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# Development of a Physical Activity and Sedentary Behaviour Policy for Canadian Childcare Settings: A Delphi Study

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## Abstract

This study aimed to obtain consensus on physical activity (PA) and sedentary behaviour (SB) policy items for use in Canadian childcare settings. Purposeful sampling of Canadian experts in PA/SB ( $n=19$ ) and Early Childhood Education (ECE;  $n=20$ ) was used to form two distinct (i.e., PA/SB and ECE) panels for a 3-round Delphi study. In round 1, the PA/SB experts suggested their top 10 items for a Canadian childcare PA/SB policy. Policy items were then pooled to generate a list of 24 unique items. In round 2, experts in both panels rated the importance of the 24 policy items using a 7-point Likert scale (i.e., 1 = *Not at all important* to 7 = *Extremely important*). The ECE panel was also asked to report on the feasibility of the policy items using a 4-point Likert scale (i.e., 1 = *Not at all feasible* to 4 = *Very feasible*). Policy items that received an interquartile deviation (IQD) score of  $\leq 1$  (indicating consensus) and a median score of  $\geq 6$  (indicating importance) in both panels were considered shared priorities. In round 3, members of both panels re-rated the importance of the policy items that did not achieve consensus among their respective panel in round 2 and were asked to order items based on importance. Descriptive statistics were used to assess feasibility of policy items, and differences in panel ratings were quantified using Mann Whitney U tests. Consensus was achieved for 23 policy items in the PA/SB panel and 17 items in the ECE panel. Overall, 15 shared priorities were identified (e.g., provide 120 min of outdoor time per day, sedentary behaviour should not be used as a punishment), and six policy items exhibited a statistical difference in ratings across panels. Members of the ECE panel indicated that the policy item, “*children should be permitted to go outside whenever they want, for as long as they want*” ( $M=1.78$ ;  $SD=0.65$ ) was lowest in terms of feasibility, and the policy item, “*children should receive opportunities to engage in both unstructured and structured physical activity opportunities daily*” ( $M=3.89$ ;  $SD=0.32$ ) was the most feasible for daily implementation. Findings from this study can inform the development of an expert-generated and feasibility-informed institutional PA/SB policy for use in Canadian childcare settings.

**Keywords** Physical activity · Sedentary behaviour · Childcare · Canada · Early childhood education

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## Introduction

Engaging in physical activity during early childhood (< 5 years) is necessary to support good health and development (Carson et al., 2017). Young children who are physically active have been found to have better cardio-metabolic health (e.g., reduced blood pressure), musculo-skeletal health (e.g., increased bone density), psychosocial health (e.g., reduced depression; increased self-efficacy), and cognitive development (e.g., language development) outcomes, compared to their inactive counterparts (Carson et al., 2017). In addition to participating in adequate levels of daily physical activity, limiting sedentary behaviours—i.e., activities involving sitting or reclining postures that require low energy expenditure (e.g., screen time; Sedentary Behaviour Research Network, 2012)—is of equal importance for children. This is because excessive time spent in sedentary behaviours is associated with poor health outcomes, such as increased adiposity and noncommunicable diseases (e.g., type 2 diabetes; Leblanc et al., 2012). Ensuring that children are sufficiently physically active, and that excessive sedentary time is limited from an early age is critical.

Research suggests that young children in Canada, particularly those enrolled in centre-based childcare, are largely inactive and engage in substantial sedentary time (Chaput et al., 2017; Kuzik et al., 2015; Vanderloo, 2014). A systematic review including studies from 11 countries identified that in Canada (via six Canadian studies), young children's moderate-to-vigorous physical activity (MVPA) during childcare ranged from 1.5 to 5.3 min/h, while sedentary time ranged from 35.2 to 53.4 min/h (O'Brien et al., 2018). These data suggest that Canadian children are spending a large portion (i.e., 59–89%) of their day sedentary and only 2–9% of their day engaged in MVPA. This is concerning, as MVPA is associated with the greatest health benefits for children when compared to any activity intensity (Poitras et al., 2016). Further, children in Canada have been found to spend anywhere from one to 2.4 h per day engaged in screen time during childcare hours alone (Vanderloo, 2014). These findings are problematic in the context of international [i.e., World Health Organization (WHO) Guidelines for the Early Years] and national guidelines (i.e., Canadian 24-Hour Movement Guidelines for the Early Years) that stipulate targets for children's activity. Above mentioned guidelines state that infants should be active several times per day with a minimum of 30 min of tummy time daily, and toddlers and preschoolers should engage in at least 180 min of total physical activity (TPA) per day, of which, 60 min should be spent in MVPA among preschoolers (Canadian Society for Exercise Physiology, 2017; WHO, 2021). Specific to sedentary

behaviours, these guidelines stipulate that children should not be restrained (e.g., in a high chair) or sitting for more than one hour at a time, and screen time should be limited (Canadian Society for Exercise Physiology, 2017; WHO, 2021). Increased efforts are needed to ensure that appropriate movement opportunities are provided for children in childcare settings.

At present, childcare in Canada is governed at the provincial/territorial level (Vercammen et al., 2020), and only four Canadian provinces/territories (i.e., Nova Scotia, Northwest Territories, British Columbia and Nunavut) include physical activity in their regulations (Vanderloo & Tucker, 2018; Vercammen et al., 2020). One province (i.e., New Brunswick) references screen-viewing, and two (i.e., Ontario, British Columbia) stipulate minimum time requirements for outdoor time (Vercammen et al., 2020). With such inconsistent and limited guidance for movement behaviour programming in Canada, individual childcare centres are responsible for programming opportunities for movement into a typical childcare day as they see fit. Not only does this result in discrepancies across childcare centres and provinces/territories, the lack of physical activity and sedentary behaviour-related policy in Canadian childcare settings results in some childcare organizations prioritizing other aspects of children's development (e.g., circle time, reading) over physical activity (Hesketh et al., 2021). Further, evidence shows that having movement-behaviour related policies in childcare results in higher levels of activity among children enrolled (Wolfenden et al., 2015). With approximately 52% of children enrolled in some form of childcare in Canada (Statistics Canada, 2022) and only 12.7% of Canadian preschoolers meeting the Canadian 24-Hour Movement Guidelines (Chaput et al., 2017), increased guidance (e.g., in the form of policy) for the childcare environment with regard to promoting children's healthy movement is needed.

The WHO recently released the *Standards for Healthy Eating, Physical Activity, Sedentary Behaviour and Sleep in Early Childhood Education and Care Settings* Toolkit (WHO, 2021). These standards offer physical activity recommendations for early childhood educators and childcare settings worldwide; however, they do not provide specific instructions, or training, for engaging children in activity (nor are they specific to the Canadian childcare setting). An example statement from the toolkit states “*The early childhood education and care environment supports healthy eating and movement behaviours, respecting diversity and promoting equity and inclusion*” (WHO, 2021; p. 8). Although incredibly important, this statement does not provide action items that can be implemented during childcare hours to enact movement among children. As such, recommendations that are specific to an 8-hour childcare day in Canada, with considerations of the childcare environment (e.g., space availability), and staffing requirements, of

this setting are needed. Moreover, more specific direction regarding children's movement programming needs to be provided for early childhood education (ECE) stakeholders (e.g., researchers, childcare centre directors, policy makers). ECE stakeholders play a vital role in facilitating physical activity for children, as these individuals are important for providing direction to early childhood educators, the individuals who care for young children during a typical 8-hour day. Having a policy in place could ensure that childcare stakeholders understand their responsibility concerning implementing (e.g., childcare centre director) and educating (e.g., ECE researcher or college instructor) movement programming. Further, increased focus on understanding the perceived feasibility of implementing a childcare physical activity policy (e.g., space availability at childcare settings to engage in indoor/outdoor activities, time, cost) and gathering input from the target population (e.g., childcare centre directors who program physical activity at childcare, childcare researchers) can help drive successful implementation of a policy aimed at supporting healthy movement behaviours during childcare hours (Szpunar et al., 2020).

Researchers in Australia identified components of a physical activity and sedentary behaviour (including screen time) policy for use in centre-based childcare settings. Christian et al. (2020) aimed to achieve consensus for this type of policy template for ECE and care settings, via the Delphi method, and findings revealed seven key recommendations regarding infants', toddlers', and preschoolers' physical activity and sedentary behaviours during a typical childcare day. For example, one statement identified in this study stated that toddlers and preschoolers should obtain "*at least 120–150 min (2–2 ½ hours) spent in a variety of physical activities, including energetic play, spread throughout the day. More is better*" (Christian et al., 2020). This study was specific to the Australian childcare context; however, the authors suggest that others are beginning to recognize the importance of movement guidelines for childcare settings, and that researchers in Australia also identified the need to engage experts to generate policy recommendations. Moreover, this study shows promise for identifying specific, expert-identified policy items for use in childcare settings. Given the unique childcare landscape in Canada [i.e., variation among provincial/territorial regulations (Vercammen et al., 2020), inclement weather/season considerations (Tucker & Gilliland, 2007), and inconsistent training in physical activity and sedentary behaviour in educators' pre-service education (Bruijns et al., 2019)], conducting a Delphi study with experts in Canada is necessary. Specifically, a Delphi study is needed to identify physical activity and sedentary behaviour action items that are appropriate for Canadian childcare centres. As such, the aim of this study was to identify physical activity and sedentary behaviour policy items and obtain expert consensus on such policy items to create an

institutional level document that is appropriate for adoption in all Canadian centre-based childcare settings and can be used for testing with front line early childhood educators. A second objective was to identify the perceived feasibility of identified policy items by the target population (i.e., ECE experts) to inform the potential of these items for implementation in the Canadian childcare context.

## Materials and Methods

### Study Design

A three-round Delphi study was conducted to identify and prioritize items for a childcare-based physical activity and sedentary behaviour policy (Hasson et al., 2000). The Delphi method is a process that involves multiple rounds of surveys to arrive at a group opinion or decision among a panel of experts (Hsu & Sandford, 2007), and can be used to develop, review, and refine policies (Pringle, 2011). Multiple rounds of surveys (Yousuf, 2007) are employed, to encourage experts to revisit their initial responses while considering the responses of others (i.e., controlled feedback; Yousuf, 2007). Anonymity is maintained throughout each round to reduce the likelihood of bias that could lead to pressure to conform (Yousuf, 2007). This study adapted procedures employed by Bruijns et al. (2020) and Alvarez and Colonna's (2020) Delphi studies. The Non-Medical Research Ethics Board at Western University provided approval for this study (#120,620).

### Participants and Recruitment

This Delphi study consisted of two Canadian panels of experts: a physical activity and sedentary behaviour (PA/SB) expert panel (i.e., topic experts), and an ECE expert panel (i.e., context experts). PA/SB experts were eligible to participate if they: (1) had at least 5 years of research experience in the early years' PA/SB field; (2) had a professional status in Canada (i.e., university professor, researcher) at the time of survey completion; (3) practiced/worked within Canada; (4) were proficient in reading and writing in English; (5) were invited by the research team to participate; and, (6) were able/willing to correspond via email and complete the online questionnaires. ECE experts were eligible to participate if they were: (1) ECE experts (e.g., childcare centre directors, childcare researchers, ECE professors and college instructors) who had at least 5 years of experience working in the early childhood education field; (2) invited by a member of the research team to participate; and, (3) were able/willing to correspond via email and complete the online English-language questionnaires. Frontline ECEs (e.g., childcare providers) were not included as these individuals

have reported to lack sufficient topical knowledge regarding PA/SB for the early years (Bruijns et al., 2019), and were identified as individuals that should be included in a follow-up study, aimed at assessing the daily implementation of the policy items generated as a result of this study. An attempt was made to recruit experts from each province/territory in both panels. The PA/SB expert panel was included in this study to provide research expertise regarding best evidence for increasing time spent in physical activity and minimizing sedentary time in childcare. The ECE expert panel was included to provide important contextual information (e.g., barriers, perceived feasibility) of the policy items regarding practical application during a typical childcare day. Involving two separate panels in a Delphi study has been shown to maximize validity, effectiveness, and acceptability of results (Cantrill et al., 1996), and can lead to an increased likelihood of acquiring different perspectives (Cantrill et al., 1996).

### Sample Size

A target of 20 participants per panel ( $n=40$ ) was set for recruitment, based on recommendations noted in the Delphi literature (e.g., recommended panel size: 10–18 members; Okoli & Pawlowski, 2004; Paliwoda, 1983). To account for an anticipated 30–40% first-round response rate among professionals and attrition over the course of the study (Davies et al., 2016), the target was adjusted to approximately 35 participants (per panel) for the first round. Given the PA/SB experts in Canada who met this study's eligibility criteria were limited, sufficient response time (e.g., 3 weeks to complete the initial survey) was allotted, snowball sampling was employed, and follow-up emails were used to increase participation rates.

### PA/SB Expert Panel

Identification of PA/SB experts was completed using a multi-step approach including: (1) compiling a list of potential PA/SB experts in Canada; (2) screening experts for eligibility criteria (outlined above); (3) inviting identified experts to participate; and, (4) allowing selected experts to refer any other Canadian experts to participate (e.g., list any experts' names that they believe should participate at the end of the survey). To generate the initial list of experts, an internet search was conducted, and study investigators independently recommended known researchers with expertise in PA/SB in the early years. Thirty PA/SB researchers with expertise in early childhood (<5 years) were identified by the research team and invited to participate. An additional four experts were suggested by study participants for a total potential sample pool of 34 experts. All recruitment took place in April 2022.

### ECE Expert Panel

The selection and recruitment of the ECE expert panel followed a similar process as the PA/SB panel. Experts were identified and screened for eligibility criteria by a research assistant who searched the websites of Canadian ECE organizations (e.g., Canadian Childcare Centre Federation) and Canadian university/college programs that offer ECE diplomas/degrees. Inclusion of the ECE expert panel was important for this Delphi study as these individuals are intended to be the target audience of the childcare PA/SB policy (e.g., prescribing it to childcare centres for implementation), and because of their understanding of the childcare setting (e.g., available space, curriculum requirements). Including the target group has been established as an important part of the Delphi method. All recruitment took place in May 2022, and a total of 38 ECE experts were recruited and invited to participate. See Fig. 1 for further details regarding the recruitment process of experts in both panels.

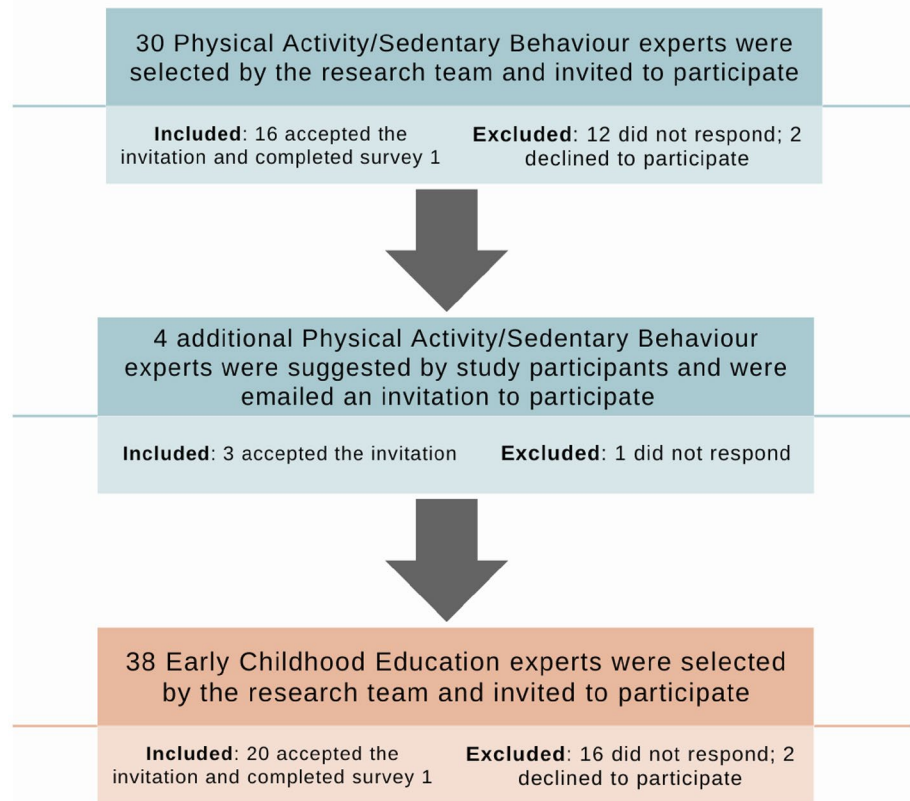
### Procedures

All questionnaires were created by the research team and informed by previous Delphi studies (e.g., structure and response options; Alvarez & Colonna, 2020; Bruijns et al., 2020; Colonna et al., 2022). Questionnaires were distributed via Qualtrics™ online survey software, and all participants were contacted and invited to participate via email. Prior to completing the initial survey, participants were asked to review the letter of information and consent form, the completion of which indicated their consent to participate. The first round of this study only included PA/SB experts to generate policy items/topics and was open for a 3-week period. The remaining two rounds were open for 2 weeks each and involved both panels. Reminder emails were sent on an as-needed basis to participants prior to the deadlines for each round. All participants were assigned a unique participant ID code (generated by the research assistant and sent in recruitment emails). Participants were instructed to input their participant ID code at the start of each online survey. This code was also used to track participation rates (i.e., to determine the need for follow-up email reminders and subsequent survey dissemination).

### Round 1

The first survey was administered using an open-ended question format, in line with the classic Delphi method (Hasson et al., 2000). Only PA/SB experts participated in the first round and were asked to list their top 10 PA/SB policy items (i.e., five in each category) that they felt should be included in a childcare-specific policy and to provide a brief justification for each policy item that they listed. Basic demographic

**Fig. 1** Purposeful sampling process undertaken to recruit PA/SB and ECE experts



information (e.g., gender, age, employment status, number of years worked in the field, province/territory) was also collected. At the end of the survey, participants were able to recommend the names of any other Canadian childhood PA/SB experts they believed should be included in this study. The same inclusion criteria (as noted above) applied to the recommended experts. Once all policy item suggestions were collected, redundant policy items were merged and items were pooled to create a unique list of policy items for subsequent study rounds (Hasson et al., 2000). See Supplementary File 1 for a list of policy items, along with corresponding brief descriptions, that were generated by PA/SB panelists in round 1.

## Round 2

In round 2, experts in both panels were asked to rate the list of policy items produced in round 1. Experts were asked to rate how important they believed each policy item was for use in Canadian centre-based childcare settings using a 7-point Likert scale (i.e., 1 = *Not at all important* to 7 = *Extremely important*). Open-ended text boxes were provided under each policy item prompt and allowed participants to justify their rating. Ratings were kept separate

for each panel. In addition, ECE experts were asked demographic questions consistent with those asked of the PA/SB panel members in round 1. The ECE panel was also asked to report on the perceived feasibility of each policy item using a 4-point Likert Scale (i.e., 1 = *Not at all feasible* to 4 = *Very feasible*). Only the ECE panel was asked to report on perceived feasibility due to their expected familiarity with childcare programming and daily scheduling (e.g., nap time, curriculum components). At the end of the PA/SB survey, PA/SB experts were asked to report whether they felt the suggested policy items they identified in the first round/survey were appropriately represented in the second survey. If not, panelists were asked to provide reasoning and to submit additional policy items via an open-ended text box. Once responses to the second round were collected, importance and consensus ratings were calculated using the mean, median and interquartile deviation (IQD) for each item. Policy items that received an IQD score of  $\leq 1$  (indicating consensus) and a median score of  $\geq 6$  (i.e., very, or extremely important; indicating importance) in both panels were considered shared priorities. Ratings from the PA/SB panel and ECE panel were analyzed individually and kept separate for the third round.

### Round 3

In the third round, participants from both expert panels were asked to re-rate the importance of the policy items that did not achieve consensus among their respective panel in round 2 (i.e., policy items that had an IQD of  $\geq 1$ ) on the same 7-point Likert scale. Participants were provided with their panel's central tendency ratings (i.e., mean, median, and mode) for each policy item from the previous survey round and were encouraged to consider these scores when re-rating policy items (Hasson et al., 2000). Mean, median and modes were embedded into the Qualtrics survey beside each policy item for consideration when re-rating. As employed in round 2, panel ratings were kept separate, and participants were able to provide their written justification for each re-rated item via open-ended responses.

Once all items that did not achieve consensus in the previous round were re-rated, both panels were presented with a list of policy items that received the same importance-rating consensus in round 2 by their respective panels [e.g., all policy items with a median of 7 (*extremely important*) were listed together]. Panelists were then asked to order the policy items based on level of importance/priority within their grouping (Alvarez & Colonna, 2020), using the rank order question function in Qualtrics. The rank order question provides participants the opportunity to rank a set of items against each other. Participants were asked to drag and drop policy items into their preferred order of importance and were able to provide written justification for their importance ordering of policy items, consistent with other survey sections. Once responses from all panelists were collected, panel-specific importance re-rating scores and consensus were completed (i.e., mean, median, mode and IQD were calculated for re-rated items), and each panels importance ordering of policy items was computed via Qualtrics.

### Data Analysis

Descriptive statistics, including frequencies, of participant demographics, policy item importance ratings, feasibility of policy items, and ratings of suggested policy items were completed in SPSS (version 27). Demographic data obtained in round 1 and participant IDs were used to inform demographic information of subsequent survey rounds. The consensus of policy item importance was measured in both rounds using the mean, median, and IQD (Alvarez & Colonna, 2020; Colonna et al., 2022; Davies et al., 2016; Schneider et al., 2012). An IQD value of  $\leq 1$  is considered a good indicator of consensus when using a 7-point Likert scale (Davies et al., 2016). Policy items that were rated with an IQD of  $\leq 1$  and a median score of  $\geq 6$  (i.e., very or extremely important) across both panels were considered shared priorities (Schneider et al., 2012). Shared priorities

represented policy items that were identified across panels as extremely important for inclusion in a PA/SB policy. The feasibility of policy items was assessed by calculating means and standard deviations. Mann Whitney U tests were used to compare the final ratings between expert panels and a statistically significant difference in rating between panels was set at  $p < .05$  (Mann & Whitney, 1947; Wilcoxon, 1992). Mann Whitney U tests were deemed appropriate for this study because they compare whether there is a difference in the dependent variable for two independent groups; therefore, informing whether consensus ratings varied between groups (Fay & Proschan, 2010). Comments (e.g., justifications for rating) provided by panelists from rounds 2 and 3 were coded as either positive/supportive, negative/critiques, suggestions, or neutral/explanatory, in line with previous Delphi studies (Alvarez & Colonna, 2020; Davies et al., 2016). Importance ordering of policy items was analyzed using the Qualtrics simple table visualization feature that provides metrics showing the number of respondents who selected the option (e.g., number of participants that selected each policy item's level of importance within their grouping).

## Results

### PA/SB Panel

In total, 19 experts in the PA/SB panel agreed to participate and completed round 1 (59% of those invited), with 15 (79%) of those experts also completing rounds 2 and 3. PA/SB experts who completed round 1 represented six Canadian provinces/territories [Ontario ( $n=10$ ); British Columbia ( $n=3$ ); Nova Scotia ( $n=2$ ); Saskatchewan ( $n=2$ ); Alberta ( $n=1$ ); and New Brunswick ( $n=1$ )], had an average age of 42.41 years ( $SD=10.03$ ), and identified primarily as female ( $n=12$ ; 63%). Most (79%) experts held positions in academia, while remaining experts reported to be government researchers ( $n=1$ ; 5%) or research scientists ( $n=3$ ; 15%). Participants had an average of 10.89 years ( $SD=3.64$ ) of work experience specific to PA/SB in the early years. PA/SB experts' demographic information across all three survey rounds can be seen in Table 1.

### ECE Panel

A total of 20 ECE experts agreed to participate and completed round 2 (53% of those invited), and 15 experts (75%) were retained and completed round 3. ECE experts who completed Round 2 (the first round for the ECE panel) represented ten provinces/territories [Ontario ( $n=7$ ); Alberta ( $n=2$ ); British Columbia ( $n=2$ ); Manitoba ( $n=1$ ); New Brunswick; ( $n=1$ ); Newfoundland and Labrador ( $n=1$ ); Nova Scotia ( $n=1$ ); Saskatchewan ( $n=1$ ); Northwest territories ( $n=1$ ); and Yukon

**Table 1** Summary of participant demographics

	PA/SB expert panel				ECE expert panel			
	Round 1 ( <i>n</i> = 19)		Rounds 2 and 3 ( <i>n</i> = 15)		Round 2 ( <i>n</i> = 20)		Round 3 ( <i>n</i> = 15)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age (years)	42.41	10.03	42.86	10.92	50.05	11.54	51.00	11.59
Years of work experience	10.89	3.64	10.33	3.60	26.65	13.61	27.47	14.10
	<i>N</i>	%			<i>N</i>	%		
<b>Gender</b>								
Male	7	36.80	5	33.33	2	10.00	2	13.30
Female	12	63.20	10	66.66	18	90.00	13	86.70
<b>Ethnicity</b>								
East Asian (e.g., Chinese, Japanese)	1	5.30	–	–	–	–	–	–
West Asian (e.g., Afghan, Iranian)	–	–	–	–	2	10.00	1	6.70
White (i.e., Caucasian)	17	89.50	15	100.00	18	90.00	14	93.30
<b>Workplace Province/Territory</b>								
Alberta	1	5.30	1	6.70	2	10.00	2	13.30
British Columbia	3	15.80	3	20.0	2	10.00	2	13.30
Manitoba	–	–	–	–	1	5.00	1	6.70
New Brunswick	1	5.30	1	6.70	1	5.00	–	–
Newfoundland and Labrador	–	–	–	–	1	5.00	1	6.70
Nova Scotia	2	10.50	2	13.30	1	5.00	1	6.70
Ontario	10	52.60	7	46.70	7	35.00	5	33.30
Saskatchewan	2	10.50	1	6.70	1	5.00	–	–
Northwest Territories	–	–	–	–	1	5.00	1	6.70
Yukon	–	–	–	–	1	5.00	1	6.70
<b>Current job title</b>								
Postdoctoral Researcher	2	10.50	2	13.30	–	–	–	–
Assistant Professor	7	36.80	5	33.30	–	–	–	–
Associate Professor	2	10.50	1	6.70	–	–	–	–
Professor	3	15.80	2	13.30	–	–	–	–
Professor Emeritus	1	5.30	1	6.70	–	–	–	–
Research Scientist	3	15.30	2	13.30	–	–	–	–



**Table 1** (continued)

	<i>N</i>	%		<i>N</i>	%			
Government Researcher	1	5.30	1	6.70	–	–	–	
PhD Candidate	1	5.30	1	6.70	–	–	–	
ECE University Professor	–	–	–	–	9	45.00	5	33.33
ECE College Instructor	–	–	–	–	3	15.00	2	13.33
Academic Chair	–	–	–	–	1	5.00	1	6.66
ECE Program Director	–	–	–	–	1	5.00	1	6.66
ECE Program Developer	–	–	–	–	1	5.00	1	6.66
ECE Professional	–	–	–	–	4	20.00	4	26.66
ECE Researcher	–	–	–	–	1	5.00	1	6.66

*ECE* Early Childhood Education. *PA/SB* Physical Activity and Sedentary Behaviour. *Years of work experience* refers to the number of years specific to early childhood education field for the ECE panel and years of work experience specific to physical activity and sedentary behaviour in the early years (<5 years) for the PA/SB panel. All numbers may not add up to 100% as participants were able to skip questions

( $n = 1$ ]. The average age of ECE experts was 50.05 years ( $SD = 11.54$ ), and most identified as female ( $n = 18$ ; 90%). Just under half of ECE panelists identified as university faculty members in the ECE field ( $n = 9$ ; 45%), followed by ECE professional ( $n = 4$ ; 20%), and ECE college instructor ( $n = 3$ ; 15%). Other job titles of ECE panelists included ECE researcher, academic chair, ECE program director, and ECE program developer. Participants reported an average of 26.65 years ( $SD = 13.61$ ) of work experience specific to ECE. The response rate for both panels in this study was higher than usual compared to other Delphi studies (typical response rate of 30–40% in the first round; Davies et al., 2016; Schneider et al., 2012). See Table 1 for full participant characteristics, organized by panel and survey round.

### Round 1

A total of 24 unique policy items were generated by the PA/SB expert panel. Sixteen items were specific to the childcare centre level and informed policy regarding PA/SB during childcare hours, while 8 additional policy items were acknowledged as important for implementation at the organizational, provincial/territorial, or federal level.<sup>1</sup> Rationale

<sup>1</sup> Although not the focus of this study, to maintain protocol in line with the Delphi method, these items were put forward for consideration in future survey rounds (i.e., subsequent study surveys). These items were deemed not feasible for childcare settings to implement alone; and therefore, were categorized as important at the organizational, provincial/territorial, or federal level.

statements provided by panelists for each policy item were transformed into brief descriptions of each policy item and were embedded into subsequent study surveys (i.e., below each listed policy item), in line with the Delphi literature (Hasson et al., 2000). See Supplemental File 1 for a complete list of policy items and their descriptions as identified in round 1.

### Round 2

Table 2 displays each policy item and consensus ratings obtained in round 2. Overall, 23 policy items from the PA/SB panel and 16 items from the ECE panel met the threshold for consensus. In this round, PA/SB experts contributed 122 comments, and ECE experts made 160 comments. Most comments referenced the importance of policy items (e.g., positive/supportive comments), some included justifications for response ratings (e.g., explanatory comments), and some included suggestions to modify the policy item or for implementation purposes. A few negative comments (e.g., critiques) regarding the policy items were made, mostly by ECE panelists, who voiced feasibility concerns. Sample quotes, organized by type of comment (e.g., positive, negative) and panel (i.e., PA/SB or ECE panelist) can be seen in Supplemental File 2. Further, 14 policy items were identified as shared policy priorities between panels (i.e., had an IQD of  $\leq 1$  and a median score of  $\geq 6$  across both panels). All experts in the PA/SB panel reported that their

**Table 2** Ratings of policy items (n = 24) by both PA/SB and ECE experts using a 7-point Likert scale

Policy item	Physical activity/sedentary behaviour expert panel				Early childhood education expert panel				
	Round 2 (n = 19)		Round 3 (n = 15)		Round 2 (n = 20)		Round 3 (n = 15)		
	Mean (SD)	Median (IQD)	Mean (SD)	Median (IQD)	Mean (SD)	Median (IQD)	Mean (SD)	Median (IQD) Sig.	
<i>Physical Activity/Sedentary Behaviour Policy Items</i>									
Shorter, more frequent periods (e.g., 3–4) of outdoor play should be provided every day	5.67 (1.59)	6.00 (1.00)	–	–	4.95 (1.84)	5.00 (2.00)	3.93 (1.67)	4.00 (1.50)	0.004*
Children should be provided with a minimum of 120 min of outdoor time and/or nature play per day. More is better	6.40 (0.63)	<b>6.00 (0.50)</b>	–	–	6.53 (0.96)	<b>7.00 (0.50)</b>	–	–	0.24
Supportive and safe active play environments in childcare should be always fostered both indoors and outdoors	6.20 (0.68)	<b>6.00 (0.5)</b>	–	–	6.68 (0.58)	<b>7.00 (0.5)</b>	–	–	0.02*
Children should engage in at least 90–120 min of physical activity per day, and time spent in higher intensity activity (moderate-to-vigorous physical activity; MVPA) should be encouraged daily. More movement is better	5.80 (0.94)	<b>6.00 (1.00)</b>	–	–	6.00 (0.88)	<b>6.00 (1.00)</b>	–	–	0.57
Children should be permitted to go outside whenever they want, for as long as they want	4.00 (1.51)	4.00 (1.00)	–	–	5.32 (1.70)	6.00 (1.5)	4.57 (1.70)	5.00 (1.50)	0.29
Opportunities for building children’s physical literacy and Fundamental Movement Skills (FMS) should be incorporated daily. Every day should include some sort of manipulative skill building	6.14 (0.77)	<b>6.00 (0.50)</b>	–	–	5.74 (1.37)	<b>6.00 (1)</b>	–	–	0.53
Early Childhood Educators should encourage children to play with loose parts every day. While outdoors, each child should have access to a minimum of five loose parts for play	5.67 (1.05)	<b>6.00 (0.5)</b>	–	–	6.16 (1.57)	<b>7.00 (0.5)</b>	–	–	0.03*
Early Childhood Educators should engage in physical activity alongside children daily, act enthusiastic about physical activity, and role model appropriate movement behaviours whenever possible	6.07 (0.80)	<b>6.00 (1.00)</b>	–	–	6.68 (0.48)	<b>7.00 (0.50)</b>	–	–	0.02*
Children should receive opportunities to engage in both unstructured (e.g., child-led) and structured (e.g., facilitator-led) physical activity opportunities daily	6.33 (1.54)	<b>7.00 (0.50)</b>	–	–	5.79 (1.40)	<b>6.00 (1.00)</b>	–	–	0.04*
Children’s screen time should be prohibited during childcare hours	5.93 (1.16)	6.00 (1.00)	–	–	4.84 (2.24)	5.00 (2.00)	5.43 (2.17)	6.50 (1.50)	0.83

Table 2 (continued)

Policy item	Physical activity/sedentary behaviour expert panel				Early childhood education expert panel				
	Round 2 (n=19)		Round 3 (n=15)		Round 2 (n=20)		Round 3 (n=15)		
	Mean (SD)	Median (IQD)	Mean (SD)	Median (IQD)	Mean (SD)	Median (IQD)	Mean (SD)	Median (IQD) Sig.	
Extended periods of sedentary time (> 30 min) should be interrupted with active play opportunities. Whenever possible, children's time spent sedentary should be avoided and/or limited both indoors and outdoors (including restrained time in strollers/highchairs)	5.33 (1.63)	6.00 (0.50)	–	–	4.68 (2.26)	5.00 (2.5)	4.86 (1.92)	5.00 (1.00)	0.42
Early Childhood Educators should not use screen-based technology, and/or should limit their screen time during children's awake hours	5.73 (1.10)	6.00 (1.00)	–	–	4.95 (2.17)	6.00 (2.00)	5.21 (2.01)	6.00 (1.50)	0.79
The use of sedentary time (e.g., sitting) as a punishment for children's bad behaviour should never be used	5.93 (1.28)	<b>7.00</b> <b>(1.00)</b>	–	–	6.05 (1.90)	<b>7.00</b> <b>(0.50)</b>	–	–	0.37
Early childhood educators and childcare centres should promote and encourage outdoor time over indoor time whenever possible	5.60 (1.06)	5.00 (1.00)	–	–	5.11 (1.85)	6.00 (1.50)	5.00 (2.08)	6.00 (2.00)	0.72
Early Childhood Educators should encourage children to employ a variety of postures while they are both indoors and outdoors, and while they are inactive and active	4.33 (1.50)	4.00 (0.50)	–	–	4.63 (2.03)	5.00 (1.50)	4.64 (1.78)	5.00 (1.50)	0.30
Early Childhood Educators should aim to include active play opportunities during traditional sedentary activities (e.g., story time)	4.93 (1.62)	5.00 (1.00)	–	–	5.63 (1.30)	6.00 (1.00)	–	–	0.17
<i>Organizational, Provincial/Territorial, and/or Federal Level Policy Items</i>									
Free and/or subsidized childcare should be provided	6.47 (0.83)	<b>7.00</b> <b>(0.50)</b>	–	–	6.68 (0.58)	<b>7.00</b> <b>(0.50)</b>	–	–	0.52
Early Childhood Educators should be required to complete comprehensive education/training on physical activity, risky play, and sedentary behaviour	6.27 (1.33)	<b>7.00</b> <b>(0.50)</b>	–	–	6.42 (1.02)	<b>7.00</b> <b>(0.50)</b>	–	–	0.81
Play should always be culturally responsive and responsive. Equity, Diversity, and Inclusion (EDI) best practices should always be implemented in childcare settings	6.33 (1.29)	<b>7.00</b> <b>(0.50)</b>	–	–	6.74 (0.56)	<b>7.00</b> <b>(0.00)</b>	–	–	0.25

Table 2 (continued)

Policy item	Physical activity/sedentary behaviour expert panel			Early childhood education expert panel		
	Round 2 (n=19)		Round 3 (n=15)	Round 2 (n=20)		Round 3 (n=15)
	Mean (SD)	Median (IQD)	Mean (SD)	Mean (SD)	Median (IQD)	Mean (SD)
The Canadian government should provide funding for physical activity	6.33 (0.90)	<b>7.00</b> ( <b>0.50</b> )	–	6.32 (1.00)	<b>7.00</b> ( <b>0.50</b> )	–
Child to space ratios should be adequate in both indoor and outdoor childcare environments to engage in a variety of physical activities	6.20 (0.86)	<b>6.00</b> ( <b>0.50</b> )	–	6.74 (0.45)	<b>7.00</b> ( <b>0.50</b> )	–
Education should be provided for parents to understand the importance of physical activity and disrupting sedentary time	5.67 (1.29)	<b>6.00</b> ( <b>1.00</b> )	–	5.63 (1.42)	<b>6.00</b> ( <b>1.00</b> )	–
Facility level implementation support strategies must be provided (e.g., training, policy monitoring initiatives, posting/sharing of best practices). This included having Evaluation, Accountability, and Measurement plans to regularly evaluate whether PA/SB targets are being met	6.07 (1.16)	6.00 (1.00)	–	5.21 (1.87)	6.00 (1.50)	7.00 (2.00)
Outdoor childcare settings should be licensed in Canada	5.73 (1.22)	6.00 (1.50)	5.60 (1.18)	6.21 (1.18)	<b>7.00</b> ( <b>1.00</b> )	–

PA physical activity; SB sedentary behaviour; ECE early childhood education; IQD interquartile deviation; M = mean; SD = standard deviation. Scale: 1 = Not at all important, 2 = Low importance, 3 = Slightly important, 4 = Neutral, 5 = Moderately important, 6 = Very important; 7 = Extremely important. Sig: statistical significance of the Mann-Whitney U test [i.e., p-value (p < .05)]; and \* represents items that had a statistically significant difference in final rankings across panels. Bold items represent those that reached consensus (IQD ≤ 1) and were rated as important (Median ≥ 6) by both panels (i.e., shared priorities)

policy suggestions put forward in round 1 were accurately represented; thus, no new policy items were added for rating in round 3.

**ECE Experts' Perceived Feasibility of Policy Items** A wide range of perceived feasibility ratings was provided by ECE experts. Scores ranged from  $M=1.78$  for “*children should be able to go outside whenever they want*” (lowest feasibility) to  $M=3.89$  for “*children should obtain opportunities to engage in both unstructured (e.g., child-led) and structured (e.g., facilitator-led) physical activity daily*” (highest feasibility). Of note, items involving the provision of outdoor time scored lower on feasibility (i.e., “*provide children with shorter, more frequent outdoor periods*”;  $M=2.67$ ;  $SD=0.77$  and “*educators should promote and encourage outdoor time over indoor time whenever possible*”;  $M=2.44$ ;  $SD=0.86$ ) compared to items that did not mention the outdoors (i.e., “*educators should encourage children to play with loose parts every day*”;  $M=3.83$ ;  $SD=0.38$  and “*supportive and safe active play environments in childcare should be always fostered both indoors and outdoors*”;  $M=3.78$ ;  $SD=0.43$ ), or items that stipulated requirements referencing limits on sedentary behaviour [i.e., “*the use of sedentary time (e.g., sitting) as a punishment for children's bad behaviour should never be used*”;  $M=3.61$ ;  $SD=0.61$ ]. The average feasibility score for all policy items was 3.69 for the childcare centre level items, and 3.27 for the organization, provincial/territorial and/or federal Items. Means and standard deviations for all 24 policy items can be seen in Table 3.

### Round 3

In the third and final round, the policy items that did not achieve consensus in the previous round (one item for the PA/SB panel and eight items for the ECE panel) were re-rated. The PA/SB panel reached consensus on their final policy item rating, resulting in all 24 policy items achieving consensus regarding their importance among this panel. For the ECE panel, only one of the re-rated policy items achieved consensus [i.e., “*extended periods of sedentary time (> 30 min) should be interrupted with active play opportunities*”], resulting in a total of 17 items achieving consensus by members on this panel. There were 40 comments made regarding the re-rating of the eight policy items by the ECE panelists; for example, ECE experts noted issues with perceived feasibility via open-ended justifications about the policy item regarding the provision of shorter, more frequent outdoor play periods. See Supplemental File 2 for sample quotes regarding the re-rating of policy items by ECE experts from round 3. At the end of round 3, a total of 15 shared priorities were identified, some of which included providing children with a minimum of 120 min of outdoor

time/day, the provision of supportive and safe active play environments, early childhood educators' engagement in physical activity alongside children (e.g., role modeling), and not using sedentary time as a punishment for children's bad behaviour. Items seemed to fall under four broad categories, including: outdoor play and physical activity engagement, early childhood educator role modelling and active participation, sedentary time and safe environments, and universal childcare considerations. See Supplementary File 3 for a list of shared priorities that emerged from the present study.

When comparing ratings across panels, six items exhibited a statistical difference. For example, policy item “*shorter more frequent outdoor play sessions should be offered*” was scored by PA/SB experts as “very important” (mean = 5.67; median = 6.00), while ECE experts rated it as “neutral” (mean = 3.93; median = 4.00). Across the 16 PA/SB items, the final average mean rating was 5.63 ( $SD=0.53$ ) for the PA/SB panel and 5.65 ( $SD=0.67$ ) for the ECE panel. The final average mean rating for the eight organizational, provincial/territorial, and federal items was 6.12 ( $SD=0.58$ ) and 6.30 ( $SD=0.58$ ) for the PA/SB and ECE panels, respectively. The average mean rating across all 24 policy items together was 5.79 ( $SD=0.51$ ) for the PA/SB panel and 5.88 ( $SD=0.61$ ) for the ECE panel.

When ordering policy items on importance, the policy item “*children should receive opportunities to engage in both unstructured and structured physical activity opportunities daily*” was designated as the most important policy item by the PA/SB panel. Conversely, ECE experts selected both “*children should be provided with a minimum of 120 minutes of outdoor time and/or nature play per day*” and “*supportive and safe active play environments in childcare should be always fostered both indoors and outdoors*” as the highest priority policy items. There were 11 and 9 comments made by PA/SB and ECE panelists, respectively, about their justifications for ordering the policy items by level of importance. Nearly all comments made from experts in both panels emphasized the difficulty of prioritizing items, and some comments revealed that panelists perceived most items as equally important for inclusion. Therefore, given that respondents acknowledged their difficulty with ranking, orderings were not used in our interpretations of importance of policy items (Tables 4 and 5).

## Discussion

The purpose of this Delphi study was to identify and arrive at consensus around PA/SB policy items that could be included in an institutional level document for childcare settings in Canada. Involving two expert panels provided diverse, but

**Table 3** Feasibility of policy items scored by the ECE expert panel

Policy item	<i>M</i>	<i>SD</i>
<i>Physical Activity/Sedentary Behaviour Policy Items</i>		
Shorter, more frequent periods (e.g., 3–4) of outdoor play should be provided every day	2.67	0.77
Children should be provided with a minimum of 120 min of outdoor time and/or nature play per day. More is better	3.50	0.79
Supportive and safe active play environments in childcare should be always fostered both indoors and outdoors	3.78	0.43
Children should engage in at least 90–120 min of physical activity per day, and time spent in higher intensity activity (moderate-to-vigorous physical activity; MVPA) should be encouraged daily. More movement is better	3.33	0.84
Children should be permitted to go outside whenever they want, for as long as they want	1.78	0.65
Opportunities for building children's physical literacy and Fundamental Movement Skills (FMS) should be incorporated daily. Every day should include some sort of manipulative skill building.	3.33	0.67
Early Childhood Educators should encourage children to play with loose parts every day. While outdoors, each child should have access to a minimum of five loose parts for play	3.83	0.38
Early Childhood Educators should engage in physical activity alongside children daily, act enthusiastic about physical activity, and role model appropriate movement behaviours whenever possible	3.50	0.62
Children should receive opportunities to engage in both unstructured (e.g., child-led) and structured (e.g., facilitator-led) physical activity opportunities daily	3.89	0.32
Children's screen time should be prohibited during childcare hours	3.41	0.94
Extended periods of sedentary time (> 30 min) should be interrupted with active play opportunities. Whenever possible, children's time spent sedentary should be avoided and/or limited both indoors and outdoors (including restrained time in strollers/highchairs)	3.22	0.81
Early Childhood Educators should not use screen-based technology, and/or should limit their screen time during children's awake hours.	3.22	0.94
The use of sedentary time (e.g., sitting) as a punishment for children's bad behaviour should never be used	3.61	0.61
Early childhood educators and childcare centres should promote and encourage outdoor time over indoor time whenever possible	2.44	0.86
Early Childhood Educators should encourage children to employ a variety of postures while they are both indoors and outdoors, and while they are inactive and active	2.89	1.08
Early Childhood Educators should aim to include active play opportunities during traditional sedentary activities (e.g., story time)	3.39	0.92
Overall Feasibility (PA/SB items)	3.69	0.32
<i>Organizational, Provincial/Territorial, and/or Federal Level Policy Items</i>		
Free and/or subsidized childcare should be provided	3.33	0.77
Early Childhood Educators should be required to complete comprehensive education/training on physical activity, risky play, and sedentary behaviour	3.44	0.71
Play should always be culturally responsible and responsive. Equity, Diversity, and Inclusion (EDI) best practices should always be implemented in childcare settings	3.56	0.62
The Canadian government should provide funding for physical activity	3.33	0.84
Child to space ratios should be adequate in both indoor and outdoor childcare environments to engage in a variety of physical activities	3.00	0.79
Education should be provided for parents to understand the importance of physical activity and disrupting sedentary time	3.11	0.58
Facility level implementation support strategies must be provided (e.g., training, policy monitoring initiatives, posting/sharing of best practices). This included having Evaluation, Accountability, and Measurement plans to regularly evaluate whether PA/SB targets are being met	3.06	0.80
Outdoor childcare settings should be licensed in Canada.	3.33	0.77
Overall Feasibility (Organizational, Provincial/Territorial, and/or Federal Level Items)	3.27	0.38

Mean scored from 1 (not at all feasible) to 4 (very feasible); *M*=mean; *SD*=standard deviation. All values shown may not add up to 100% or *n*=20 as some individuals chose not to answer certain questions

valuable perspectives on the importance of policy items. As public health efforts regarding the promotion of increased physical activity and decreased sedentary behaviour among toddlers and preschoolers have been put forward by national (e.g., Canadian Society of Exercise Physiology) and international organizations (i.e., WHO), this study aimed to inform policy to increase healthy movement behaviours in Canadian childcare, as these settings build children's habits during a

very impressionable life stage (Canadian Society for Exercise Physiology, 2017; World Health Organization, 2021). Fifteen shared priorities (i.e., policy items) were identified in this study for inclusion in a childcare PA/SB policy. Many findings are discussed below.

Some of the shared priorities identified in the present study include providing children with a minimum of 120 min of outdoor time/day, the provision of supportive

**Table 4** Policy items ordered from highest to lowest priority by PA/SB expert panel (n = 15)

Physical activity/ sedentary behaviour policy items by importance ranking category	Expert ranking									
<i>Extremely important</i> (Median = 7.00)	1	2	3	4	5	6	7	8	9	10
Children should receive opportunities to engage in both unstructured (e.g., child-led) and structured (e.g., facilitator-led) physical activity opportunities daily	10	5	-	-	-	-	-	-	-	-
The use of sedentary time (e.g., sitting) as a punishment for children's bad behaviour should never be used	5	10	-	-	-	-	-	-	-	-
<i>Very important</i> (Median = 6.00)	1	1	2	5	1	2	1	0	1	1
Shorter, more frequent periods (e.g., 3-4) of outdoor play should be provided every day	8	2	2	1	0	0	1	1	0	0
Children should be provided with a minimum of 120 minutes of outdoor time and/or nature play per day. More is better	2	2	4	2	2	1	1	1	0	0
Supportive and safe active play environments in childcare should be always fostered both indoors and outdoors	3	6	1	2	0	1	0	1	1	0
Children should engage in at least 90-120 minutes of physical activity per day, and time spent in higher intensity activity (moderate-to-vigorous physical activity; MVPA) should be encouraged daily. More movement is better	0	1	3	2	5	3	0	1	0	0
Opportunities for building children's physical literacy and Fundamental Movement Skills (FMS) should be incorporated daily. Every day should include some sort of manipulative skill building	0	1	0	0	1	2	5	2	0	4
Early Childhood Educators should encourage children to play with loose parts every day. While outdoors, each child should have access to a minimum of five loose parts for play	0	1	1	1	2	4	3	1	1	1
Early Childhood Educators should engage in physical activity alongside children daily, act enthusiastic about physical activity, and role model appropriate movement behaviours whenever possible	1	1	1	1	1	1	2	2	5	0
Children's screen time should be prohibited during childcare hours	0	0	1	1	3	1	2	3	2	2
Extended periods of sedentary time (>30 min) should be interrupted with active play opportunities. Whenever possible, children's time spent sedentary should be avoided and/or limited both indoors and outdoors (including restrained time in strollers/highchairs)	0	0	0	0	0	0	0	3	5	7
Early Childhood Educators should not use screen-based technology, and/or should limit their screen time during children's awake hours	10	5	-	-	-	-	-	-	-	-
<i>Moderately Important</i> (Median = 5.00)	5	10	-	-	-	-	-	-	-	-
Early childhood educators and childcare centres should promote and encourage outdoor time over indoor time whenever possible	2	13	-	-	-	-	-	-	-	-
Early Childhood Educators should aim to include active play opportunities during traditional sedentary activities (e.g., story time)	13	2	-	-	-	-	-	-	-	-
<i>Neutral Importance</i> (Median = 4.00)	2	13	-	-	-	-	-	-	-	-
Children should be permitted to go outside whenever they want, for as long as they want	13	2	-	-	-	-	-	-	-	-
Early Childhood Educators should encourage children to employ a variety of postures while they are both indoors and outdoors, and while they are inactive and active	13	2	-	-	-	-	-	-	-	-
Organizational, Provincial/Territorial and Federal Policy Items by Importance Ranking Category	Expert ranking									
<i>Extremely Important</i> (Median = 7.00)	1	2	3	4						
Free and/or subsidized childcare should be provided	7	2	2	2						
Early Childhood Educators should be required to complete comprehensive education/training on physical activity, risky play, and sedentary behaviour	2	8	3	0						
Play should always be culturally responsible and responsive. Equity, Diversity, and Inclusion (EDI) best practices should always be implemented in childcare settings	3	2	3	5						
The Canadian government should provide funding for physical activity	1	1	5	6						
<i>Very Important</i> (Median = 6.00)	3	6	4	0						
Child to space ratios should be adequate in both indoor and outdoor childcare environments to engage in a variety of physical activities	1	3	6	3						
Education should be provided for parents to understand the importance of physical activity and disrupting sedentary time	1	3	6	3						

**Table 4** (continued)

Organizational, Provincial/Territorial and Federal Policy Items by Importance Ranking Category	Expert ranking				
Facility level implementation support strategies must be provided (e.g., training, policy monitoring initiatives, posting/sharing of best practices). This included having Evaluation, Accountability, and Measurement plans to regularly evaluate whether PA/SB targets are being met	5	3	3	3	2
Outdoor childcare settings should be licensed in Canada	4	1	0	0	8

1 = Most important. Table was adapted from Qualtrics simple table Visualization that provides metrics showing the number of respondents who selected the option (e.g., number of participants that selected each policy items level of importance within their grouping). Expert Ranking represents the number of experts that selected each unique policy item's level of importance. All policy item expert rankings may not add up to 15 as some experts chose not to order items based on importance

and safe active play environments, early childhood educators' engagement in physical activity alongside children (e.g., role modeling), and not using sedentary time as a punishment for children's bad behaviour. In Ontario, policy already exists for providing children with 120 min of outdoor time per day during childcare; however, this is not the case in other provinces (Vercammen et al., 2020), nor does outdoor time guarantee physical activity participation (e.g., children could be outdoors, sitting in a sandbox; Gubbels et al., 2012). While the research does suggest that children are more active outdoors versus indoors at childcare (Vanderloo et al., 2013), it is still possible that without structured opportunities, children may choose to remain sedentary while outdoors. It is likely that experts from across Canada highly value outdoor time and understand the importance of having a childcare policy stipulating outdoor time, considering the large body of literature that supports outdoor play to increase levels of physical activity among young children (Truelove et al., 2018). Conversely, policy items that included the outdoors, such as permitting children to go outside whenever they want, for as long as they want, and providing shorter, more frequent outdoor periods (e.g., 3–4) per day were not identified as important for inclusion in a PA/SB policy by either panel. This could have been a result of experts comparing these items to other policy items, and considering these items as either less important, or less feasible, for daily implementation. This may be due to the literature that reports the feasibility concerns of allowing children to go outdoors whenever they desire in a country such as Canada that has four seasons (Szpunar et al., 2020; Tucker & Gililand, 2007). Further, providing children with the ability to go outdoors whenever they like was scored very low on feasibility by the ECE panel, and likely influenced the importance ratings of this panel.

The PA/SB panel reached consensus on a greater number of policy items than the ECE panel (24 vs. 17 policy items, respectively); however, ECE experts had a slightly higher overall mean importance rating of all 24 policy items when compared to the PA/SB panel. The recent publication of the WHO *Standards for Healthy Eating, Physical Activity, Sedentary Behaviour and Sleep in Early Childhood Education and Care Settings* Toolkit (WHO, 2021) may have informed PA/SB panelists' ratings of policy items and led to homogeneity in PA/SB panelist responses. Since the toolkit was created with academics, researchers, development agencies, health workers, and policy makers as the target audience in mind, a comprehensive understanding and knowledge of the items in the toolkit by the PA/SB panelists may have influenced the similarity in ratings to the policy items found in the present study. As research around PA/SB standards and best-evidence recommendations is developing quickly, it is important to capture experts' perspectives as



new recommendations regarding the childcare environment surface.

Significant differences in ratings across the two panels were found for several policy items (e.g., “*shorter, more frequent periods (e.g., 3–4) of outdoor play should be provided every day*” was rated as extremely important by the PA/SB panel and of neutral importance by the ECE panel). This is likely due to different priorities, and feasibility considerations between the two panels, as this policy item scored well below the feasibility average compared to all other policy items as rated by the ECE experts. Further, ECE experts shared their perspectives via open-ended responses that revealed their outlook (i.e., low feasibility) of this policy item. These findings are consistent with our team’s research exploring the implementation adherence and feasibility of a previously implemented physical activity policy in childcare centres ( $n = 5$ ) in London, Ontario, which showed that the provision of shorter, more frequent outdoor periods was scored as low on feasibility by practicing early childhood educators (Szpunar et al., 2020). It is important to note that in countries such as Canada that experience variations in season/weather environmental factors could also influence the feasibility of items involving transitions from indoors to outdoors due to additional time requirements such as dressing children in appropriate clothing during the winter months (Driediger et al., 2017; Szpunar et al., 2020). In the future, researchers should aim to explore whether the provision of shorter, more frequent outdoor periods is influenced by time of year in countries with multiple seasons.

The finding that all but one of the policy items for consideration at the organizational, provincial/territorial, and/or federal level by both panels ranked high in terms of overall importance warrants further discussion. This finding, although unexpected, emphasizes more pressing issues and insights from ECE and PA/SB experts in Canada that are critical to improving the childcare landscape for all. Further, this reveals that action from the Canadian government is warranted. For example, policy items concerning free and/or subsidized childcare, training for early childhood educators on physical activity, risky play, and sedentary behaviour, adherence to equity, diversity, and inclusion (EDI) principles in childcare settings, and the provision of government funding for physical activity were all rated as extremely important by most experts in both panels. Undoubtedly, these high importance ratings and consensus across panels deserves attention from governing bodies. However, it is important to note that 2021 was the first year that a national childcare strategy was put forward by the Canadian government with a proposed \$30 billion investment for Early Learning and Childcare (“Supporting Early Learning and Child Care-Canada.ca,” 2022), which is an encouraging step forward. This budget from the federal government may serve as an opportunity for changes, regulations, or improvements to

childcare settings across all provinces. For example, the budget revealed Canada’s goal of enabling all provinces and territories to make additional childcare investments (e.g., build new facilities, subsidize childcare). Further, the COVID-19 pandemic also underscored the importance of accessible childcare for all (e.g., ability to secure and provide childcare; Findlay & Wei, 2021). As the number of households in Canada that have dual working parents has nearly doubled in the last 50 years, (Statistics Canada, 2016) affordable childcare that provides safe, accessible, and equity focused environments for young children is needed. Nevertheless, missing from the proposed framework is the role that childcare plays for young children’s development of healthy movement behaviours. As such, incorporating training for ECEs regarding physical activity, sedentary time, and risky play, as identified as a policy item in the present study, during early career stages (e.g., school, training) would ensure all ECEs are trained and prepared to incorporate movement opportunities for children. In fact, ECEs have previously noted their lack of training about healthy movement behaviours during their education in ECE programs and have requested additional courses on such topics be implemented in their curricula (Bruijns et al., 2019, 2020, 2022).

Research exploring childcare PA/SB policies in Canada has revealed high variability in the presence of childcare policy (Ott et al., 2017), as well as inconsistency among the type of policy and policy items observed among Canadian provinces/territories (Vercammen et al., 2020). Having a detailed policy, with multiple items, that is consistently implemented across Canada is important as it serves to inform a variety of evidence-based strategies that can improve children’s movement behaviours. Given that achieving 100% adherence to physical activity policy in the childcare environment is highly unlikely, as we have suggested previously (Szpunar et al., 2020), having more action items may prove beneficial (i.e., as no two childcare centres are alike, and ECEs may prefer different strategies for getting children active). This is especially important when considering the behavioural and scheduling differences between toddler (1–2 years) and preschool (3–4 years) classrooms found in most childcare settings. For example, if an educator is not able to provide shorter more frequent outdoor periods for their toddlers due to time demands of getting children dressed but feels confident in providing structured physical activity opportunities indoors, the children under their care would be getting some form of movement due to the alternative avenues for movement promotion outlined in the policy. Undoubtedly, future research is needed to explore how policy items can be tailored for toddler and preschool-aged classrooms uniquely.

**Table 5** Policy items ordered from highest to lowest priority by ECE expert panel (n = 15)

Physical activity/sedentary behaviour policy items by importance ranking category	Expert ranking						
<i>Extremely important (Median=7.00)</i>	1	2	3	4	5	6	7
Children should be provided with a minimum of 120 min of outdoor time and/or nature play per day. More is better	5	3	1	4	1	–	–
Supportive and safe active play environments in childcare should be always fostered both indoors and outdoors	5	3	4	1	1	–	–
Early Childhood Educators should encourage children to play with loose parts every day. While outdoors, each child should have access to a minimum of five loose parts for play	0	3	3	2	6	–	–
Early Childhood Educators should engage in physical activity alongside children daily, act enthusiastic about physical activity, and role model appropriate movement behaviours whenever possible	1	3	4	4	2	–	–
The use of sedentary time (e.g., sitting) as a punishment for children's bad behaviour should never be used	3	2	2	3	4	–	–
<i>Very important (Median=6.00)</i>							
Children should engage in at least 90–120 min of physical activity per day, and time spent in higher intensity activity (moderate-to-vigorous physical activity; MVPA) should be encouraged daily. More movement is better	3	3	3	3	1	1	0
Children should be permitted to go outside whenever they want, for as long as they want	2	1	1	0	1	1	8
Opportunities for building children's physical literacy and Fundamental Movement Skills (FMS) should be incorporated daily. Every day should include some sort of manipulative skill building	2	3	3	2	2	2	0
Children should receive opportunities to engage in both unstructured (e.g., child-led) and structured (e.g., facilitator-led) physical activity opportunities daily	6	4	1	1	1	1	0
Early Childhood Educators should not use screen-based technology, and/or should limit their screen time during children's awake hours	0	0	0	4	2	5	3
Early childhood educators and childcare centres should promote and encourage outdoor time over indoor time whenever possible	1	1	3	1	4	3	1
Early Childhood Educators should aim to include active play opportunities during traditional sedentary activities (e.g., story time)	0	2	3	3	3	1	2
<i>Moderately important (Median=5.00)</i>							
Shorter, more frequent periods (e.g., 3–4) of outdoor play should be provided every day	3	6	2	3	–	–	–
Extended periods of sedentary time (> 30 min) should be interrupted with active play opportunities. Whenever possible, children's time spent sedentary should be avoided and/or limited both indoors and outdoors (including restrained time in strollers/highchairs)	3	5	5	1	–	–	–
Children's screen time should be prohibited during childcare hours	5	2	0	7	–	–	–
Early Childhood Educators should encourage children to employ a variety of postures while they are both indoors and outdoors, and while they are inactive and active	3	1	7	3	–	–	–
<b>Organizational, provincial/territorial and federal policy items by importance ranking category</b>	<b>Expert ranking</b>						
<i>Extremely important (Median=7.00)</i>	1	2	3	4	5	6	
Free and/or subsidized childcare should be provided	7	2	1	1	1	2	
Early Childhood Educators should be required to complete comprehensive education/training on physical activity, risky play, and sedentary behaviour	1	7	3	0	2	1	
Play should always be culturally responsible and responsive. Equity, Diversity, and Inclusion (EDI) best practices should always be implemented in childcare settings	3	3	5	0	2	1	
The Canadian government should provide funding for physical activity	0	1	2	4	3	4	
Child to space ratios should be adequate in both indoor and outdoor childcare environments to engage in a variety of physical activities	2	1	1	5	4	1	
Outdoor childcare settings should be licensed in Canada	1	0	2	4	2	5	
<i>Very important (Median=6.00)</i>							
Education should be provided for parents to understand the importance of physical activity and disrupting sedentary time	0	14	–	–	–	–	
Facility level implementation support strategies must be provided (e.g., training, policy monitoring initiatives, posting/sharing of best practices). This included having Evaluation, Accountability, and Measurement plans to regularly evaluate whether PA/SB targets are being met	14	0	–	–	–	–	

1 = Most important. Table was adapted from Qualtrics simple table Visualization that provides metrics showing the number of respondents who selected the option (e.g., number of participants that selected each policy items level of importance within their grouping). Expert Ranking represents the number of experts that selected each unique policy item's level of importance. All policy item expert rankings may not add up to 15 as some experts chose not to order items based on importance

## Implications and Future Directions

The results of this study build upon action items identified in the WHO's *Standards for Healthy Eating, Physical Activity, Sedentary Behaviour and Sleep in Early Childhood Education and Care Settings* (WHO, 2021) and can help to inform strategies employed as a result of Canada's new Early Learning and Child Care Infrastructure Fund ("Supporting Early Learning and Child Care-Canada.ca," 2022). Further, the contextual information (e.g., feasibility) acquired from the ECE panel highlights important information for informing a PA/SB policy for piloting in Canadian centre-based childcare settings. As this study reported specific PA/SB policy items that are shared priorities by two groups of experts, next steps include testing the policy in childcare settings, starting with shared priority policy items. More specifically, objective assessment (i.e., measuring children's PA/SB via accelerometry) is needed to assess whether the policy results in changes to children's movement behaviours. In addition, future studies aiming to inform childcare policy should include front line ECE workers (e.g., in-training and practicing early childhood educators) and ask them to report on the feasibility of the policy after a period of implementation. Doing so would provide more context on the feasibility of incorporating such a policy into an 8-hour day. Finally, items that were not identified as shared priorities should be revisited (e.g., re-framed or adapted) in a way that balances both importance and feasibility to assess whether these items can be built into the policy. For example, the provision of shorter, more frequent outdoor periods does serve as an approach for increasing children's time spent in physical activity (Tucker et al., 2017), so exploring other approaches to undertaking increased outdoor play scheduling are needed.

## Strengths & Limitations

Strengths of the present study include the inclusion of two separate panels to maximize the validity and acceptability of study findings (Cantrill et al., 1996), and the inclusion of Canadian-only panelists. Exclusively including Canadian panelists served as a strength as it ensures applicability to the Canadian childcare setting which also facilitates buy in and credibility of the policy items generated and the value of testing them in the future. Further, snowball sampling of PA/SB experts, and the use of open-ended responses to gather more descriptive perspectives of policy items and their justifications for ranking are also notable strengths. Finally, the high initial online survey response rate (79 and 53% among PA/SB and ECE panelists, respectively) should be acknowledged. Despite the noted strengths, this study is not without its limitations. First, relevant to findings from any study that employed the Delphi method, data gathered were based upon availability and the subjective opinion, knowledge, and expertise of participants. Second, there was

no representation from Quebec and Prince Edward Island among both panels, and little representation from Manitoba, Newfoundland and Labrador, Northwest Territories, and Yukon, which limits the generalizability of study findings to all of Canada (especially given the unique childcare settings that may be present in more rural parts of the country). In addition, most experts in both panels identified as Caucasian, further limiting the generalizability of findings as this is unrepresentative of Canada, a very multicultural country (Statistics Canada, 2022). Moreover, the opportunity to re-rate policy items was only provided in one survey round (i.e., round 3 for PA/SB panel, and round 2 for ECE panel). Although all policy items achieved consensus among the PA/SB panel, having an additional survey round may have led to more items achieving consensus among ECE panelists. Finally, comments made from experts in both panels regarding the ordering of policy items based on importance priority suggest that results should be interpreted with caution as nearly all panelists indicated that they had trouble with ordering items, and some reported that they ordered them at random (e.g., perceived them as equally important).

## Conclusion

This study used the Delphi method to identify the level of consensus among two panels on policy items for use in a PA/SB policy for use in Canadian childcare settings. Fifteen policy items were deemed as shared priorities, some of which include the provision of at least 120 min of outdoor time per day, the provision of structured and unstructured play opportunities daily, and encouraging children to play with loose parts. ECE experts' feasibility scores revealed mixed perspectives, such as low feasibility for providing shorter more frequent periods of outdoor play, and high feasibility for providing children with opportunities to engage in unstructured and structured play daily. By gathering the perspectives of two important groups of experts, this study not only provided novel input towards informing a Canadian childcare PA/SB policy, but also ensured that both topical and pedagogy experts weighted in on the importance of identified policy items.

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