



Evaluation of the impact of the Healthy Start/Départ Santé intervention on improving menu planning practices and improving the congruence between planned menus and actual food served in Saskatchewan childcare centres

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ABSTRACT

The objective of this study was to evaluate the impact of the Healthy Start/Départ Santé (HS/DS) intervention program on improving menu planning practices and improving the congruence between planned menus and actual food served in licensed childcare centres in Saskatchewan.

Overall, 39 licensed childcare centres in the province of Saskatchewan, Canada, were selected through a cluster randomized control trial to evaluate the impact of the HS/DS intervention. The pre and post intervention food menus of these centres were analyzed and compared to the Saskatchewan Childcare Nutrition Guidelines (SCNG). The food and beverages served at lunch were observed and digitally recorded using digital plate-waste measures. The congruence between the planned menus and the actual food served was assessed. Descriptive analyses and non-parametric tests were performed to determine the impact of the intervention.

The results of this study indicated that there was no significant difference between the groups regarding the distribution and proportion of centres that adhered to the SCNG. The centres that received the intervention demonstrated significant improvements in adherence to their written menus, with the proportions of match between the items that served and listed (p -value = 0.029), and additional items served (p -value = 0.014). Within each group, intervention and usual practice, there were significant differences in centres that met the foods to limit guideline among the usual practice centres (p -value = 0.035). Findings from this study indicated that the HS/DS intervention had a positive impact on improving the adherence of the participating centres to the centres' planned menus.

HS/DS trial registration number: NCT02375490.

1. Introduction

Childhood obesity is considered a major health problem that can be a predictive factor for adult obesity and its resulting long-term health complications (Araújo and Ramos, 2017). The World Health Organization (2017) estimates that more than 41 million infants and children below the age of five were overweight or obese in 2016 (The World Health Organization, 2017). Poor eating and physical activity habits are the most common causes of childhood obesity (Sahoo et al., 2015; Spence et al., 2020). A recent Canadian study sampled 19,026 two to five-year-old children and found that 29.8% were overweight or obese

(Kakinami et al., 2015). Furthermore, many obesity-related health problems, such as heart disease, type 2 diabetes, hypertension, stroke, gallbladder disease and certain types of cancers, which were previously common to only obese adults, are now affecting children (Sahoo et al., 2015).

Over half (60%) of young children in Canada (aged 2–4 years) are enrolled in some types of childcare such as childcare centres, home daycare, nannies, and preschool programs, for a minimum of 30 h a week (Sinha, 2014; Ward et al., 2020). According to Statistics Canada, childcare centres are the most popular type of childcare (Sinha, 2014). Thus, the foods children consume there could have a bearing on their

Abbreviations: CACFP, Child and Adult Care Food Intervention Program; HS/DS, Healthy Start-Départ Santé program; SCNG, Saskatchewan Childcare Nutrition Guidelines; SK, Saskatchewan; NB, New Brunswick; USA, United States of America.

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attitudes and lifestyle choices (Alkon et al., 2014; Lyn et al., 2013; Spence et al., 2020). Childcare environments provide a strategic opportunity to implement community-based intervention programs aimed at reducing childhood obesity (Bell et al., 2015; Benjamin Neelon and Briley, 2011; Benjamin et al., 2007; Finch et al., 2018; Grady et al., 2020a; Hennink-Kaminski et al., 2018; Larson et al., 2011; Maher et al., 2008; Yoong et al., 2015).

1.1. Food menus of childcare centres

Childcare centres' menus provide information about their food service, which usually consists of two meals and two snacks, and most Saskatchewan centres prepare food on site. Well-planned menus are essential for meeting children's nutritional needs and developing life-long healthy eating habits (Mann et al., 2013). Infrequent revision limits children's experience with new foods, textures and flavours. Additionally, revising menus on a seasonal basis could lower food costs (Gerritsen et al., 2017).

Research indicates that children who attend childcare facilities full-time consume one to two-thirds of their daily recommended nutrition requirements at the centre (Swindle et al., 2018), while other studies recommend that they consume one-half to two-thirds of their daily required nutrition there (Erinosho et al., 2013; Sambell et al., 2019). Recent studies suggest that children are frequently provided with inadequate food group servings (e.g. fruits, vegetables, grains, meats and dairy) to meet their daily nutrient requirements (Benjamin Neelon et al., 2013; Finch et al., 2018; Frampton et al., 2014; Gerritsen et al., 2017; Maalouf et al., 2013; Ward et al., 2017; Yoong et al., 2014).

Menu-planning guidelines are vital in ensuring that young children (age 2–5) consume nutritious meals and snacks at the childcare settings (Nikolopoulos, 2012). A balanced and nutritious diet at a young age is essential for health and proper growth (Mann et al., 2013). Menu guidelines allow menu planners to select a variety of healthy foods that meet children's daily nutrition requirements. Although each province has its own menu-planning policies and regulations, most provinces follow Health Canada's recommendations (Health Canada, 2013).

Saskatchewan provincial childcare nutrition regulations and menu-planning guidelines are delineated in The Child Care Regulations, 2015 (Section 24) (Government of Saskatchewan, 2016) which are adapted from Canada's Food Guide (CFG) (Health Canada, 2013). The guidelines recommend serving numbers of food groups per meal and snack. They state that breakfast must include three or more food groups, lunch must include four food groups, and snacks must consist of two or more food groups including a serving of fruit or vegetables. They recommend serving unflavoured milk twice daily, restricting sugary beverages and limiting processed foods (Government of Saskatchewan, 2016). These guidelines were introduced to childcare centres that participated in the Healthy Start/Départ Santé (HS/DS) intervention evaluation study during the HS/DS program.

International studies suggest that childcare centres' menus may not accurately reflect the foods children are served (Benjamin Neelon et al., 2010). This lack of consistency may lead to children ingesting inadequate or excessive energy and nutrients (Alves and Morais, 2015). To date, the impact of nutrition interventions on the accuracy of menus in childcare centres is largely unknown. Our study evaluated the impact of the HS/DS intervention on childcare centres' menus' accuracy and compliance with nutrition guidelines.

2. Methods

2.1. The Healthy Start/Départ Santé program

Healthy Start/Départ Santé (HS/DS) is a bilingual non-profit initiative aimed at improving eating habits and physical activity in children three to five-years-old in early learning environments, including childcare centres, home childcare settings, preschool and pre-kindergarten

programs, and family support centres (Healthy Start/Départ Santé, 2014; Sari et al., 2017). The HS/DS program consists of the following six components: The HS/DS Implementation Manual: this manual is a step-by-step guide developed to support caregivers. Training, Modeling, and Monitoring: this component included a two-hour on-site customized training session followed by booster sessions (Bélanger et al., 2016; Ward et al., 2018). Evidence-Based Resources: each centre is fully equipped with evidence-based resources including three LEAP-BC™ (Literacy, Education, Activity and Play) manuals: *The Food Flair Handbook*, *HOP™ - Healthy Opportunities for Preschoolers family resource* and the *HOP™ - Early Learning Practitioner handbook*. Additional Supplementary Resources: resources were made available to centres, families, and communities. Communication, Knowledge Development, and Exchange: "a communication strategy" was implemented to raise awareness of the program and engage parents, communities, and organizations (Bélanger et al., 2016). Inter-Sectoral Partnerships: the HS/DS initiative cultivated partnerships with many community and governmental organizations at the local and national levels (Bélanger et al., 2016). Further details about the HS/DS intervention can be found elsewhere (Bélanger et al., 2016; Leis et al., 2020; Ward et al., 2018).

2.2. Participants and design

From October 2013 to June 2016, a delayed cluster randomized control trial was performed in 39 Saskatchewan childcare centres enrolled in Phase II of HS/DS (Fig. 1). These centres were randomly assigned as intervention (n = 19) or control (usual practice) centres (n = 20) and stratified by location (urban or rural) and language (anglophone or francophone). Over a six to eight-month period, the intervention received training and resources, while control centres received the intervention components (the LEAP™-Food Flair resource and menu planning template which lists the Saskatchewan Childcare Nutrition Guidelines (SCNG), and on-site training) following the study (Bélanger et al., 2016; Ward et al., 2020). Since two participating centres were managed by one director, we considered them as one centre. Another centre was excluded due to a significant drop in enrollment. As a result, a total of 37 centres remained (out of the initial 39) at the endpoint. Fig. 2 shows the demographic distribution of the centres and the data collection timeline. This study focuses on only the nutritional aspects of HS/DS, specifically menu analysis. A detailed description of the HS/DS intervention study design, sampling frame, eligibility, recruitment and randomization process can be found elsewhere (Bélanger et al., 2016; Leis et al., 2020).

2.3. Menu analysis

Centres' menus were collected at the baseline and endpoint of the study. Eighteen of 56 menus, representing the baselines and endpoints for years one and two of the program, were missing. Thus, the HS/DS team followed up via telephone to collect incomplete menu information. As a result, sixteen missed or incomplete menus were received. Cycle length varied from one week to twelve weeks. Overall, 39 centres' menus' adherence to nutrition guidelines were assessed prior to the HS/DS intervention (Abobakar et al., 2018). At the endpoint, 34 centres provided complete menus, while two centres provided only lunch menus. Researchers compared the data from the 34 centres that provided complete menus. Cycle menus were coded and entered into Excel spreadsheet. All foods and beverages listed on centres' menus were categorized and coded by food reference group as classified in the SCNG: vegetables and fruits, grain products, milk and alternatives, meat and alternatives, foods to limit, unflavoured milk, and 100% fruit juice. Foods to limit are high in calories, fat, salt or sugar. Fruit juice was classified as one serving of fruit and further assessed against the juice guideline (listed no more than three times per week). With the oversight of a registered dietician, assumptions were made to categorize the food and beverages that contained multiple ingredients (mixed dishes). Plate

CONSORT 2010 Flow Diagram

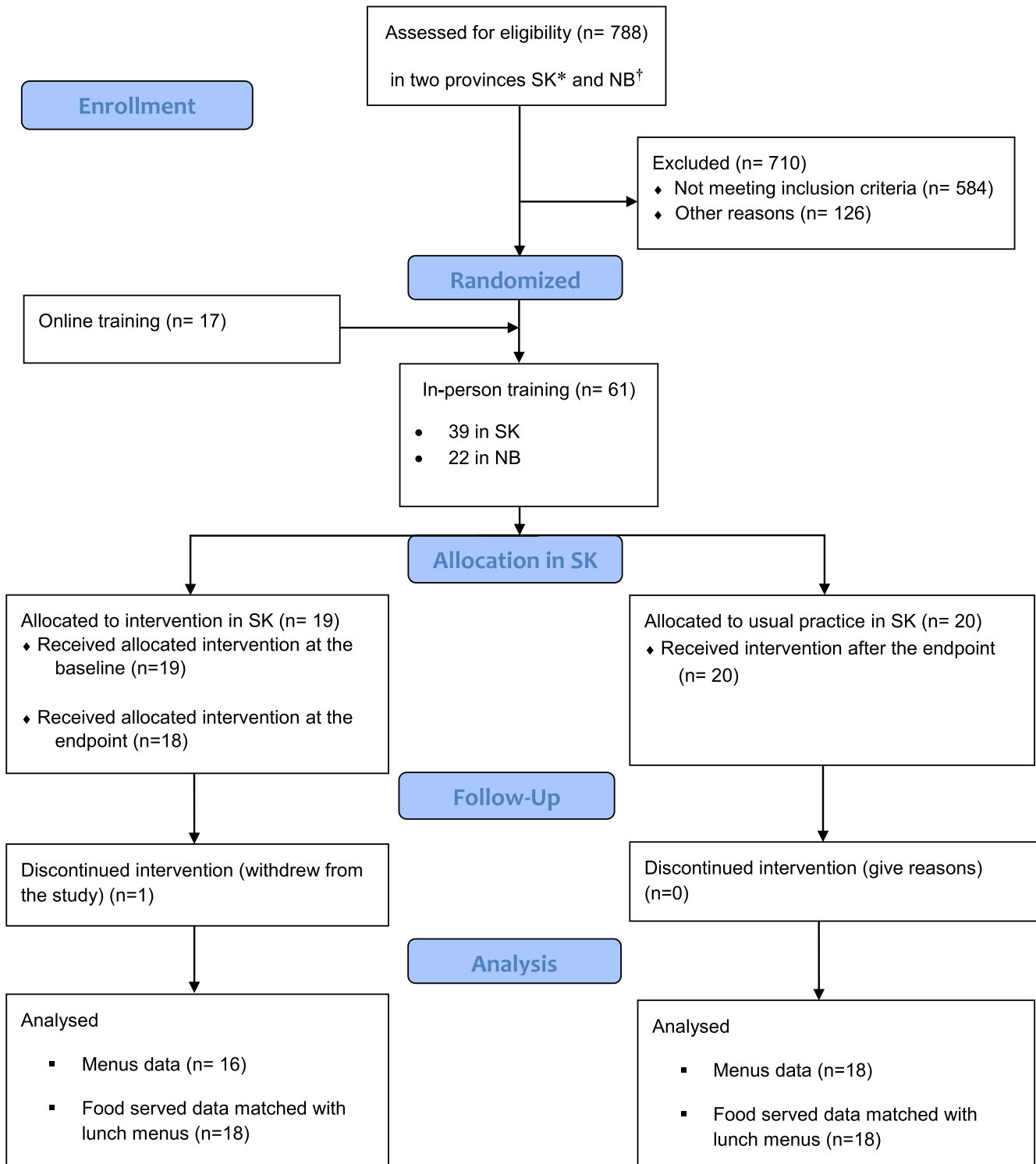


Fig. 1. CONSORT flow diagram. *SK: Saskatchewan. †NB: New Brunswick.

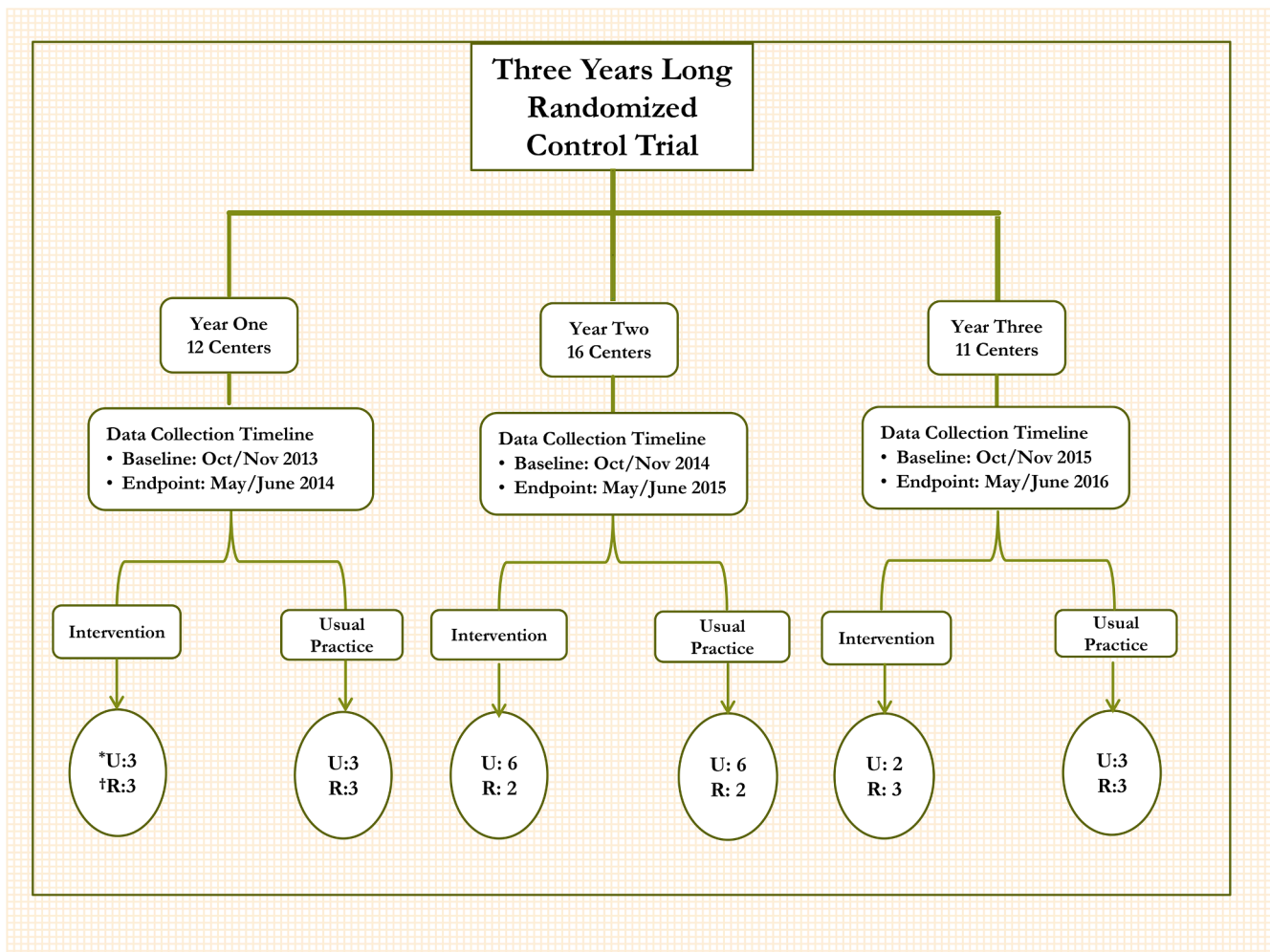


Fig. 2. The demographic distribution of the centres and the data collection timeline. * Urban. † Rural.

waste photos and internet research was used to analyse unfamiliar dishes. Each meal and snack was evaluated separately. Table 1 shows the number of meals and snacks that were analyzed. The listed food groups were compared to the guidelines. Table 2 summarizes the SCNG requirements and the menu compliance scoring process. This method is based on a 2012 Alberta study by Nikolopoulos. Points were awarded based on the number of food group servings listed for each meal and snack per day and the number of days that centres met nutrition guidelines. For example, if a centre’s menu listed two food groups per snack, the centre received one point. If in a four-week cycle menu the centres’ cumulative points were 10/20, the centre would receive a score of 50% for having met the snack guideline. For lunch, centres were awarded four points if the lunch consisted of four food groups. Additionally, centres were awarded one point if the menu listed unflavoured milk twice daily. Lastly, centres were awarded one point per week if the menu listed juice or foods to limit no more than three times per week. Comparisons were made between the groups and within each group to assess the intervention’s impact.

Table 1
Distribution of meal and snack types at the baseline and endpoint of the study.

Meal and snack type	Baseline n = 34	Endpoint n = 34
Breakfast meal	11	10
Lunch meal	34	34
Two snacks (morning and afternoon/or evening)	29	29
One Snack (afternoon)	5	5

2.4. Congruence between planned menus and actual food served as measured in the plate-waste study

In the HS/DS evaluation study, a weighted plate waste tool measured the type and amount of food and beverages served and consumed. A detailed description of the tool can be found elsewhere (Bélanger et al., 2016). Briefly, the food and beverages consumed were measured by weighing with a digital scale and simultaneously taking a digital picture of the food and the plate. At the end of the meal, any leftovers of the foods and drinks (except water), were then weighed and pictured again. This method is considered the most precise measurement of dietary intake in early learning settings (Sambell et al., 2019). Each centre was visited by trained, tablet-equipped researchers. A total of 142 lunches were observed at 36 centres. Eighteen centres belong to the intervention group and 18 the usual practice group. Observations took place over two days at 35 centres and one day at one centre at both the baseline and endpoint of the study. Plates were coded and placed on food weight scales. A digital photo of the food was taken using the Android tablet app “ASUS Memo Pad HD7” before and after the children had eaten (Bélanger et al., 2016).

Menu accuracy was assessed by comparing the food and beverages served at lunch with the items listed on the menus during observation days. Items were classified: vegetables, fruits, grain products, milk and alternatives, meat and alternatives, mixed dishes, juice and other foods. The mixed dishes category describes multi-component food and beverages. The “other foods” category includes condiments, foods to limit and side dishes (e.g. French fries, nachos, tater tot, etc.). The analysis

Table 2
Summary of the SCNG requirements and the menu compliance scoring process.

Menu Component	Points
Breakfast	
Consist of 3 food groups	1
• Vegetables and fruit	
• Grain products	
• Milk and alternatives	
• Meat and alternatives	
Morning Snack	
Consist of a serving of vegetables or fruit plus 1 other food group	1
• Grain products	
• Milk and alternatives	
• Meat and alternatives	
Lunch	
Consist of all four food groups	1
• Vegetables and fruit	
• Grain products	
• Milk and alternatives	
• Meat and alternatives	
Afternoon Snack	
Consist of a serving of vegetables or fruit plus 1 other food group	1
• Grain products	
• Milk and alternatives	
• Meat and alternatives	
Milk	
• Serving unflavoured milk twice daily	1
Juice	
• 100% unsweetened, and listed no more than 3 times/week	1
Foods to limit	
• Listed no more than 3 times/week	1

excluded items that were served to a single child, brought from home or served on a special occasion. Five indicators were used to assess the congruence between menus and food served based on a 2016 study (Breck et al., 2016): percent of match, percent of omissions, percent of additions, percent of substitutions, and percent of total match. Table 3 describes these indicators. The menus and the foods/beverages served were compared between and within the groups (intervention and usual practice centres) using the frequencies and percentages of the five indicators.

2.5. Data analyses

Data were entered into Microsoft Excel for Windows 2010 and transferred to Stata ES (14.2). Descriptive analyses were performed to determine the percentage of adherence to guidelines, and frequency of

Table 3
Description of the five indicators that were used to assess the congruence between planned menus and actual food served.

Indicator	Description
Percent of match	Number of food items that are listed on the planned menus and served to the children/number of times those items were served × 100
Percent of omissions	Number of food items that are listed but not served/number of times those foods and beverages were listed on the menu × 100
Percent of additions	Number of different food items given but not listed on the planned menus/number of times those items were served × 100
Percent of acceptable Substitution	Number of different food items given as replacements for listed food that belong to the same food group category on the planned menu/number of times those items were served) × 100
Percent of Total match	Number of served items that match the menu + number of “acceptable substitutions”/total number of all items served × 100

adherence to the written menus. Distributions were assessed using the Tukey ladder of transformations. Since results did not indicate normal distributions, non-parametric tests were used.

Only two centres met 100% of the provincial guidelines at both the baseline and endpoint of the intervention. Thus, a 75% benchmark was used to assess guideline adherence. The Wilcoxon rank-sum test was applied to assess the difference between the groups (intervention vs. usual practice centres). The Fisher exact test was used to compare the proportions of intervention and usual practice centres at the baseline of the study that achieved at least 75% of the food guidelines. The same approaches were used at the endpoint of the study.

3. Results

3.1. Adherence of the planned menus to the guidelines

The food menus of 34 centres were analyzed at two points of time. Sixteen centres belong to the intervention group and 18 to the usual practice group. The results showed increased adherence to the breakfast (80% to 100%), lunch (12.5% to 18.8%), and foods to limit guidelines (37.5% to 43.8%) among the intervention centres, although these improvements were not statistically significant. Conversely, there were no improvements at usual practice centres, with the exception of the foods to limit guideline (27.8% to 44.4%) (Table 4 and Figs. 3 and 4).

No significant differences were observed between the groups in the distribution and proportion of centres that adhered to 75% or more of the guidelines. Within each group, however, there were significant differences in centres that met the foods to limit guideline among the usual practice centres (p-value = 0.035). Generally, the percentage of adherence to the lunch, snack and milk guidelines was higher among the usual practice centres than the intervention centres, shown in Table 4.

3.2. Congruence between planned menus and actual food served

Only 32 observed meals (22.5%) entirely matched the menus. In total, 617 foods and beverages were served at lunch (308 baseline, 309 endpoint) while 511 items were listed on the menus (258 baseline, 253 endpoint). Frequencies and percentages of the items that matched the menu or were substituted, omitted, or added were analyzed to assess any significant differences between and within each group. Tables 5 and 6 show this distribution at the baseline and endpoint.

At the baseline of the study, there were no significant differences in the menus’ accuracy at the intervention and usual practice centres. However, the proportion of omission differed significantly at the endpoint (p-value = 0.039). Fig. 5 shows that the percentage of omission among the intervention group was lower than the percentage of omission in the usual practice group. Fruits, grain products, juice, vegetables,

Table 4
Percentage of centres that met the guidelines at the baseline and endpoint of the study.

	Intervention Centres (n = 16)					
	Breakfast G.	Lunch G.	Snack G.	Milk G.	Juice G.	Foods to Limit G.
Baseline	80.0%*	12.5%	6.3%	56.3%	100%	37.5%
Endpoint	100%†	18.8%	6.3%	56.3%	100%	43.8%
	Usual Practice Centres (n = 18)					
	Breakfast G.	Lunch G.	Snack G.	Milk G.	Juice G.	Foods to Limit G.
Baseline	66.7%‡	22.2%	27.8%	66.7%	100%	27.8%
Endpoint	60.0%§	22.2%	16.7%	61.1%	100%	44.4%

* Five centres out of sixteen listed breakfast meals.
 † Five centres out of sixteen listed breakfast meals.
 ‡ Six centres out of eighteen listed breakfast meals.
 § Five centers out of eighteen listed breakfast meals.

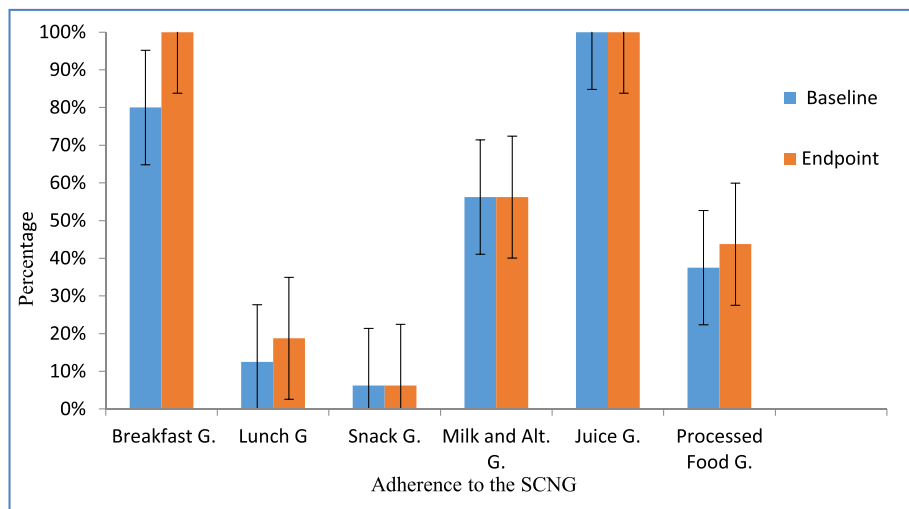


Fig. 3. Percentage of intervention centres that met the guidelines at the baseline and the endpoint. I = Standard Error, $n = 16$.

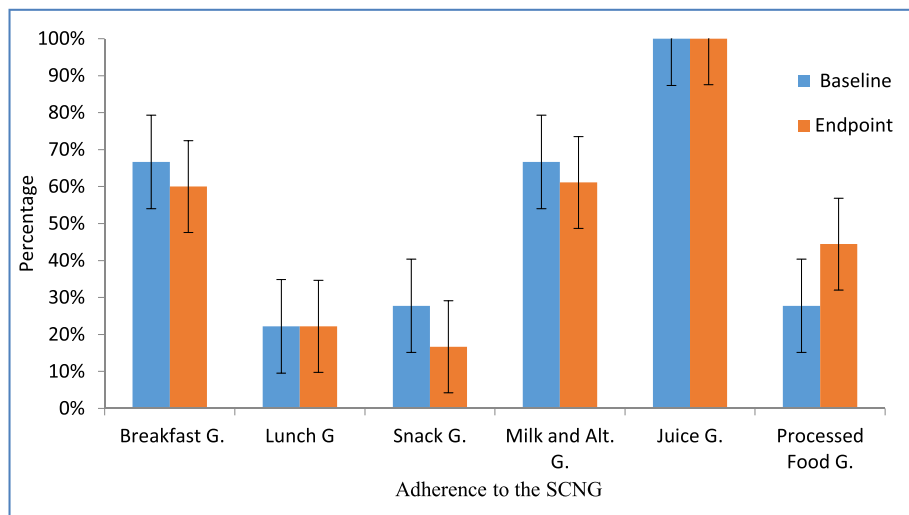


Fig. 4. Percentage of usual practice centres that met the guidelines at the baseline and the endpoint. I = Standard Error, $n = 18$.

and meat and alternatives were most frequently omitted items.

Comparisons show significant differences in the proportions of match and addition within the intervention group: p -value = 0.029 and 0.014 respectively. The p -value for the proportion of substitutions (0.056) bordered on significant. About 90% of foods served as additional items belonged to the “other” category. Figs. 6 and 7 show the distribution of the matched and additional items among the intervention group. There was no significant difference within the usual practice centres.

The proportion of served items that matched the menu among intervention centres increased between the baseline and the endpoint, while the proportion of additional items decreased. As a result, the percentage of adherence to the written menus among the intervention centres was higher.

4. Discussion

This study evaluated the impact of HS/DS on menus' compliance with nutrition guidelines and the congruence of menus and actual food served at childcare centres. At the baseline and endpoint of the study, only two centres (one intervention and one usual practice) met 100% of guidelines. Analysis of pre and post HS/DS menus for both groups

showed no significant difference between the groups' adherence to the SCNG. Although the percentage of intervention centres that met most of the guidelines improved, these improvements were not statistically significant. Similar results were noted in an earlier pilot study in Saskatchewan childcare centres (Chow et al., 2016), which is consistent with several American and Australian studies (Erinosho et al., 2011; Finch et al., 2018; Grady et al., 2018; Hardy et al., 2010; Kuratko et al., 2000). Future research should address the barriers that prevent childcare providers from following applicable guidelines.

The HS/DS offers a menu planning template that includes the SCNG recommendations and the LEAP™-Food Flair resource (Ward et al., 2018). The template lists food group servings for each meal and snack. *The Food Flair Handbook* promotes creating healthy eating environments and includes recipes and food-related activities for children (Sari et al., 2017). These resources can improve guideline compliance and help menu planners incorporate healthy recipes. However, our study reveals that providing these resources is insufficient to encourage centres to meet all guidelines. Adopting new nutrition standards is complex and requires multicomponent interventions (Bell et al., 2015; Hardy et al., 2010; Johnston Molloy et al., 2015; Seward et al., 2016). However, these interventions do not translate to immediate improvements in guideline adherence (Finch et al., 2018; Hardy et al., 2010; Ward et al., 2008).

Table 5
Frequency of food and beverage items listed on menus vs. items served at the baseline.

Food Items	Intervention Centres*									
	Match		Substitutions		Omission		Addition		Total match [†]	
	N	%	N	%	n	%	N	%	N	%
Total	96	62.7	24	15.7	12	9.1	33	21.6	120	78.4
Vegetables	16	51.6	8	25.8	2	7.7	7	22.6	24	15.7
Fruits	7	70.0	1	10.0	2	20.0	2	20.0	8	5.2
Grain Products	10	47.6	5	23.8	3	16.7	6	28.6	15	9.8
Milk & Alt.	30	85.7	0	0.00	0	0.00	5	14.3	30	19.6
Meat & Alt.	10	66.7	3	20.0	2	13.3	2	13.3	13	8.5
Juice	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Mixed dishes	23	71.9	6	18.8	1	3.3	3	9.4	29	19.0
Others	0	0.00	1	11.1	2	66.7	8	88.9	1	0.7

* n = 18.

[†] Number of items that matched the menu or were deemed acceptable substitutions out of 153 items served at the intervention centres during the baseline of the study.

Food Items	Usual Practice Centres*									
	Match		Substitutions		Omission		Addition		Total match [†]	
	N	%	N	%	N	%	N	%	n	%
Total	96	61.9	12	7.7	16	12.9	47	30.3	108	69.7
Vegetables	22	61.1	4	11.1	5	16.1	10	27.8	26	16.8
Fruits	6	75	0	0.00	0	0.00	2	25	6	3.9
Grain Products	14	58.3	2	8.3	2	11.1	8	33.3	16	10.3
Milk & Alt.	26	72.2	1	2.8	2	6.9	9	25	27	17.4
Meat & Alt.	10	52.6	0	0.00	3	23.0	9	47.4	10	6.5
Juice	0	0.00	0	0.00	0	0.0	0	0.00	0	0.00
Mixed dishes	17	70.8	5	20.8	4	15.4	2	8.3	22	14.2
Others	1	12.5	0	0	0	0	7	87.5	1	0.6

* n = 18.

[†] Number of items that matched or were deemed acceptable substitutions out of 155 items served at the usual practice centres during the baseline of the study.

Table 6
Frequency of food and beverage items listed on menus vs. items served at the endpoint.

Food Items	Intervention Centres*									
	Match		Substitutions		Omission		Addition		Total match [†]	
	N	%	N	%	N	%	N	%	n	%
Total	123	76.4	6	3.7	8	5.8	32	19.9	129	80.1
Vegetables	19	67.9	3	10.7	2	8.3	6	21.4	22	13.7
Fruits	9	69.2	2	15.4	0	0.00	2	15.4	11	6.8
Grain Products	18	75.0	0	0.00	2	10.0	6	25.0	18	11.1
Milk & Alt.	30	90.9	0	0.00	1	3.2	3	9.1	30	18.6
Meat & Alt.	12	92.3	1	7.7	0	0.00	0	0.00	13	8.1
Juice	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Mixed dishes	31	93.9	0	0.00	1	3.1	2	6.1	31	19.3
Others	4	23.5	0	0.00	2	33.3	13	76.5	4	2.5

* n = 18.

[†] Number of items that matched or were deemed acceptable substitutions out of 161 items served at the intervention centres during the endpoint of the study.

Food Items	Usual Practice Centres*									
	Match		Substitutions		Omission		Addition		Total match [†]	
	N	%	N	%	N	%	N	%	n	%
Total	98	66.2	12	8.1	12	9.8	38	25.7	110	74.3
Vegetables	21	58.3	4	11.1	3	10.7	11	30.6	25	16.9
Fruits	6	85.7	0	0.00	1	14.3	1	14.3	6	4.1
Grain Products	7.5	55.6	2	14.8	2	17.4	4	29.6	9.5	6.4
Milk & Alt.	25	69.4	0	0.00	1	3.8	11	30.6	25	16.9
Meat & Alt.	9.5	90.4	0	0.00	2	17.4	1	9.5	9.5	6.4
Juice	0	0.00	0	0.00	1	100	0	0.00	0	0.00
Mixed dishes	25	71.4	6	17.1	1	3.1	4	11.4	31	20.9
Others	4	40%	0	0	1	20.0	6	60.0	4	2.7

* n = 18.

[†] Number of items that matched or were deemed acceptable substitutions out of 148 items served at the usual practice centres during the endpoint of the study.

This supports ours and others' research and suggests that full adherence to nutrition standards is unlikely to be fully achieved (Finch et al., 2018; Seward et al., 2017). Studies have consistently shown that while increased kitchen staff training results in increased knowledge, this knowledge does not translate into full guideline compliance (Finch et al., 2018; Grady et al., 2020b; Seward et al., 2018).

Analyzing foods to limit, including sweets, salty snacks and sweetened drinks, is essential when assessing menu quality since many of the menus contained processed and sugary foods. Exposure to these foods can influence children's food preferences (Wallace et al., 2017; Zaltz et al., 2018). Throughout our study, more than 50% of centres listed processed food in amounts exceeding recommendations at both the

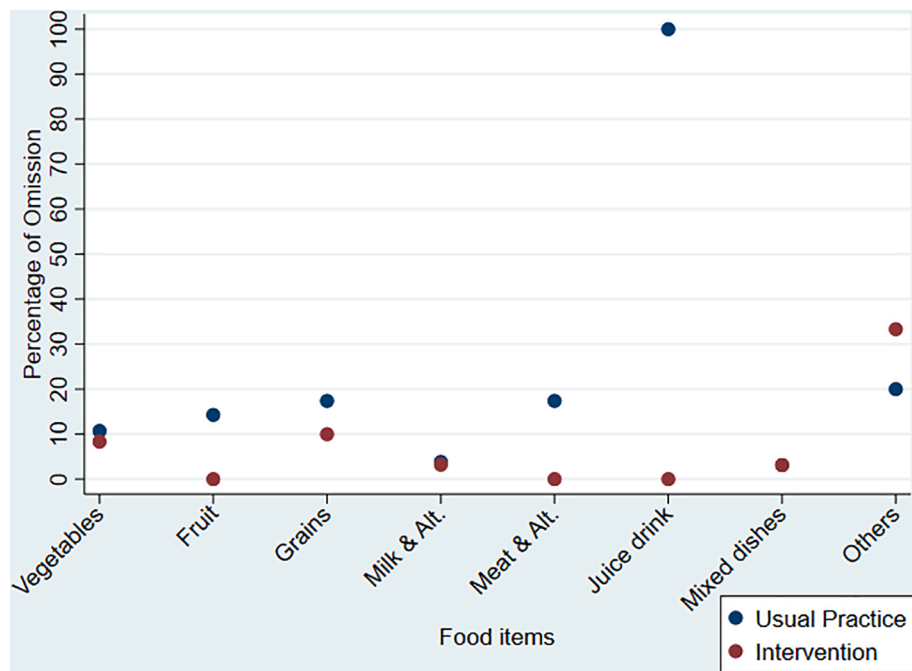


Fig. 5. Comparison of the percentage of omission between intervention and usual practice groups at the endpoint. The percentage of omission of fruits, grain products, juice, meat and alternatives, and vegetables were higher among the usual practice centres at the endpoint of the study.

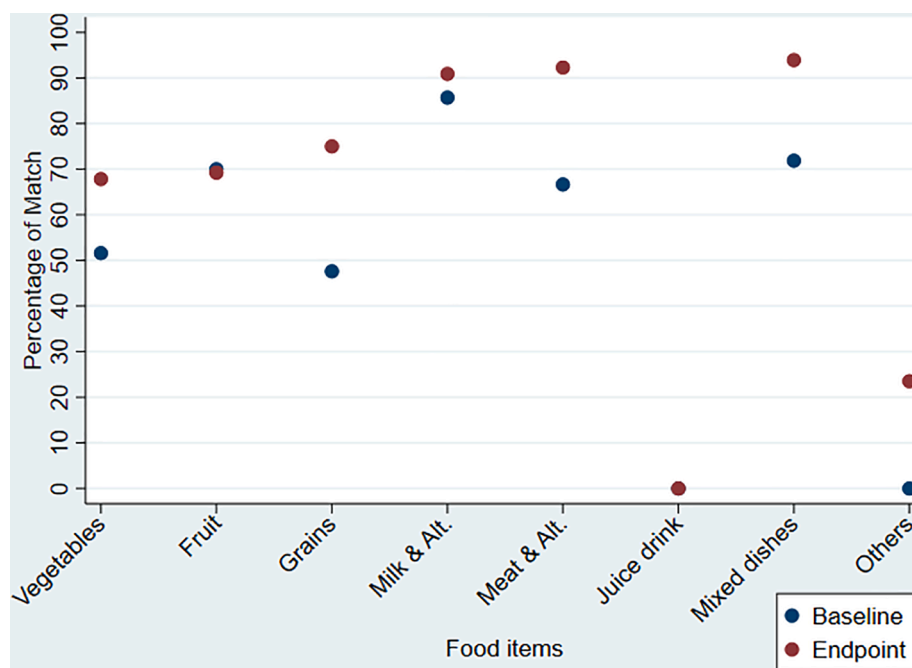


Fig. 6. Comparison of the percentage of items that matched the menu within the intervention group. The percentage of match of grain products, meat and alternatives, milk and alternatives, mixed dishes, others and vegetables was greater at the endpoint of the study.

baseline and endpoint of the study. However, the quantity of these foods served at the usual practice centres decreased. Providing these foods may lead to children consuming excessive sugar and saturated fat (Sambell et al., 2019), which may indicate that childcare centres are contributing to childhood obesity (Costa et al., 2017). Further studies should determine if our results reflect common practice. More research is needed to determine the impact of these practices on children’s food preferences. Both groups met the juice guidelines but did not indicate whether the juice was 100% fruit juice.

Our study did not investigate the barriers that impact guideline

adherence. However, the HS/DS evaluation and program planning study cited a lack of time to revise and update menus and resistance to change (Ward et al., 2018). Another study assessed barriers and facilitators to adopting nutrition policies at 163 centres and reported that cost and food preferences affected the adoption of nutrition guidelines (Zaltz et al., 2018). The policies and regulations that guide menu planning could have a great impact on improving menu planning practices. Policy makers should develop comprehensive menu planning training tools and resources that emphasize quality, quantity, and variety of foods and provide examples of nutritious recipes. Regular training focused on

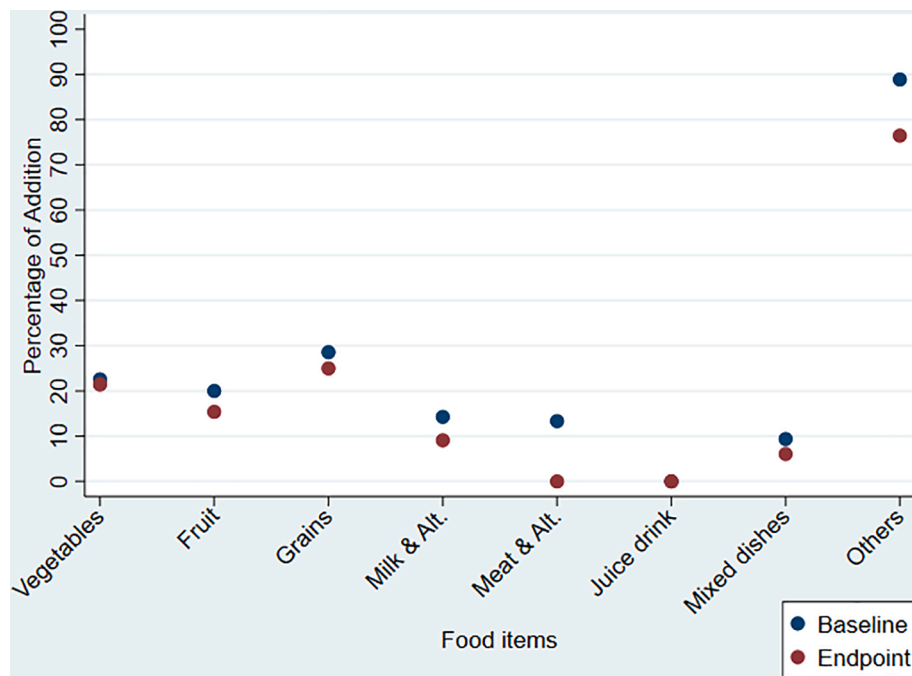


Fig. 7. Comparison of the percentage of addition within the intervention group. The percentage of addition among all food items, except juice, was lower at the endpoint of the intervention.

provincial regulations and nutritional knowledge is crucial.

The discrepancy between menu and food served suggests that researchers and parents cannot rely on menus alone to provide valid information. Few studies have measured the congruence between menu and food served (Alves and Morais, 2015; Benjamin Neelon et al., 2010; Breck et al., 2016; Dave and Cullen, 2018), and ours is the first to assess the impact of interventions on menu accuracy. At intervention centres, the study noted a decreased proportion of omission of fruits, grain products, juice, vegetables, and meat and alternatives, and an increased percentage of match. About 90% of the additional items that were served belonged to the “other” food items category. “Others” were often foods to limit and side dish items, such as tortilla chips and tater tots, condiments including ketchup, mayonnaise, ranch dressing, salad dressing, sour cream, gravy, and mustard. The addition of unlisted items also decreased at intervention centres. There was no significant improvement within the usual practice centres.

Our results illustrate that the intervention increased participating centres’ menu adherence. However, the omission of foods from major food groups and the addition of “foods to limit and side dishes” could indicate that menus misrepresent the diet provided, which highlights the importance of improving menu accuracy. Encouraging centres’ staff to choose acceptable substitutions could enhance menu accuracy, and provide better insight for researchers and parents (Sisson et al., 2020). Further studies should assess the nutritional value of food served at childcare settings.

4.1. Study strengths and limitations

This study benefits from the delayed cluster randomized controlled trial used to evaluate the HS/DS intervention which allowed us to track the impact of HS/DS on the menus of the participating centres. Another strength is that the data collection was based on an advanced observation system and the measurement of food provided and consumed. This collection method provided the opportunity to compare items listed on the menus with items that children were served. Furthermore, to our knowledge, our study is the first study to assess the impact of a nutrition intervention on improving the accuracy and consistency of planned menus and the actual food served in childcare centres.

This study’s limitation was its small sample size. Thirty-nine centres participated at the baseline of the study and 37 centres remained at the endpoint. Only 34 centres’ menus had complete cycle information at the endpoint of the intervention. This study is susceptible to sample selection bias since centres were enrolled in the study at random. In several instances, the usual practice centres met the SCNG more often than the intervention centres. Furthermore, the usual practice centres were aware of the HS/DS objectives and may have been motivated to improve their nutrition practices independently. Since this study investigated centres’ adherence to the SCNG, the reasons behind these disparities are unclear. Future studies should examine barriers to SCNG adoption and assess the impact of socioeconomic and geographical distribution on centres’ menu planning practices.

5. Conclusion

Since more than 50% of Canadian preschoolers attend childcare centres, serving quality food at centres is crucial (Briley and McAllaster, 2011; Lynch and Batal, 2012). However, our study found no significant differences in the distribution and proportion of intervention and usual practice centres that adhered to 75% or more of the guidelines. More centres adhered to the breakfast, lunch, and foods to limit guidelines among the intervention centres; however, these improvements were not statistically significant. In usual practice centres, one statistically significant improvement occurred regarding adherence to the foods to limit guidelines.

Our study has expanded knowledge about menus and nutrition practices in licensed childcare centres in Saskatchewan. This study illustrates that the intervention positively impacted the adherence to the centres’ planned menus. This implies that interventions may effectively improve the accuracy and reliability of menus. Further research may help centres more closely adhere to the SCNG guidelines and their own planned menus. Since our study was conducted between the second and third phases of the HS/DS, our findings may positively impact menu planning practices during the intervention’s next phase.

6. Authorship

LA and HV designed the study. LA drafted the manuscript under the direct supervision of HV. HV provided critical review and feedback throughout different stages of the manuscript preparation. RES and AL were actively involved in the design of the study and provided critical review of the manuscript. All authors read and approved the final manuscript.

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CRedit authorship contribution statement

Lila Abobakar: Data curation, Investigation, Formal analysis, Software, Writing - original draft. **Rachel Engler-Stringer:** Project administration, Methodology, Writing - review & editing. **Anne Leis:** Project administration, Funding acquisition, Writing - review & editing. **Hassan Vatanparast:** Conceptualization, Project administration, Funding acquisition, Methodology, Supervision, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Ethical standards disclosure

This study received ethics approval from the behavioural Research Ethics Board of the University of Saskatchewan (BEH# 16-386). A secondary data that was conducted during HS/DS intervention study has been used to produce this paper. Thus, consent to participate was not required.

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