Guidelines for physical activity and screen-time in the outside school hours childcare setting: a scoping review.

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Abstract

Background:
Globally millions of children attend outside school hours care. Children’s activity in this setting is critical to meeting daily physical activity recommendations. Guidelines are evidence-based statements intended to optimise practice. This study aimed to identify guidelines for physical activity and screen time for use in outside school hours care.

Methods:
Guidelines were identified by systematically searching Medline, Emcare, Embase, Scopus, ERIC, Sportsdiscus, TROVE, ProQuest, UpToDate, NICE, SIGN and Google in accordance with PRISMA-ScR guidelines. Results were screened independently by two reviewers and data synthesized narratively.

Results:
Nine guideline documents were identified from grey literature only (n = 8 USA, n = 1 Canada). The guidelines focused predominantly on the after school care period (n = 9 vs n = 1 for the before-school period). All had recommendations for physical activity, whilst 7 also had screen time recommendations. The guidelines varied considerably in their physical activity and screen time recommendations, though taken together, they recommended > 30–60 minutes of MVPA and < 60 minutes of recreational screen time per session. All guidelines were developed by expert/stakeholder panels, but none followed rigorous guideline development methods.

Conclusions:
Limited published guidelines for physical activity and screen-time in outside school care exist. Guidelines designed with rigorous tools and for other world regions are warranted.

Background:
Rationale
Moderate-to vigorous-intensity physical activity (MVPA) in children is associated with many health-related benefits, including improved aerobic fitness, cognitive abilities and self-confidence, with reduced rates of cardiovascular risk factors and depression\(^1\). Evidence suggests that children who participate in regular physical activity in childhood are more likely to remain active into adulthood, thus reducing the risk of non-communicable diseases such as stroke, heart disease, diabetes, cancer and chronic lung disease\(^2, 3\). Excessive sedentary behaviour, particularly recreational screen-time,
has been shown to have adverse health effects and is associated with increases in adiposity, metabolic risk and metabolic syndrome in children and adolescents\textsuperscript{4}. A systematic review by de Rezende et al\textsuperscript{5} investigated associations between sedentary behaviour and health outcomes and found that for children and adolescents, there was moderate evidence of a negative association of television viewing and screen-time for blood pressure, total cholesterol, obesity, self-esteem, social behaviour, physical fitness and academic achievement\textsuperscript{5}.

Clinical and public health guidelines have an important role in providing people with evidence-based information to ensure optimal health outcomes\textsuperscript{6}. The current WHO guidelines for children aged 5 to 17 years recommend that children achieve at least 60 minutes of MVPA and no more than 2 hours of recreational screen-time every day\textsuperscript{7}. Despite the existence of and efforts to implement these guidelines, most children do not meet them. The most recent Global Matrix 3.0 investigating the physical activity and sedentary behaviours of children, found that only 40 to 46\% of children between the ages of 5 and 17 years in very high income countries (such as the United States, Australia, New Zealand, United Kingdom, Spain) were achieving the recommended levels of physical activity (PA)\textsuperscript{8}. Low to middle income countries and high income countries had similar low rates of PA at 40–46\% and 34–39\% respectively\textsuperscript{9}. Given these low rates of PA, further efforts are required to identify ways to help children achieve more daily MVPA and limit their screen-time.

Typically, PA interventions for children have been delivered in the school setting, as a way of reaching many children in an equitable way. However, another important time in children’s daily schedules is the outside school hours period, the segments of the day before and after formal school lessons during the school week (typically Monday to Friday before school hours 7.30am-9.30am and after school hours 3:00 pm to 6:00 pm). These time periods have received relatively little attention for interventions, though they are recognised as having an important contribution to children’s overall daily physical activity and screen-time levels, and whether activity guidelines are met\textsuperscript{10, 11}. A study of Australian children (mean age 8.1 years) found that 54\% of the after school period (3–6 pm) is
spent in sedentary behaviours which accounts for 21% of their total daily sedentary levels. Boys spent more time in MVPA than girls (14.9% vs 13.6% respectively) which only contributed 27.6% (boys) and 29.8% (girls) to their daily levels\textsuperscript{12}.

The number of school-aged children attending before and after school childcare is increasing globally, due to changing societal trends, including an increasing number of families with two working parents, single parent families, and reduced childcare support from extended families\textsuperscript{13}. Recent estimates suggest that, in the United States, 18% of school-aged children attend after school programs\textsuperscript{14}. In Australia, nearly 10% of primary school-aged children attend before and/or after school childcare services\textsuperscript{15}. Given the growing numbers of children who attend these services and the lack of PA that takes place in this setting, an opportunity exists to positively influence activity behaviours.

To date, relatively little research has focused on children’s physical activity and screen-time behaviours in before and after school childcare programs. A handful of studies have attempted to describe children’s physical activity and/or screen-time in Outside School Hours Care (OSHC). These studies have typically reported children achieve between 8 to 24 minutes of MVPA in this setting\textsuperscript{11,16,17}. Several studies have also attempted to intervene on children’s PA (typically in the after school setting). Mears and Jago’s\textsuperscript{17} review of 6 intervention studies found evidence for efficacy was mixed. Thus far, it appears that intervention studies have been geographically localised, and not disseminated on a large scale.

Efforts to understand, and intervene on, children’s activity patterns in OSHC, to date, have been fragmented and lacking cohesion. It is possible that having guidelines for physical activity and screen-time specific to OSHC may positively influence and guide practice\textsuperscript{18}. Currently, guidelines for OSHC are not widely available or endorsed. We are aware that some jurisdictions around the world have published physical activity and/or screen-time guidelines for this setting, typically in grey literature sources. It is unclear whether the existing guidelines have followed evidence-based methodologies during their development.
Beets et al\textsuperscript{19} conducted a review of the literature to determine state-level after school provider documentation to identify standards/policies for promoting physical activity in the after school care setting. This review was conducted in the United States and identified that of the 47 out of 52 states with an after school program policy, 14 included language incorporating physical activity, and five of these specified actual times that children should be active. This review included only grey literature and identified documents from registries of state after school networks\textsuperscript{19}. The authors of the review chose two organisations to review based on them being recognised as “national leaders in the advocacy of policies and standards to provide quality afterschool programs for all school-age youth”\textsuperscript{19}. Whilst their review was the first of its kind, its scope was limited to the United States and to the two “recognised organisations”. In the nearly 10 years since this prior review was published, there has been increasing attention and research focussing on activity behaviours in this setting, as well as improved quality processes within programs (for example, the National After School Association of America released Healthy Eating and Physical Activity Standards in 2011 and an update in 2018). Given the importance of children’s activity behaviours in this setting and the lack of recent evidence of guidelines and development in the field of after school care research, an updated scoping review of the literature was warranted.

**Objectives**

This scoping review aimed to determine the published guidelines that exist for physical activity and/or sedentary behaviour for the outside school hours care setting and the methods used to create the guidelines, internationally. This scoping review was considered on the basis of a knowledge to action framework\textsuperscript{20}. This provides a conceptual framework from which to consider the processes for knowledge creation and the integration into knowledge application. It is made up of two distinct components: knowledge creation and knowledge action which funnel and cycle between one another to provide a broad range of solutions for various stakeholders including health professionals, patients, policymakers, the public and government to help with the implementation of knowledge into action. Specifically, the following research questions were addressed under the framework:
Knowledge creation (inquiry and synthesis)

1. What published guidelines currently exist for physical activity and/or screen-time specifically for use in the outside school hours childcare setting (OSHC)?
   a. Are they still in use?
   b. Are they endorsed or implemented by Government authorities?

Knowledge creation (synthesis)

2. What do these guidelines recommend?
   a. How much physical activity do they encourage?
   b. How much screen-time do they permit?

Knowledge Action (adapt knowledge to local frameworks)

3. What methodological processes were followed to create these guidelines?

Methods:
Protocol and Registration: The protocol for this review was prospectively registered (JBI database, registered 26.3.19 at https://joannabriggs.org/research/registered_titles.aspx). The scoping review was undertaken in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA-ScR) guidelines for scoping reviews. Ethics approval was not required for this review.

Eligibility Criteria
To be eligible, the guidelines needed to refer to physical activity and/or screen-time behaviours of primary/elementary school-aged children (i.e., aged between approximately 4 and 12 years) specifically in OSHC setting.

The guidelines had to include specific recommendations for physical activity and/or screen-time, in the OSHC setting. The guidelines must have been for use in the OSHC setting (i.e., in the hours of the day before and after formal school lessons), in a formal childcare setting (as opposed to informal childcare provided by a family member), and published by an authoritative organisation (e.g., YMCA, Government department etc.)

For the purpose of this review, to be considered a guideline, the document was required to provide
specific directives for the volume of physical activity, in terms of duration, with or without intensity (e.g., that children should achieve at least 30 minutes of MVPA). Statements that are worded generally (e.g., that children should be given opportunity for active play) were not considered guidelines and therefore not included. It was not required that the guideline provide specific details of the methods used for creation, however this information was also collected where available (e.g., if processes such as GRADE were followed or other guideline development tools).

In accordance with scoping review recommendations, any existing literature was considered for inclusion. This included, but was not limited to, quantitative journal articles/pieces of original research, theses, government (either state or national) reports/guidelines, non-government organisation or private sector guidelines published in grey literature also.

There were no exclusion criteria or language limits. All guidelines, relevant articles or studies, even if no longer currently in use, were considered for the review.

Information Sources
An initial scoping search was undertaken of six databases (MEDLINE, Emcare, Embase, Scopus, ERIC and Sportdiscus). After this initial search, the key words and subject heading words from the sources identified as appropriate were added to the search strategy and searched across databases (Fig. 1). This search strategy was created in collaboration with an academic librarian. Reference lists of all included sources were screened for further potentially eligible guidelines.

The search strategy was adapted for use in grey literature (Fig. 2). The following sources were searched: Google, TROVE, ProQuest Dissertations and Theses, UpToDate, National Institute for Health and Clinical Excellence (NICE) and Scottish Intercollegiate Guidelines Network (SIGN). Grey literature was searched for the first 500 articles and then stopped after 10 irrelevant articles were sequentially identified through the screening process. No geographical limits were placed on Google searches in an attempt to identify as many international guidelines as possible.

Selection of sources of evidence
Results from the database and grey literature searches were collated and exported into Covidence software to allow for removal of duplicates and screening.
Two reviewers (RV and LL) independently screened all results based on title and abstract in Covidence. Disagreements were discussed and resolved without requiring a third reviewer. A flowchart in accordance with PRISMA-Sc Rv$^{21}$ was created with reasons for exclusion recorded.

Data Charting

An Excel spreadsheet, as recommended by the Joanna Briggs Institute (JBI)$^{22}$, was used to table the data extraction from the included documents, including bibliographic details, document type, source, country of origin, sponsors, aims of guidelines, methods of development and guideline recommendations (Supplement 1). Data extraction was completed by the primary reviewer (RV), with any discrepancies/uncertainties referred to a secondary reviewer (LL). Information regarding who created the guidelines (e.g. government agencies, academics, researchers), how much physical activity /screen-time is being advocated, what methods were followed to develop the guidelines, and whether/how the guidelines have been disseminated/implemented was also collected.

Synthesis of results

Due to the descriptive nature of the extracted data, data were synthesised narratively by the primary reviewer (RV) and cross checked by the research team.

Results:

Selection of sources of evidence

A total of 269 citations were identified from the database and grey literature searches. Of those, 26 were reviewed in full text and nine were included in the final scoping review (Fig. 3). Seventeen documents were excluded due to a lack of time-specific guidelines for use in the outside school hours care setting e.g. only providing guidelines for the whole day rather than specific for the outside school hours setting or referring to ways to improve physical activity during the school day in lesson breaks such as recess and lunch. All nine included guidelines were identified through online grey literature sources; none of the guidelines were published in scientific, peer-reviewed sources.

Characteristics of included documents

Of the nine documents included, eight originated from the United States and one from Canada. These documents all targeted the after school care period. Table 1 provides a summary of the included guideline documents and Table 2 summarises the specific physical activity and screen-time
recommendations from those guideline documents.

| Year | Reference | Guideline Title | Country of Origin | Source | Funding | Aim of document |
|------|-----------|-----------------|-------------------|--------|---------|----------------|
| 2018 | National Afterschool Alliance\(^{24}\) | The National Afterschool Alliance Healthy Eating and Physical Activity (HEPA) Standards 2.0 | U.S. | Government document available online | National Afterschool Association | “NAA adopted the HEPA standards to provide practical, comprehensive guidance for OST programs. The NAA HEPA Standards address food and beverage and physical activity content and quality, staff training, social supports (including staff role modelling, family engagement, and children’s social development), program support, and environmental support.” p. 3 |
| 2018 | Ontario Ministry of Education\(^{25}\) | Before-And-After School Programs (Kindergarten to Grade 6) - Policies and Guidelines for School Boards | Canada | Government document available online | Ministry for Education - Ontario, Canada | “This document summarizes the provisions set out in the Education act and regulations for before-and-after school programs for students in Kindergarten to Grade 6. It also sets out requirements with regard to reporting and program content for before-and-after school programs and additional considerations to support the implementatio of these programs” p. 1 |
| 2014 | Public Health Law Centre\(^{26}\) | Minnesota Afterschool and Out of School Time - Best Practice | U.S. | Public health document available online | Public Health Law Centre at Williams Mitchell College of Law | “Guidelines developed by national and regional experts to |
| Year | Organization | Document Title | Location | Source | Description |
|------|--------------|----------------|----------|--------|-------------|
| 2011 | Ohio Afterschool Network and Ohio Department of Health | Ohio Kids on the Move: Physical Activity Guidelines for Afterschool Programs | U.S. | Public health document available online | “These guidelines are not requirements, but are rather recommendations designed to support afterschool programs as they address the critical issue of childhood obesity. This document aims to identify and define the areas of physical activity in which staff and caregivers of children grades K-12 can strive to gain” p.8 |
| 2011 | National Afterschool Alliance | National Afterschool Association Health Eating and Physical Activity (HEPA) Standards | U.S. | Government document | “In 2011 the National Afterschool Association adopted standards for healthy eating and physical activity (HEPA) in Out-of-School time” p. 1 |
| 2010 | Harvard T.H. Chan School of Public Health | Out of School Nutrition and Physical Activity (OSNAP) | U.S. | University document from a prevention research centre available | “The OSNAP goals for nutrition and physical activity aim to help program leaders create...” |

Experts at the College of Law, Minnesota are working with experts to advance best practices for healthy eating and physical activity as part of a comprehensive strategy to prevent childhood obesity. The guidelines provide practical standards to help afterschool/OS programs: 1) improve the nutrition of snacks and meals; and 2) select activities and play spaces that will increase physical fitness.” p.3
Leaders create healthier out-of-school environments for children. They are based on current scientific evidence about healthy eating and physical activity and have been developed for out-of-school settings like sport programs and afterschool programs, and can easily be modified for full-day programs like summer camps.” p. 1 In addition to this, it provides another resource on i5w website, called “Food and Fun program”, which outlines the same guidelines as set out by the OSNAP initiative.

| Year | Author/Institution | Title | Region | Type | Availability | Summary |
|------|-------------------|-------|--------|------|-------------|---------|
| 2009 | Californian Department of Education | California After School Physical Activity Guidelines | U.S. | Government document | available online, n/a | “...to make available to after school providers a resource for implementing physical activity in their after school programs” p. iv |
| 2009 | Move More After School Collaboration | Move More North Carolina: Recommended standards for After School Physical Activity | U.S. | Government document | available online, North Carolina Cap WakeMed Boys and Girls Clubs - North Carolina, Alliance North Carolina Recreation and Park Association, North Carolina Health and Wellness Trust Fund, North Carolina Public Health, East Carolina University, North Carolina Afterschool Coalition, North Carolina current Department of research and... | “Move More North Carolina: Recommended Standards for After-School Physical Activity outlines recommendations for providing quality physical activity in North Carolina after-school programs. The standards are based on...” |
| Year | Organization                     | Title/Description                                                                 | Country     | Details                                                                 |
|------|----------------------------------|-----------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------|
| 2008 | New York State Department of Health | Healthy Kids, Healthy New York - After-School Initiative toolkit                  | U.S.        | Public health document available online                                 |

New York State Healthy Eating and PA Alliance – joint initiative between health department of NY and industry

Model guidelines for use in after school settings as a way to improve PA and obesity rates in children in New York.

U.S. (United States), PA (Physical Activity), NAA (National Afterschool Association), HEPA (Healthy Eating and Physical Activity), OSNAP (Out-of-School Nutrition and Physical Activity Initiative), NY (New York), YMCA (Young Men's Christian Association), OST (Out of School Time), n/a (not available)
| Guideline Title | Physical Activity Recommendations (time and intensity specific) | Recreational Screen-time Recommendations (time specific) |
|-----------------|---------------------------------------------------------------|--------------------------------------------------------|
| **The National Afterschool Alliance Healthy Eating and Physical Activity (HEPA) Standards 2.0** | • Plan and provide PA: a) 1 hr program = 10 min  
b) 2 hr program = 20 min  
c) 3 hr program = 30 min  
d) 4 hr program = 40 min  
e) 5 hr program = 60 min  
• provide MVPA for 50% of PA time (e.g. 5 min of 10 minutes spent in MVPA) | • Ensure that digital devices are used for homework, research, or digital learning that is active rather than passive  
• No television or movies are allowed  
• Daily total screen-time is limited to: a) 1- to 2-hr. programs—40 min  
b) 3 hrs. or more—60 min |
| **Before-And-After School Programs (Kindergarten to Grade 6) - Policies and Guidelines for School Boards** | • School-board requires there must be a minimum of 30 minutes of daily active play in daily programming to align with government initiatives | n/a |
| **Minnesota Afterschool and Out of School Time - Best Practice Guidelines** | • Include 30 minutes of moderate, fun, PA for every child everyday (include outdoor activity if possible)  
• Offer 20 minutes of Vigorous PA three times per week | Limit recreational computer time to less than one hour a day |
| **Ohio Kids on the Move: Physical Activity Guidelines for Afterschool Programs** | • Dedicates at least 20% or 30 minutes of morning or afterschool program time to PA (60 minutes for a full day program)  
• Provides MVPA for 50% of PA time  
• Ensures that daily physical activity time includes aerobic and age-appropriate muscle- and bone strengthening and cardio-respiratory fitness activities | • No television or movies, and limit digital device time to less than one hour per day to allow for other activities  
• Digital device use is limited to homework or devices/programs that actively engage children in moderate to intense physical activity |
| **Out of School Nutrition and Physical Activity (OSNAP)** | • Include 30 minutes of moderate, fun, PA for every child everyday (include outdoor activity if possible)  
• Offer 20 minutes of Vigorous PA three times per week | Eliminate the use of commercial broadcast TV/movies  
• Limit recreational computer time to less than one hour a day |
| **California After School Physical Activity Guidelines** | • A minimum of 30–60 minutes of MVPA  
• For students not engaging in PA elsewhere, aim to provide the full 60 minutes of recommended MVPA  
• Arrange the afterschool schedule to ensure that students do not sit for more than 60 minutes at a time | Limit recreational screen-time to 30 minutes and total screen-time to 60 minutes per after school session |
| **Move More North Carolina: Recommended standards for After School Physical Activity, North Carolina** | • 20% of the total session time should be dedicated to PA | n/a |
| **Healthy Kids, Healthy New York - After-School initiative toolkit** | • Schedule at least 30 minutes of MVPA for every 3-hour block, and half of that time spent outside  
• Provide an activity break for no more than 60 minutes of continuous sedentary activity | Limit television and recreational screen-time to no more than 2.5hrs of a 5-day week i.e. 30 minutes per day |

PA (Physical Activity), AS (After School), MVPA (Moderate to vigorous physical activity), n/a (not available)
The included guideline documents were developed by either a department of education (n = 2), a collaboration between a department of health and private sector/after school network (n = 2), a collaboration between a University centre with government funding; private sector and/or after school sector and/or non for profit e.g. YMCA (n = 4); or a collaboration between a department of health, a university, private sector, afterschool network and families ( n = 1)

Synthesis Of Results:
Methods for creation of guidelines
Eight of the nine included guideline documents used a similar method to create their guidelines. This consisted of a panel of experts including research personnel, industry personnel (e.g. OSHC directors, facilitators) and government authorities. It is clear from five of the guidelines that key stakeholders were also included in the development process in (e.g. The Move More North Carolina guidelines additionally collaborated with parents, administrators, funders and community partners). Funding came from a variety of sources, with three of the guideline documents funded by government departments and five funded through a combination of industry and universities. The Minnesota guidelines did not “create” their own guidelines as such, so did not require funding. Rather, they summarised and collated the current guidelines from the Out of School Nutrition and Physical Activity, Healthy Eating and Physical Activity, New York State Healthy Eating and Physical Activity Alliance and Move More North Carolina guidelines. The methods used to create the Ontario Ministry of Education guidelines are unclear as no details of methods or contact details / corresponding author were provided.

Summary Of Evidence:
Physical activity recommendations in the guidelines
For a typical three hour afternoon care session, the recommendations across nine guidelines ranged between 30 and 60 minutes of PA. Six of the nine guidelines had a simple fixed recommendation for example, the OSNAP guidelines\textsuperscript{29} recommended inclusion of “30 minutes of moderate, fun, PA for every child, everyday”. Three of the guidelines recommended that PA time vary according to the length of a session (n = 3) i.e., the Move More North Carolina guidelines\textsuperscript{30} recommended that 20% of the total session time should be allocated to PA and provides an example of how to calculate this and
suggested activities to ensure children are engaging in MVPA rather than light physical activity. The National After School Alliance - HEPA guidelines update\textsuperscript{24} goes beyond this, providing varying recommendations per session length, and separate recommendations for light physical activity and MVPA i.e., they recommend that for the time allocated to PA, 50% should be spent in MVPA (e.g. they recommend for a 1 hr program, 10 minutes is for PA, of which 5 minutes should be MVPA).

**Screen-time recommendations in the guidelines**

Seven of the included guidelines also provided screen-time recommendations. Four of the guidelines had a simple recommendation of the maximum duration of screen-time e.g. Minnesota guidelines recommend that recreational computer time is limited to less than one hour a day\textsuperscript{26}. The other guidelines provided recommendations that varied depending on the session length (n = 3) e.g. Ohio Afterschool Network recommends screen-time is limited to 10% of total program time\textsuperscript{27}. Some of the recommendations provided advice regarding the screen content e.g. discouraging the use of commercial broadcast TV/movies (Table 2)\textsuperscript{29}. Similarly, the HEPA guidelines updated in 2018 provided a varying time frame of screen-time use dependent on session time, however also provided recommendations on the use of digital devices (i.e. for homework only) and specifically no television or movies to be allowed\textsuperscript{24}.

**Discussion:**

This scoping review aimed to identify all existing guidelines for PA and/or screen-time in the OSHC setting. We identified nine guideline documents, all of which targeted physical activity, and seven of which also included guidelines for screen-time. All guidelines originated from North America and were formulated using expert panels or stakeholder groups in combination with research experts. Whilst all guidelines included specific recommendations for PA, the operationalization varied considerably among guidelines. For example, two guidelines provided recommendations for the amount of PA without specifying intensity\textsuperscript{27} whilst the remaining (n = 7) guideline/s stated recommendations for the amount of MVPA, or amounts at different PA intensities (for example, that half of all physical activity time should be spent in MVPA\textsuperscript{24} or that a certain proportion of physical
activity time should be vigorous.\(^2\). It is important to note that the HEPA guidelines were consistent in their recommendation in the first published guidelines in 2011 and their update in 2018 that 50% of PA time should be spent in MVPA; however, their updated 2018 guidelines provided greater detail, providing minute increments of PA per number of hours e.g. 2 hour program 20 minutes of PA. The majority of guidelines (n = 6) stated a recommendation for the whole afternoon care session (e.g. 30 minutes), but some gave hourly recommendations (e.g. 10 minutes per hour). Despite these differences, taken together, the guidelines were fairly consistent in their recommendations for PA between 30 to 60 minutes per session. This seems congruent with daily PA guidelines published by many jurisdictions, which commonly recommend children should accumulate at least 60 minutes of MVPA per day\(^7\). Given that a large portion of children’s discretionary time occurs during the after school period, it seems reasonable to expect that children should achieve half or more of their daily PA whilst they are in this setting.

Compared with the PA guidelines, the guidelines for screen-time varied more widely in their recommendations. All guidelines allowed use of screens for homework/educational purposes. Collectively, no more than 60 minutes of recreational screen-time per after school care session was recommended, which, like the PA guidelines, aligns well with daily screen-time recommendations (which state that recreational screen-time should be no more than 2 hours per day)\(^7\). Two guidelines\(^2\) did not allow any recreational screen-time, whereas the remaining five screen-time guidelines allowed recreational screen-time with restrictions, such as based on duration, content (banning “commercial” television or movies), or bout length. Like PA guidelines, most screen-time guidelines (n = 6) were based on the whole afternoon care session, but some gave varying screen-time allowances depending on the session length.

All but one of the guidelines were developed in consultation with an expert panel, typically comprising of representatives from industry (e.g., care staff), government (e.g., Education Department, Health Department), non-government bodies (e.g., YMCA) and academics. Only one guideline clearly stated that parents were involved in the guideline development process.\(^3\) The guideline developers
typically reported that they consulted the scientific literature, however none of the guidelines appeared to follow “gold-standard” methodologies for guideline development, such as the Grading for Recommendations Assessment, Development and Evaluation (GRADE) approach\textsuperscript{33} Guidelines-International-Network (GIN)\textsuperscript{34} or Appraisal of Guidelines for Research and Evaluation (AGREE and AGREE II)\textsuperscript{35}. In recent years, there has been an increased focus on these methodologies and tools, which are believed to improve the quality of ensuing guidelines, and to assist in their implementation\textsuperscript{33}. Such methodologies have quickly gained traction in clinical and health services contexts; however, they are yet to be widely adopted in public health/education, which may explain why these methodologies were not applied for the development of the guidelines identified in this review.

Strengths And Limitations
This review has several methodological strengths. The protocol was prospectively registered, and an extensive search strategy was used, covering both scientific and grey literature. Our review is the first of its kind to identify and compare international guidelines for physical activity and screen-time in out of school care settings. Limitations included that our database searches were restricted to works published in English, thus there may be non-English guidelines that were not identified by our search strategy (though we are not aware of any). In addition the omission of the term before school care from the search strategy may have affected the results. All identified guidelines originated from North American jurisdictions, thus their generalizability to other world regions and cultures is unclear.

This review highlighted that relatively few jurisdictions around the world currently have guidelines for PA and screen-time in OSHC. It could be argued that settings-specific guidelines are of limited value, given that there are already daily guidelines in place. However, we assert that OSHC has received relatively little attention as an avenue for delivering health promotion content to many children in a cost-effective manner. Having guidelines provides a measure which educators/care-givers can use to plan care session schedules and review their processes. To date, efforts in this space are being led by teams in the United States and Canada\textsuperscript{36, 37, 38}, and their experience serves as a useful guide for
future efforts in other world regions.

The existence of guidelines does not ensure implementation, and children can only benefit from the guidelines if the OSHC services follow the guidelines. Thus, guidelines should be developed within an implementation science framework, which allows for implementation of the guidelines at scale, over a sustained period, and evaluation of the effectiveness of such efforts. To date, a small number of studies have examined implementation of guidelines. Gortmaker et al\textsuperscript{36} examined the OSNAP guidelines (the food and fun component) and found that controlling for baseline covariates, children in intervention sites showed greater increases in average physical activity level than in control sites.

Other research conducted more recently by Beets et al\textsuperscript{37} and Weaver et al\textsuperscript{38} investigated the effectiveness of the Californian After School Guidelines and HEPA guidelines respectively. Results suggested that guideline implementation led to an increase in MVPA in boys but not girls. These efforts highlight the challenges of guideline implementation and form important, early attempts to systematically change physical activity and screen-time practices in OSHC, providing invaluable learnings for future efforts.

Presumably in time, other jurisdictions will produce guidelines for PA and screen-time in OSHC. Also, future guideline development could incorporate guideline development methodologies such as GRADE\textsuperscript{33}, G-I-N\textsuperscript{34} or AGREE\textsuperscript{35}. These methodologies provide a systematic approach to using latest evidence and consulting widely with stakeholders with a view to maximising implementation, the fundamental goal of guidelines.

**Conclusion:**

To date, relatively few guidelines addressing physical activity and screen-time patterns in OSHC settings have been published. Existing guidelines have originated from North America. Future efforts should consider physical activity and screen-time both during the before school and after school care periods and may benefit from following rigorous guideline development processes. In addition, efforts to implement and evaluate the effectiveness of implementation strategies are warranted.

**Abbreviations**

PA – Physical activity, OSHC- outside school hours care, MVPA – moderate to vigorous physical
activity, PRISMA-ScR - Preferred Reporting Items for Systematic Reviews and Meta-analysis, WHO - World Health Organization.

Declarations

**Ethics approval and consent to participate**

Not applicable

**Consent for publication**

Not applicable

**Availability of data and materials**

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

**Competing interests**

The authors declare that they have no competing interests.

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**Author’s Contributions**

RV, LKL, ACP, MR and CAM conceptualised the review question and contributed to the writing of the manuscript. RV and LKL conducted screening and full text reviewing, whilst RV completed data extraction in its entirety. RV, LKL, ACP, MR and CAM read and approved the final manuscript for publication.

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Figures
1. (“out of school care” or “OSHC” or “outside school hours care” or “after school” or “after-school” or after school)
2. Practice guideline/
3. Guideline/
4. (guideline? or recommend* or polic*)
5. 2 or 3 or 4
6. Exercise/
7. exercis*.mp
8. physical activit*
9. 6 or 7 or 8
10. Sedentary Behaviour/
11. (sedentary or screen-time or screen time)
12. 10 or 11
13. 1 and 5 and 9 and 12

Footnote: ( / ) Subject heading (MeSH) Medline, ( * ) truncation symbol, ( ? ) wildcard symbol

Figure 1
Search strategy for Medline

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guideline AND physical activity OR screen time AND after school
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Figure 2
Search strategy for Google
Supplementary Files
This is a list of supplementary files associated with this preprint. Click to download.
PRISMA-ScRv Fillable Checklist BMCPediatrics.docx