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Comparison between the Healthy Start-Départ Santé online and in-person training of childcare educators to improve healthy eating and physical activity practices and knowledge of physical activity and fundamental movement skills: A controlled trial

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ABSTRACT

Online training may be a more effective and sustainable way to reach educators in early childcare centres (ECCs). This study compared the effectiveness of an online version of the Healthy Start-Départ Santé (HSDS) training to the traditional in-person version of the training as well as to the usual practice condition on ECC educators' healthy eating (HE) and physical activity (PA) practices and knowledge of PA and fundamental movement skills (FMS). Seventy-eight ECCs were randomly chosen across the provinces of New Brunswick and Saskatchewan, Canada and were allocated to either the online training, the in-person training or the usual practice groups between 2013 and 2018. Educators in each group completed a self-administered questionnaire before and nine months after the intervention, which included questions regarding their HE and PA practices in the ECC, as well as their knowledge of children's FMS and PA. Group differences were assessed with mixed-effect models. Compared to educators in the usual practice group, educators in the online training group reported a greater improvement in scores for HE and PA practices ($p = 0.03$ and 0.03, respectively), but change for educators in the in-person training group were not different ($p = 0.8$ and 0.56, respectively). The rate of improvement in FMS and PA knowledge did not differ across all three groups ($p = 0.9$). The HSDS online training is an effective method of improving educators' HE and PA practices in ECCs.

Trial registration: ClinicalTrials.gov (NCT02375490)

1. Introduction

Childhood obesity affects a growing number of preschoolers in many developed countries, including the United States (Fryar et al., 2018), Australia (Australian Institute of Health and Welfare, 2017) and various European countries (Garrido-Miguel et al., 2019). In Canada, 21% of preschoolers have excess weight or obesity (Shields, 2006). Children with a high body mass index are at increased risk of developing non-communicable diseases in adulthood (Park et al., 2012; Reilly and Kelly, 2011; Friedemann et al., 2012; Guo et al., 2000; Freedman et al., 2005) and to develop these diseases earlier in life (Public Health Agency of Canada, 2011). Excess weight in childhood has also been linked to poor physical (World Cancer Research Fund/American Institute for Cancer Research, 2018; Freedman et al., 1999; Reilly et al., 2003) and emotional health, and diminished social well-being (Reilly et al., 2003). Therefore, many organizations recognize the importance of identifying measures to counter childhood obesity (World Health Organization, 2012; Obesity Canada, 2020; Baur, 2009).

According to the Organisation for Economic Co-operation Development (OECD), approximately 90% of preschoolers in OECD countries are

Abbreviations: **ECC**, Early childcare centre; **FMS**, Fundamental movement skills; **HE**, Healthy eating; **HSDS**, Healthy Start-Départ Santé; **NAP SACC**, Nutrition and Physical Activity Self-Assessment of Child Care; **PA**, Physical activity.

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enrolled in childcare or primary school (Organisation for Economic Co-operation and Development, 2019). In Canada, roughly 60% of children aged 2 to 4 years receive out-of-home care for at least 30 h a week (Sinha, 2014). Therefore, early childcare centres (ECCs) are promising locations for preventing obesity, with educators acting as role models to promote healthy eating (HE) and physical activity (PA) in young children (Ward et al., 2015). Training educators has shown to be key in promoting healthy behaviours of children (Engelen et al., 2013; Céspedes et al., 2013; Nemet et al., 2013, 2011). Studies that used in-person training to help educators deliver HE and PA interventions have reported improvements in preschoolers' dietary intake (Gorelick and Clark, 1985; Byrd-Bredbenner et al., 1993), PA levels (Reilly et al., 2006; de Silva-Sanigorski et al., 2010) and fundamental movement skills (FMS) (Leis et al., 2020).

While demonstrating the effectiveness of an intervention is important, its sustainability is an outcome that is often overlooked (Hanson et al., 2009). Interventions such as Healthy Start-Départ Santé (HSDS) commonly use in-person training (Bélanger et al., 2016). Funded by the Public Health Agency of Canada, HSDS provides in-person training to ECC staff by experts in nutrition and PA on how to enhance opportunities for PA and HE of children. However, the sustainability of interventions, such as HSDS, is often limited because they require substantial financial and human resources (Sari et al., 2017). Difficulties with coordination of training sessions and high turn-over rate of personnel in ECCs also pose a challenge (Ward et al., 2018). Online education has been identified as a possible option for professional learning in early childhood education (Peden et al., 2018; Kennedy et al., 2017), with one randomized pilot study suggesting that in-person programs can effectively be translated to an online format and be successfully implemented by ECC directors (Ward et al., 2017). Thus, online training could reduce costs associated with human resources and onsite training, allow educators to complete the training at their own pace, and provide all new personnel with the opportunity to be trained. Therefore, online training may be an effective and sustainable way of reaching a greater number of ECC educators.

This study aimed to compare the effectiveness of an online version of the HSDS training to the in-person HSDS training and to the usual practice conditions, on educators' HE and PA practices and their knowledge of children's FMS and PA.

2. Material and methods

2.1. Study design and setting

This study was conducted as an add-on to the HSDS cluster randomized controlled trial (RCT), which evaluated the effectiveness of the intervention on children's dietary intake, PA and FMS (Leis et al., 2020) (registered in ClinicalTrials.gov #NCT02375490). In the HSDS RCT, 61 ECCs in the Canadian provinces of Saskatchewan (n = 37) and New Brunswick (n = 24) were randomly allocated to the HSDS in-person intervention or usual practice groups between September 2013 and 2015. In 2018, 17 new ECCs were recruited in New Brunswick (n = 12) and Saskatchewan (n = 5) to participate in an additional arm of the study, which involved an online version of the HSDS training. While the HSDS RCT assessed the effectiveness of the intervention on children's behaviours, the current study looked at its impact on educators' practices and knowledge. The intervention component of both the RCT and the add-on study was conducted over a nine-month period and data were collected before and after the intervention component (either in-person or online).

2.2. Sample and participants

Details on the recruitment of participants in the HSDS RCT have been published (Bélanger et al., 2016). The 17 additional centres followed the same recruitment method as the RCT to ensure a fair comparison between the three groups (Bélanger et al., 2016). Briefly, a provincial registry of all licenced ECCs in New Brunswick and Saskatchewan helped identify those who met the inclusion criteria, which included having at least 20 children between the ages of 3 and 5, providing meals and not having received a PA or nutrition promoting intervention in the past. The provincial coordinator called centres to supplement missing information. Eligible ECCs were stratified by school district (Anglophone or Francophone) and by geographical location (rural or urban), and randomly selected to participate in the study. The provincial coordinator contacted each selected ECC by phone, provided them with information on the study and obtained their written consent. All educators in the recruited centres were invited to participate in the study. Ethics approval was obtained from the Université de Sherbrooke (#2014–620, 13–088).

2.3. Randomization and blinding

In the initial RCT, once an ECC had provided consent, the provincial coordinator randomly allocated them in a 1:1 ratio to either the usual practice or in-person intervention, using a sequence generation software. In the add-on study, all randomly selected centres which agreed to participate were allocated to the online training group. If an ECC declined to participate, another was randomly selected. Blinding was not possible due to the nature of the intervention; therefore, ECC staff were aware of their group allocation.

2.4. Intervention

Details on each component of the HSDS intervention are described elsewhere (Bélanger et al., 2016; Ward et al., 2018) and are summarized below.

Usual practice – ECCs in the usual practice group were instructed to continue their usual programming. These centres were provided with all components of the HSDS in-person training after the study was completed.

In-person training – The intervention consisted of a 3-hour training session to ECC staff in their respective centre, after regular childcare hours. During this session, trainers with an expertise in nutrition and kinesiology discussed the importance of HE and PA for young children, explained how to improve the HE environment in ECCs, how to build children's FMS and how to incorporate PA and HE in their daily routine. All participants received a certificate of completion. Each trained centre was given the evidence-based LEAP BC™-GRANDIR resources, including the HOP (physical activity) and Food Flair (healthy eating) manuals (Decoda Literacy Solutions, 2020). These resources were developed at the University of Victoria and include activity ideas, tips and information to help educators, caregivers and parents provide opportunities for children to be physically active and eat healthy. Centres were also given the Active Kids Toolkit which included miscellaneous active play equipment. On-going support was provided via phone or email once or twice a month by the provincial coordinator and a 90-minute on site "Booster session" took place three to six months after the in-person training. These sessions reinforced aspects of PA or HE that they found difficult to implement (e.g. risk in active outdoor play, nutrition and physical activity for infants and toddlers).

Online training – The online HSDS training consisted of two separate modules, one on HE and the second on PA. The online training took an average of 4 h to complete and covered all the same topics as those in the in-person training. Both LEAP BC™-GRANDIR resources were referenced in the online training and a complete PDF version of the manuals was made available for download. Videos of best practices were filmed in a local ECC and embedded in the modules to ensure the training was visually interesting and interactive. The modules were formatted in a way that allowed educators to complete the training at their own pace. Educators were given one month to complete the training, after which they received a certificate of completion. Once the educators were

trained, their ECC was sent the Active Kids Toolkit. As a substitute for the in-person "Booster sessions", a series of 4 optional bilingual (English and French) webinars were developed (average length of 34 min each). These were based on the most common questions and requests which came from centres who received the in-person training. As with the in-person training, on-going support was provided via phone or email by the provincial coordinator.

2.5. Data collection procedures and measures

Data were collected among educators in the in-person training and usual practice groups in September 2013 and 2014, and again nine months later in May 2014 and 2015. For educators in the online training group, data were collected in September 2018 and in May 2019. Participating educators completed a pen and paper questionnaire that assessed their HE and PA practices, and their knowledge of children's FMS and PA before and nine months after the intervention. This questionnaire was developed using 18 items of the Nutrition and Physical Activity Self-Assessment of Child Care (NAP SACC) tool (Ammerman et al., 2007; Benjamin et al., 2007) and on Bandura's social cognitive theory and self-efficacy (Bandura, 1977). NAP SACC items were selected based on the best practices targeted in the online and in-person training.

HE and PA practices – The questionnaire included 12 items related to educators' HE practices (e.g. "When in classroom during meal or snack times, I eat and drink the same foods and beverages as children") and 6 items related to PA practices (e.g. "I incorporate physical activity into classroom routines and transitions"). Items related to HE were found to have a Cronbach alpha of 0.52, while PA items had a Cronbach alpha of 0.72. Each item was attributed a score between 0 and 3, where a score of 3 represented the best practice. A total score was computed for HE practices (0to36points) and for PA practices (0to18points).

FMS and PA knowledge – Self-perceived knowledge of FMS (i.e. locomotor, projection, reception and striking skills) was assessed with 1 item (e.g. "Rate your level of knowledge of activities that incorporate motor skills in the daily activities of preschoolers"). Level of knowledge of sedentary behaviour was evaluated with the question: "Rate your level of knowledge on the sedentary behaviour of young children". Seven items assessed self-perceived knowledge in teaching FMS (e.g. "Rate your level of knowledge in teaching preschoolers the following fundamental movement skills…"). One item was used to assess educators' level of confidence in providing physical activities for children (i.e. "Rate your level of confidence in providing activities that are appropriate for the physical development of young children"), while another assessed their level of confidence in teaching FMS (i.e. "Rate your confidence in teaching young children fundamental movement skills"). These 11 items showed excellent internal consistency with a Cronbach alpha of 0.97. Items were attributed a score between 0 and 4, where 4 represented an educator who felt very knowledgeable/confident. Each item was summed to provide a total FMS and PA knowledge score (0to44points).

ECC and educator demographics – ECCs were defined as urban or rural based on publicly available geospatial information from the Community Information Database (Government of Canada's Rural Secretariat, 2006). Those located in census metropolitan areas, census agglomerations or strong metropolitan influenced zone (MIZ) were defined as urban centres, while those located in moderate, weak or no MIZ areas were defined as rural centres. Primary language spoken at the ECC (English or French) was based on the school district to which they belong (Anglophone or Francophone school districts). Age and highest level of education of the educators were obtained through the study questionnaires. Educators also reported how many years they had been working as an educator in the current ECC and how long they had been working as an educator in any ECC.

2.6. Statistical analyses

Outcomes of interest were fitted in mixed-effect models using time of measurement (baseline or endpoint), group (online training, in-person training or usual practice), and an interaction between time and group as fixed effects. To account for clustering related to repeated measures and to groupings of educators within ECCs, variables representing educators were included as random effects nested within ECCs. Analyses were adjusted for the educators' province and were conducted with the MIXED procedure in SAS, version 9.4. Complete case analyses were used and a p value of < 0.05 was chosen as the criterion for statistical significance for all analyses.

3. Results

Of the 788 ECCs assessed for eligibility, 204 met the inclusion criteria. Of those ECCs, 127 were randomly selected and 78 agreed to participate (response proportion of 61%) (Fig. 1). A total of 324 educators were recruited and 304 completed the pre-questionnaire (response proportion of 94%; number of recruited educators/ECC ranged from 1 to 8). Of these educators, 204 (67%) completed the post-questionnaire. Data on reasons for loss of follow-up were not captured in the RCT, but for the add-on study, the primary reasons for loss of educators at follow-up included maternity leaves ($n = 8$), no longer being employed in the ECC ($n = 16$) or not having completed the online training in the timeframe given ($n = 15$). Baseline characteristics of the participating ECCs and educators are shown in Table 1.

Educators from all three groups had similar HE and PA practices at the onset of the study (Table 2). However, the online intervention group had higher scores on FMS and PA knowledge at the beginning of the study, compared to the usual practice group. Results also suggest that on average, there was a general improvement in scores for knowledge related to FMS and PA throughout follow-up among educators from all three groups. Scores for HE practices of educators in the online training group improved to a greater extent than improvements observed among educators in the usual practice group. Similarly, a greater improvement in scores for PA practices was observed among educators in the online training group compared to the changes detected in the usual practice group. The rate of improvement in FMS and PA knowledge did not differ across all three groups.

4. Discussion

Findings suggest that the online HSDS training is effective at improving educators' HE and PA practices in ECCs. While another study looked at the impact of an online intervention on ECCs nutrition environment (Ward et al., 2017), this is the first study to show positive outcomes on educators' self-reported health behaviour practices after having been exposed to an online training intervention.

In the online training intervention, educators were able to complete it at their own pace and at a time that was suitable to them. In comparison, the 3-hour time constraint of the HSDS in-person intervention may have been too short for educators to properly assimilate its content. In fact, during the process evaluation of the HSDS study, educators reported wanting longer training sessions to provide more time to cover aspects that were new to them (Ward et al., 2018). Although in-person training allows for meaningful discussions and hands-on experience (Peden et al., 2018), it also has limitations. Physical and mental fatigue may have hindered educators' ability to learn and retain the information provided, as the in-person intervention was offered after regular child-care hours. This is particularly relevant, as learning is enhanced when individuals are focused (Bandura, 1977). Furthermore, educators exposed to online training had the opportunity to go back and re-read or watch concepts that they may not have fully understood the first time, including the optional webinars. The ability to review the training's content when needed may have made it more relevant to educators and

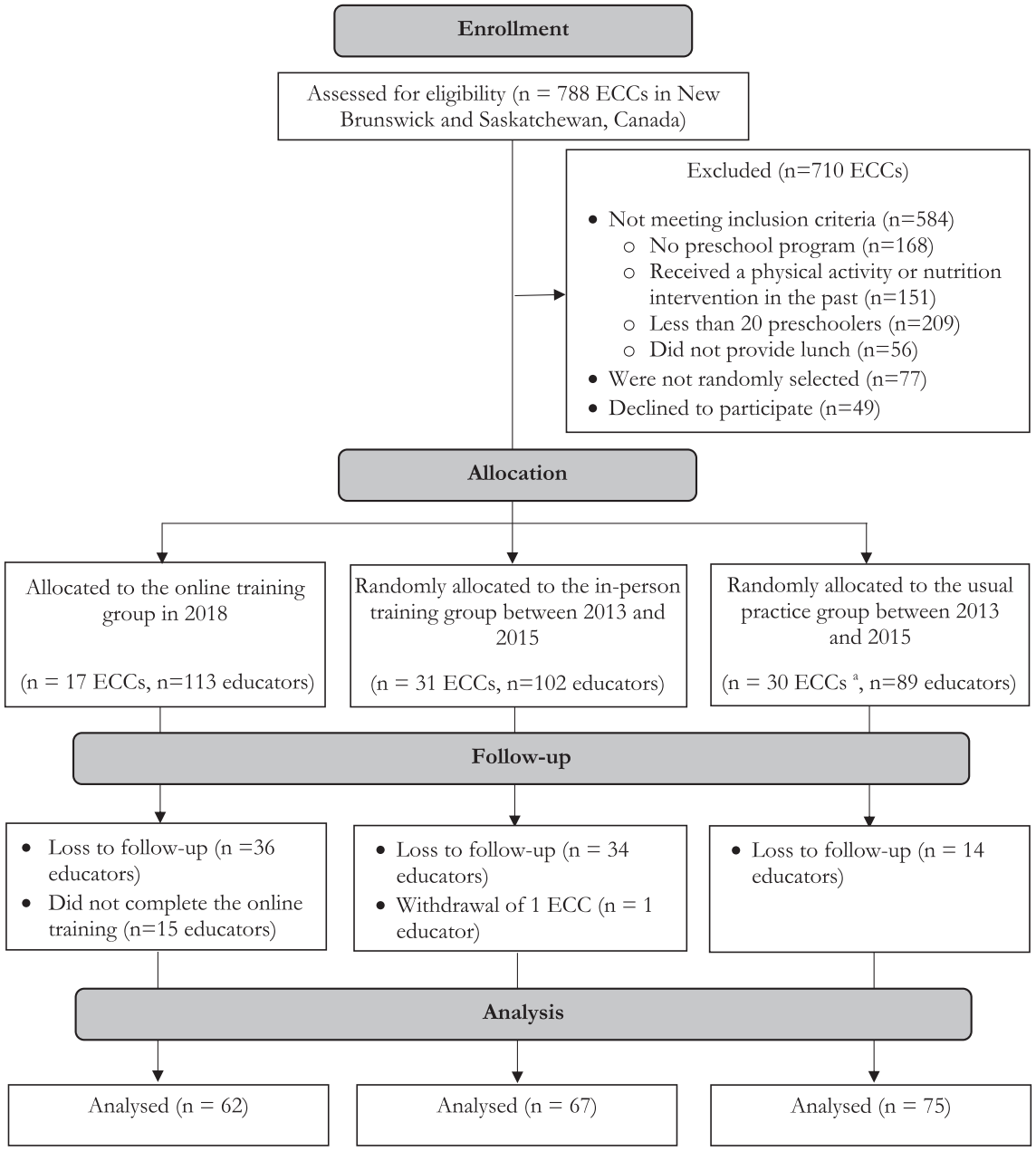

Fig. 1. CONSORT flow diagram of participants [a] Following recruitment of one ECC in the usual practice group, it was found that it had the same director as a nearby ECC that had been recruited in the in-person training group. Given the risk of contamination, the two ECCs were considered as one ECC in the in-person training group.

thus increased their retention of the content (Bandura, 1977).

Multi-component approaches that combine various forms of professional learning, such as training and booster sessions, may promote better practices among educators (Peden et al., 2018). In the online training intervention, educators were invited to view a standard set of webinars on topics of interest to educators and commonly covered in booster sessions. The online format may have allowed for more educators to take part in this professional learning opportunity. In contrast, booster sessions were individualized based on ECCs' needs, so sessions varied from one ECC to the other (e.g. staff meetings, parent presentations, menu planning) and educators were not always involved in the booster sessions, which may have limited the impact of the in-person training.

The ease of online access to the LEAP BC™ GRANDIR manuals and the ability to download their own copy may also have been an enhancing factor. In the in-person training, each ECC was provided with one physical copy of both the HOP and Food Flair manuals to share among the staff, while in the online training intervention, each educator had individual access to an electronic copy. The direct access to these resources may have allowed educators to use them more readily and more frequently than those who had to share a physical copy of the same resources.

Compared to the online intervention where educators were only provided with a post-questionnaire if they had completed the initial training, this was not the case in the in-person intervention. Records from trainers' logbooks showed that on average, only 75% of the educators within the ECC attended the in-person training, yet all educators in the ECC were invited to complete the post-questionnaire. Therefore, the effectiveness of the in-person intervention may have been underestimated as some of the educators may not have actually been trained.

Table 1
Baseline characteristics of participants.

	Usual practice	In-person intervention	Online training
	n = 89 educators (30 ECCs)	n = 102 educators (31 ECCs)	n = 102 educators (31 ECCs)
	n (%)	n (%)	n (%)
Province			
New Brunswick	34 (38)	36 (35)	80 (71)
Saskatchewan	55 (62)	66 (65)	33 (29)
Location			
Rural community	34 (38)	41 (40)	13 (12)
Urban community	55 (62)	61 (60)	100 (88)
Primary language spoken in the ECC			
Anglophone	64 (72)	74 (73)	97 (86)
Francophone	25 (28)	28 (28)	16 (14)
Age (years)			
19 and under	4 (4)	4 (4)	1 (1)
20 to 29	32 (36)	40 (39)	46 (41)
30 to 39	20 (23)	25 (24)	30 (26)
40 to 49	23 (26)	17 (17)	22 (20)
50 and over	8 (9)	8 (8)	14 (12)
Did not answer	2 (2)	8 (8)	0 (0)
Highest level of education			
Did not finish high school	3 (3)	3 (3)	0 (0)
High school diploma	12 (14)	4 (4)	14 (13)
Some college or university	12 (14)	19 (18)	8 (7)
College or university degree	59 (66)	64 (63)	84 (74)
Other	0 (0)	2 (2)	7 (6)
Did not answer	3 (3)	10 (10)	0 (0)
Mean (standard deviation) of the number of years working as an educator in the current childcare centre	5.01 (5.35)	4.11 (5.26)	5.28 (7.09)
Mean (standard deviation) of the number of years working as an educator in any childcare centre	7.27 (6.37)	6.91 (6.98)	8.82 (8.90)

Time and place of the study: September 2013 to May 2019 in New Brunswick and Saskatchewan, Canada.

Our findings suggest that the HSDS online training is effective at improving practices but not knowledge. Specifically, the rate of improvement in FMS and PA knowledge increased similarly in all three groups. While no significant differences were found between the online training, the in-person and the usual practice groups, it is encouraging that educators seemed to gain knowledge of PA and FMS in general. The concept of physical literacy, including FMS, has gained significant attention over the past few years and this increase in awareness may have led to the improvement of FMS knowledge among all educators in our study. The lack of differences measured among the three groups could also be due to issues with baseline reporting. It is possible that educators were overconfident in their knowledge and skills related to FMS at the beginning of the study, as has been reported by some educators in a previous study (McLachlan et al., 2017). A Canadian study also found that educator candidates had a relatively high perception of self-efficacy to teach locomotor skills to children, with those having taken one or more post-secondary courses on PA scoring only slightly higher than those who had no training (8.54 vs 8.19 on a 0–10 scale) (Bruijns et al., 2019). In our study, this high level of confidence may have decreased the ability to detect differences between groups. It is also possible that, compared to HE and PA practices, FMS may be a technical concept that is more easily acquired through experience and practice over time. Systematic reviews have shown that educator-led programs are effective at improving FMS in preschool-aged children (Wick et al., 2017; Logan et al., 2011). Therefore, educators should be provided with on-going professional learning opportunities and resources that motivate and support ECC educators to continue to deliver programs that promote FMS. This said, knowledge itself has consistently shown to be insufficient to change behaviour (Kelly and Barker, 2016). It is possible that the online training provided educators with the practical tools needed to apply the knowledge they already had, which could explain why it had a greater impact on practices than on knowledge.

Our findings are relevant from a sustainability perspective. The cost of the HSDS in-person intervention is approximately $285 per child, with human resources representing 70% of expenditure (Sari et al., 2017). In contrast, cost of the online training was primarily associated with the initial development of the training and webinars. Since the online training is self-directed, costs related to human resources are greatly reduced, except for administrative and technical support from the host organization. While difficulties with training coordination and high turnover rates of personnel in ECCs were identified as key challenges to the sustainability of the HSDS in-person intervention (Ward et al., 2018), the online training does not require training coordination as it can be taken by any new educator and can also be integrated in post-secondary early childhood education programs. Therefore, the HSDS online training also appears to be sustainable and cost-effective.

Study strengths included the random selection of ECCs, the large sample size and the controlled trial design. Limitations included that randomization was not possible for the online training since this was a

Table 2
Between group differences in scores for healthy eating and physical activity practices and FMS and physical activity knowledge of educators [a].

Outcome	Usual practice		In-person intervention		Online training		Baseline difference between groups	Effect of time	Group differences in effect of time
	Baseline (n = 102 educators)	Follow-up (n = 75 educators)	Baseline (n = 89 educators)	Follow-up (n = 67 educators)	Baseline (n = 113 educators)	Follow-up (n = 62 educators)			
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	p value	p value	p value
Healthy eating practices (0 to 36 pts)	24.2 (4.1)	25.3 (4.3)	25.3 (3.8)	25.9 (4.3)	24.1 (4.3)	26.5 (4.7)	In-person vs Usual: 0.30 Online vs Usual: 0.08	0.18	In-person vs Usual: 0.80 Online vs Usual: 0.03
Physical activity practices (0 to18 pts)	13.3 (2.7)	13.4 (3.0)	13.2 (3.0)	13.3 (2.9)	12.8 (3.2)	14.1 (2.9)	In-person vs Usual: 0.99 Online vs Usual: 0.15	0.92	In-person vs Usual: 0.56 Online vs Usual: 0.03
Fundamental movement skills and physical activity knowledge (0 to 44 pts)	31.0 (6.8)	33.3 (6.4)	32.7 (7.0)	33.4 (6.6)	32.2 (6.3)	34.1 (5.8)	In-person vs Usual: 0.10 Online vs Usual: <0.001	0.04	In-person vs Usual: 0.78 Online vs Usual: 0.98

[a] Analyses account for educators' province and for clustering related to repeated measures. Note: Time and place of the study: September 2013 to May 2019 in New Brunswick and Saskatchewan, Canada.

continuation of an initial RCT. However, educators in all three groups had similar levels of education, age, years as an educator, and baseline scores for HE and PA practices. Because of differences in timing between intervention groups, it is possible that the online intervention subconsciously gained from lessons learned with the in-person intervention. Furthermore, the nature of the study meant that blinding of ECCs was not possible but educators' group allocation was blinded at the time of statistical analyses. The psychometric properties of the questionnaire are also a limitation since questions related to HE and PA practices have very low to moderate kappa statistics (-0.01 to 0.59) when compared to direct observations (Benjamin et al., 2007) and properties of the FMS and PA knowledge questions have yet to be determined. As is often the case with self-reported questionnaires, social desirability is also possible.

5. Conclusions

The HSDS online training was found to be effective at improving educators' HE and PA practices in ECCs. The ease with which it can be integrated in educators' training and its ability to reach a large number of educators regardless of location makes it a promising method of enabling them to create healthier environments in ECCs.

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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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