Healthy Start – Départ Santé: A pilot study of a multilevel intervention to increase physical activity, fundamental movement skills and healthy eating in rural childcare centres

Amanda Froehlich Chow, PhD,[1] Anne Leis, PhD,[2] Louise Humbert, PhD,[1] Nazeem Muhajarine, PhD,[2] Rachel Engler-Stringer, PhD[2]

ABSTRACT

OBJECTIVES: In order to improve healthy behaviours among rural children in their early years, a physical activity and healthy eating intervention (Healthy Start – Départ Santé) was implemented in rural childcare centres throughout Saskatchewan. The objective of the current study was to evaluate the impact of a multimodal physical activity and healthy eating intervention on educators' provision of opportunities for children to improve their physical activity levels, fundamental movement skills and healthy eating behaviours.

SETTINGS: Six childcare centres (three Francophone and three Anglophone) located in five different rural and semi-rural communities in Saskatchewan participated in this intervention.

PARTICIPANTS: A total of 69 children with a mean age of 4 years 9 months, and 19 female early childhood educators.

INTERVENTION: Guided by an ecological framework, we implemented a population health controlled intervention, using a wait list control design (48 weeks delayed intervention), and evaluated its impact in rural childcare centres. Mixed methods were employed to determine the effectiveness of the intervention.

OUTCOMES: Overall, educators felt that the intervention supported the provision of physical activity and healthy eating opportunities for children. Increases in children's physical activity levels were reported following the intervention.

CONCLUSION: The lessons learned in this study can be used to improve the Healthy Start – Départ Santé intervention so that its implementation can be effectively expanded to childcare centres within and outside Saskatchewan, in turn, supporting the healthy development of early years (0–5) children in the province and beyond.

KEY WORDS: Child development; health promotion; early intervention; rural health

La traduction du résumé se trouve à la fin de l'article.

Can J Public Health 2016;107(3):e312–e318
doi: 10.17269/CJPH.107.5279

Current research indicates that Canadian early years children (0–5 years) spend a large portion of their day engaging in sedentary behaviour. Moreover, children are not meeting the recommended food guide servings for fruits, vegetables and milk products.[1–3] Combined, these behaviours have been associated with an increased risk of becoming overweight (i.e., body mass index above 25). Children who are overweight before school entry often continue on this unhealthy trajectory and have a significant risk of becoming obese during their youth and adult years.[4]

In Canada, over 50% of children aged 6 months to 5 years attend out-of-home care.[5] These settings include licensed childcare centres, licensed day homes and unlicensed day homes. Licensed childcare centres must meet provincially legislated guidelines. In addition, educators working in these centres must hold an Early Learning and Childcare Diploma. Childcare environments can provide a platform for exploring children's behaviours and thus have been identified as the ideal setting for delivering interventions that provide opportunities to introduce lessons, activities and programming aimed at promoting healthy behaviours.[6]

Larson and colleagues found that only a limited number of interventions have effectively addressed and reported improvements in both the physical activity and healthy eating behaviours of children in childcare settings.[7] However, a recent systematic review showed that nutrition-focused interventions in childcare settings can positively influence children's fruit and vegetable consumption and their nutrition-related knowledge.[8] Similarly, a systematic review of physical activity interventions

Author Affiliations

1. College of Kinesiology, University of Saskatchewan, Saskatoon, SK
2. Department of Community Health and Epidemiology, University of Saskatchewan, Saskatoon, SK

Correspondence: Amanda Froehlich Chow, PhD, 87 Campus Drive, University of Saskatchewan, Saskatoon, SK S7N 5B2, Tel: 306-370-9391, E-mail: a.froehlichchow@usask.ca

Acknowledgements: We thank the participating childcare centres and our funders, Public Health and the Agricultural Rural Ecosystems. Without their participation and support, this pilot study would not have been possible.

Conflict of Interest: None to declare.

found that factors such as manipulation of playground equipment, the number of children playing at one time, and goal-setting and reinforcement have the potential to promote physical activity participation among children in childcare.[9]

In the province of Saskatchewan, there are over 215 licensed childcare centres,[10] and a number of these centres are located in rural communities (populations less than 10,000).[11] Educators in these rural childcare centres have reported being influenced by a number of unique factors when attempting to provide physical activity and healthy eating opportunities for early years children.[12] For instance, access to resources that support physical activity indoors during winter months and access to fresh, inexpensive healthy foods year round have been identified as barriers to promoting healthy behaviours among children in care.[12–14]

To our knowledge, no interventions have considered the unique factors influencing *both* physical activity and healthy eating practices in rural childcare centres. The primary purpose of this research was to pilot test a bilingual (French and English) multilevel, community-based intervention, Healthy Start/Départ Santé (hereafter referred to as Healthy Start),[15] in rural childcare centres in Saskatchewan. The study objectives were to a) determine whether the Healthy Start intervention contributed to increases in physical activity levels, improvements in fundamental movement skills and healthier eating behaviours among early years children aged 3 to 5 years; and b) describe educators' perceptions of Healthy Start and its influence on the provision of physical activity and healthy eating opportunities within the childcare centre environment.

METHODS

Settings and participants

Licensed childcare centres were recruited through researchers' connections in rural communities and by convenience sampling. The six participating childcare centres (three Francophone and three Anglophone) were located in five different rural and semi-rural communities in Saskatchewan. One rural community offered both a Francophone and an Anglophone childcare centre. The communities were matched as well as possible on size and geographic locale.

Parental consent was obtained. After losses to follow-up a total of 69 children participated in the study. Losses to follow-up occurred if the children had left the centre or were not in attendance during midpoint and/or endpoint data collection. A total of 16 children were lost to follow-up or had missing data. The mean age of participating children was 4 years 9 months. In the intervention group ($n = 42$) 61% of children were male and 39% were female. In the comparison group ($n = 27$) 67% were male and 33% were female. Together, 19 female early childhood educators (intervention group [$n = 11$] and comparison group [$n = 8$]) participated in the intervention.

Healthy Start intervention

Guided by McLeroy's ecological model[16] and a population health approach,[17] this targeted multilevel intervention aimed to instigate behaviour change among early years children (3–5 years) and their educators by systematically targeting factors at various levels (e.g., individual, interpersonal, institutional, community and public policy). The Healthy Start intervention consisted of four components: the Healthy Start Implementation Manual; the HOP (Healthy Opportunities for Preschoolers) physical activity resource; the Food Flair healthy eating resource; and ongoing support for educators.

The Healthy Start Implementation Manual was a step-by-step guide for implementing, tailoring and adapting intervention activities and resources to fit the needs of various childcare centre environments. The second was HOP, a physical activity guide and activity bag (containing child-tested activities and materials) developed to support educators in providing opportunities for increasing physical activity and improving physical literacy (emphasizing the development of fundamental movement skills) among children. The third component was Food Flair, a recipe book that included activities for engaging children in food preparation and encouraging healthy eating.[15] HOP and Food Flair are part of the evidence-based physical activity and healthy eating resource LEAP (Literacy Education Activity Play).[12] Ongoing support and monthly communication was the fourth component provided to intervention centres over the course of the intervention. The intervention training and ongoing support were delivered by two certified LEAP trainers. The implementation activities of the Healthy Start intervention and corresponding components are depicted in the program logic model (Figure 1).

Evaluation

A wait-list comparison intervention design (48-week delayed intervention) was used to evaluate the effectiveness of Healthy Start. A total of six rural childcare centres participated in the study (three intervention centres and three comparison centres) (see Table 1). The childcare centres were randomly assigned to the intervention or comparison group. The intervention centres received the Healthy Start intervention immediately after baseline measurement, and the comparison centres were trained in Healthy Start after the 48-week intervention (following the endpoint measurement).

Accelerometers: The physical activity levels of children were assessed with Actical accelerometers (Mini Mitter Co., Inc., Bend, OR). Children wore accelerometers for seven consecutive days at three time points (baseline, mid and post intervention). Accelerometers measured movement in 15-second epochs, and cut points for children's physical activity intensities (sedentary to vigorous activity levels)[18] were applied to produce a series of activity intensities measured in minutes, representing all activity levels (e.g., sedentary [SED], light physical activity [LPA], moderate to vigorous physical activity [MVPA] and total physical activity [LPA + MVPA = TPA]).

Test of Gross Motor Development Skills II (TGMD II): Children's fundamental movement skills were measured using the TGMD II. The test evaluates 12 skills that are subdivided into two skill areas: locomotor movement skills and object control skills. The TGMD II testing took place at baseline and post intervention in both intervention and comparison childcare centres. In order to get a combined measurement, subtest scores were summed and converted into a total gross motor quotient (GMQ), which factored in the child's age.

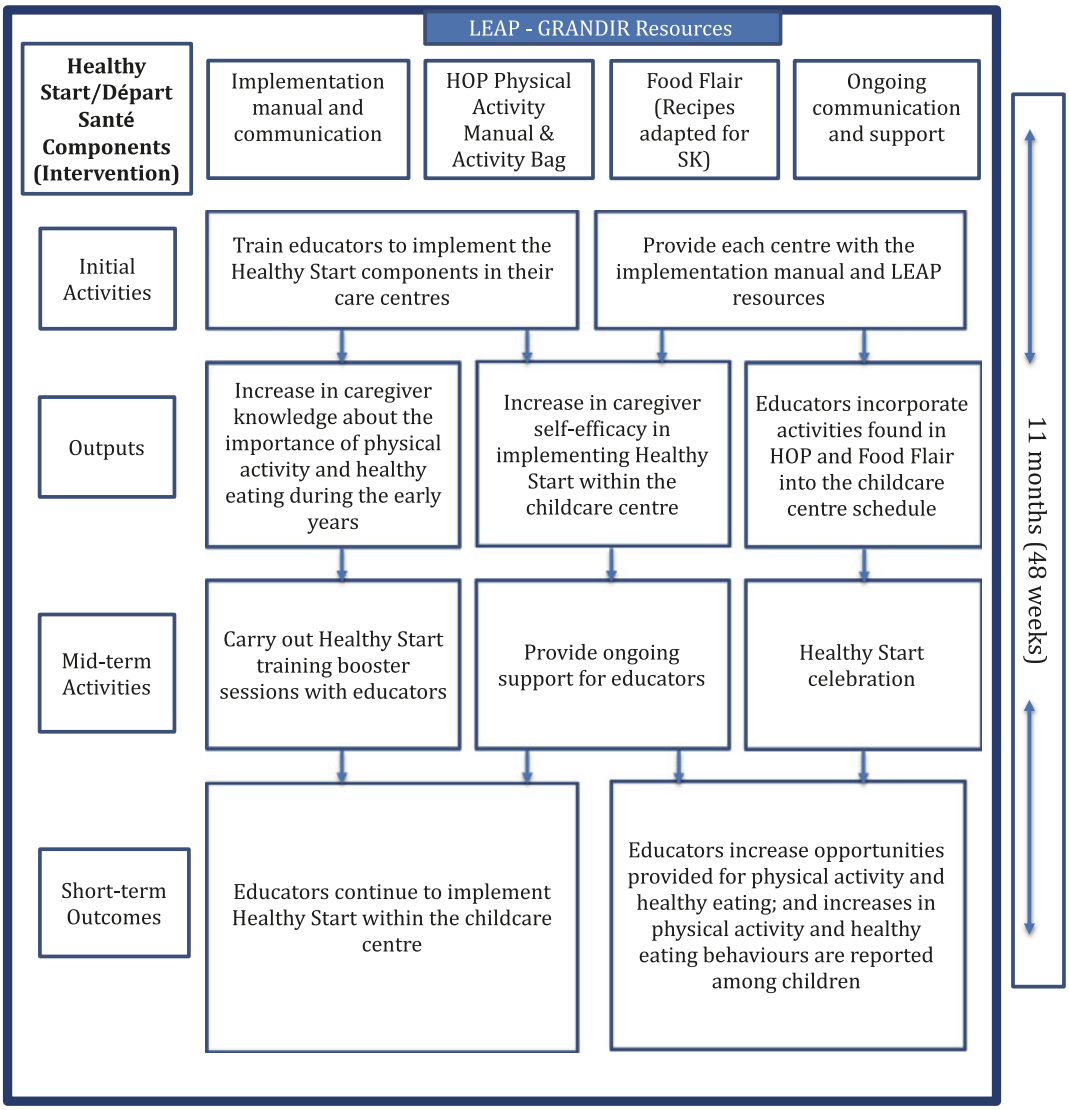

Figure 1. Program logic model depicting the implementation of the Healthy Start intervention (HOP, Health Opportunities for Preschoolers; SK, Saskatchewan; LEAP, Literacy Education Activity Play)

Menu review: The childcare centre menus were collected and reviewed at three time points (baseline, mid and post intervention) to determine to what extent childcare centres were meeting the guidelines outlined in the provincial nutrition policy.[19]

Environment and Policy Assessment and Observation Tool (EPAO): Environmental scans were conducted at baseline and post intervention with the EPAO tool.[6] The EPAO is a comprehensive tool designed to measure various aspects of the childcare centre environment related to the promotion of physical activity and healthy eating.

One-on-one educator interviews: Interviews were conducted with the educators and directors in the intervention group. Participants were asked to describe their overall experience with implementing Healthy Start and to discuss any changes in children's physical activity and healthy eating behaviours over the course of the intervention. A semi-structured interview guide containing open-ended questions was used to facilitate the interviews.

Analysis

Descriptive statistics were computed on data from accelerometers, TGMD II, menu reviews and environmental scans. All statistical analyses were carried out using IBM SPSS Statistics 20 for Windows. Data were considered statistically significant if a two-tailed p value of less than 0.05 was reported. Participants with missing data were not included in the data analysis.

Before the SPSS analysis was performed, raw accelerometer data were analyzed using custom software, KineSoft version 3.3.63 (KineSoft, Loughborough, UK), and standardized quality control and data reduction procedures were carried out.[20] For analysis of accelerometer data, the criterion for a valid day was 8 hours of consecutive wear, and the criterion for non-wear was 60 minutes of consecutive zeros, allowing for 2 minutes of interruptions. All data with at least one valid day of data were included in the analyses. Analysis of variance was used to evaluate differences within and between groups in activity levels, and when appropriate Tukey

Table 1. Description of participating childcare centres ($n = 6$)

Centre	Approximate number of educators trained in Healthy Start and/or involved in the study from 2011–2012	Number of children involved in the study over the course of 2011–2012	Capacity for children aged 2.5–4 at the centre	Total capacity of centre	Daily free play times	Indoor free play space	Outdoor free play space	Educators' qualifications	Physical activity policy	Approximate size of rural community
CC_A	4	11	30	80	Changes daily	Yes	Yes	ELCC Diploma	No	30,000
CC_B	2	7	10	18	Changes daily	Yes	Yes	ELCC Diploma	No	1500
CC_C	2	9	10	15	Changes daily	Yes	Yes	ELCC Diploma	No	700
IC_D	5	8	8 (full time)	30	6:30–9 am, 2:30–5 pm	Yes	Yes	ELCC Diploma	No	2000
IC_E	2	14	15	27	Changes daily	Yes	Yes	ELCC Diploma	No	30,000
IC_F	4	20	25	67	6–9 am, 3pm until pick-up	Yes	Yes	ELCC Diploma	No	800

ELCC, Early Learning and Childcare Diploma; CC, comparison centre; IC, intervention centre.

post-hoc tests were performed. Independent and paired samples *t* tests were performed to compare baseline and post GMQ, menu review and environmental scan scores between and within groups.

Educator interviews were transcribed verbatim. Thematic analysis was used to analyze the interview transcripts.[21] Themes were defined, named and categorized into one of the five ecological levels to accurately represent educators' experiences and perceptions of the intervention. Participants were given an opportunity to review and confirm the themes defined during analysis.

RESULTS

Children's physical activity levels

As the intervention was implemented in childcare centres, the accelerometer data reported focused on the weekday physical activity levels of children aged 3–5 years while they were attending their childcare centre. Baseline and endpoint results for average weekday wear minutes, counts per minute and minutes of activity at various levels of intensity are reported in Table 2.

In relation to physical activity levels, between group differences in endpoint MVPA levels indicated that children in the intervention group were engaging in significantly more MVPA than the comparison group. An obvious pattern was observed with the intervention group showing an increase in TPA levels over the course of the intervention. This increasing pattern was not reported in the comparison group; rather a decreasing pattern was observed. Additionally, although not statistically significant, a decrease in SED behaviour was observed post intervention in the intervention group.

Children's fundamental movement skills

Between and within group differences in TGMD II scores at baseline and post intervention were not significantly different. However, greater improvements in the intervention group from baseline to post intervention were observed. The TGMD II scores in the intervention group increased from a mean of 59.63 (SD = 23.83) at baseline to 64.00 (SD = 28.34) at endpoint, whereas those observed in the comparison group increased from 53.19 (SD = 35.58) at baseline to 56.80 (SD = 26.55) at endpoint.

Table 2. Mean (SD) weekday (accelerometer) wear minutes, counts per minute and minutes of physical activity at various levels of intensity

Data collection	Intervention group	Comparison group	*p* value
Wear minutes – baseline	690.36 (103.72)	675.06 (42.77)	NS
Wear minutes – endpoint	680.25 (65.78)	663.73 (63.62)	$p < 0.05$*
Counts per minute – baseline	382.78 (140.58)	431.10 (110.53)	$p < 0.001$*
Counts per minute – endpoint	530.76 (163.20)	389.50 (116.40)	NS
SED – baseline	392.83 (59.49)	369.17 (40.86)	NS
SED – endpoint	360.00 (77.49)	386.20 (52.17)	NS
MVPA – baseline	47.97 (19.70)	52.56 (17.70)	NS
MVPA – endpoint	66.74 (31.01)	45.54 (21.24)	$p < 0.05$*
TPA – baseline	284.30 (57.67)	305.87 (52.40)	NS
TPA – endpoint	310.12 (66.93)	281.32 (41.96)	NS

Note: Time point ($n = 42$) ($n = 27$).
NS, non-significant; SED, sedentary; MVPA, moderate to vigorous physical activity; TPA, total physical activity.

Table 3. Themes representing educators' perceptions of how Healthy Start influenced physical activity in the childcare centre

Theme (ecological level)	Description	Quote
Educator participation (individual)	Educators explained it was important for adults to participate in activities, and they felt Healthy Start encouraged adult involvement.	*"Even though the activities can be child directed the kids still want adults to be involved." (F)*
Educator perceptions of parental involvement (interpersonal)	Aware of Healthy Start but generally not involved with the activities. Some expressed interest in HOP activity cards that were sent home.	*"Parent involvement is an issue all the time, not just with LEAP." (SB)* *"Parents put the belts on and that is about all." (D)*
Educator perception of changes in children's physical activity behaviours (interpersonal)	Many educators noticed substantial improvements in children's fundamental movement skills (e.g., throwing and kicking a ball).	*"Improvements in physical literacy were obvious, especially among one child who had really struggled with activities in the past. We saw such an improvement that the mom was even on board and began using Healthy Start activities at home to help her child". (D)* *"Since the children often choose the activities they are excited to play them." (D)* *"They love to see the book and bag come out." (D)*
Incorporation of activities (institutional)	Some centres added a Healthy Start section to their weekly lesson plans.	*"We score each activity with an X or ✓, depending if the children like it." (D)*
Physical activity during winter months (institutional)	Increased opportunities, particularly in the winter months.	*"We built a big hill in the yard so the kids could run up and down it and use it for sledding in the winter." (D)* *"We were able to do a lot of activities from Healthy Start indoors in the winter." (F)*
Use of local facilities (community)	Some centres began to regularly use community facilities for physical activities.	*"We walked over to the school to use the gym, the kids really enjoyed that." (D)*
Physical activity policy (policy)	Currently there is no provincial physical activity policy for childcare centres; however, the intervention instigated educators and directors to start thinking of how they could develop their own centre-level physical activity policy.	*"We sort of have an unspoken policy about going outside, unless it is really cold. But I think it would be good if wrote down and made sure parents knew about it." (F)*

Childcare centre menus

On the basis of the weekly menus reviewed at baseline, midpoint and post intervention, neither group (intervention nor comparison) met all provincial nutrition policy guidelines five days a week (e.g., 100% of the time). Overall, no significant differences were reported between the intervention and comparison groups or within each group. However, analysis of baseline data indicated that the comparison group was meeting the nutrition policy guidelines more regularly, although the percentage decreased from baseline (94%) to post intervention (92%). Conversely, childcare centres in the intervention group met the nutrition guidelines more often post intervention (83%) than at baseline (78%).

Childcare centre environment

Overall, between groups differences for environmental scan scores at baseline and post intervention were not statistically significant; however, the intervention centres did have a higher post intervention score (mean = 25.00; SD = 3.75) than the usual practice centres (mean = 17.50; SD = 3.30; $p = 0.06$). Again, although not statistically significant, a general increasing pattern was observed within the intervention centres, indicating improvements in the physical activity and nutrition environment from baseline (mean = 21.33; SD = 3.36) to post intervention (mean = 25.00; SD = 3.30).

Experiences and perceptions of educators

One-on-one interviews were conducted with educators in the intervention group ($n = 11$). The interviews provided an avenue for monitoring fidelity to the intervention and for gaining insight into the educators' perception of how the intervention influenced physical activity and healthy eating within the childcare centre. A description of key themes and corresponding quotes representing educator perceptions can be found in Tables 3 and 4.

DISCUSSION

Previous research investigating physical activity and healthy eating among early years children (primarily in childcare settings) has identified multiple factors shown to influence these health-promoting behaviours.[22–24] Moreover, rural childcare centres have reported being influenced by additional factors associated with geographic location, such as resources and training for educators, access to facilities and space for indoor play, and access to fresh, healthy food year round.[12] The current pilot study tested the effectiveness of Healthy Start in addressing specific factors shown to influence physical activity and healthy eating within rural childcare centres. Given where Health Start was implemented, it should be noted that the findings of this study are primarily applicable to licensed childcare settings.

In relation to physical activity, the Healthy Start intervention aimed to increase children's physical activity levels and improve children's fundamental movement skills through targeting various factors at multiple levels. Accelerometer results indicated that children in the intervention group had significantly higher MVPA levels post intervention than the comparison group. In relation to children's movement skills, although significant differences were not observed, there was an obvious pattern indicating that children in the intervention group had greater improvements in their fundamental movement skills than children in the comparison group. This is important, as the development of fundamental movement skills is influential in determining physical activity participation both during the early years and over the course of an individual's life.[25,26]

A systematic review of interventions in childcare settings targeting healthy behaviours and obesity prevention recommended that interventions should emphasize adult role modelling and incorporate aspects of Bandura's social cognitive theory/social

Table 4. Themes representing educators' perceptions of how Healthy Start influenced healthy eating in the childcare centre

Theme (ecological level)	Description	Quote
Educator self-efficacy (individual)	Educators unanimously reported that Healthy Start improved their ability to promote healthy eating through fun and creative activities. Some staff explained that they began cooking with children and teaching the children how to cook healthy meals.	*"It (Food Flair) is great! We have incorporated all the recipes into our menu." (D)* *"Because the kids can pick recipes out themselves, they are excited to try the new foods."*
Children's eating behaviours (interpersonal)	One childcare centre started a garden, and children were more open to trying a variety of new foods when they understood where the food came from and when they helped to prepare food.	*"We have gotten the children to help us prepare the food, they really like this and they (children) are more open to try new foods when they help prepare the snack or meal." (D)*
Challenges for cooks (interpersonal)	Some educators reported that cooks needed further support and education as they resisted incorporating the Healthy Start recipes into the centre menus. Additionally, it was suggested that Healthy Start recipes should be revised to include larger serving sizes because currently most recipes only provide 4 to 8 servings.	*"The cook has used Food Flair a handful of times, but I think she needs more training on healthy cooking and how to easily incorporate the recipes into our menu." (F)* *"Recipes were good but had to be adapted for larger groups and this took some time." (F)*
Centre menus (institutional)	Some centres used a pre-existing rotating menu that had been developed and approved by centre directors before the intervention implementation. Therefore some cooks were resistant to making large menu revisions to incorporate recipes.	*"We have a rotating menu and it would be a lot of work for the cooks to revise it to incorporate all the recipes from the resource (Healthy Start)" (D)*
Access to fresh produce year round (community)	Although Healthy Start provided information about affordable seasonal fruits and vegetables, educators commented that small rural grocery stores had limited fresh produce particularly in the winter months.	*"We are limited by the produce available at the local grocery store… there is not a lot of selection in the winter months." (D)*
Adhering to provincial nutrition policy (policy)	The recipes suggested in the intervention made it easier for staff to regularly incorporate healthy foods into the menu and thus follow the provincial guidelines.	*"It (Healthy Start) was very helpful in following nutrition guidelines." (D)*

learning theory.[27] Educators indicated that Healthy Start was able to increase their confidence and, in turn, behaviours associated with the provision of healthy opportunities for children. This is important, as it is well known that young children are more likely engage in a particular behaviour if an adult (parent, educator, etc.) is modelling the same behaviour.[28] Moreover, increased fidelity and effectiveness of the intervention was reported in centres where educators regularly engaged in physical activity and healthy eating in their personal lives. This finding emphasizes the importance of focusing on educators' personal health-related behaviours.

The Healthy Start intervention also prompted educators to engage the children in discussion about healthy eating and to use food preparation as a learning activity. Experts suggest that using an interdisciplinary and applied approach, which integrates disciplines (reading, writing, math, etc.,) and combines learning environments (indoor and outdoor settings) based on real-life applications, can promote brain and cognitive development and increase focus not only among school-aged children but during the early years as well.[29,30] One centre created a garden space outside where the children grew their own vegetables during the summer months. Children also wanted to be involved in food preparation, and some centres began using the child-friendly recipes in Food Flair and cooking with children on a regular basis. When children participated in these activities, they were more open to trying new foods.

Strengths and limitations

As with any research, there were limitations to this study. The small sample, although not an issue in qualitative research, proves to be problematic when employing quantitative methods. Although this was a pilot study, the small number of participants likely contributed to the overall lack of non-significant results, even when differences appeared to be large. Moving forward, a power calculation should be computed in order to determine the necessary sample size.

Another limitation was the time of baseline data collection. Childcare centres typically follow the school year calendar; as such all administrative tasks and scheduling, including meal planning, were carried out primarily during the summer months. Baseline data collection took place in early fall, and the 4–6 week rotating menus used by childcare centres had already been developed. Therefore, a number of directors and cooks were not particularly receptive to changing the menu, and so menu reviews may not have accurately portrayed the potential effectiveness of Healthy Start in encouraging educators and cooks to provide a variety of healthy foods.

Among the strengths of this study was the fact that a wait-list comparison design was employed to evaluate the Healthy Start intervention. The use of a comparison group allowed researchers to conclude with more certainty that changes associated with physical activity in the intervention group could be attributed to the Healthy Start intervention. Additionally, a wait-list ensured that the centres in the comparison group were also provided the opportunity to implement and benefit from Healthy Start, thus limiting the ethical challenge that arises when offering a program only to the intervention group. A second strength was the intersection of the ecological model and a population health approach. This intersection assisted in not only targeting specific factors while designing and implementing the intervention but also guiding the evaluation. Specifically, researchers were able to identify how the intervention successfully influenced or failed to address specific factors (influencing physical activity and healthy eating) in each ecological category and any interactions between categories.

IMPLICATIONS AND FUTURE RESEARCH

The lessons learned in this study can improve the Healthy Start intervention. Specifically, the limitations discussed above will be addressed through a revision of the intervention and data collection procedures. This will support the effective expansion of Healthy

Start to childcare centres within and outside of Saskatchewan, in turn promoting the healthy development of early years children in childcare throughout the province and beyond. Future research should aim to understand educators' own behaviours and their self-efficacy to not only deliver but also engage in health-promoting programming *with* the children in their care.

REFERENCES

1. Temple VA, Naylor P-J, Rhodes RE, Higgins JW. Physical activity of children in family child care. *Appl Physiol Nutr Metab* 2009;34(4):794–98. PMID: 19767816. doi: 10.1139/H09-061.
2. Pabayo R, Spence JC, Casey L, Storey K. Food consumption patterns in preschool children. *Can J Diet Pract Res* 2012;73(2):66–71. PMID: 22668839. doi: 10.3148/73.2.2012.66.
3. Colley RC, Garriguet D, Adamo KB, Carson V, Janssen I, Timmons BW, et al. Physical activity and sedentary behavior during the early years in Canada: A cross-sectional study. *Int J Behav Nutr Phys Act* 2013;10:54. PMID: 23642258. doi: 10.1186/1479-5868-10-54.
4. Freedman DS, Khan LK, Serdula MK, Dietz WH, Srinivasan SR, Berenson GS. The relation of childhood BMI to adult adiposity: The Bogalusa Heart Study. *Pediatrics* 2005;115(1):22–27. PMID: 15629977.
5. Bushnik T. Child Care in Canada. Ottawa, ON: Statistics Canada, 2006. Available at: http://publications.gc.ca/Collection/Statcan/89-599-MIE/89-599-MIE2006003.pdf (Accessed November 12, 2013).
6. Ward DS, Benjamin SE, Ammerman AS, Ball SC, Neelon BH, Bangdiwala SI. Nutrition and physical activity in child care: Results from an environmental intervention. *Am J Prev Med* 2008;35(4):352–56. PMID: 18701236. doi: 10.1016/j.amepre.2008.06.030.
7. Larson N, Ward DS, Neelon SB, Story M. What role can child-care settings play in obesity prevention? A review of the evidence and call for research efforts. *J Am Diet Assoc* 2011;111(9):1343–62. PMID: 21872698. doi: 10.1016/j.jada.2011.06.007.
8. Mikkelsen MV, Husby S, Skov LR, Perez-Cueto FJ. A systematic review of types of healthy eating interventions in preschools. *Nutr J* 2014;13(1):56. PMID: 24906305. doi: 10.1186/1475-2891-13-56.
9. Temple M, Robinson JC. A systematic review of interventions to promote physical activity in the preschool setting. *J Spec Pediatr Nurs* 2014;19(4):274–84. PMID: 24888784. doi: 10.1111/jspn.12081.
10. Government of Saskatchewan. *Licensed Childcare in Saskatchewan*. 2015. Available at: https://www.saskatchewan.ca/business/entrepreneurs-start-or-exit-a-business/start-a-business/managing-a-child-care-business/licensed-child-care-in-saskatchewan (Accessed June 5, 2015).
11. Beshiri R, Bollman RD. Definitions of "Rural." *Stat Can Rural Small Town Can Anal Bull* 2002;3(21):1–43.
12. Froehlich Chow A, Humbert ML. *Supporting the Healthy Development of Rural Children: An Ecologically Based Investigation of Barriers and Facilitators Identified by Early Years Caregivers in the Promotion of Physical Activity and Healthy Eating*. Thesis. University of Saskatchewan Library, 2010.
13. Vanderloo LM, Tucker P, Johnson AM, Holmes JD. Physical activity among preschoolers during indoor and outdoor childcare play periods. *Appl Physiol Nutr Metab* 2013;38:1173–75. PMID: 24053528. doi: 10.1139/apnm-2013-0137.
14. Froehlich Chow A, Humbert ML. Perceptions of early childhood educators: Factors influencing the promotion of physical activity opportunities in Canadian rural care centers. *Child Indic Res* 2013;7(1):57–73. doi: 10.1007/s12187-013-9202-x.
15. Healthy Start – Départ Santé. Saskatoon, SK: Wordpress, 2013. Available at: www.healthystartkids.ca (Accessed June 8, 2015).
16. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Educ Behav* 1988;15(4):351–77. PMID: 3068205. doi: 10.1177/109019818801500401.
17. Public Health Agency of Canada. *What is the Population Health Approach?—Population Health Approach*, 2001. Available at: http://www.phac-aspc.gc.ca/ph-sp/approach-approche/appr-eng.php (Accessed November 29, 2012).
18. Puyau M, Adolph A, Vohra F, Issa Z., Butte N. Prediction of activity energy expenditure using accelerometers in children. *Med Sci Sport Exerc* 2004;36(9):1514–21. PMID: 15354047. doi: 10.1249/01.MSS.0000139898.30804.60.
19. Government of Saskatchewan. *The Childcare Act*. 2012. Available at: http://www.qp.gov.sk.ca/documents/English/Statutes/Statutes/C7-3.pdf (Accessed October 18, 2013).
20. Colley R, Gorber SC, Tremblay MS. Quality control and data reduction procedures for acelerometry-derived measures of physical activity. 2010. Available at: http://www.statcan.gc.ca/pub/82-003-x/2010001/article/11066-eng.pdf (Accessed October 18, 2013).
21. Ryan GW, Bernard HR. Techniques to identify themes. *Field Methods* 2003;15(1):85–109. doi: 10.1177/1525822X02239569.
22. Gagné C, Harnois I. The contribution of psychosocial variables in explaining preschoolers' physical activity. *Health Psychol* 2013;32(6):657–65. PMID: 23566181. doi: 10.1037/a0031638.
23. Naylor P-J, Temple VA. Enhancing the capacity to facilitate physical activity in home-based child care settings. *Health Promot Pract* 2013;14(1):30–37. PMID: 22146905. doi: 10.1177/1524839910393280.
24. Henderson KE, Grode GM, Connell MLO, Schwartz MB. Environmental factors associated with physical activity in childcare centers. *Int J Behav Nutr Phys Act* 2015;12(43):1–9. PMID: 25889978. doi: 10.1186/s12966-015-0198-0.
25. Tremblay L, Boudreau-Larivière C, Cimon-Lambert K. Promoting physical activity in preschoolers: A review of the guidelines, barriers, and facilitators for implementation of policies and practices. *Can Psychol* 2012;53(4):280–90.
26. Goldfield GS, Harvey A, Grattan K, Adamo KB. Physical activity promotion in the preschool years: A critical period to intervene. *Int J Environ Res Public Health* 2012;9(4):1326–42. PMID: 22690196. doi: 10.3390/ijerph9041326.
27. Nixon CA, Moore HJ, Douthwaite W, Gibson EL, Vogele C, Kreichauf S, et al. Identifying effective behavioural models and behaviour change strategies underpinning preschool- and school-based obesity prevention interventions aimed at 4–6-year-olds: A systematic review. *Obes Rev* 2012;13:106–17. PMID: 22309069. doi: 10.1111/j.1467-789X.2011.00962.x.
28. Ward S, Bélanger M, Donovan D, Horsman A, Carrier N. Correlates, determinants, and effectiveness of childcare educators' practices and behaviours on preschoolers' physical activity and eating behaviours: A systematic review protocol. *Syst Rev* 2015;4(10):18. PMID: 25875658. doi: 10.1186/s13643-015-0011-9.
29. Berk L. *Child Development*, 2nd ed. Boston, MA: Allyn & Bacon, 2006.
30. Atterberry K, Miles C, Riddle LA, Rueda J, Betz D. Development of a STEM-based school garden and nutrition education program to increase knowledge and consumption of pulse crops by school aged children (626.17). *FASEB J* 2014;28(1 Suppl 626.17).

Received: August 28, 2015
Accepted: February 21, 2016

RÉSUMÉ

OBJECTIFS : Afin de renforcer les comportements sains des enfants vivant en milieu rural au cours de leurs premières années de vie, on a mis en œuvre une intervention d'activité physique et d'alimentation saine (Healthy Start – Départ Santé) dans les centres ruraux de la petite enfance de la Saskatchewan. L'objectif de notre étude était d'évaluer l'impact d'une intervention multimodale d'activité physique et d'alimentation saine sur les occasions offertes aux enfants par les éducatrices d'améliorer leurs niveaux d'activité physique, leurs habiletés motrices fondamentales et leurs comportements d'alimentation saine.

LIEUX : Six centres de la petite enfance (trois francophones et trois anglophones) situés dans cinq communautés rurales et semi-rurales de la Saskatchewan ont participé à cette intervention.

PARTICIPANTS : En tout, 69 enfants (âge moyen : 4 ans 9 mois) et 19 éducatrices de la petite enfance.

INTERVENTION : Avec un cadre de travail écologique pour guide, nous avons mis en œuvre une intervention contrôlée en santé des populations, en utilisant des témoins placés sur une liste d'attente (intervention différée de 48 semaines), et nous en avons évalué l'impact dans les centres ruraux de la petite enfance. Nous avons employé des méthodes mixtes pour déterminer l'efficacité de l'intervention.

RÉSULTATS : Globalement, les éducatrices ont considéré que l'intervention soutenait l'offre d'occasions d'activité physique et d'alimentation saine aux enfants. Des hausses des niveaux d'activité physique des enfants ont été déclarées après l'intervention.

CONCLUSION : Les leçons de cette étude peuvent servir à améliorer l'intervention Healthy Start – Départ Santé pour que l'on puisse efficacement en étendre l'application aux centres de la petite enfance à l'intérieur et à l'extérieur des frontières de la Saskatchewan, pour ainsi soutenir en retour le développement sain des jeunes enfants (0 à 5 ans) dans la province et ailleurs.

MOTS CLÉS : développement de l'enfant; promotion de la santé; intervention précoce; santé en zone rurale