	215	4.7
Preferred not to answer	468	10.2
Parental education		
Secondary or less	1217	26.6
Community college	1567	34.2
University	969	21.1
Graduate university	383	8.4
Preferred not to answer	444	9.7
Annual household income (\$)		
<20,000	371	8.1
20,000–40,000	762	16.6
40,000–60,000	918	20.0
>60,000	1396	30.5
Preferred not to answer	1133	24.8
School neighborhood average income		
First tertile (lowest)	1621	35.4
Second tertile	1413	30.9
Third tertile (highest)	1546	33.7

\*The findings originate from 4589 students participating in the 2003 CLASS and are weighted for nonresponse to reflect provincial estimates.

nificantly associated with decreased odds of poor academic performance. Parental marital status was also associated with academic performance: those children living in a lone-parent household had increased odds of failing 1 or both assessments. Students attending school in an urban area were significantly less likely to fail than those living in rural areas. Additionally, school neighborhood income was found to be significantly associated with academic performance. Children living in neighborhoods with increased average income levels were less likely to fail 1 or both assessments. Meanwhile, children attending schools with a poorer average performance on the literacy assessment had significantly increased odds of failing the assessment.

Adjusting for differences with respect to gender, parental income and education, and school, students in the second and third DQI-I tertiles were, respectively, 18% and 30% less likely to fail the literacy assessment (Table 3). Parental education and income remained significantly associated with students' academic performance. Overall school performance continued to be strongly associated with student's academic performance. Urban or rural residence, weight status, and marital status of parents were not independently associated with academic performance after adjustment.

**Table 2. Indicators of Diet Quality and Associations With Poor Academic Performance: Unadjusted Odds Ratios and 95% CIs**

Independent Variable	Odds Ratio (95% CI)
DQI- <sup>26</sup> overall score	
First tertile (lowest)	1
Second tertile	0.74 (0.61-0.90)
Third tertile (highest)	0.59 (0.48-0.72)
DQI-I variety score	
First tertile (lowest)	1
Second tertile	0.71 (0.58-0.88)
Third tertile (highest)	0.67 (0.54-0.83)
DQI-I moderation score	
First tertile (lowest)	1
Second tertile	0.85 (0.68-1.06)
Third tertile (highest)	0.80 (0.63-1.02)
DQI-I balance score	
<1	1
≥1	1.13 (0.97-1.33)
DQI-I adequacy score	
First tertile (lowest)	1
Second tertile	0.52 (0.43-0.64)
Third tertile (highest)	0.30 (0.22-0.41)
HEI- <sup>29</sup> score	
First tertile (lowest)	1
Second tertile	0.76 (0.63-0.92)
Third tertile (highest)	0.54 (0.44-0.67)
Percent energy from fat	
First tertile (lowest)	1
Second tertile	1.32 (1.11-1.59)
Third tertile (highest)	1.43 (1.20-1.72)
Fruit and vegetable intake	
First tertile (lowest)	1
Second tertile	0.66 (0.55-0.79)
Third tertile (highest)	0.60 (0.47-0.75)
Iron intake	
First tertile (lowest)	1
Second tertile	0.68 (0.54-0.84)
Third tertile (highest)	0.60 (0.42-0.84)

CI, confidence interval.  
 All odds ratios are adjusted for energy intake following established recommendations.<sup>31</sup>  
 Findings presented are adjusted for nonresponse.  
 The findings originate from 4589 students and their parents participating in the 2003 CLASS.

## DISCUSSION

These findings demonstrate an independent association between overall diet quality and academic performance among grade 5 students in Nova Scotia, Canada. Dietary adequacy and variety were identified as specific aspects of diet quality important to academic performance, thereby highlighting the value of consuming a diverse selection of foods in order to meet the recommended number of servings from each food group. Additionally, fruit and vegetable consumption and dietary fat intake, 2 critical nutritional concerns among children,<sup>5</sup> were demonstrated as important to academic performance. The contribution of diet to academic performance is frequently stated; however, the focus of much of the research has been on hunger, malnutrition, micronutrient deficiency, and the effects of breakfast on cognition. In separate

**Table 3. Diet Quality, Weight Status, and Sociodemographic Characteristics: Associations With Poor Academic Performance**

Independent Variable	Odds Ratio (95% CI)	Multivariate Odds Ratio (95% CI)
DQI-1 overall score*		
First tertile (lowest)	1	1
Second tertile	0.74 (0.61-0.90)	0.82 (0.67-1.00)
Third tertile (highest)	0.59 (0.48-0.72)	0.70 (0.56-0.88)
Gender		
Female	1	
Male	2.04 (1.75-2.93)	2.16 (1.82-2.57)
Urban/rural residence		
Rural	1	
Urban	0.70 (0.58-0.85)	
Weight status*		
Normal	1	
At risk for overweight	1.09 (0.91-1.32)	
Overweight	1.41 (1.10-1.81)	
Parental marital status		
Married or common law	1	
Separated or divorced	1.17 (0.94-1.47)	
Single or widowed	1.72 (1.27-2.34)	
Parental education		
Secondary or less	1	1
Community college	0.79 (0.67-0.92)	0.90 (0.75-1.08)
University	0.34 (0.28-0.43)	0.44 (0.33-0.57)
Graduate university	0.39 (0.29-0.53)	0.55 (0.39-0.78)
Annual household income (\$)		
<20,000	1	1
20,000-40,000	0.63 (0.48-0.82)	0.73 (0.54-0.97)
40,000-60,000	0.38 (0.29-0.50)	0.50 (0.37-0.67)
>60,000	0.30 (0.23-0.39)	0.50 (0.38-0.67)
School-level academic performance		
<10% failure	1	1
10-19% failure	2.10 (1.71-2.60)	1.82 (1.45-2.29)
20-29% failure	3.65 (2.89-4.63)	2.77 (2.12-3.61)
30-39% failure	7.41 (5.37-10.24)	5.63 (3.95-8.64)
School neighborhood average income		
First tertile (lowest)	1	
Second tertile	0.86 (0.68-1.10)	
Third tertile (highest)	0.63 (0.50-0.79)	

CI, confidence interval.  
 \*Odds ratios are adjusted for energy intake following established recommendations.<sup>31</sup>  
 Findings presented are adjusted for nonresponse.  
 The findings originate from 4589 students with available information on weight status and academic performance participating in the CLASS.

reviews, Taras and Rampersaud conclude that the provision of a healthy breakfast through school breakfast programs is effective in improving cognitive functioning and academic performance, especially among undernourished populations.<sup>11,16</sup> This study extends current knowledge in this area by demonstrating the independent importance of overall diet quality to academic performance and by identifying specific dietary factors that contribute to the association between nutrition and academic performance. The consistency of this association across various indicators of diet quality gives emphasis to the importance of children's nutrition not only at breakfast but also throughout the day.

Academic performance influences future educational attainment and income, which, in turn, affect

health and quality of life.<sup>2</sup> The socioeconomic benefits of educational attainment carry forward to future generations as children from socioeconomically advantaged backgrounds are more likely to succeed in school. Moreover, as increased levels of educational attainment and income facilitate increased understanding of nutrition messages and access to healthy food,<sup>24,32,33</sup> children from socioeconomically advantaged families are more likely to consume healthy diets. Increased diet quality among these children will provide further benefit to their academic performance and, in terms of health, contribute to healthy child development, which influences health throughout the life course. In addition, healthy eating behaviors adopted in childhood are likely to continue through adolescence and adulthood and result in decreased risk of chronic diseases.<sup>34</sup> Alternatively, children from socioeconomically disadvantaged backgrounds are more likely to have poor diets and poor academic performance resulting in lower levels of educational attainment and poorer health outcomes. Over time, the cyclical and compounded effects of socioeconomic factors and diet quality on academic performance may contribute to future increases in socioeconomic disparities in health. This research supports previous research demonstrating that academic performance varies according to the student's gender and that male students are more likely to perform poorly in terms of literacy.<sup>4</sup> This relationship has been observed as steady across different levels of socioeconomic status.<sup>4</sup>

In light of the current childhood overweight epidemic and underlying poor dietary habits, prevention is a public health priority. Our findings suggest enhanced learning as an additional benefit of a healthy diet in childhood. In a review of overweight and student school performance, Taras and Potts-Datema note the consistency of the association between childhood overweight and poorer levels of academic achievement.<sup>35</sup> Clearly, overweight results from an imbalance between diet and physical and sedentary activities, and thus, each of these lifestyle factors may hold an association with academic performance. However, in the present study, weight status was not independently associated with academic performance when the associations between diet quality, socioeconomic factors, and academic performance were considered. The lack of an independent association of weight status suggests that underlying diet quality may be largely contributing to the previously observed association between childhood overweight and academic achievement. School-based programs that promote healthy eating and physical activity may therefore be effective in both preventing childhood overweight and improving academic performance.<sup>25,36</sup> Our findings further highlight the importance of promoting dietary adequacy and variety, increased fruit and vegetable intake, and moderate consumption of dietary fat as

key nutrition messages for school-based programs and policies.

This study involved a population-based sample in a relatively homogenous setting where almost all elementary school children attend public schools that are similarly funded. The high response rate, relative to other school-based surveys requiring parental consent, and the use of a weighting factor in analyses to adjust for nonresponse bias should be considered as strengths. Conversely, the rate of nonresponse does introduce the potential for bias of results. Systematic differences between responders and nonresponders other than income may introduce bias, which would adversely affect the results and limit the generalizability of the findings.

Our analyses were adjusted for various confounders, most importantly socioeconomic confounders; however, we may not exclude confounding by factors that were not considered. The consistency of the relationship between diet quality and academic performance across the various indices of diet quality is a further strength of the present study. A variety of outcomes for academic performance have been examined in the research.<sup>11,16,35,36</sup> This study is unique in that it linked nutritional information with census-level data and standardized test results, minimizing bias in the assessment of academic performance. However, this study is limited by the extent to which 2 standardized tests accurately measure academic performance. The nutritional information was collected using the YAQ, a validated food frequency questionnaire suitable for this age-group; however, self-administered responses remain subject to error. Results of this study highlight the associations between diet quality and academic performance. However, the direction of these associations cannot be ascertained from a cross-sectional study. Interpretation of the demonstrated association between diet quality and academic performance is based on the literature surrounding this association and related theory that led to the development of the research objectives. In order to demonstrate the temporal sequence of the relationship, further longitudinal research examining diet quality and academic performance would need to be conducted. These strengths and limitations should be considered when interpreting the present findings and making comparisons with other studies.

In summary, we demonstrated that, above and beyond socioeconomic factors, diet quality is important to academic performance. This association is important to children's future educational attainment and herewith future income, socioeconomic status, and health. These findings support the broader implementation and investment in effective school nutrition programs<sup>25</sup> that have the potential to improve student's diet quality, academic performance, and, over the long term, their health.

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REPORT FOR



Alberta Project Promoting  
active Living & healthy Eating

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