

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Influence of the day care, home and neighbourhood environment on young children's physical activity and health: Protocol for the PLAYCE observational study
AUTHORS	Christian, Hayley; Maitland, Clover; Enkel, Stephanie; Trapp, Gina; Trost, Stewart; Schipperijn, Jasper; Boruff, Bryan; Lester, Leanne; Rosenberg, Michael; Zubrick, Stephen

VERSION 1 - REVIEW

REVIEWER	Erica Hinckson Auckland University of Technology
REVIEW RETURNED	26-Sep-2016

GENERAL COMMENTS	Excellent protocol for investigating the Influence of the day care, home and neighbourhood environment on young children's physical activity and health. Two comments I would like to make: 1. The authors are not asking for assent from the child. Only consent from the parents. It is important that children are asked "if it is ok" to participate in the study in a way that they could understand and be fitted with the devices etc 2. While the sample size is appropriate, there is no mention of strategies in case the desired sample number is not reached. From experience, this is a major component of large cross-sectional studies (achieving the desired sample size) and needs to be considered early on, in terms of overall number and accelerometer valid data.
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REVIEWER	Suvi Määttä Sanfundet Folkhälsan, Folkhälsan Research Centre University of Helsinki
REVIEW RETURNED	04-Oct-2016

GENERAL COMMENTS	Comments: Overall, this study protocol is very well-written. The study is unique and will provide new knowledge on the influence of several environments on preschool children's physical activity (PA). The authors thoroughly justify the importance of this study in their manuscript. Nevertheless, I have some comments that I ask you to consider and take into account in the best way as possible. Strengths and Limitations:
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- You state that one of your limitations is: "Recruitment of children via day care centres will limit the generalisability of the findings however, 85% of children (in Australia) attend a preschool or a preschool program in long day care." I was wondering about this statement, and if I have understood correctly it. Your article is about studying preschool environment, and one of your main aims is to "Determine the physical activity levels of pre-schoolers while attending day care centres". So, if your focus is on preschool children, how can it be then a weakness that you are recruiting via preschools? Or do you mean that you would like to have children who are not in preschool at all? Perhaps clarify this sentence. This sentence is also the only time when you use preschool or a preschool programme in your manuscript. Is there a difference in Australia by the meaning of preschool and day care centre?

Introduction:

- This section is very long. I recommend you shorten this section and re-write it so that it is easier to read and understand. You could for example shorten the sections about the benefits of PA, and rather focus on discussing the environmental settings that are a focus in your study.

- It is good that you have given "The day care environment" its own section in the introduction, but I expected more information about the Australian day care system and environment. Are preschools mostly municipality-based or private – what kind system is there in Australia? You mention that there are two national (?) frameworks for preschools, but you do not introduce so much as to what these frameworks actually include. E.g. Do these frameworks include guidelines about compulsory PA lessons, outdoor times etc.? Does every preschool have compulsory outdoor hours each day? Do preschools conduct trips to their surrounding neighbourhood? I hoped that you could discuss more about the Australian day care system, especially focusing on PA, for the international readers. I also wondered how similar or different preschools are in Australia/your recruitment area.

- In addition, you explain later the recruitment criteria and recruitment protocol thoroughly, and you mention that you take into account the SES neighbourhood of preschools. I was wondering how families receive the preschool place for their child(ren). Is the preschool usually the closest one in their neighbourhood? Do families need to pay an enrolment fee to preschools? I suggest a few sentences already about this in your introduction would give a better understanding about recruitment later on.

Objectives/data analysis plan:

- In these sections, there are many repetitions. You re-write the same objectives in the data analysis plan as you have already presented in the objectives section. Could you shorten the data analysis section? I liked the way you presented your objectives in the data analysis plan section. Maybe you could move this part up to objectives part. You could also shorten the data analysis plan section. It does not probably need to be as specific as it currently is.

Sampling:

- Why did you choose preschools according to SES neighbourhood, although SES factors are not the main focus in your study? Why did you not choose all preschools and then randomise them?

Data collection:

- I considered this section informative and well-written. I have only

	<p>one minor comment. You used GPS for a sub-sample (n=310). Why exactly just 310 participants? Are you planning to recruit children randomly for this? Or how?</p> <p>Conclusions:</p> <ul style="list-style-type: none"> - You write that you are planning to conduct natural experiments (at the end of the chapter). This sentence is unconnected with the other sentences in the chapter. Could you please expand on this? <p>Overall, my comments are minor, but I hope they will improve the quality of your manuscript. This is a great study plan and I'm looking forward to reading the results of this study later in scientific journals.</p>
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REVIEWER	Eero Haapala Institute of Biomedicine, School of Medicine, University of Eastern Finland
REVIEW RETURNED	05-Oct-2016

GENERAL COMMENTS	<p>The Authors describe the methods of an ambitious research project with high quality methods and a large sample size. The evidence from such a study will benefit future intervention studies and public health actions aiming to promote physically active lifestyle. The Authors have described the methodology and the need for this project in detail. I have just few comments and suggestions.</p> <p>P15, L52. I suppose that the Authors are not only trying "to collect location data from the GPS unit for the majority of waking hours on at least three weekdays and one weekend day" but to collect GPS data at the same time than accelerometer data. Please specify.</p> <p>P17. Have you planned to query parental physical activity and screen-time levels? Although parental support to be active maybe more important than parental physical activity itself, evidence supports the idea that parental screen-time correlates fairly well with child's screen time.</p> <p>P17. Have you planned to include any measure of adiposity (body fat percentage, BMI-sds etc.)? Overweight and obesity may modify the associations between the determinants and physical activity/sedentary time.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name: Erica Hinckson

Institution and Country: Auckland University of Technology Please state any competing interests:
None declared

Excellent protocol for investigating the influence of the day care, home and neighbourhood environment on young children's physical activity and health. Two comments I would like to make:

1. The authors are not asking for assent from the child. Only consent from the parents. It is important that children are asked "if it is ok" to participate in the study in a way that they could understand and

be fitted with the devices etc

RESPONSE: During the initial day care visit research staff will provide each child with a brief and simple description of the devices (accelerometers and RFID/GPS) on the day they are fitted, and will answer any questions the child may have. Before including a child in the study, the research team member will ensure there is no reason to believe that participation in this study is contrary to the best interests of the child. If any child is upset about wearing the devices or refuses at the time of fitting, the parent will be notified and after discussing it with their child can choose not complete this part of the study. The parent on the child's behalf has the right to refuse to participate or withdraw their participation at any point for any reason without prejudice. This information has been added to the 'Ethics and Dissemination' section on page 21.

As described in the manuscript (page 21, paragraph 2), parents provide informed written consent for themselves and their child's participation in the study. Under the Australian National Health and Medical Research Council's National Statement on Ethical Conduct in Human Research - Chapter 4.2, children aged 2-5 years are considered "young children, who are able to understand some relevant information and take part in limited discussion about the research, but whose consent is not required." As such active written consent will be required by the parent of the participating child on behalf of the child, but not by the child.

2. While the sample size is appropriate, there is no mention of strategies in case the desired sample number is not reached. From experience, this is a major component of large cross-sectional studies (achieving the desired sample size) and needs to be considered early on, in terms of overall number and accelerometer valid data.

RESPONSE: Based on our experience in recruiting participants for large studies[1-5] as well as our experience gained from a 2014 pilot study which involved 150 preschool children across 15 day care centres[6]we have implemented a number of strategies to ensure we achieve the target sample size. We will maximise response rates of centres via conducting a study briefing with all staff prior to commencing parent recruitment. This will ensure all centre staff engage with the study and assist with letting parents know about the study at their centre. We have devised multiple methods centres can use to tell their families about the study (email and newsletter templates, banners, sign up posters, flyers etc). We will also have a set date for parent consent forms to be returned to the centre which encourages parents to have their forms back on time and improves response rates. We will provide centres, parents and children incentives for participating; all centres and parents receive an individualised report of the findings and children receive a thank you gift (Frisbee).

Furthermore, we will regularly (monthly) assess centre and parent response rates and the quality of data (e.g., valid accelerometer data) to ensure that we are on track with our sample size and data quality. By regularly reviewing response rates and data quality we will be able to respond quickly if found to be heading off track. Finally, the data collection period for this study is over two years. Every six months we will review the number of day care centres registered by the Australian Children's Education and Care Quality Authority (ACECQA). We expect there will be new centres added to this list that we will be able to sample from and begin recruiting for the study. We will continue to add centres to this list and sample from them until the sample size is reached.

Further information about these strategies for reaching our target sample size have been added (Page 12-13).

Reviewer: 2

Reviewer Name: Suvi Määttä

Institution and Country: Sanfunden Folkhälsan, Folkhälsan Research Centre, University of Helsinki
Please state any competing interests: None declared

Overall, this study protocol is very well-written. The study is unique and will provide new knowledge on the influence of several environments on preschool children's physical activity (PA). The authors thoroughly justify the importance of this study in their manuscript.

Nevertheless, I have some comments that I ask you to consider and take into account in the best way as possible.

Strengths and Limitations:

1. You state that one of your limitations is: "Recruitment of children via day care centres will limit the generalisability of the findings however, 85% of children (in Australia) attend a preschool or a preschool program in long day care." I was wondering about this statement, and if I have understood correctly it. Your article is about studying preschool environment, and one of your main aims is to "Determine the physical activity levels of pre-schoolers while attending day care centres". So, if your focus is on preschool children, how can it be then a weakness that you are recruiting via preschools? Or do you mean that you would like to have children who are not in preschool at all? Perhaps clarify this sentence. This sentence is also the only time when you use preschool or a preschool programme in your manuscript. Is there a difference in Australia by the meaning of preschool and day care centre?

RESPONSE: While the primary aims of this study are to examine the influence of the day care centre environment on preschooler's physical activity (Objectives 1-3) we are also seeking to understand the influence of the home and neighbourhood environment on pre-schoolers physical activity (Objectives 4-5). Study objectives 4 and 5 are limited to those children who attend a day care centre because children are recruited for the study via the day care centre they attend. Thus we will not be able to examine the influence of the home and neighbourhood environment on the physical activity levels of children who do not attend a day care centre.

Information about early childhood education and care services provided in Australia has been clarified.

These points have been edited in the 'Strengths and Limitations' section (page 4) and page 6, paragraph 1).

Introduction:

2. This section is very long. I recommend you shorten this section and re-write it so that it is easier to read and understand. You could for example shorten the sections about the benefits of PA, and rather focus on discussing the environmental settings that are a focus in your study.

RESPONSE: The Introduction has been shortened as suggested.

3. It is good that you have given "The day care environment" its own section in the introduction, but I expected more information about the Australian day care system and environment. Are preschools mostly municipality-based or private – what kind system is there in Australia? You mention that there are two national (?) frameworks for preschools, but you do not introduce so much as to what these frameworks actually include. E.g. Do these frameworks include guidelines about compulsory PA lessons, outdoor times etc.? Does every preschool have compulsory outdoor hours each day? Do preschools conduct trips to their surrounding neighbourhood? I hoped that you could discuss more about the Australian day care system, especially focusing on PA, for the international readers. I also wondered how similar or different preschools are in Australia/your recruitment area.

RESPONSE: There is one National Quality Framework (NQF) for Early Childhood Education and Care in Australia. The Australian Children's Education and Care Quality Authority (ACECQA) are the regulatory body who oversees the implementation of the NQF and works with the Australian state and territory regulatory authorities to implement and administer the NQF. The NQF includes seven quality areas for which two are relevant to pre-schooler physical activity and the day care physical environment. The NQF does not include guidelines about compulsory physical activity lessons or time spent outdoors nor is it very common for day care centres in Australia to take children on excursions to their surrounding neighbourhood. The NQF does provide links to resources targeting healthy eating and physical activity in early childhood settings (e.g., Australian Commonwealth Department of Health "Get Up & Grow" resources[7]) however these resources only refer to the Australian general physical activity recommendations for toddlers and pre-schoolers and do not provide specific guidelines on the amount of time per day children attending day care centres should spend outdoors and physically active.

Further details about the Australian day care system and the Australian National Quality Framework for Early Childhood Education and Care have been provided in the Introduction (page 7-8).

4. In addition, you explain later the recruitment criteria and recruitment protocol thoroughly, and you mention that you take into account the SES neighbourhood of preschools. I was wondering how families receive the preschool place for their child(ren). Is the preschool usually the closest one in their neighbourhood? Do families need to pay an enrolment fee to preschools? I suggest a few sentences already about this in your introduction would give a better understanding about recruitment later on.

RESPONSE: In Australia, parents can enrol their child in a day care of their choice. The day care centre a child attends is usually one close to their home. Day care centres charge parents a daily fee for their service however parents who meet the work and study criteria are eligible for a government childcare rebate (i.e., 50% of the fee is paid by the government up to \$7,500 per child). Further information about registration and fees for Australian day care centres has been provided in the Introduction (page 7, paragraph 3).

Objectives/data analysis plan:

5. In these sections, there are many repetitions. You re-write the same objectives in the data analysis plan as you have already presented in the objectives section. Could you shorten the data analysis section? I liked the way you presented your objectives in the data analysis plan section. Maybe you could move this part up to objectives part. You could also shorten the data analysis plan section. It does not probably need to be as specific as it currently is.

RESPONSE: As requested, the data analysis section has been shortened (page 20-21). The objectives wording is the same in the Data analysis plan section and Project significance, aims and objectives section.

Sampling:

6. Why did you choose preschools according to SES neighbourhood, although SES factors are not the main focus in your study? Why did you not choose all preschools and then randomise them?

RESPONSE: To ensure we have an equal representation of centres from different levels of socio-economic status (SES) we have sampled an equal number of centres from low, medium and high SES. Prior to sampling, all day care centres in the Perth metropolitan area were sorted according to low, medium and high SES (as well as size). We then randomly selected centres from this list (sorted by centre SES and size) to begin contacting to invite them to take part in the study. We aim to recruit a similar number of centres from each SES strata to take part. This will help to ensure that any effect

from centre-level SES is evenly distributed across our sample (see "Sampling" section, pages 11-12).

Data collection:

7. I considered this section informative and well-written. I have only one minor comment. You used GPS for a sub-sample (n=310). Why exactly just 310 participants? Are you planning to recruit children randomly for this? Or how?

RESPONSE: The sample size for the GPS sub-study was based on a power calculation and the following text has been added: 'This sample size will provide 80% power to detect a meaningful difference in MVPA between two groups for an attribute of the neighbourhood environment (e.g., living in high vs. low walkable neighbourhood).' Children will be recruited as part of the main PLAYCE study and will wear the GPS unit for 7 days with the accelerometer. All children from a centre will be invited to wear the GPS unit as well as the accelerometer. Centres will be randomly selected to participate with one centre (approximately 15 children) per week taking part over a 5-6 month period (October 2016-March 2017). Further information about the GPS sub-study has been added to the 'Data collection' section (page 15-16).

Conclusions:

8. You write that you are planning to conduct natural experiments (at the end of the chapter). This sentence is unconnected with the other sentences in the chapter. Could you please expand on this?

RESPONSE: The term 'natural experiments' has been edited to 'interventions' (page 23).

Overall, my comments are minor, but I hope they will improve the quality of your manuscript. This is a great study plan and I'm looking forward to reading the results of this study later in scientific journals.

Reviewer: 3

Reviewer Name: Eero Haapala

Institution and Country: Institute of Biomedicine, School of Medicine, University of Eastern Finland

Please state any competing interests: None declared

The Authors describe the methods of an ambitious research project with high quality methods and a large sample size. The evidence from such a study will benefit future intervention studies and public health actions aiming to promote physically active lifestyle. The Authors have described the methodology and the need for this project in detail. I have just few comments and suggestions.

1. P15, L52. I suppose that the Authors are not only trying "to collect location data from the GPS unit for the majority of waking hours on at least three weekdays and one weekend day" but to collect GPS data at the same time than accelerometer data. Please specify.

RESPONSE: This has been clarified (see page 16, paragraph 1).

2. P17. Have you planned to query parental physical activity and screen-time levels? Although parental support to be active maybe more important than parental physical activity itself, evidence supports the idea that parental screen-time correlates fairly well with child's screen time.

RESPONSE: The primary objectives of this study involve understanding the influence of the day care environment on pre-schooler's physical activity (Objectives 1-3). We will also examine its effect on other health behaviours such as screen time and sedentary behaviour. Objectives 4 and 5 involve examining the influence of the home and neighbourhood environment on physical activity and sedentary behaviour. Unfortunately due to the number of variables required in the parent survey we

will not be able include a measure of parent screen time. Any further questions in the parent survey would add significantly to responder burden and decrease the quality of the other data we receive. We will however acknowledge when reporting the study findings that this could be a potential study limitation.

3. P17. Have you planned to include any measure of adiposity (body fat percentage, BMI-sds etc.)? Overweight and obesity may modify the associations between the determinants and physical activity/sedentary time.

RESPONSE: Objectively measured height and weight of pre-school children will be collected by the research team as part of the day care centre data collection visits. This has been added to the 'Data collection' section (page 15, paragraph 1).

We trust that the changes made are satisfactory and that you now regard this manuscript suitable for publication in BMJ Open.

Yours sincerely,
Asst/Prof Hayley Christian

References

1. Giles-Corti B, Knuiman M, Timperio A, et al. Evaluation of the implementation of a state government community design policy aimed at increasing local walking: Design issues and baseline results from RESIDE, Perth Western Australia. *Prev Med*. 2008;46(1):46-54
2. Christian H, Knuiman M, Bull F, et al. A new urban planning code's impact on walking: The residential environments project. *Am J Public Health* 2013;103(7):1219-28
3. Giles-Corti B, Wood G, Pikora T, et al. School site and the potential to walk to school: The impact of street connectivity and traffic exposure in school neighborhoods. *Health Place* 2011;17(2):545-50
4. Trapp G, Giles-Corti B, Christian H, et al. Increasing children's physical activity individual, social, and environmental factors associated with walking to and from school. *Health Educ Behav* 2012;39(2):172-82
5. Martin K, Rosenberg M, Miller M, et al. Move and munch final report: Trends in physical activity, nutrition and body size in Western Australian children and adolescents: The child and adolescent physical activity and nutrition survey (CAPANS) 2008. Government of Western Australia 2008
6. Jones H, Jones E, R B. Preschoolers' physical Activity: Role of the Childcare Setting and the Built Environment. Perth, Australia: The University of Western Australia, 2014.
7. Australian Government Department of Health. Get Up & Grow: Healthy Eating and Physical Activity for Early Childhood. Director/Coordinator Book. Canberra, Australia: Commonwealth of Australia, 2009.

VERSION 2 – REVIEW

REVIEWER	Suvi Määttä Samfundet Folkhälsan, Finland
REVIEW RETURNED	03-Nov-2016

GENERAL COMMENTS	Authors have done great work for revising the manuscript. They
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	have answered to my questions and taken into account the comments that I had. I have nothing to add. I hope that this manuscript will be accepted for publication.
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REVIEWER	Eero Haapala Institute of Biomedicine, University of Eastern Finland, Finland
REVIEW RETURNED	10-Nov-2016

GENERAL COMMENTS	The Authors have appropriately answered to my questions.
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