Examining correlates of outdoor play in childcare centres

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Received: 3 April 2020 / Accepted: 18 August 2020 / Published online: 17 September 2020
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Abstract

Objectives Childcare centres are an important setting for young children to engage in outdoor play. The objectives for this study were to (1) determine the average outdoor play duration and frequency for toddlers (19–35 months) and preschoolers (36–60 months) in childcare centres, (2) determine if duration and frequency differed across winter (December–March) and non-winter (April–November) months, and (3) determine correlates of outdoor play duration and frequency.

Methods Childcare centre directors ($n = 240$) in Alberta, Canada, completed a questionnaire adapted from the Nutrition and Physical Activity Self-Assessment for Child Care (GO NAP SACC) Outdoor Play Tool that measured outdoor play separately for toddlers/preschoolers and winter/non-winter months. Consistent with the tool, centres were categorized as meeting or not meeting best practices for outdoor play duration and frequency. The questionnaire also measured demographic, socio-cultural, environmental, and policy correlates. Chi-squared tests and multiple logistic regression models were conducted.

Results More centres met the outdoor play duration and frequency best practices in non-winter than in winter months for toddlers (duration: 79.2% vs 24.9%; frequency: 11.4% vs 1.4%) and preschoolers (duration: 55.7% vs 14.6%; frequency: 20.2% vs 3.4%). Correlates of outdoor play duration and frequency varied across age groups and seasons. However, educator certification, educator professional development, and play areas were most consistent across final models.

Conclusions Findings from this study suggest correlates of outdoor play may differ across age groups and seasons. Interventions aimed at increasing outdoor play in childcare centres appear warranted, especially in winter months for northern locations.

Résumé

Objectifs Il est important que les enfants en garderie aillent jouer dehors. L'étude avait les objectifs suivants : 1) déterminer pendant combien de temps et à quelle fréquence les tout-petits (19 à 35 mois) et les enfants d'âge préscolaire (36 à 60 mois) en garderie jouaient dehors; 2) déterminer si la durée et la fréquence diffèrent en hiver (décembre à mars) par rapport aux autres saisons (avril à novembre); et 3) déterminer les corrélations entre le temps passé dehors et la fréquence à laquelle les enfants jouent dehors.

Méthodes Des personnes ($n = 240$) à la tête de garderies de l'Alberta, au Canada, ont rempli un questionnaire adapté du Nutrition and Physical Activity Self-Assessment for Child Care (GO NAP SACC) Outdoor Play Tool qui mesurait séparément les données pour les tout-petits et les enfants d'âge préscolaire et les mois d'hiver et autres mois. Conformément à l'outil, les garderies ont été classées selon qu'elles respectent ou non les meilleures pratiques en matière de temps passé dehors pour les enfants et de fréquence à laquelle ils jouent dehors. Le questionnaire a également permis de mesurer les corrélats démographiques, socioculturels, environnementaux et politiques. Des tests du khi carré et des modèles de régression logistique multiple ont été réalisés.

Résultats Le nombre de garderies qui ont respecté les meilleures pratiques pour ce qui est du temps passé dehors pour les enfants et de la fréquence à laquelle ces derniers jouent dehors est plus élevé dans les mois non hivernaux que dans les mois hivernaux, à la fois chez les tout-petits (79,2 % contre 24,9 % pour la durée, 11,4 % contre 1,4 % pour la fréquence) et chez les enfants d'âge préscolaire (55,7 % contre 14,6 % pour la durée, 20,2 % contre 3,4 % pour la fréquence). Les corrélats de la durée et de la fréquence variaient selon les groupes d'âge et les saisons. Cependant, la formation des éducateurs, le perfectionnement professionnel des éducateurs et les aires de jeux étaient les données les plus stables parmi les modèles finaux.

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Conclusions Les résultats de cette étude suggèrent que les corrélats du temps passé à jouer dehors peuvent différer selon les groupes d'âge et les saisons. Les interventions visant à faire en sorte que les enfants jouent plus souvent dehors en garderie semblent justifiées, en particulier pendant les mois d'hiver pour les régions nordiques.

Keywords Motor activity · Play and playthings · Child day care centres · Child, preschool

Mots-clés Activité motrice · jeux et jouets · garderies · enfant d'âge préscolaire

Introduction

The first five years of a child's life, also referred to as 'the early years', is an imperative period for healthy growth and development (Berk 2018). Play, often described as a self-directed activity done for fun and amusement, is a fundamental component of development during this life stage (Smith 2010). Specifically, active outdoor play has been deemed essential for healthy development by various stakeholder groups (Tremblay et al. 2015). Although not all outdoor play is active, children often engage in more active play when outside than inside as gross motor activities are typically limited or prohibited indoors. Unfortunately, outdoor play has been declining in recent decades largely due to children's increased use of technology (Larson et al. 2011) and parents' safety concerns (Clements 2004; Veitch et al. 2006).

Declining outdoor play and the subsequent opportunities for active play is a concern because active play provides children of the early years with the well-known physical, social, and cognitive benefits of physical activity (Carson et al. 2017). For children of the early years, outdoor play and access to nature has also been associated with decreased depressed affect (Brussoni et al. 2017), better spatial working memory (Schutte et al. 2015) and self-regulation (Becker et al. 2014), and improved overall mental well-being (McCormick 2017). Additionally, outdoor play has been found to have positive associations with vitamin D levels (Absoud et al. 2011), which is important for the healthy development of bones and teeth and the prevention of multiple chronic diseases (Papandreou et al. 2010).

Previous studies that have examined correlates of children's outdoor play have focused on the home and neighbourhood setting. For example, studies have identified parental perceptions of safety, neighbourhood friends (Veitch et al. 2010) and proximity to green spaces and cul-de-sacs (Brockman et al. 2011) as positive correlates of outdoor play in school-aged children. In younger children, different types of housing and the socio-economic status of the community have also been identified as correlates of outdoor play (Aarts et al. 2010). However, many of these correlates do not translate to the childcare setting, and to our knowledge, no studies have examined correlates of outdoor play in childcare centres. This

represents an important gap in the literature because just over half of Canadian children under the age of 5 years attend non-parental child care, of which 70% are full-time (Sinha 2014). Therefore, the childcare setting can provide a large number of children with regular opportunities for outdoor play.

Identifying correlates of outdoor play duration and frequency in child care centres is necessary to inform future interventions and initiatives aimed at increasing children's outdoor play opportunities. Due to developmental differences and separate rooms and schedules for toddlers and preschoolers in childcare, it is important to examine these two age groups separately. Furthermore, in northern locations such as Alberta, Canada, it is also critical to consider seasonal differences, as outdoor play can be impacted in winter months due to colder temperatures (Carson and Spence 2010). As such, the objectives of this study were to (1) determine the duration and frequency of outdoor play for toddlers and preschoolers in Alberta while in childcare, (2) determine if outdoor play differs between winter and non-winter months, and (3) examine the centre demographic, environmental, socio-cultural, and policy correlates of outdoor play.

Materials and methods

Participants and procedures

Participants of this cross-sectional study were directors of licensed childcare centres with full-time programming for toddlers (19–35 months) and/or preschoolers (36–60 months) in Alberta, Canada. Eligible childcare centres were identified through lists from provincial licensing agencies and through an online childcare lookup tool (Government of Alberta 2019). A total of 897 centres were identified and contacted between May and November 2018. Of these, 13 centres were ineligible for the following reasons: part-time programming ($n = 3$), no toddlers or preschoolers ($n = 2$), drop-in only ($n = 3$), or permanently closed or closing soon ($n = 5$). Of the remaining 884 centres, it was not possible to contact 44 directors via e-mail or phone. Additionally, a small number of centres ($n = 18$) declined, leaving a sample of 822 participants.

Participating centres completed a questionnaire through REDCap, an electronic data capture tool (Harris et al. 2009) or via paper copy ($n = 4$). Ethics approval was granted from the University of Alberta Research and Ethics Board. All participating directors provided written informed consent.

Measures

Outdoor play in this study was defined as any time that children were outside playing, including free play and instructor-led play. Outdoor play correlates were measured with a modified version of the freely available Go Nutrition and Physical Activity Self-Assessment for Child Care (Go NAP SACC) Outdoor Play and Learning Tool (Ward et al. 2014). The Go NAP SACC tool includes best practices guided by research and expert opinion, though participants in this study were not aware of the tool's definitions of best practices. Inter-rater reliability between childcare directors/staff (Kappa statistic: 0.46–0.71; percentage agreement: 57.9–89.5), test-retest reliability (Kappa statistic: 0.25–0.41; percentage agreement: 44.8–75.2), and criterion validity based on the Environment and Policy Assessment and Observation (EPAO) system (Ward et al. 2008) (Kappa statistic: 0.16–0.79; percentage agreement: 52.2–90.6) have been previously reported for some of the questions in this tool (Benjamin et al. 2007).

Outdoor play duration and frequency

Directors were asked to report the average daily outdoor play duration and frequency separately for two age groups (toddlers and preschoolers) and seasons (winter: December to March, and non-winter: April to November). The seasonal questions were added by the research team and were based around the winter solstice and spring equinox. The best practice for outdoor play duration was defined as ≥ 60 min/day for toddlers and ≥ 90 min/day for preschoolers and the best practices for daily frequency was defined as ≥ 3 times/day for both age groups (Ward et al. 2014). However, because so few centres met the best practice of ≥ 3 times/day, specifically in the winter months, the frequency best practice of ≥ 2 times/day was also calculated.

Centre demographic correlates

The research team added centre demographic questions to the Go NAP SACC Outdoor Play Tool. Directors were asked to report on the numbers of toddlers, preschoolers, and total children in their centre, the numbers of part-time and full-time educators, and the educator's certification level. Educator certification level was dichotomized into $< 50\%$ and $\geq 50\%$ of centre educators with level 2 (Child Development Worker;

one-year certificate) or level 3 (Child Development Supervisor; two-year diploma) certification. Directors also reported the approximate population size of the municipality where their centre was located and the accreditation status of their centre.

Socio-cultural correlates

The socio-cultural correlates included educator professional development and family education on outdoor play. Directors were asked to report how often their educators receive outdoor play professional development such as in-person or online training. If directors answered that their educators received professional development, they were asked to indicate the topics from a list. Directors were also asked to report how often their centre provided families with education on outdoor play through in-person sessions, newsletters, or similar methods. Similar to professional development, if directors indicated that education was offered to parents, the directors then marked which topics were provided.

Environmental correlates

The environmental correlates included outdoor space, number of outdoor play areas, and portable play equipment for outdoors. For outdoor space, directors were asked to report the available space in relation to the proportion of children who could run around safely at one time. Directors also reported the number of outdoor play areas their centre had for toddlers and preschoolers separately. Play areas were defined as areas that offer different opportunities for children, such as a swing set, sand box, and garden. For portable play equipment, directors were asked to report the different types of outdoor portable play equipment (e.g., jumping toys, push-pull toys) available for children from a comprehensive list. The different types of portable play equipment were totaled and categorized into one of four categories ranging from none to 6–8 types, as per the Go NAP SACC tool (Ward et al. 2014). Directors also reported how often portable play equipment was available outdoors and the amount of portable play equipment available outdoors for the toddlers and preschoolers in their centre.

Policy correlates

The GO NAP SACC tool defines written policies as guidelines, including information on a program's operations and expectations for educators, children, and families. Written policies could be included in documents such as parent or staff manuals. Directors were asked if their centre had a written policy for outdoor play. If the centre had a policy, directors were then asked to indicate the topics included in their policy from an extensive list (e.g., daily outdoor time, appropriate

Table 1 Descriptive characteristics ($n = 240$)

Item	Mean $\pm$ SD or n (%)
Centre demographics	
Children	
Toddler	15.2 $\pm$ 14.0
Preschooler	24.3 $\pm$ 17.4
Centre total	61.2 $\pm$ 43.5
Educators	
Part-time	2.5 $\pm$ 2.7
Full-time	11.2 $\pm$ 7.7
Staff certification	
Level 1	4.7 $\pm$ 3.2
Level 2	2.3 $\pm$ 2.4
Level 3	6.1 $\pm$ 5.7
Accreditation status	
Not accredited	5 (2.1)
In-process	35 (14.6)
Accredited	200 (83.3)
Centre location	
Rural (< 1000 people)	28 (12.0)
Small (1000–29,999 people)	52 (21.7)
Medium (30,000–99,999 people)	59 (24.6)
Large ($\geq$ 100,000 people)	100 (41.7)
Socio-cultural	
PD* frequency	
Never	17 (7.1)
< 1 time per year	48 (20.0)
1 time per year	122 (50.8)
$\geq$ 2 times per year	53 (22.1)
PD* topics	
None	19 (7.9)
1 topic	30 (12.5)
2–3 topics	104 (43.3)
$\geq$ 4 topics	87 (36.3)
Family education frequency	
Never	62 (25.8)
< 1 time per year	38 (15.8)
1 time per year	67 (27.9)
$\geq$ 2 times per year	73 (30.4)
Family education topics	
None	47 (19.6)
1 topic	43 (17.9)
2 topics	58 (24.2)
$\geq$ 3 topics	92 (38.3)
Environmental	
Space to run	
None	0 (0.0)
Some children	20 (8.3)
Most children	59 (24.6)
All children	161 (67.1)

Table 1 (continued)

Item	Mean $\pm$ SD or <i>n</i> (%)
Toddler play areas	
1–2 areas	40 (18.1)
3–5 areas	80 (36.2)
6–7 areas	57 (25.8)
≥ 8 areas	44 (19.9)
Preschooler play areas	
1–2 areas	32 (13.4)
3–5 areas	74 (31.0)
6–7 areas	68 (28.5)
≥ 8 areas	65 (27.2)
Portable play equipment	
None	0 (0.0)
1–2 types	6 (2.5)
3–5 types	50 (20.8)
6–8 types	184 (76.7)
Equipment availability	
Rarely/never	4 (1.7)
Sometimes	19 (7.9)
Often	62 (25.8)
Always	155 (64.6)
Amount of equipment	
Very limited	3 (1.3)
Limited	16 (6.7)
Somewhat limited	43 (17.9)
Not limited	178 (74.2)
Policy	
Written policy	
Yes	226 (94.2)
No	14 (5.8)
Policy components	
None	15 (6.3)
1–2 topics	14 (5.8)
3–5 topics	132 (55.0)
≥ 6 topics	79 (32.9)

* *PD* professional development

clothing, professional development for educators). The policy topics were totaled for each centre.

Statistical analyses

Statistical analyses were performed using STATA (version 15) software. To address objective 1 of the study, descriptive statistics were calculated for average daily duration and frequency of outdoor play. For objective 2, chi-squared tests were used to determine if the percentage of centres meeting the best practice for outdoor play duration and frequency were different between the winter and non-winter months for both toddlers and preschoolers. To address objective 3, a series of

logistic regression analyses were conducted to examine the correlates of meeting the best practice for outdoor play duration and frequency. Analyses were run separately for each age group (toddler and preschool) and season (winter and non-winter). First, bivariate logistic regression analyses were conducted for each correlate. Final models were conducted using multiple logistic regression that included all correlates with a $p < 0.10$ in the bivariate models to determine the most important correlates. Ordinal variables were used in all models, where applicable, due to smaller cell sizes for some responses, and ≥ 2 times per day was used as the frequency best practice due to very few centres meeting the best practice of 3 sessions per day. Final models were checked for multicollinearity

Fig. 1 Outdoor play duration of toddlers in winter (December–March) and non-winter (April–November) months ($n = 221$)

using variance inflation factors (VIF). Correlates with a VIF ≥ 10 were removed one at a time (James et al. 2017), starting with the largest value until all correlates had a VIF < 10 . In the case of two correlates with similar VIF ≥ 10 , each correlate was removed one at a time to determine the best model fit measured by pseudo- R -squared statistics. Statistical significance was defined as $p < 0.05$.

Results

Of the 822 directors who were contacted, 240 responded with complete data (programs for toddlers only $n = 3$, preschoolers only $n = 19$, and both age groups $n = 218$; a response rate of 29%). Of the

remaining 582 directors, 113 partially completed the survey and were not included in the analysis. The remaining directors either did not go to the survey link or were not interested in participating in the study after reading the letter of information. Descriptive characteristics of participating centres are summarized in Table 1.

Outdoor play duration and frequency

The median category for toddler outdoor play duration was 30–44 min in the winter months and 75–89 min in the non-winter months (see Fig. 1), whereas the median category for preschooler outdoor play duration was 45–59 min and 90–119 min in the winter and non-winter months,

Fig. 2 Outdoor play duration of preschoolers in winter (December–March) and non-winter (April–November) months ($n = 237$)

Fig. 3 Outdoor play frequency of toddlers in winter (December–March) and non-winter (April–November) months ($n = 221$)

respectively (see Fig. 2). The percentage of centres meeting the best practice for outdoor play duration (toddlers: ≥ 60 min/day; preschoolers: ≥ 90 min/day) was significantly different between winter and non-winter months for toddlers (24.9% vs 79.2%) and preschoolers (14.6% vs 55.7%). The median category for toddler outdoor play frequency was 1 time/day in the winter months and 2 times/day in the non-winter months (see Fig. 3). Comparably, the median category for preschooler outdoor play frequency was 2 times/day in the winter and non-winter months (see Fig. 4). The percentage of centres meeting the best practice for outdoor play frequency (≥ 3 times per day) was also significantly different between winter and non-winter months for toddlers (1.4% vs 11.4%) and preschoolers (3.4% vs 20.2%). Similar significant findings were observed when the cut-off of ≥ 2 times per day was used for toddlers (43.9% vs 91.4%) and preschoolers (50.2% vs 93.3%).

Outdoor play duration correlates

The associations between correlates and meeting the best practice for outdoor play duration are presented in Table 2. For the final models in toddlers, having more than 50% of educators with level 2 (one-year certificate) or level 3 (two-year diploma) certification, compared with centres with a lower percentage, was associated with a higher likelihood of meeting the duration best practice in winter months (OR = 2.31, 95% CI: 1.15–4.65). In the non-winter months, non-accredited centres or centres in the process of accreditation were more likely to meet the duration best practice compared with centres that were accredited (OR = 5.18, 95% CI: 1.15–23.27). It is important to note that only two centres were categorized as not meeting the best practice for the non-accredited/in-process of accreditation group. Also, each additional unit of outdoor play areas was associated with a higher

Fig. 4 Outdoor play frequency of preschoolers in winter (December–March) and non-winter (April–November) months ($n = 237$)

Table 2 Bivariate and multiple logistic regression analyses for the correlates of meeting the best practice for outdoor play duration (toddlers: ≥ 60 min/day; preschoolers: ≥ 90 min/day)

Predictor	Toddler winter			Toddler non-winter			Preschool winter			Preschool non-winter		
	Bivariate OR (95% CI)	Final OR (95% CI)		Bivariate OR (95% CI)	Final OR (95% CI)		Bivariate OR (95% CI)	Final OR (95% CI)		Bivariate OR (95% CI)	Final OR (95% CI)	
Variance (pseudo-R^2)	-	0.04		-	0.10		-	-		-	0.05	
Centre demographics												
No. toddlers	1.01 (0.98–1.03)	-		0.98 (0.96–1.01)	-		n/a	n/a		n/a	n/a	
No. preschoolers	n/a	n/a		n/a	n/a		1.01 (0.99–1.03)	-		1.00 (0.98–1.01)	-	
No. total children	1.00 (0.99–1.01)	-		0.99 (0.99–1.00)	-		1.00 (0.99–1.01)	-		1.00 (0.99–1.01)	-	
No. part-time educators	1.03 (0.92–1.14)	-		0.96 (0.86–1.07)	-		0.98 (0.84–1.13)	-		1.00 (0.90–1.10)	-	
No. full-time educators	1.01 (0.98–1.05)	-		0.97 (0.94–1.01)	-		1.02 (0.97–1.06)	-		0.99 (0.96–1.03)	-	
$\geq 50\%$ of educators with level 2/3 certification	2.30 (1.15–4.60)	2.31 (1.15–4.65)		0.53 (0.26–1.09)	0.71 (0.33–1.52)		1.30 (0.60–2.79)	-		0.66 (0.39–1.13)	-	
Accreditation status												
Not accredited/in-process	0.66 (0.27–1.60)	-		5.50 (1.27–23.79)	5.18 (1.15–23.27)		1.59 (0.66–3.82)	-		1.82 (0.89–3.74)	-	
Accredited	ref	-		ref	ref		ref	-		ref	-	
Centre location	1.12 (0.83–1.50)	-		0.78 (0.56–1.08)	-		0.88 (0.63–1.23)	-		0.73 (0.57–0.94)	0.71 (0.55–0.92)	
Socio-cultural												
Professional development frequency	1.47 (0.99–2.17)	1.47 (0.99–2.20)		1.21 (0.82–1.77)	-		1.45 (0.91–2.31)	-		0.99 (0.73–1.35)	-	
Professional development topics	1.06 (0.83–1.36)	-		0.91 (0.70–1.20)	-		1.18 (0.86–1.63)	-		1.07 (0.88–1.32)	-	
Family education frequency	0.97 (0.75–1.26)	-		0.96 (0.72–1.26)	-		1.16 (0.84–1.58)	-		1.04 (0.84–1.30)	-	
Family education topics	0.96 (0.74–1.25)	-		0.77 (0.57–1.05)	0.78 (0.55–1.11)		1.15 (0.83–1.59)	-		1.21 (0.97–1.52)	1.21 (0.95–1.53)	
Environmental												
Space to run	1.02 (0.63–1.66)	-		0.82 (0.48–1.41)	-		1.04 (0.59–1.84)	-		0.78 (0.52–1.17)	-	
Play areas†	1.12 (0.83–1.52)	-		1.44 (1.02–2.01)	1.56 (1.09–2.25)		1.17 (0.82–1.67)	-		1.47 (1.13–1.90)	1.41 (1.07–1.84)	
Portable play equipment	1.25 (0.63–2.46)	-		0.79 (0.38–1.64)	-		2.03 (0.80–5.17)	-		1.69 (1.00–2.87)	*	
Equipment availability	1.34 (0.84–2.14)	-		0.98 (0.62–1.54)	-		1.52 (0.83–2.78)	-		1.15 (0.81–1.65)	-	
Amount of equipment	1.00 (0.63–1.57)	-		1.07 (0.67–1.73)	-		1.47 (0.76–2.84)	-		1.05 (0.71–1.54)	-	
Policy												
Written policy	0.99 (0.25–3.81)	-		**	-		2.12 (0.27–16.88)	-		0.77 (0.25–2.44)	-	
Policy components	0.96 (0.65–1.42)	-		0.56 (0.34–0.93)	0.68 (0.39–1.19)		0.88 (0.56–1.37)	-		0.88 (0.63–1.22)	-	

Statistically significant associations ($p < 0.05$) are highlighted in boldStatistically significant associations ($p < 0.10$) in bivariate are italicized

Dashes (-) indicate variables that were not included in the final model

†Models used respective toddler or preschool area totals

*Variable not included in the final model due to multicollinearity

**Logistic regression could not be calculated due to a cell count of 0

likelihood of meeting the duration best practice (OR = 1.56, 95% CI: 1.09–2.25).

For the final models in preschoolers, as centre location increased in size from rural to large municipality, the likelihood of meeting the duration best practice decreased in non-winter months (OR = 0.71, 95% CI: 0.55–0.92). Similar to the case for toddlers, outdoor play areas were a significant positive correlate of duration best practice in preschoolers (OR = 1.41, 95% CI: 1.07–1.84). No significant associations were found for preschoolers in the winter months.

Outdoor play frequency correlates

The associations between correlates and meeting the best practice for outdoor play frequency (≥ 2 times per day) are presented in Table 3. In the final toddler models, centres with more than 50% of educators with level 2 or level 3 certification, compared with centres with a lower percentage, were more likely to meet the frequency best practice in the winter months (OR = 2.72, 95% CI: 1.43–5.19). Also, each additional unit of professional development frequency was associated with a higher likelihood of meeting the frequency best practice in the winter months (OR = 1.83, 95% CI: 1.15–2.93). In the final non-winter model, no significant associations were found.

For the final preschool models, each unit increase of full-time educators was associated with a higher likelihood of meeting the best practice for outdoor play frequency in the winter months (OR = 1.05, 95% CI: 1.01–1.09). Similar to the toddler final model, educator certification was a significant positive correlate of frequency best practice in the winter months (OR = 2.22, 95% CI: 1.20–4.12). Each additional unit of outdoor play areas was also associated with a higher likelihood of meeting the frequency best practice in winter months (OR = 1.34, 95% CI: 1.01–1.80). In the non-winter months, each additional unit of family education topics was associated with a higher likelihood of meeting the frequency best practice (OR = 1.83, 95% CI: 1.04–3.22).

Discussion

This study examined outdoor play in toddlers and preschoolers during winter and non-winter months, as well as potential correlates in a large sample of childcare centres. Regardless of age group, a higher percentage of centres met outdoor play duration and frequency best practices in the non-winter than in the winter months. Correlates of outdoor play duration and frequency varied across age groups and seasons. Across varying models, higher educator certification, more frequent educator professional development, more family education topics, and more play areas were most consistently associated with meeting outdoor play best practices.

Due to the many benefits of outdoor play, increased opportunities for active outdoor play have been encouraged by an expert-developed position statement (Tremblay et al. 2015). In the present study, average outdoor play duration was lower than the recommended best practice, which is consistent with the findings of a recent review where an average of 45.2 min of outdoor play duration for an average childcare day was observed across 26 studies (Truelove et al. 2018). Furthermore, the present study found less than a quarter of centres met the frequency best practice regardless of age group or season. Increasing outdoor play frequency during childcare has recently been identified as a potential strategy to increase moderate- to vigorous-intensity physical activity (MVPA). For instance, one study found that despite spending less total time outside during childcare, the intervention group (3 sessions/day), which played outside more frequently, engaged in significantly more MVPA than the control group (1 session/day) (Razak et al. 2018). As such, limited outdoor play reduces children's opportunities to obtain the many benefits of outdoor play (Tremblay et al. 2015) and MVPA (Carson et al. 2017).

A novel aspect of the present study was examining the seasonal differences of outdoor play duration. Although outdoor play can be challenging in Canadian winters, childcare is a setting that can maximize outdoor play duration during this season because children typically attend childcare during the warmest and lightest parts of the day. Nevertheless, large differences were observed in best practice attainment between winter and non-winter months in both age groups. This finding is consistent with another study in a small sample of North Dakota preschools, where outdoor play time during childcare reduced by 60% from fall to winter months (Schuna et al. 2013). Therefore, interventions to increase outdoor play time and frequency in childcare centres are needed, especially in the winter months. Findings from the present study suggest that correlates of outdoor play that could potentially be targeted in future child care interventions are multifaceted and differ across age groups and seasons. However, the correlates most consistently associated with meeting best practices, including higher educator certification, more frequent educator professional development, more family education topics, and more play areas, could be considered in future research targeting outdoor play in childcare settings.

To our knowledge, no previous research has examined the association of children's outdoor play with educator certification or professional development; however, studies have examined these correlates' association with children's physical activity levels. For example, one study found that children were more active on playgrounds when attending a preschool with a majority of college-educated teachers compared with children at preschools with fewer college-educated teachers (Dowda et al. 2004). This increase in physical activity may be attributed to educators' confidence in facilitating physical

Table 3 Bivariate and multiple logistic regression analyses for the correlates of meeting the best practice for outdoor play frequency (≥ 2 times/day)

Predictor	Toddler winter			Toddler non-winter			Preschool winter			Preschool non-winter		
	Bivariate OR (95% CI)	Final OR (95% CI)	Bivariate OR (95% CI)	Bivariate OR (95% CI)	Final OR (95% CI)	Bivariate OR (95% CI)	Bivariate OR (95% CI)	Final OR (95% CI)	Bivariate OR (95% CI)	Final OR (95% CI)		
Variance (pseudo-R ²)												
Centre demographics												
No. toddlers	1.02 (1.00–1.05)	1.01 (0.98–1.05)	1.04 (0.99–1.10)	-	0.13	-	-	0.12	-	-	0.14	
No. preschoolers	n/a	n/a	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
No. total children	1.01 (1.00–1.02)	1.00 (0.99–1.01)	1.01 (0.99–1.02)	-	n/a	1.01 (1.00–1.03)	1.01 (1.00–1.02)	*	1.01 (0.99–1.03)	1.01 (0.99–1.03)	-	
No. part-time educators	1.03 (0.93–1.14)	-	0.96 (0.83–1.11)	-	-	0.99 (0.90–1.09)	0.95 (0.81–1.12)	-	0.95 (0.81–1.12)	0.95 (0.81–1.12)	-	
No. full-time educators	1.04 (1.00–1.08)	*	1.04 (0.96–1.12)	-	-	1.06 (1.02–1.11)	1.08 (0.98–1.19)	-	1.08 (0.98–1.19)	1.08 (0.98–1.19)	-	
≥ 50% of educators with level 2/3 certification	2.92 (1.63–5.25)	2.72 (1.43–5.19)	2.54 (0.98–6.60)	-	2.54 (0.89–7.27)	2.17 (1.26–3.71)	2.37 (0.85–6.62)	2.22 (1.20–4.12)	2.37 (0.85–6.62)	2.34 (0.72–7.63)	-	
Accreditation status												
Not accredited/in-process	0.64 (0.31–1.34)	-	0.73 (0.23–2.35)	-	-	0.88 (0.44–1.73)	0.86 (0.23–3.18)	-	0.86 (0.23–3.18)	0.86 (0.23–3.18)	-	
Accredited	ref	-	ref	-	-	ref	ref	-	ref	ref	-	
Centre location	1.41 (1.09–1.84)	1.13 (0.84–1.52)	1.11 (0.71–1.71)	-	-	1.27 (0.99–1.61)	1.51 (0.95–2.40)	1.05 (0.79–1.40)	1.51 (0.95–2.40)	1.28 (0.74–2.20)	-	
Socio-cultural												
Professional development frequency	1.88 (1.32–2.69)	1.83 (1.15–2.93)	1.26 (0.73–2.17)	-	-	1.86 (1.33–2.59)	1.59 (0.89–2.83)	1.47 (0.95–2.26)	1.59 (0.89–2.83)	-	-	
Professional development topics	1.30 (1.04–1.63)	1.08 (0.79–1.46)	1.44 (1.04–1.00)	-	1.26 (0.83–1.90)	1.42 (1.14–1.77)	1.49 (1.05–2.11)	1.25 (0.93–1.67)	1.49 (1.05–2.11)	1.23 (0.81–1.87)	-	
Family education frequency	1.25 (0.99–1.57)	0.94 (0.66–1.32)	1.19 (0.80–1.78)	-	-	1.30 (1.04–1.62)	1.29 (0.83–1.99)	0.93 (0.66–1.30)	1.29 (0.83–1.99)	-	-	
Family education topics	1.33 (1.05–1.69)	1.12 (0.78–1.60)	1.74 (1.16–2.63)	-	1.58 (0.95–2.63)	1.40 (1.11–1.76)	1.95 (1.22–3.12)	1.16 (0.83–1.62)	1.95 (1.22–3.12)	1.83 (1.04–3.22)	-	
Environmental												
Space to run	0.98 (0.64–1.48)	-	1.19 (0.59–2.39)	-	-	0.95 (0.64–1.41)	1.23 (0.59–2.58)	-	1.23 (0.59–2.58)	-	-	
Play areas†	1.07 (0.82–1.40)	-	1.43 (0.87–2.34)	-	-	1.36 (1.05–1.76)	1.50 (0.90–2.49)	1.34 (1.01–1.80)	1.50 (0.90–2.49)	-	-	
Portable play equipment	1.26 (0.71–2.24)	-	0.88 (0.31–2.49)	-	-	2.26 (1.29–3.97)	1.24 (0.48–3.23)	*	1.24 (0.48–3.23)	-	-	
Equipment availability	1.41 (0.95–2.09)	*	1.89 (1.10–3.25)	-	1.62 (0.88–3.00)	1.46 (1.01–2.12)	1.63 (0.90–2.95)	*	1.63 (0.90–2.95)	-	-	
Amount of equipment	1.06 (0.71–1.58)	-	1.06 (0.53–2.10)	-	-	1.20 (0.81–1.77)	1.53 (0.82–2.87)	-	1.53 (0.82–2.87)	-	-	
Policy												
Written policy	1.60 (0.47–5.49)	-	2.26 (0.46–11.15)	-	-	2.37 (0.71–7.93)	2.75 (0.56–13.65)	-	2.75 (0.56–13.65)	-	-	
Policy components	1.18 (0.84–1.67)	-	1.82 (1.08–3.06)	-	*	1.47 (1.04–2.07)	2.14 (1.23–3.70)	*	2.14 (1.23–3.70)	*	*	

Statistically significant associations ($p < 0.05$) are highlighted in boldStatistically significant associations ($p < 0.10$) in bivariate are italicized

Dashes (-) indicate variables that were not included in the final model

†Models used respective toddler or preschool area totals

*Variable not included in final model due to multicollinearity

activities based on their training (Martyniuk and Tucker 2014). Similarly, additional education may enable teachers to be more confident and knowledgeable in leading outdoor play activities. Educator certification and professional development frequency may be particularly important in the winter months due to increased challenges associated with outdoor play in winter conditions. Additionally, educators and parents alike may not value the importance of outdoor play in childcare centres. Therefore, increasing education frequency or providing more education topics for stakeholder groups may cause a shift in these values and increase buy-in, thus increasing a centre's likelihood to meet the best practices.

In terms of physical environmental correlates, a number of weak to moderate associations (Oleckno 2002) were observed between the number of outdoor play areas and meeting best-practice outdoor duration and frequency. Increased play areas may allow children to move freely and engage in more activities and therefore play outside longer. However, since the present study only focused on number of play areas, future research should consider assessing the quality and types of play areas in all seasons to better inform recommendations on designing childcare outdoor play areas.

A strength of this study was the large sample of childcare centres from various regions across the province of Alberta, Canada. The response rate of this study aligns with other online-based survey research (Nulty 2008); however, directors who participated in this study may have placed a higher value on outdoor play than non-participants. Consequently, our descriptive results regarding outdoor play duration and frequency may have been overestimated. As with most questionnaires, the threat of social desirability and recall bias was a limitation. However, because directors reported total outdoor play time and frequency, as opposed to specific active play or teacher-led play, they likely reported the duration and frequency from their centre's daily schedule, therefore limiting recall bias. The Go NAP SACC tool was developed in the United States and best practices may not be generalizable to a Canadian childcare context. Due to the high number of statistical tests used, there is an increased chance of a type 1 error in our analyses. Finally, due to the cross-sectional nature of the study, causal conclusions cannot be made regarding correlates of outdoor play duration and frequency.

Conclusion

Toddlers and preschoolers in this large sample of childcare centres played outdoors longer and more frequently in non-winter months than in winter months. In final models, few significant associations were found between correlates and outdoor play duration and frequency. However, the associations that were observed tended to differ across seasons and age groups, which may be important to consider in future

interventions. Overall, educator certification and professional development, family education, and play areas may be promising targets. Given the limited evidence in this area and the modest variance explained in final models, further studies are needed to confirm and strengthen the findings of outdoor play correlates in childcare settings.

Acknowledgements We would like to thank all childcare centre directors for taking the time to complete the questionnaire.

Funding The research was funded internally by the Faculty of Kinesiology, Sport, and Recreation at the University of Alberta. MP is supported by a Canadian Institutes of Health Research (CIHR)-Frederick Banting and Charles Best Canada Graduate Scholarship-Master's Award. VC is supported by a CIHR New Investigator Salary Award.

Compliance with ethical standards

Ethics approval was granted from the University of Alberta Research and Ethics Board. All participating directors provided written informed consent.

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

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