



Translation of school-learned health behaviours into the home: student insights through photovoice

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Received: 13 September 2018 / Revised: 22 April 2019 / Accepted: 23 May 2019 / Published online: 15 July 2019
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Abstract

Objective Sedentary behaviours, physical inactivity, and poor diets in Canadian children are a major public health problem. Comprehensive school health (CSH) recognizes the importance of school and home collaboration; however, it is unknown how health behaviours promoted in school are adopted at home. The purpose of this research was to explore student perceptions of the translation of an intervention taking a CSH approach in Alberta, Canada, into the home environment.

Methods The guiding method was focused ethnography, using photovoice as the data generation strategy. Grades 5 and 6 students were purposively sampled ($n = 25$), and asked to take photos of what CSH looks like in their home environment. Subsequent one-on-one interviews were conducted as part of the photovoice process to gain a deeper understanding of student perceptions.

Results Two main themes emerged: students embraced the CSH philosophy, and students are driving change to create a healthy home culture. The underlying concept of leadership and independence was necessary for students to impact their health and the health of family members. Results demonstrated that students are catalyzing positive changes in the home environment by supporting changes in the home food environment, trying new things, facilitating improvements to healthy eating and active living, and monitoring unhealthy behaviours.

Conclusion This study illustrates students' abilities to positively impact the home environment as a result of their involvement in CSH. Student leadership and independence should be promoted and emphasized in CSH to facilitate transition of health behaviours into the home environment.

Résumé

Objectif Les comportements sédentaires, l'inactivité physique et la mauvaise alimentation constituent un grave problème de santé publique chez les enfants canadiens. L'approche globale de la santé en milieu scolaire (AGSS) reconnaît l'importance de la concertation entre l'école et la maison, mais on ignore si les comportements de santé promus à l'école sont adoptés à la maison. Notre étude visait à explorer les perceptions d'élèves de l'Alberta, au Canada, à l'égard de l'application dans leur milieu de vie d'une intervention axée sur l'AGSS.

Méthode Nous avons fait appel à l'ethnographie ciblée et utilisé des données produites par la méthode *Photovoice*. Nous avons demandé à un échantillon délibéré d'élèves de 5^e et de 6^e année ($n = 25$) de prendre des photos pour illustrer l'AGSS dans leur milieu de vie. Par la suite, nous avons mené des entretiens en personne, conformément à la méthode *Photovoice*, pour approfondir notre compréhension des perceptions des élèves.

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Résultats Deux grands thèmes sont ressortis : les élèves ont adopté la philosophie de l'AGSS, et ils et elles sont des moteurs de la création d'une culture de santé à la maison. Les notions sous-jacentes de leadership et d'indépendance ont été nécessaires aux élèves pour influencer leur propre santé et celle des membres de leur famille. Les résultats obtenus montrent que les élèves apportent des changements positifs dans leur milieu de vie en favorisant la transformation de leur environnement alimentaire à la maison, en essayant de nouvelles choses, en facilitant des améliorations axées sur l'alimentation saine et la vie active, et en surveillant les comportements nuisibles pour la santé.

Conclusion Notre étude montre que les élèves peuvent avoir une influence positive sur leur milieu de vie en participant à l'AGSS. Le leadership et l'indépendance des élèves sont des valeurs à promouvoir et à souligner dans l'AGSS pour faciliter le transfert des comportements de santé dans le milieu de vie.

Keywords Comprehensive school health · Nutrition · Physical activity · Children · Qualitative research · Photovoice

Mots-clés Approche globale de la santé en milieu scolaire · Nutrition · Exercice physique · Enfant · Recherche qualitative · Photovoice

Introduction

Health behaviours related to healthy eating and active living (HEAL) among Canadian children are a major public health concern, as research suggests diets, physical activity, and sedentary behaviour levels fall short of national guidelines (Canadian Society for Exercise Physiology 2019; Health Canada 2019). National guidelines from Health Canada (Canada's Food Guide) and the Canadian Society for Exercise Physiology (Canadian 24-Hour Movement Guidelines) provide evidence-based guidelines for optimal diets, physical activity, sedentary behaviour, and sleep in order for Canadian children and youth to achieve optimal health outcomes. Meeting HEAL guidelines can be challenging due to a complex interplay of factors (e.g., socio-economic, geographic, access, availability); however, they are important references to promote healthy growth and development. In regard to settings, the home and school are recognized as influential in shaping children's health behaviours (Epstein 2011). Parents are typically responsible for food purchasing, meal selection, preparation, and the home food environment (Couch et al. 2014), and parental role modelling, food preferences, and involvement of children in meal preparation have been shown to influence child food choices (Faught et al. 2015). Previous research has demonstrated that parental encouragement and engagement in physical activity results in higher reported child physical activity (Vander Ploeg et al. 2012). Outside of the home, children obtain a significant amount of their daily physical activity during school hours (Dessing et al. 2013), as schools provide opportunities for children to be physically active during recess, physical education class, organized sports, and before and after school. Schools also shape children's food choices, as many schools run breakfast or lunch programs, and operate canteens. School districts may also implement nutrition policies, and have nutrition education within curriculum (Alberta Education 2002).

The comprehensive school health (CSH) framework is an international approach to health promotion in schools, with principles rooted in the World Health Organization's Ottawa Charter for Health Promotion. CSH aims to foster the development of sustainable healthy school communities using a multifaceted, intersectoral approach which is adapted to fit the local school context (Storey et al. 2016; World Health Organization 1986). A defining feature of CSH is that schools are encouraged to assess their needs and cater the planning, implementation, and evaluation of their initiatives to meet their unique wellness goals (Storey et al. 2016). CSH recognizes the importance of ensuring health behaviours are sustained beyond the school, and aims to unite efforts across the home, school, and community. This approach promotes a strong community of care to support student achievement and well-being (Epstein 2011; Langford et al. 2015), as opposed to a deficit-based model which often results in feelings of blame and shame among students and their families. Although CSH aims to support families, involvement is often cited as challenging (Langford et al. 2015). Given the importance of school and home environments and the capacity for the child to translate learning between these settings, it is necessary to better understand how children's school-learned behaviours can impact the home. Therefore, the aim of this study was to utilize students' perspectives to understand how participation in a project taking a CSH approach, A Project Promoting healthy Living for Everyone in Schools (APPLE Schools), impacts health behaviours in the home.

Methods

This research was guided by CSH and is based on the socio-ecological model which proposes that individual, interpersonal, community, and organizational factors have direct and indirect influences on health. While CSH (and the socio-ecological model) provided context, the research

remained inductive. A constructivist perspective informed this research, which aligned methodologically given the study consisted of an exploration of student constructions of their lived experiences at home and in an APPLE School (Mayan 2009). Consistent with the participatory nature of both the method and data generating strategy, a subjectivist epistemology was employed with the belief that the researcher and participants were co-creators of knowledge and understanding due to the researcher's relationship with the APPLE Schools management team and the intensive multi-step data collection strategy as described below. Focused ethnography (Higginbottom et al. 2013) was the method used, and data was generated using photovoice. Like traditional ethnographies, focused ethnographies aim to describe culture by gaining in-depth perspective about a group of people by learning from them. However, focused ethnographies are framed within a discrete community, phenomenon, and context (Higginbottom et al. 2013). Focused ethnography was chosen given that the research explored unique experience of youth translating school-learned health behaviours at home in the context of their APPLE School. Photovoice was used for data generation and is a participatory approach which utilizes photos to tell a story or capture visual understandings of an individual's lived world (Wang and Burris 1997). Through photo-taking, participants are given a voice to address personal issues and catalyze change (Wang and Burris 1997). Photovoice is well suited and has been frequently used in research involving children (Heidelberger and Smith 2015; Postma et al. 2014; Wang 2006). Photovoice was appropriate, methodologically aligned, and provided a means to explore the relationship between APPLE Schools and the home environment while giving a voice to elementary students in a reflective and participatory manner (Wang and Burris 1997). Photovoice stages were followed using a modified version of the acronym SHOWeD to ensure interview questions were appropriate for youth. Three qualitatively trained researchers conducted the interviews; a single researcher completed the analysis. Peer debriefing with research team members and the APPLE Schools management team was employed. Photobooks were given to each participating school to share findings.

Setting: APPLE Schools

Within the province of Alberta, Canada, the CSH framework informs the intervention of interest: APPLE Schools. APPLE Schools is a registered charitable organization promoting healthy school communities since 2008 and currently works with student populations in 70 schools across northern and rural Alberta, Northwest Territories, and Manitoba (APPLE Schools 2018). Of note, APPLE Schools strategically aims to work with school communities that are in greatest need of HEAL supports (APPLE Schools 2018). All schools have a

consistent philosophy: “promoting healthy kids in healthy schools” by “inspire[ing] and empower[ing] school communities to lead, choose, and be healthy”. The intention is for these efforts to result in “sustainable changes to school, home, and community environments” (APPLE Schools 2018). A unique feature of APPLE Schools is the allocation of dedicated staff time in the form of a school health facilitator (SHF) in each school. The SHF role is to facilitate the development and implementation of CSH using a school-specific wellness plan, which considers the unique economic, socio-cultural, political, and physical context of each school community. Previous research evaluating the effectiveness of APPLE Schools has determined that improvements in students' physical activity occur during and after school hours (Vander Ploeg et al. 2014); however, the broader mechanisms of how these behaviours translate into the home have yet to be explored. Examining how students translate health behaviours acquired at an APPLE School into the home environment is vital to understanding the strengths and impact of the project and the CSH approach.

Participants

Purposive sampling was used to identify 25 grades 5 and 6 student participants from three APPLE Schools to gather insight about APPLE Schools and its reach into the home (Higginbottom et al. 2013). While saturation determined sample size (Mayan 2009), it was estimated based on previous photovoice research with school-aged children that 20 to 30 participants would be required (Wang 2006; Mayan 2009). With only one classroom per grade in the participating APPLE Schools, this translated to three schools. The researcher worked with the APPLE Schools project manager to identify schools that had capacity to take on the research project and were located in an urban setting in close proximity to the research institution. Students were 9–11 years old ($n = 13$ males), and most students ($n = 19$) were in the fifth grade (1 grade 5 class, 2 grade 5/6 split classes). Children of this age have developed the cognitive ability to be active participants in research (Riding and Mathias 1991). Students had attended an APPLE School for various lengths of time ranging from a few months to 6 years, and came from diverse home settings (i.e., place of dwelling, number of siblings, caregiver).

Procedure

To introduce the project and develop rapport with the students, the researcher facilitated a classroom session with support of the classroom teacher. Students were asked to brainstorm what their APPLE School looked like by writing words and drawing pictures independently, in small groups, and as a class. The researcher explained in lay terms the intent of the project and the students' roles as experts. Students were given single-use

disposable cameras and asked to take photos to answer the question “What does APPLE Schools look like in your home?” Students had 1 week to take at least 20 photos. They were instructed that there were no wrong answers and they would have a chance to discuss the photos with the researcher afterwards. Due to ethical requirements, students were advised not to take photos of people, including themselves. Upon returning their cameras, students received a copy of their photos to keep. To maintain inclusivity, all students were given a camera and photo-taking instructions. Only consenting students partook in interviews. Of the 69 students invited, 32 consented and 25 participated in all aspects of the project (school A = 12, school B = 8, school C = 5). Reasons consenting students did not participate included not returning cameras within the allotted timeframe and student absence on interview day.

Aligned with photovoice and the participatory nature of the project, interviews involved three stages of sharing (Wang and Burris 1997). Selection: students chose 5–6 photos that they wished to discuss in the interview. Contextualization: students answered a series of questions to contextualize their photos. Questions were a modified reflection of the photovoice mnemonic SHOWeD: Why did you take this photo? What do you see here? What is *happening* here? How does this relate to *our* lives (at home/at school)? Why do you have/do this in your home? Has something you learned in school influenced you to *do* this? (Wang 2006). Codifying: students grouped their photos into similar ideas, and were asked to give a title to each photo.

Within 3 weeks of interviews, the researcher reviewed all photos and transcripts to identify preliminary results. The researcher then presented the findings to each of the three participating classes to allow for member-checking by the students. Sessions were informal and interactive; students were encouraged to provide feedback and suggestions regarding the researcher’s interpretations.

Data analysis

Interviews were audio recorded and transcribed verbatim. Following transcription, the researcher began preliminary analysis by reading each interview and recording initial thoughts. This served to identify emerging findings, which were shared and discussed during member-checking with students. Subsequent analytic steps, as per focused ethnographic inductive data analysis, are outlined in the following five steps. (1) Coding for descriptive labels: coding was done manually by highlighting and writing notes, summarizing initial segments of data, and providing descriptive labels (Miles and Huberman 1994; Mayan 2009). The researcher took an inductive approach in that no a priori framework was used to guide analysis. Initial codes were used in the member-checking sessions, and included general ideas such as teaching family about healthy eating, and being a leader. NVivo analytic

software was used to organize codes into larger groupings (nodes), which aimed to further reduce the number of analytic units (Miles and Huberman 1994). (2) Sorting for categories: nodes were sorted and grouped into larger categories (Mayan 2009). (3) Identification of negative cases: negative cases were identified and discussed in detail with the research team (Miles and Huberman 1994). (4) Generalizing the constructs (theming): theming involved aligning and grouping categories together by identifying if and how categories were interconnected. (5) Memoing: memoing was employed throughout and allowed the researcher to capture ideas, organize thoughts, and reflect upon emerging themes. Memos and field notes were referred to during analysis to incorporate additional contextual information (Higginbottom et al. 2013).

Rigour

To establish the trustworthiness of the data, the criteria of credibility, transferability, dependability, and confirmability were used (Guba and Lincoln 1982). Credibility was established through member-checking and researcher familiarization with APPLE Schools. To promote transferability, purposive sampling of students with varied school-level demographics was employed. Dependability was ensured by maintaining methodological congruence, documenting decisions, reflective journaling, and peer debriefing. The analytic process involved a dynamic integration of categorizing and theming (Mayan 2009). As such, the concluded results were identified through constant revisiting of categories and the progression of analysis through knowledge generation (Higginbottom et al. 2013), enhancing the confirmability of inferences drawn.

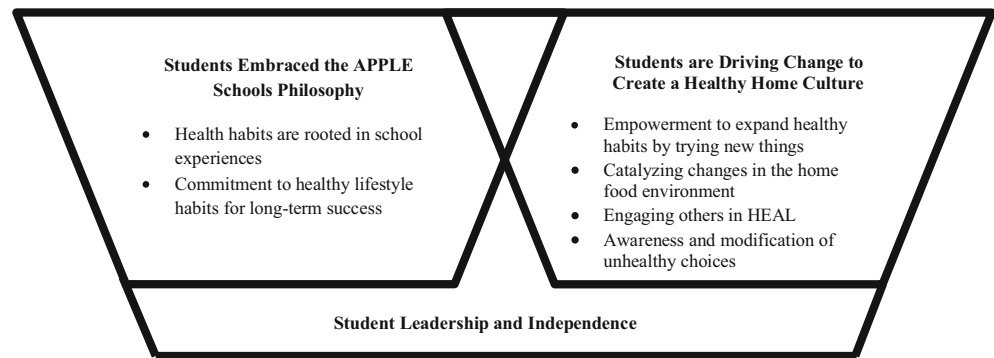
Results

The data revealed two major themes: (1) *students embraced the APPLE Schools philosophy* and (2) *students drive change to create a healthy home culture* as a result of their involvement in an APPLE School. Underlying both themes was the concept of *student leadership and independence* (Fig. 1).

Student leadership and independence

Results suggested that students served as leaders and their perceived independence drove behaviours, actions, and decisions in the home. Student leadership pertained to the students’ perceived ownership of their behaviours and actions in order to ensure they made informed decisions. Independence was evident in that students indicated they possessed the knowledge, autonomy, and confidence to independently manoeuvre through decision-making processes and justify their choices based on their values. Leadership and independence were identified as foundational concepts by

Fig. 1 Results of a photovoice project examining the impact of APPLE Schools on the home environment



the students, and are therefore present in all aspects of the subsequent two themes. Students reported a “take charge” attitude which drove them to maintain school-learned behaviours in their homes, and this was reflected in the health behaviours they reported. As one student described:

[Figure 2 depicts] being proactive, where you have all your things and you are ready for the next day and you are in charge of yourself. (P6, female)

Students embraced the APPLE Schools philosophy

Students reported that being a part of an APPLE School expanded their knowledge about health practices, which allowed them to value and embrace the APPLE Schools philosophy as part of their school culture. Students also conveyed an understanding that habits and values fostered in school were to be enacted at home. This is described through two subthemes outlined below.

Health habits are rooted in school experiences

The school environment provided both formal and informal learning opportunities to develop health habits, which played a crucial role in the independence students voiced in enacting

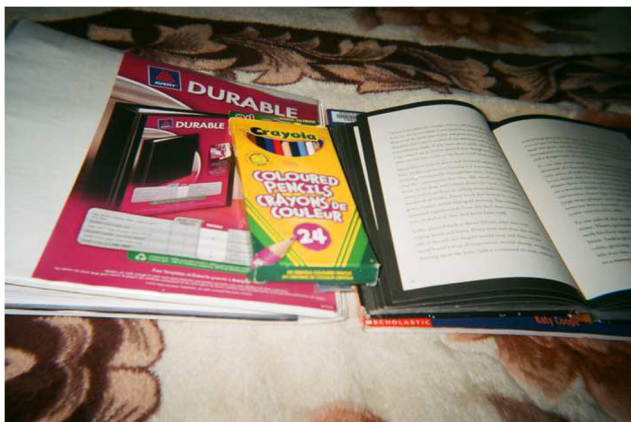


Fig. 2 Putting first things first

home health habits. Formally, students cited their APPLE School as a reliable source of health information, and drew on this knowledge to motivate and sustain such behaviours in the home. A student shared:

[You should] drink milk every night before you go to sleep so you can be healthy and your bones and teeth will be strong... [I learnt that] at different schools but they talk mostly about milk here...When I [moved] to [an] APPLE School last year after Grade 4, after spring break...I went here and I started drinking milk because it’s healthy for your body. (P4, male) (Fig. 3)

Health messages were relayed to students in school, and students reported that they embraced the value of these messages. As a result, students indicated they wanted to practice these behaviours at home. The formal learning opportunities that students reported such as knowledge of dietary and physical activity guidelines allowed them independence to validate and make decisions about their healthy lifestyle choices. One student explained that as a result of classroom nutrition activities, she was more conscious of her food choices when preparing food for herself at home: “[In class we] play games like put what’s healthy and what’s not healthy in like two different food groups... [At home I try to eat] a little bit of both. Mostly like-I have to get vegetables in there, so a little bit of both” (P23, female). Students also reported that they embraced the APPLE School’s philosophy by adhering to the informal expectations

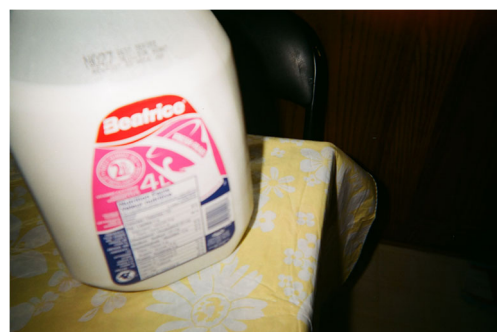


Fig. 3 Growing milk

cultivated in school. These expectations appeared to dictate students' behaviours regarding things such as deciding what foods to pack for lunch and ensuring they got enough sleep.

Commitment to healthy lifestyle habits for long-term success

Students reported that as part of an APPLE School, they learned to value healthy lifestyle habits for both short- and long-term benefits, and recognized the broader implications of their current actions. One student justified her healthy eating with the knowledge that “you could live a lot longer if you eat healthy” (P3, female), while another explained that “if you're always eating junk food you won't be good. You won't feel good” (P25, male). Students expressed that they were motivated to maintain healthy habits at home due to school values, which focused on long-term health implications of sustaining such behaviours. Students also conveyed that they understood the broader implications of developing healthy lifestyle behaviours for educational benefits. Getting enough sleep at night was something that students felt responsible for in the home. As one student explained: “If you don't get your rest and if you don't learn you won't have a good grade and you won't go to the next grade” (P2, male).

Students are driving change to create a healthy home culture

Students demonstrated that they were leaders in driving positive changes in HEAL behaviours for themselves and family members within the home. Four distinct mechanisms were identified by which students appeared to drive changes in the home environment in order to create a healthy home culture.

Empowerment to expand healthy habits by trying new things

Students discussed their openness to adopting new healthy behaviours at home as a result of school influences. Within the context of these findings, empowerment can be described as the students' apparent confidence to do something. APPLE Schools aimed to empower students to do and try new things, and, as one student explained, “teachers...encourage you to do things that you think you can't do” (P19, male). Many APPLE Schools had programs for students to taste-test new foods in order to increase their exposure to healthy foods. As a result, students expressed that they expanded their healthy habits at home.

Sometimes people hate stuff that they never tried, and then once they try it they like it, so sometimes they pack it for lunch 'cause they like it. Which I did, 'cause I used to hate bananas... We had a banana snack at school and I didn't really like it but I just tried it and then I just liked it (P10, female). (Fig. 4)



Fig. 4 Healthy strategies

Through exposure to healthy options, and building independence at school, students reported a willingness to try new foods and activities autonomously at home. They also reported exposing family members to healthy food options by sharing recipes they tried at school. The student above further explained by saying: “Usually [my teacher and the librarian] make like these healthy snacks. And I tell my mom to like make some for me...and my brother. And so...we get to eat more healthy” (P10, female). Students also shared examples about their willingness to learn new games and activities in school and share these with their families at home. Students appeared to have a strong sense of pride and ownership in doing so. A student described her involvement in a school physical activity program that she shared with her family, stating “it's an afterschool thing and they teach you about like healthy stuff and we play a lot of games...I actually have to teach [my family how to play]” (P11, female). Students expressed that they shared new healthy lessons learned in school to promote positive lifestyle behaviours in the home for the benefit of themselves and their families.

Catalyzing changes in the home food environment

As students expanded and shifted their food preferences towards healthier options, changes in food availability were needed to foster these healthy eating habits at home. Students shared how they were able to change their caregiver's food purchasing habits, explaining:

“I asked my mom and dad to change what they're buying... I usually pack bad stuff and then when I asked them that, they like were happy 'cause I don't usually do that sometimes” (P10, female). Improvements to the content of home meals were also evident due to students' influence. One student shared that as a result of her participation in the school's Cooking Club, her parents had “changed the supper into like...healthy stuff” (P11, female). As a result of cooking programs, students reported their increased involvement in meal preparation, as they were comfortable cooking and



Fig. 5 Always have a rainbow lunch

making snacks in the kitchen both independently and alongside their caregiver. As such, students appeared to play an important role in catalyzing changes in the home food environment. (Fig. 5)

Engaging others in healthy eating and active living

Students conveyed a sense of obligation to look out for family members, and a desire to share health knowledge to improve family behaviours. A student shared his experience influencing his brother's eating habits, stating: "Before, [my brother didn't] want to drink milk. But I told him that he need[s] to drink milk...I [told] him that he can be healthy and milk is better than [Coca Cola]" (P8, male). Because of students' uptake of active living in the home, family members were also encouraged and exposed to more opportunities to be active. Students shared that by increasing their own physical activity at home, their family members' activity levels also increased, which often occurred through co-participation (P18, female):

Student: ...when I started playing basketball, I started telling my brothers, and they really like going out and playing with me.

Interviewer: Did your brothers play basketball before?

Student: Mm huh yeah. But they didn't play as much.

Awareness and modification of unhealthy choices

Students explained that they established self-control and a sense of personal ownership in moderating unhealthy behaviours at home. Although students were realistic in expressing that they enjoyed having treats and unhealthy snacks which is in alignment with key messages from provincial nutrition guidelines (choose most often/sometimes/least often), they did recognize their home environment was often different than the APPLE School environment. Notably, students appeared to possess a great deal of responsibility and awareness in

moderating food consumption. As a student explained: "There are some things in my pantry that are like-like marshmallows and I always think-I should have these occasionally but not like every day" (P18, female). The importance of awareness and modification also applied to students' sedentary behaviour and physical activity at home.

A student shared how she reduced her sedentary behaviour by explaining: "Well at home, I usually go on the iPad and go on Mathletics or something. But then like... sometimes I'm always inside. So I go outside, going on a bike or rollerblade with my friends" (P10, female) (Fig. 6). Another student shared how she regulated her family's eating habits, saying: "[I] make sure my mom and my brother don't eat too much candy when they're snacking...they both have a big sweet tooth" (P3, female). Students took on a leadership role to foster a healthy home culture similar to that of their APPLE School, demonstrating their capacity to embody HEAL values outside of their school.

Discussion

It is well established that the home and the school environments play a significant role in influencing children's lifestyle behaviours (Epstein 2011; Langford et al. 2015). As such, school and family partnerships are essential. The CSH framework highlights this importance; however, there is a limited understanding regarding the reach of CSH beyond the school. Further, engaging families is challenging and there is a need to explore alternative approaches to facilitate involvements (Langford et al. 2015). The current study utilized students' perspectives to explore the extent to which behaviours fostered in APPLE Schools were transferred into the home, and demonstrated that students can play an active role in engaging and encouraging their family members in healthy behaviours.



Fig. 6 We're supposed to stay active

Leadership and independence were fundamental elements underlying students' ability to embrace the APPLE Schools philosophy and drive changes in the home. The results of this research support previous work which demonstrated the positive association between self-leadership and improved diet quality and physical activity in grade 5 students (Ferland et al. 2015). However, our research provides novel insight regarding how leadership and independence fostered through CSH can have impact beyond the school. This may provide an understanding of the contextual factors behind why students with higher leadership skills have improved HEAL behaviours (Ferland et al. 2015).

Students were shown to play an active role in driving changes in HEAL behaviours within the home. These results are particularly compelling because previous research has recognized the difficulty, yet importance, of involving families in school-based health interventions (Langford et al. 2015). Previous studies have examined the reach of various school-learned behaviours into the home and community (Aldinger et al. 2008; Gadhoke et al. 2015; Flurry 2007); however, no existing studies rely solely upon the student perspective exclusively through student voice.

As a result of their exposure to new foods and activities, students were more open to trying other new healthy things at home and often shared these foods or activities with their families. To our knowledge, no earlier studies addressed the concept of students trying new things in schools as a means for promoting positive health behaviours at home. This may be a feature within APPLE Schools that provides novel insight into a mechanism by which students influence change in the home. Our results demonstrated students' ability to positively change the home food environment by influencing parents' purchasing behaviours and participating in meal preparation. These results align with previous research, which supports the idea that children can significantly influence grocery-purchasing decisions (Flurry 2007). Students began taking on an active role in the kitchen by helping with meal preparation, which has been shown to result in better diet quality for children (Chu et al. 2014).

By participating in HEAL with family members, students positively influenced the eating habits and activity levels in the home. Co-participation in activities with family members has been shown to increase overall physical activity and decrease leisure time sedentary behaviours (Xin et al. 2015). Further, children have been shown to greatly influence how families spend their recreation time, and can play a significant role in determining the nature of leisure activities. Last, students drove changes in their homes through their awareness and modification of unhealthy behaviours. Others have emphasized the role that children play in advising family members about behaviours, including smoking (Aldinger et al. 2008), fast food purchasing (Gadhoke et al. 2015), environmental behaviours (Ballantyne et al. 2001), and unhealthy

food consumption (Rausch et al. 2015). Our results align with these findings, and support existing research regarding students' ability to educate their families about unhealthy behaviours.

Our research results suggest that children can act as powerful change agents to enable others to enact health behaviours, learned through CSH at school, without targeted "parent campaigns". The results not only support previous studies which demonstrate children's ability to be change agents in the home through the sharing of knowledge, attitudes and behaviours, and intergenerational learning (Ballantyne et al. 2001), but also reveal that leadership and independence are essential. To our knowledge, this was the first study to use student perspectives to provide evidence that exposure to a school-based health promotion project was able to reach the home. Therefore, contrary to previous research which relied on parent-centered components (i.e., parent workshops, newsletters) in school-based interventions (Rausch et al. 2015), this research demonstrated how students independently brought their school-learned health behaviours home.

Limitations

Students were restricted from taking photos of people, which may otherwise have added to the richness and diversity of examples students drew from when discussing their photos. A further limitation was the small number of participating schools. As well, each APPLE School is unique; therefore, students from other schools may have varying responses and examples.

Conclusion

This research provides new insight into the reach of CSH into the home, and illustrates the significant role that students have in catalyzing changes in the home. Fostering student leadership and independence was a fundamental concept, which was essential to students' abilities to facilitate change. Students reported embracing the APPLE School's philosophy by rooting their health habits in school experiences and valuing the long-term implications of their actions. Additional objective measures of diet and physical activity, specifically within the home environment, may add to our understanding of this phenomenon. Future research into the prolonged impact of APPLE Schools on the home environment could be conducted to explore sustainability. This study supports the notion that changes made in schools can have a significant positive impact to the home environment. Our results outline key factors that may contribute to students' abilities to positively impact the home environment as a result of their involvement in a school-based health promotion

intervention. This knowledge may be used for future CSH approaches to ensure their reach into the home. Research into students' roles as key stakeholders in family health promotion is therefore warranted, and may offer a promising direction for future health promotion efforts.

Acknowledgements The authors would like to thank the students who participated in this research, as well as the teachers and administrators from the three APPLE Schools. We would also like to thank the APPLE Schools management team for their support on this project.

Funding information The current work was supported by a Collaborative Research and Innovation Opportunities (CRIO) Team program from Alberta Innovates (grant number 201300671) led by PJV. CM was supported through the CRIO Team program. KES is supported as a Distinguished Researcher, Stollery Science Lab, Stollery Children's Hospital Foundation and is also a member of the Women and Children's Health Research Institute. PJV holds a Canada Research Chair in Population Health, an Alberta Research Chair in Nutrition and Disease Prevention, and an Alberta Innovates Health Scholarship.

Compliance with ethical standards

This research received ethical approval from the University of Alberta Human Research Ethics Board (Pro00035108_REN3). Written parental consent and verbal student assent was gathered from all study participants.

Conflict of interest The authors declare that they have no conflict of interest.

Disclaimer All interpretations and opinions in the current study are those of the authors.

References

- Alberta Education (2002). Health & Life Skills Kindergarten to Grade 9. <https://education.alberta.ca/media/160196/health.pdf>. Accessed January 20, 2019.
- Aldinger, C., Zhang, X.-W., Liu, L.-Q., Pan, X.-D., Yu, S.-H., Jones, J., et al. (2008). Changes in attitudes, knowledge and behavior associated with implementing a comprehensive school health program in a province of China. *Health Educ Res*, 23(6), 1049–1067.
- APPLE Schools (2018). A Project Promoting healthy Living for Everyone in Schools. <http://www.appleschools.ca>. Accessed August 24 2018.
- Ballantyne, R., Fien, J., & Packer, J. (2001). Program effectiveness in facilitating intergenerational influence in environmental education: lessons from the field. *J Environ Educ*, 32(4), 8.
- Canadian Society for Exercise Physiology (2019). Canadian 24-Hour Movement Guidelines. <https://csepguidelines.ca/>. Accessed January 22 2019.
- Chu, Y. L., Storey, K. E., & Veugelers, P. J. (2014). Involvement in meal preparation at home is associated with better diet quality among Canadian children. *Journal of Nutrition Education and Behavior* (4), 304–308.
- Couch, S. C., Glanz, K., Zhou, C., Sallis, J. F., & Saelens, B. E. (2014). Research: home food environment in relation to children's diet quality and weight status. *J Acad Nutr Diet*, 114, 1569–1579. <https://doi.org/10.1016/j.jand.2014.05.015>.
- Dessing, D., Pierik, F. H., Sterkenburg, R. P., van Dommelen, P., Maas, J., & de Vries, S. I. (2013). Schoolyard physical activity of 6–11 year old children assessed by GPS and accelerometry. *International Journal of Behavioral Nutrition & Physical Activity*, 10(1), 97–105 **109p**. <https://doi.org/10.1186/1479-5868-10-97>.
- Epstein, J. (2011). School, family, and community partnerships : preparing educators and improving schools (2nd ed.). Boulder: Westview Press.
- Faught, E., Vander Ploeg, K., Chu, Y. L., Storey, K., & Veugelers, P. J. (2015). The influence of parental encouragement and caring about healthy eating on children's diet quality and body weights. *Public Health Nutrition*, 1–8.
- Ferland, A., Chu, Y. L., Gleddie, D., Storey, K., & Veugelers, P. (2015). Leadership skills are associated with health behaviours among Canadian children. *Health Promot Int*, 30(1), 106–113.
- Flurry, L. A. (2007). Children's influence in family decision-making: examining the impact of the changing American family. *J Bus Res*, 60, 322–330. <https://doi.org/10.1016/j.jbusres.2006.09.029>.
- Gadhoke, P., Christiansen, K., Swartz, J., & Gittelsohn, J. (2015). "Cause it's family talking to you": children acting as change agents for adult food and physical activity behaviors in American Indian households in the Upper Midwestern United States. *Childhood*, 22(3), 346–361 **316p**. <https://doi.org/10.1177/0907568214538290>.
- Guba, E. G., & Lincoln, Y. S. (1982). Epistemological and methodological bases of naturalistic inquiry. *Educ Commun Technol*, 30(4), 233–252.
- Health Canada (2019). Canada's food guide. <https://food-guide.canada.ca/en/>. Accessed February 9 2019.
- Heidelberger, L., & Smith, C. (2015). The food environment through the camera lenses of 9- to 13-year-olds living in urban, low-income, midwestern households: a photovoice project. *Journal of Nutrition Education and Behavior*, 47(5), 437–445.
- Higginbottom, G. M. A., Pillay, J. J., & Boadu, N. Y. (2013). Guidance on performing focused ethnographies with an emphasis on healthcare research. *Qualitative Report*, 18(9), 1–6.
- Langford, R., Bonell, C., Jones, H., & Campbell, R. (2015). Obesity prevention and the health promoting schools framework: essential components and barriers to success. *International Journal of Behavioral Nutrition & Physical Activity*, 12(1), 1–17 **17p**. <https://doi.org/10.1186/s12966-015-0167-7>.
- Mayan, M. J. (2009). *Essentials of qualitative inquiry*. Walnut Creek: Left Coast Press.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis* (2nd ed.). Thousand Oaks: Sage.
- Postma, J., Peterson, J., Ybarra Vega, M. J., Ramon, C., & Cortes, G. (2014). Latina youths' perceptions of children's environmental health risks in an agricultural community. *Public Health Nurs*, 31(6), 508–516 **509p**. <https://doi.org/10.1111/phn.12112>.
- Rausch, J. C., Berger-Jenkins, E., Nieto, A. R., McCord, M., & Meyer, D. (2015). Effect of a school-based intervention on parents' nutrition and exercise knowledge, attitudes, and behaviors. *Am J Health Educ*, 46(1), 33–39.
- Riding, R., & Mathias, D. (1991). Cognitive styles and preferred learning mode, reading attainment, and cognitive ability in 11-year-old children. *Educational Psychology: An International Journal of Experimental Educational Psychology*, 11(3–4), 383–393.
- Storey, K. E., Montemurro, G., Flynn, J., Schwartz, M., Wright, E., Osler, J., et al. (2016). Essential conditions for the implementation of comprehensive school health to achieve changes in school culture and improvements in health behaviors of students. *BMC Public Health*, 16, 1133.
- Vander Ploeg, K. A., Maximova, K., Kuhle, S., Simen-Kapeu, A., & Veugelers, P. J. (2012). The importance of parental beliefs and support for physical activity and body weights of children: a population-based analysis. [Report]. *Canadian Journal of Public Health*, (4), 277–281.
- Vander Ploeg, K., McGavock, J., Maximova, K., & Veugelers, P. J. (2014). School-based health promotion and physical activity during

- and after school hours. *Pediatrics*, 133(2), e371–e378. <https://doi.org/10.1542/peds.2013-2383>.
- Wang, C. (2006). Youth participation in photovoice as a strategy for community change. *J Community Pract*, 14(1/2), 147–161.
- Wang, C., & Burris, M. A. (1997). Photovoice: concept, methodology, and use for participatory needs assessment. *Health Educ Behav*, 24(3), 369.
- World Health Organization. (1986). Ottawa charter for health promotion. Retrieved from <http://www.jcsh-cces.ca/images/Ottawa%20Charter%20for%20Health%20Promotion%201986.pdf>. Accessed April 3, 2019.
- Xin, W., Qing-Min, L., Yan-Jun, R., Jun, L., & Li-Ming, L. (2015). Family influences on physical activity and sedentary behaviours in Chinese junior high school students: a cross-sectional study. *BMC Public Health*, 15(1), 1–9. <https://doi.org/10.1186/s12889-015-1593-9>.

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