

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	An ecological study of playground space and physical activity among primary school children
AUTHORS	Grunseit, Anne; O'Hara, Blythe; Drayton, Bradley; Learnihan, Vincent; Hardy, Louise L.; Clark, Eve; Klarenaar, Paul; Engelen, Lina

VERSION 1 – REVIEW

REVIEWER	Dean Dudley Macquarie University, Australia
REVIEW RETURNED	04-Nov-2019

GENERAL COMMENTS	<p>Thank you for asking me to review this paper. I found it interesting and well-written. The authors frame their argument about area needed for student physical activity in schools succinctly and appropriately. I have only a small number of suggestions that should be addressed prior to publication.</p> <ol style="list-style-type: none">1. Limitations that the conclusions are drawn from cross-sectional data need to be addressed.2. Random sampling methods need to be described in greater detail (i.e. bias coin or otherwise)
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REVIEWER	Georges Baquet University of Lille
REVIEW RETURNED	23-Mar-2020

GENERAL COMMENTS	<p>Manuscript: bmjopen-2019-034586</p> <p>This study examined relationships between school playground areas and students' total physical activity (PA), cardiorespiratory fitness, and fundamental movement skills. The authors also investigate the fact that these associations could be modified by playground equipment and if any 'threshold' emerge to indicate a minimum amount of playground area required for students to meet health-enhancing PA. The authors used data from SPANS, a population health survey of school children.</p> <p>This paper includes a large number of children, aged 5 to 12 years-old and a nice statistics section. The presented results are numerous. My major concern is the assessment of Physical Activity. In SPANS report, we can read</p> <p>"In previous SPANS, physical activity participation of children in Years K, 2 and Year 4 was measured (proxy report by parents) using a reliable, but not validated question developed by the NSW Ministry of Health, and in Year 6 (child self-report) was measured using the valid and reliable Adolescent Physical Activity Recall Questionnaire (APARQ). Both questions have been replaced in 2015 with a one item, validated question endorsed by the</p>
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	<p>Australian Healthy Kids Alliance as the primary indicator for population monitoring surveys of children's physical activity. The question asks respondents to report, "Over the past 7 days, on how many days were you/was your child engaged in moderate to vigorous physical activity for at least 60 minutes (this can be accumulated over the entire day, for example in 10-minute intervals) each day?" Response categories were 0 to 7 days; with a response of 7 days indicating meeting of the physical activity recommendations."</p> <p>The fact that PA differently may cause a bias in the study, underlining by the authors that PA was limited by self- report and could not distinguish where the PA took place at school or outside of school hours. Are the most active in school the most active outside of school? Can the size of playgrounds influence physical activity outside of school?</p> <p>Moreover, in the same report "A methodological factor to consider in the interpretation of the findings on children in primary school is the difference in respondent. Parents reported on behalf of their children in Years K, 2 and 4, while children in Year 6 self-reported. Therefore, any differences in the reported prevalence of indicators of physical activity between children in Years K, 2 and 4 and children in Year 6 may be a result of these differences in data collection methods.</p> <p>I think that the authors should separate their study with children with PA report (3584) and children with self-report (1354). Can a 11-year-old child answer a physical activity questionnaire better than a 10-year-old child? I think that in such a study it is difficult to monitor PA with accelerometry, but a consistent PA measurement is needed.</p> <p>Specific comments</p> <p>Abstract:</p> <p>Objectives: replace cardiorespiratory fitness by fitness</p> <p>Outcome measure: it will be better to consider Grade Level to separate the PA assessment; the (children between 10 and 11 years are not concerned?)</p> <p>Results: Loose equipment was only introduced in the result section. (Playground size and equipment)</p> <p>Methods:</p> <p>Child information: Sedentary time and active travel to school are part of this section and in the measure section as covariates. Change</p> <p>Cardiorespiratory endurance: Change for cardiorespiratory fitness</p>
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	Figure 1: Figure 1 is difficult to read in BW without results section.
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VERSION 1 – AUTHOR RESPONSE

Comment	Response	page/line
<u>Reviewer 1</u>		
1) Thank you for asking me to review this paper. I found it interesting and well-written. The authors frame their argument about area needed for student physical activity in schools succinctly and appropriately.	Thank-you	N/A
2) Limitations that the conclusions are drawn from cross-sectional data need to be addressed	We have added this limitation to the Discussion section as suggested.	P19, lines 430-1
3) Random sampling methods need to be described in greater detail (i.e. bias coin or otherwise)	We have clarified that the random selection use a random number generator as indicated in the SPANS report ¹ .	P6, Lines 46-7
Reviewer 2		
The fact that PA differently may cause a bias in the study, underlining by the authors that PA was limited by self- report and could not distinguish where the PA took place at school or outside of school hours. Are the most active in school the most active outside of school? Can the size of playgrounds influence physical activity outside of school?	In our analysis and as stated in the introduction, we are analysing the relationship between playground size and total physical activity because this is the concern of public health and health promotion (that children get sufficient PA irrespective of where it is accumulated). As also noted in the introduction in the manuscript there are mixed findings with respect to the relationship between PA undertaken in school (which has been shown to be related to playground size) and PA outside of school, some showing an equalising effect, others showing no relationship. One study which did measure playground size and examined out-of-school PA did not find a relationship, but the range of playground sizes was limited. We have added a line to the limitations which notes the assumption that PA in and out of school are independent.	P20, lines 435-7

	It is a limitation of this study that we cannot isolate the in-school PA, but our approach is consistent with the stated objective of analysing the meeting of PA guidelines and objective health outcomes of PA.	
Moreover, in the same report "A methodological factor to consider in the interpretation of the findings on children in primary school is the difference in respondent. Parents reported on behalf of their children in Years K, 2 and 4, while children in Year 6 self-reported. Therefore, any differences in the reported prevalence of indicators of physical activity between children in Years K, 2 and 4 and children in Year 6 may be a result of these differences in data collection methods. I think that the authors should separate their study with children with PA report (3584) and children with self-report (1354).	We agree with the reviewer that separate analyses should be conducted on the physical activity measure which used differentially self-report and parental report for K/2/4 and Year 6 students respectively; that is indeed what is presented in the original manuscript as may be seen by Table S1, and Figure 1. However, this was not explicitly stated in the Methods, and therefore we have added a line to the manuscript which states specifically that these PA questions were analysed separately. We have also added a note to Table S1 indicating the sample sizes for each of these analyses to further clarify the underlying analytic sample. The objective measures however, combined all students who had data (as shown in Table 1) as these were consistently measured objectively across different age groups.	P10, lines 246-7; Table S1.
I think that in such a study it is difficult to monitor PA with accelerometry, but a consistent PA measurement is needed.	As noted by the reviewer accelerometry is somewhat infeasible for a study this size. Further as noted by the reviewer quoting from the SPANS report, in the 2015 survey, the question was consistent across the age groups. What differed was the source of the data, which, as we state above, was why the analysis was split for the different approaches.	As above
Can a 11-year-old child answer a physical activity questionnaire better than a 10-year-old child?	Setting age cut points for children's ability to self report is challenging, however self-report is generally not recommended for children under 10 years of age as they are not sufficiently developed cognitively to accurately recall their physical activity behaviour. ² Therefore children young than this age required parental report in SPANS	NA

	<p>Further, SPANS is a serial population survey of children that has been conducted since 1997 and one of the most important elements of population serial surveys is to maintain the methodology and questions. Year 6 children have always self-reported their PA and to change that procedure would prohibit estimating change over time.</p>	
<p>Abstract:</p> <p>Objectives: replace cardiorespiratory fitness by fitness</p> <p>Outcome measure: it will be better to consider Grade Level to separate the PA assessment; the (children between 10 and 11 years are not concerned?)</p> <p>Results: Loose equipment was only introduced in the result section. (Playground size and equipment)</p>	<p>Changed as suggested.</p> <p>The reason why we specify the ages is because the schooling systems are different across countries and the BMJ-Open is an international journal. By putting age groups in the abstract ahead of using the grade specifications in the manuscript, it is clear to any reader the age of the children the grades are referring to.</p> <p>With respect to children aged up to (but not including) age 11 would be included in the ≤ 10 years because age was asked in years. However, we agree with the reviewer that this appears to not cover all children. We have therefore changed the age categories to < 11 years and ≥ 11 years for clarification in the abstract and through the manuscript.</p> <p>The word count and format of abstracts is very limited. We have followed the format as recommended in the author guidelines (https://bmjopen.bmj.com/pages/authors/#research) which does not have sections which specify exposures or covariates. We have therefore not changed this in the manuscript.</p>	<p>P2, line 39</p> <p>P2, line 44 and throughout manuscript</p>
<p>Body text</p> <p>Methods:</p> <p>Child information: Sedentary time and active travel to</p>	<p>If I have understood the reviewer correctly, he is concerned that we have repeated information. We have included both of these variables in the Child Information section and Covariate sections because the child information falls under the broader heading of Data Collection and is where we give information about the question which gave rise to the data; the</p>	<p>NA</p>

school are part of this section and in the measure section as covariates. Change	covariate section however is under Measures where we give information about what was included in the model and how it was operationalised. This is the case not only for these two variables but others as well such as BMI and waist-to-height ratios, hence why they seem to appear twice. We have therefore left these descriptions as they are.	
Cardiorespiratory endurance: Change for cardiorespiratory fitness	This has been changed as suggested throughout the manuscript and the Supplementary Tables.	Throughout manuscript, Table S1
Figure 1: Figure 1 is difficult to read in BW without results section.	We apologise that the copy of Figure 1 the reviewer may have received may not have been in colour, but original figure is. We therefore have not changed this Figure as the results are clear in the submitted version.	NA
Formatting		
The author "Lina Engelen" in your main document is registered as "Engelen, Lena" in ScholarOne. Please ensure that the author has same registered name.	This has now been rectified in the ScholarOne system	NA

1. Hardy LL, Mihrashahi S, Drayton BA, et al. NSW Schools Physical Activity and Nutrition Survey (SPANS) 2015: Full Report. In: NSW Department of Health, ed. Sydney, 2016.
2. Dollman J, Okely AD, Hardy L, et al. A hitchhiker's guide to assessing young people's physical activity: Deciding what method to use. *Journal of Science and Medicine in Sport* 2009;12(5):518-25.

VERSION 2 – REVIEW

REVIEWER	DEAN ALAN DUDLEY Macquarie University, Sydney Australia
REVIEW RETURNED	01-May-2020

GENERAL COMMENTS	I am more than confident that the authors have addressed any outstanding concerns previous revisions had brought to their attention. I believe this manuscript is now fit for publication in BMJ Open. Congratulations.
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REVIEWER	Georges Baquet University of Lille
REVIEW RETURNED	18-May-2020

GENERAL COMMENTS	The authors have clearly responded to my comments.
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