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# Child care centre adherence to infant physical activity and screen time recommendations in Australia, Canada and the United States: An observational study

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# Child care centre adherence to infant physical activity and screen time recommendations in Australia, Canada and the United States: An observational study

## **Abstract**

*Objective:* The aim of this study was to compare adherence to physical activity and sedentary behaviour recommendations within the 2011 Institute of Medicine Early Childhood Obesity Prevention Policies as well as screen time recommendations from the 2013 American Academy of Pediatrics for samples of infants in child care centres in Australia, Canada, and the United States (US).

*Methods:* This cross-sectional study used data from: the Australian 2013 Standing Preschools (N = 9) and the 2014-2017 Early Start Baseline (N = 22) studies; the 2011 Canadian Healthy Living Habits in Pre-School Children study (N = 14); and the American 2008 (N = 31) and 2013-2017 (N = 31) Baby Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) trials. Data were compared on the above infant recommendations. Percentages were used to describe compliance to the recommendations and chi-square tests to determine whether compliance differed by country.

*Results:* Child care centres were most compliant (74%-95%) with recommendations to: provide daily indoor opportunities for infants to move freely under adult supervision, daily tummy time for infants less than 6 months of age, indoor and outdoor recreation areas that encourage infants to be physically active, and discourage screen time. Centres were least compliant (38%-41%) with adhering to recommendations to: limit the use of equipment that restricts an infant's movement and provide education about physical activity to families. Compared with Canadian and US centres, Australian centres were less compliant (46%) with the recommendation to engage with infants on the ground each day, to optimize adult-infant interactions and to limit the use of equipment that restricts the infant's movement. Canadian centres were less compliant (39%) with the recommendation to provide training to staff and education to parents about children's physical activity. US centres were less compliant (25%-41%) with the recommendations to provide daily opportunities for infants to explore their outdoor environment, limit the use of equipment that restricts the infant's movement and provide education to families about children's physical activity.

*Conclusions:* Assisting child care centres on limiting the use of equipment that restricts an infant's movement, and providing education about children's physical activity to families may be important targets for future interventions.

## **Disciplines**

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2        **recommendations in Australia, Canada and the United States: An observational**  
3        **study**

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## 35 **Abstract**

### 36 **Objective**

37 The aim of this study was to compare adherence to physical activity and sedentary  
38 behavior recommendations within the 2011 Institute of Medicine Early Childhood  
39 Obesity Prevention Policies as well as screen time recommendations from the 2013  
40 American Academy of Pediatrics for samples of infants in child care centres in  
41 Australia, Canada, and the United States (US).

### 42 **Methods**

43 This cross-sectional study used data from: the Australian 2013 Standing Preschools  
44 (N = 9) and the 2014-2017 Early Start Baseline (N=22) studies; the 2011 Canadian  
45 Healthy Living Habits in Pre-School Children study (N=14); and the American 2008  
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47 for Child Care (NAP SACC) trials. Data were compared on the above infant  
48 recommendations. Percentages were used to describe compliance to the  
49 recommendations and chi-square tests to determine whether compliance  
50 differed by country.

### 51 **Results**

52 Child care centres were most compliant (74%-95%) with recommendations to:  
53 provide daily indoor opportunities for infants to move freely under adult supervision,  
54 daily tummy time for infants less than 6 months of age, indoor and outdoor recreation

areas that encourage infants to be physically active, and discourage screen time. Centres were least compliant (38%-41%) with adhering to recommendations to: limit the use of equipment that restricts an infant's movement and provide education about physical activity to families. Compared with Canadian and US centres, Australian centres were less compliant (46%) with the recommendation to engage with infants on the ground each day, to optimize adult-infant interactions and to limit the use of equipment that restricts the infant's movement. Canadian centres were less compliant (39%) with the recommendation to provide training to staff and education to parents about children's physical activity. US centres were less compliant (25%-41%) with the recommendations to provide daily opportunities for infants to explore their outdoor environment, limit the use of equipment that restricts the infant's movement and provide education to families about children's physical activity.

## **Conclusions**

Assisting child care centres on limiting the use of equipment that restricts an infant's movement, and providing education about children's physical activity to families may be important targets for future interventions.

**Keywords:** Child care, Infant, Obesity, Recommendation, Physical activity, Screen time, Tummy time

Baby NAP SACC Clinical Trials Registration (ClinicalTrials.gov registry):

NCT01890681. Registered 27 June 2013.

## **Background**

The global prevalence of 0- to 5-year-old children who are overweight or obese has increased from 4.2% in 1990 to 7.8% in 2015 and this trend is expected to continue to rise to 9.1% by 2020 [1]. For developed countries such as the United Kingdom, United States, Canada, Australia, New Zealand and Japan, the prevalence is even higher. In 1990, 7.9% of children aged 0–5 years in these countries were overweight or obese; this rose to 12.9% in 2015 and is expected to reach 14.1% by 2020 [1]. The early years are strongly predictive of obesity in later childhood and subsequently adulthood [2]. It is also well known that excess weight in infancy is associated with delayed gross motor development [3], and leads to other adverse health outcomes, such as coronary heart disease in adulthood [4]. Therefore, the early years provide an important opportunity for obesity prevention [5].

A moderate proportion of very young children attend formal child care across developed countries. For instance, the Longitudinal Study of Australian Children (LSAC) reported that 35% of parents used regular child care for their infants [6]. Likewise, 17% of American children aged birth to 2 years are in some type of formal child care, [7] and 54% of Canadian children from 6 months to 5 years are cared for in some type of non-parental care [8]. Recent evidence has shown attending child care in the first year of life was associated with slightly higher weight at 12 months of age [9]. With a large number of infants attending such settings, there is a need to understand the factors contributing to obesity prevention while in these environments and review child care practices in the first 12 months of life.

To assist in the prevention of obesity in infancy and early childhood, in 2011 the National Academy of Medicine, previously known as the Institute of Medicine,

published recommendations aimed at promoting healthy environments in child care settings [10]. These recommendations provide guidance on appropriate quantities and types of physical activity, sleep, and sedentary behaviour. In addition, as the use of recreational electronic media plays an important role in the development of childhood obesity [11], in 2013 The American Academy of Pediatrics published updated recommendations on the use of television and other entertainment media for infants and young children [11, 12].

To our knowledge, there are no studies examining adherence to infant physical activity and screen time recommendations in formal child care settings. Such data may assist to identify child care practices in the first 12 months of life which impact the development of obesity. The purpose of this study was to examine the adherence of child care centres to these infant recommendations using data from three developed countries.

## **Methods**

### ***Overview***

For this observational study, data were collected from the 2013 Standing Preschools (N=9) and the 2014 - 2017 Early Start Baseline (N=22) studies in Australia, the 2011 Healthy Living Habits in Pre-school Children study (N=14) in Canada and the 2008 (N=31) and 2013 - 2017 (N=31) Baby Nutrition and Physical Activity Self-Assessment for Child Care (Baby NAP SACC) trials in the US. Since this study conducted secondary analyses using existing centre-level data and did not involve interaction with any human subjects, ethical approval was not required; each individual study had its own ethical approval. This study, however, followed the



guidelines in the Strengthening the Reporting of Observational studies in  
Epidemiology (STROBE) statement [13].

### *National Academy of Medicine and American Academy of Pediatrics recommendations*

The four recommendations from the National Academy of Medicine and one from the  
American Academy of Pediatrics regarding healthy and appropriate physical activity  
and screen time practices for infants attending child care centres are reported in Table  
1.

### *Recommendations review*

The questions and response option criteria from each country's child care centre  
questionnaire that best reflected the recommendations were used from each study. For  
example, to meet the criteria for "Does this child care centre limit the use of  
equipment such as strollers, swings, and bouncer seats/chairs for holding infants while  
they are awake?", participants needed to answer "Rarely or Never". To meet the  
criteria, "Are early childhood educators trained in ways to encourage physical activity  
and decrease sedentary behavior in young children through certification and  
continuing education?", participants needed to answer they were receiving  
professional development at least 1-2 times per year. A complete list of each  
country's question and the criteria required to meet the recommendation is in Table 2.

### *Analysis*

The percentage of child care centres that were compliant with the recommendations  
as outlined in Table 2 were calculated. Pearson chi-square tests were used to assess

whether compliance differed across countries. Missing data (average overall 8%) were not included in the analysis. Analyses were conducted using SPSS version 21 (IBM Corp, Armonk, NY, USA). The statistical significance was set to  $p < 0.05$ . Socio-economic status (SES) was assessed in Australia, Canada and the United States using Socio-economic Indexes for Areas (SEIFA) [14], neighbourhood SES (education, income, unemployment rate from 2006 Canadian census data in PCensus for MapPoint through ArcGIS software) and household income [15], respectively. The area where the child care centre was located was defined as urban (>50 000 population) or non-urban (<50 000 population) (Table 4) [16].

## Results

The final sample included 107 child care centres with 31 from Australia, 14 from Canada, and 62 from the United States. Almost all surveys (95%) were completed by the director of the child care centre. Centre opening and closing hours ranged from 6:30 am to 12:00 midnight, the average number of infants per centre was 10, and the year the child care centre started operating ranged from 1969 to 2014. Almost all staff (94%) had a diploma, certificate or degree in child care.

Most child care centres provided daily opportunities for infants to explore their indoor environments, provided them with tummy time, had suitable indoor and outdoor recreation areas and discouraged screen media exposure (Table 3). One third limited the use of equipment that restricted the infant's movement whilst they were awake and provided education to families about children's physical activity.

Significant differences ( $p < 0.05$ ) were found between countries for compliance to the following seven recommendations: daily opportunities for infants to move freely under adult supervision to explore their indoor environment; daily opportunities for infants to move freely under adult supervision to explore their outdoor environment; staff who provide daily 'tummy time' for infants less than 6 months of age; indoor recreation areas that encourage infants to be physically active; limiting the use of equipment for holding infants whilst they are awake; staff training in ways to increase children's physical activity; and education to families about children's physical activity.

When compared to the sample of child care centres in Canada and the United States, the Australian sample had the greatest non-compliance to the discouragement of screen media exposure and staff engaging with infants on the ground. On a positive note, the sample of child care centres from Australia had the greatest compliance to providing education to families regarding physical activity for infants and staff training on ways to increase infants' physical activity.

The greatest compliance from the sample of Canadian child care centres was in providing daily opportunities for infants to explore their outdoor environment, and this was closely followed by the provision of a suitable outdoor recreation area. However, only 39% of these centres provided staff training and education to families regarding infants' physical activity.

The sample from the United States complied mostly with the provision of an outdoor recreation area suitable for infants and providing daily tummy time. In contrast, only

one fifth of the centres limited the use of equipment that restricts an infant's movement and provided education regarding infants' physical activity to families.

## **Discussion**

Prior to this study there was limited evidence about the extent to which infant physical activity and screen time recommendations were adhered to in child care centres. Reporting these data may assist with providing recommendations regarding future research to increase physical activity, prevent sedentary behaviour, and decrease media exposure in infants. Based on the findings from this study, potential targets would be limiting the use of equipment that restricts infant's movement and strategies for educating families on children's physical activity.

There were some significant variations between samples from the different countries. For example, the conclusion that the sampled child care centres need to improve their education to families regarding physical activity applies more to the Canadian and United States samples than it does to the Australian sample. This could potentially be explained by the introduction of the Early Years Learning Framework where learning outcomes are actively promoted in Australian child care settings, in collaboration with families [17]. In addition, improving the number of opportunities for infants to move freely under adult supervision to explore their outdoor environment and the provision of an indoor recreation space that encourages infants to be physically active applies more to the United States than it does to Canada or Australia.

Some of the messages regarding physical activity provision to infants in child care settings is being adhered to. In this study, approximately two thirds of the sampled

child care centres met the recommendations to provide suitable indoor and outdoor recreation areas, indoor play, daily tummy time and no screen time to the infants in their care. However, there are still a number of areas where further improvement is possible including time spent in outdoor play, playing on the ground, limiting restrictive equipment and educating families and staff regarding physical activity. To address these areas that require improvement, infant child care curriculum may need to be reviewed to ensure they meet the national physical activity and sedentary behaviour guidelines [18, 19]. It has been suggested that infants may experience prolonged periods of inactivity in a crib or high chair due to staff needing to care for other children [9]. Further training and a review of staff-to-infant ratios could possibly be other important areas to target for future research to ensure staff are equipped to limit the use of equipment that restricts infants' movement while they are awake.

There were some limitations to this study. Overall, missing data ranged from 4% to 11.5% per question. Sample sizes were small and differed between countries ranging from 14 in Canada to 62 in the United States. This potentially could have skewed results, favoring a particular country over another. The US data contributed four times as much to the overall results than the Canadian data and twice as much as the Australian data. Retrospective self-reporting questionnaires were used which may present a response bias. It would have been preferable to assess compliance with the recommendations by direct observation using an independent observer. The National Academy of Medicine recommendations became available in 2011 and the AAP recommendations in 2013. Some data were collected prior to this time. As such, child care centres providing this data may have now changed practice according to the published recommendations. However, additional analyses were conducted removing

the United States 2008 sample. The results were very similar, limiting the use of equipment and providing education to families remained the two recommendations where compliance was the least adhered to both overall and in the most recent US sample alone. Alarming, the adherence to the no screen time policy dropped from 84% with the 2008 US sample included to 68% in the 2013-2017 US sample alone and from 80% overall to 71% overall. This may be due to the availability of i-Pads and other tablets in the 2011-2017 data sample and not in the 2008 sample. The same seven recommendations had the same significant differences between countries and the recommendations that were the adhered to the most were the same. Previous cross-sectional research has investigated state regulations related to the promotion of physical activity among infants in child care centres [20]. It found that physical activity regulations differed amongst and within states. In this study, Australian child care centres were from the state of New South Wales, Canada from the Province of Alberta and the United States from Massachusetts and North Carolina. As such, this study provides a snapshot of a small proportion of the child care centres in these states/provinces and may not be generalizable to the other parts of these countries. In addition, samples are not representative of that country and as such, cannot be applied to represent the entire country. Another important issue is for some of the recommendations, different questions were used to assess adherence (Table 2). The recommendation regarding engaging with infants on the ground each day to optimize adult-infant interactions is a good example of this and may explain why the Australian sample did so poorly relative to the Canadian sample.

## **Conclusions**

Promoting physical activity and reducing screen time should commence in the infant stage of life. Within this study, many child care centres were able to provide suitable indoor and outdoor recreation areas and daily indoor opportunities to encourage physical activity, provide tummy time and avoid screen media exposure to the infants in their care. Potential areas of improvement for future interventions to target include, limiting the use of equipment that restricts the infant's movement whilst they are awake and providing education to staff and families about children's physical activity.

## **List of abbreviations**

IOM: Institute of Medicine; AAP: American Academy of Pediatrics; US: United States; LSAC: Longitudinal Study of Australian Children; NAP SACC: Nutrition and Physical Activity Self-Assessment for Child Care; STROBE: Strengthening the Reporting of Observational Studies in Epidemiology; SPSS: Statistical Package for the Social Sciences; IBM: International Business Machines; Corp: Corporation; NY: New York; US: United States; SES: Socio-economic status; SEIFA: Socio-economic Indexes for Areas.

## **Declarations**

### ***Ethics approval and consent to participate***

Since this study conducted secondary analyses using existing centre-level data and did not involve interaction with any human subjects, ethical approval was not required; each individual study had its own ethical approval.

### ***Consent for publication***

303 Not applicable

304

305 ***Availability of data and material***

306 The data that support the findings of this study are available from the University of  
307 Wollongong, Duke University Medical Centre, and Queen's University; however,  
308 restrictions apply to the availability of these data, which were used under license for  
309 the current study, and so are not publicly available. Data are however available from  
310 the authors upon reasonable request and with permission of the Universities  
311 mentioned above.

312

313 ***Competing interests***

314 The authors declare that they have no competing interests

315

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322

323 ***Authors' contributions***

324 LH analyzed and interpreted the data and drafted the manuscript. ADO conceived of  
325 the study. LH, SEBN, VC, RMS and ADO contributed to defining how each  
326 recommendation was met. All authors revised the manuscript, read and approved the  
327 final version.



328

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 332 school Children study and the United States Baby NAP SACC trials.

333

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**Table 1. 2011 IOM\* physical activity [10] and 2013 AAP screen time recommendations [21]**

| <b>IOM* recommendation number</b> | <b>Description of recommendation</b>   | <b>Potential actions for infants</b>   |
|-----------------------------------|--|--|
| 3.1                               | “Child care regulatory agencies should require child care providers and early childhood educators to provide infants, toddlers, and preschool children with opportunities to be physically active throughout the day”  | 1) Providing daily opportunities for infants to move freely under adult supervision to explore their indoor and outdoor environments<br>2) Engaging with infants on the ground each day to optimize adult-infant interactions<br>3) Providing daily “tummy time” (time in the prone position) for infants less than six months of age. |
| 3.2                               | “The community and its built environment should promote physical activity for children from birth to age five”   | 1) To ensure that indoor and outdoor recreation areas encourage all children, including infants, to be physically active.  |
| 3.3                               | “Child care regulatory agencies should require child care providers and early childhood educators to allow infants, toddlers, and preschoolers to move freely by limiting the use of equipment that restricts infants’ movement and by implementing appropriate strategies to ensure that the amount of time toddlers and preschoolers spend sitting or standing still is limited” | 1) Using cribs, car seats, and high chairs for their primary purpose only – cribs for sleeping, car seats for vehicle travel, and high chairs for eating<br>2) Limiting the use of equipment such as strollers, swings, and bouncer seats/chairs for holding infants while they are awake.   |
| 3.4                               | “Health and education professionals providing guidance to parents of young children and those working with young children should be trained in ways to increase children’s physical activity and decrease their sedentary behavior, and in how to counsel parents about their children’s physical activity”  | 1) Child care regulatory agencies requiring child care providers and early childhood educators to be trained in ways to encourage physical activity and decrease sedentary behaviour in young children through certification and continuing education.   |
| <b>AAP recommendation</b>         | <b>Description</b>   | <b>Potential actions for infants</b>   |
| 2013                              | “Screen media exposure should be discouraged for children under 2 years of age”  | No screen media exposure for infants   |

\*IOM, from 2015, known as the National Academy of Medicine

405 **Table 2. Corresponding question and criteria required from each country's**  
 406 **survey for the child care centre's response to meet the infant recommendations**

|                         | Question   | Early Start Baseline <sup>a</sup>  |  | Standing Preschools Project <sup>b</sup>   |  | Healthy Living Habits in Pre-school Children study <sup>c</sup>  |   | Baby NAP SACC (2008) <sup>d</sup>   |  | Baby NAP SACC (2013-2017) <sup>e</sup>  |  |
|-------------------------|--|--|--|--|--|--|---|---|--|---|--|
|                         | Did the centre provide...  | Survey question  | Response needed to meet recommendation | Survey question  | Response needed to meet recommendation | Survey question  | Response needed to meet recommendation                | Survey question   | Response needed to meet recommendation | Survey question   | Response needed to meet recommendation |
| <b>INDOOR</b>           | Daily opportunities for infants to move freely under adult supervision to explore their indoor environment? (IOM Rec 3.1)                  | Our program offers the following features in the indoor play space   | 2 to 4 features                        | Our program offers the following features in the indoor play space   | 2 to 4 features                        | Indoor active play time is provided to all children: Infants   | 120 to 180 minutes or more each day                   | Opportunities for moving around within the classroom is provided for all infants  | 1, several or at all times per day     | Our program provides structured active play (teacher-led activity that occurs indoors or outdoors) each day: To infants | Always                                 |
| <b>OUTDOOR</b>          | Daily opportunities for infants to move freely under adult supervision to explore their outdoor environment? (IOM Rec 3.1)                 | Infants are taken outdoors   | 1 to 2 times per day or more           | Infants are taken outdoors   | 1 to 2 times per day or more           | On average, how many minutes are spent in outdoor active play time per day in the fall, winter, spring, summer                     | >60 minutes   | Outdoor time is provided for all infants  | Everyday                               | Children are taken outdoors: Infants  | 1 time per day or more                 |
| <b>GROUND</b>           | Staff who engage with infants on the ground each day to optimize adult-infant interactions? (IOM Rec 3.1)                                  | During tummy time and other activities, teachers interact with infants to help them build motor skills         | Always                                 | During tummy time and other activities, teachers interact with infants to help them build motor skills         | Always                                 | Formal instruction or teaching of gross motor skills (indoor or outdoor) is provided to all children: Infants                      | 1 to 3 or more times per day                          | Staff engage with infants to encourage development of gross motor skills (reaching, sitting, standing, crawling, walking) | All of the time                        | During floor play, teachers get on the ground with infants:   | Always                                 |
| <b>TUMMY TIME</b>       | Staff who provide daily 'tummy time' for infants less than 6 months of age? (IOM Rec 3.1)  | Our program offers 3-5 minutes of tummy time to infants  | 1 to 2 times per day                   | Our program offers 3-5 minutes of tummy time to infants  | 1 to 2 times per day                   | No suitable question   | N/A   | Short periods of supervised tummy time is provided for all infants  | 1 or 2 times per day                   | Our program offers 3-5 minutes of tummy time for infants who can't turn over  | 1 or several times per day             |
| <b>AREA INDOORS</b>     | Indoor recreation areas that encourage infants to be physically active? (IOM Rec 3.2)  | Our program offers the following in the indoor play space (mark number of features)                            | 2 to 4 features                        | Our program offers the following in the indoor play space (mark number of features)                            | 2 to 4 features                        | Indoor space is available: Infants   | For all active play activities (eg crawling, walking) | Does your centre have an indoor play area such as a gym or a room for gross motor activity?                               | Yes                                    | Our program offers the following in the indoor play area  | 2 or more checked                      |
| <b>AREA OUTDOORS</b>    | Outdoor recreation areas that encourage infants to be physically active? (IOM Rec 3.2)   | Our program uses the outdoors for the following type of activities   | 2 to 5 activity types                  | Our program uses the outdoors for the following type of activities   | 2 to 5 activity types                  | Outdoor play space includes: Infants   | Plenty of play space to move around and explore       | Does your centre have an outdoor play area such as a playground?  | Yes                                    | Our program uses the outdoors for the following types of activities   | 2 or more checked                      |
| <b>LIMIT EQUIPMENT</b>  | Limitation to the use of equipment such as strollers, swings, bouncer seats/chairs for holding infants while they are awake? (IOM Rec 3.3) | Outside nap and meal times, the longest that infants spend in seats, swings, or exersaucers at any one time is | Never                                  | Outside nap and meal times, the longest that infants spend in seats, swings, or exersaucers at any one time is | Never                                  | Infants participate in seated or non-active play activities (excluding naps/meals) for more than 30 minutes at a time              | Never   | Infants are placed in a bouncy seat, swing, or play pen for more than 15 minutes at a time                                | Never                                  | Outside of nap and meal times, the longest spent in seats, swings, or ExcerSaucers at any one time is                   | Never                                  |
| <b>STAFF TRAINING</b>   | Training to staff in ways to increase children's physical activity? (IOM Rec 3.4)  | Teachers and staff receive professional development on children's physical activity                            | 1 to 2 times per year                  | Teachers and staff receive professional development on children's physical activity                            | 1 to 2 times per year                  | Training opportunities are provided to staff in physical activity and/or gross motor development (not including playground safety) | 1 to 2 times per year                                 | Training is provided for staff on promoting infant movement   | 1 to 2 times per year                  | Teachers and staff receive professional development or continuing education on children's gross motor activity          | 1 to 2 times per year                  |
| <b>FAMILY EDUCATION</b> | Education to families (who have children enrolled) about children's physical activity? (IOM Rec 3.4)                                       | Families are offered education on children's physical activity   | 1 to 2 times per year                  | Families are offered education on children's physical activity   | 1 to 2 times per year                  | Physical activity and/or gross motor development education is offered to parents   | 1 to 2 times per year                                 | Active play education (workshops and activities) is offered to parents  | 1 to 2 times per year                  | Families are offered education on children's gross motor activity   | 1 to 2 times per year                  |

|                  |  |  |                        |  |                        |  |           |  |       |  |                        |
|------------------|--|--|------------------------|--|------------------------|--|-----------|--|-------|--|------------------------|
|                  |  |  |                        |  |                        | through workshops, activities or take home materials   |           |  |       |  |                        |
| <b>NO SCREEN</b> | Discouragement of screen media exposure for children < 2 years of age? (AAP rec) | For children under 2 years of age, the amount of screen time allowed in our program each week is | No screen time allowed | For children under 2 years of age, the amount of screen time allowed in our program each week is | No screen time allowed | Can children watch TV/videos/DVDs, play video games or use a computer at your daycare? Infants | No to all | Infants and toddlers are allowed to watch or allowed to access TV/DVDs/videos viewed by older children or adults | Never | The amount of screen time provided in our program or used during feeding each week is: Infants | No screen time allowed |

<sup>a</sup>Australian Early Start Baseline (2014 to 2017)

<sup>b</sup>Australian Standing Preschools Project (2013)

<sup>c</sup>Canadian Healthy Living Habits in Pre-school Children study (2011)

<sup>d</sup>United States Baby NAP SACC trial (2008)

<sup>e</sup>United States Baby NAP SACC trial (2013 to 2017)

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**Table 3: Percentage compliance with infant 2011 IOM<sup>^</sup> physical activity and 2013 AAP screen time recommendations**

|  | <b>Recommendation:<br/>Does this centre<br/>provide...</b>   | <b>All (%)<br/>n= 107</b> | <b>Australia (%)<br/>n= 31</b> | <b>Canada (%)<br/>n=14</b> | <b>United States (%)<br/>n= 62</b> |
|--|--|---------------------------|--------------------------------|----------------------------|------------------------------------|
| <b>INDOOR</b><br><i>P=0.001</i><br><i>χ²=14.910</i><br><i>df=2</i>           | Daily opportunities for infants to move freely under adult supervision to explore their indoor environment? (IOM Rec 3.1)                  | 79                        | 100                            | 50                         | 76                                 |
| <b>OUTDOOR</b><br><i>P=0.000</i><br><i>χ²=25.737</i><br><i>df=2</i>          | Daily opportunities for infants to move freely under adult supervision to explore their outdoor environment? (IOM Rec 3.1)                 | 62                        | 86                             | 100                        | 41                                 |
| <b>GROUND</b><br><i>P=0.091</i><br><i>χ²=4.797</i><br><i>df=2</i>            | Staff who engage with infants on the ground each day to optimize adult-infant interactions? (IOM Rec 3.1)                                  | 63                        | 46                             | 71                         | 70                                 |
| <b>TUMMY</b><br><i>P=0.000</i><br><i>χ²=14.760</i><br><i>df=1</i>            | Staff who provide daily 'tummy time' for infants less than 6 months of age? (IOM Rec 3.1)  | 91.5 <sup>a</sup>         | 75                             | No suitable question       | 100                                |
| <b>AREA INDOORS</b><br><i>P=0.000</i><br><i>χ²=18.266</i><br><i>df=2</i>     | Indoor recreation areas that encourage infants to be physically active? (IOM Rec 3.2)  | 74                        | 100                            | 86                         | 58                                 |
| <b>AREA OUTDOORS</b><br><i>P=0.373</i><br><i>χ²=1.970</i><br><i>df=2</i>     | Outdoor recreation areas that encourage infants to be physically active? (IOM Rec 3.2)   | 95                        | 100                            | 93                         | 93                                 |
| <b>LIMIT EQUIPMENT</b><br><i>P=0.014</i><br><i>χ²=8.477</i><br><i>df=2</i>   | Limitation to the use of equipment such as strollers, swings, bouncer seats/chairs for holding infants while they are awake? (IOM Rec 3.3) | 38                        | 50                             | 62                         | 26                                 |
| <b>STAFF TRAINING</b><br><i>P=0.041</i><br><i>χ²=6.388</i><br><i>df=2</i>    | Training to staff in ways to increase children's physical activity? (IOM Rec 3.4)  | 63                        | 79                             | 39                         | 61                                 |
| <b>FAMILY EDUCATION</b><br><i>P=0.000</i><br><i>χ²=19.809</i><br><i>df=2</i> | Education to families (who have children enrolled) about children's physical activity? (IOM Rec 3.4)                                       | 41                        | 75                             | 39                         | 25                                 |
| <b>NO SCREENS</b><br><i>P=0.364</i><br><i>χ²=2.022</i><br><i>df=2</i>        | Discouragement of screen media exposure for children < 2 years of age? (AAP rec)   | 80                        | 71                             | 83                         | 84                                 |

<sup>a</sup>Data from Australia and United States only

Note: Missing data not included

<sup>^</sup>IOM, from 2015, known as the National Academy of Medicine

**Table 4. Baseline characteristics of the 107 child care centres with infants who participated in the Early Start Baseline, Standing Preschools Project, Healthy Living Trial and Baby NAP SACC trials from 2008 – 2017**

| Baseline characteristic   | All<br>N= 107             | Australia<br>N=31 | Canada<br>N=14       | United States<br>N=62     |
|---|---------------------------|-------------------|----------------------|---------------------------|
| Survey completed by the director                                    | 102                       | 26                | 14                   | 62                        |
| Survey completed by an educator                                     | 5                         | 5                 | 0                    | 0                         |
| Date survey completed (range)                                       | 2008 to 2017              | 2013 to 2017      | 2011                 | 2008 to 2017              |
| Hours of operation (range)  | 6.30 am to 12:00 midnight | 6.30 am to 6.30pm | 6.30 am to 6.30 pm   | 6.30 am to 12:00 midnight |
| Average number of children per centre                               | 66                        | 67                | 44                   | 88                        |
| Average number of infants per centre                                | 10                        | 14 *              | 7                    | 9                         |
| Year started operating as a child care centre (range)               | 1969 to 2014              | 1986 to 2014      | 1969 to 2010         | 1986 to 2008 <sup>#</sup> |
| Teachers who have a diploma/certificate or degree (mean percentage) | 93.5%                     | 100%              | 87%                  | No suitable question      |
| Child care centres located in an urban area (mean percentage)       | 83%                       | 63%               | 85%                  | 100%                      |
| Socio-economic status (% high;medium;low)                           | 25;24;50                  | 7;26;67           | 8;33;58 <sup>~</sup> | 59;12;24 <sup>+</sup>     |

\* Standing preschools data only. No suitable question in early start baseline data

<sup>#</sup> 2008 Baby NAP SACC data only. No suitable question from 2013 to 2017 Baby NAP SACC data

<sup>~</sup> From urban child care centres only

<sup>+</sup> 4.4% data missing