Author’s response to reviews

Title: The mediating role of the home environment in relation to parental educational level and preschool children’s screen time: A cross-sectional study

Authors:

Suvi Määttä (suvi.maatta@folkhalsan.fi)
Riikka Kaukonen (riikka.kaukonen@folkhalsan.fi)
Henna Vepsäläinen (henna.vepsalainen@helsinki.fi)
Elviira Lehto (elviira.lehto@helsinki.fi)
Anna Ylönen (anna.ylonen@folkhalsan.fi)
Carola Ray (carola.ray@folkhalsan.fi)
Maijaliisa Erkkola (maijaliisa.erkkola@helsinki.fi)
Eva Roos (eva.roos@folkhalsan.fi)

Version: 1 Date: 13 Jul 2017

Author’s response to reviews:

The authors' response letter has been included as a supplementary file

Dear reviewers,

Thank you for the comments and additional questions. We appreciate the comments and questions because these changes in manuscript improve the quality of our manuscript. Hopefully, our changes in the manuscript will further clarify the manuscript. More detailed answers are written below. The changes made in the manuscript are written in red. The possible removals are marked with strikethrough and red color.

Thank you for the opportunity to review this paper. Given the increasing prevalence of screen use in children's day-to-day lives, coupled with the multiple adverse health effects associated with this behavior, the focus of this paper is quite timely. That said, there are multiple higher-level and specific issues that require revision prior to publication.

Background information is lacking from the Introduction section of this paper. The paper would be greatly strengthened if the rationale was stronger and more poignant. Thank you for this
comment. We have now sharpened and justified better our rationale. Together with comments from other reviewers, we made multiple modifications to the introduction (please see the lines between 62-69 and 103-117). We hope that these structural changes in the introduction make our rationale stronger.

Was the questionnaire used to assess parental education level validated? Please elaborate. Our questionnaire used to assess parental educational level was not validated. However, this questionnaire is used widely in national surveys in Finland conducted by the Institute of Health and Welfare (e.g. Finriski (https://www.thl.fi/en/web/thlfi-en/research-and-expertwork/population-studies/the-national-finrisk-study) and ATH (https://www.thl.fi/fi/tutkimus-ja-asiantuntijatyo/vaestotutkimukset/aikuisten-terveys-hyvinvointi-ja-palvelututkimus-ath).

It also covers all the main and the most common educational degrees in Finland. We added this information to the manuscript to clarify (line 144).

Can you elaborate on why parents were asked to report on all sedentary behaviors in which their children participated, rather than just screen time (as this was the focus)? Was the other data collected to be used elsewhere? Or provide additional context to your findings? One of the aims in conducting this cross-sectional study was to find out more information about the different types of sedentary behaviors at this age group and about the time spent in these behaviors because there is not currently available much information about it in Finland. Therefore, we decided to measure several different types of sedentary behaviors. We are going to use the other data collected in our future studies, but in the present study, our focus has been to understand the factors associated with preschoolers’ screen time.

Does the fact that one parent reporting on their child's screen-viewing, rather than both, serve as a potential limitation of the study? Could differences in responses occur? Thank you for your comment. There definitely could be differences in responses between parents, as some studies have indicated. We have added a sentence about this to our manuscript (see lines 371-374).

The Discussion section of the paper somewhat fails to really drive home the key take-aways from this work. Specifically, how can the findings of this paper be used to reduce screen-viewing among children. The "so what?" piece is missing. I would also encourage you to review the recent UK paper by Heilman et al. (2017) on the presence of TVs in children's bedrooms. Thank you for this reference. We have added a sentence referring to this study in our manuscript (see lines 326). Based on this article together with other comments about key take-away messages, which was provided by you and other reviewers, we made several modifications in our
discussion (please see the changes in lines 319-331 and 350-367). We hope that we have now elaborated more profoundly the relevance of our findings. Because other reviewers also had ideas about how to improve the discussion, we combined these comments to form a more cohesive structure in the discussion.

Be consistent with your use of the Oxford comma. Our manuscript was double-checked by a native language editor. She has now checked that the Oxford comma is used consistently.

The manuscript should be reviewed in its entirety to improve the overall quality of written English. Specifically, there are a number typos that need to be corrected as well as issues with verb tenses and verb-subject agreement. Thank you for this comment. A native language editor has now double-checked our manuscript and paid attention to the verb tenses and verb-subject agreement.

Revise BMC Public Health's guidelines for formatting references. The titles should not be bolded. OK. We have revised the guidelines.

SPECIFIC COMMENTS

* Line 25 - remove "to" after "driving" OK.

* Line 31 - "questionnaires" should be plural OK. *Line 33 - insert "the" before "home" OK.

* Line 59 - delete "already" OK.

* Line 60 - define what is meant by early childhood (age range?) OK. *Line 68 - "behaviours" should be plural OK *Line 79 - delete "in" OK

* Line 104 - revise to "…were invited to participate in the study by an information letter…” OK

* Line 139 - issue with references. We have corrected this reference so that it is in form with the guidelines.

* Line 141 - replace "are" with "were" OK.
* Line 154 - delete "than" We assume that this means the replacement of “that.” OK.

* Line 157 - consider using "sex" instead of "gender" if you are referring to biological traits OK.

* Line 171 - should be "firstly" OK.

* Lines 179 to 181 - this sentence could be clearer OK. We have split this sentence into two separate sentences. We hope that this correction makes the sentence clearer. *Line 192 - revise to "Of the children who participated, 94% lived in two-parent families, where 6%..." OK.

* Line 200 - insert "was" before "distributed" OK.

* Line 208 - delete extra period OK.

* Line 213 - insert "a" after "with" OK.

* Line 214 - insert a comma after "time" OK.

* Line 243 - revise to "…, placed a higher importance on…" OK.

* Line 250 - delete "the" OK.

* Line 251 - delete "the" OK.

* Line 305 - when you say "environmental factors" are you alluding to factors outside the home? This is a relevant comment. We have modified this sentence so that we added “besides home setting.”

* List of abbreviations - what about "SD" and "DAGIS"? We have added these abbreviations to the list (lines 415–418).

* Table 1 - delete "if not stated otherwise" from column 2 (doesn't really make sense) OK.

* Table 1 - insert "=" after mean and SD OK. *Table 1 - row 4, column 3: delete "reference category…” OK.
* Table 2 - specific the alpha value for significance (i.e., *, **, ***) OK. *Table 3 - remove "preschool children's screen time" under the table title (seems repetitive) OK. *Table 3 - what does the bolding signify? We have added a footnote to define what the bolding means.

* Table 4 - what does the bolding signify? We have added a footnote to define what the bolding means.

Maite Verloigne (Reviewer 2): I really enjoyed reading this well structured and clear manuscript. The topic is of interest and contributes to the literature. I have some minor (although essential) issues that could be addressed by the authors.

Abstract - Method. Instead of writing the following sentence 'A total of eight measures of social and physical environment factors in home setting acted as potential mediators in this study.', the authors could sum up the 8 factors at the end of the following sentence 'Parental questionnaire (N=808) assessed the educational level and social and physical environment factors at home (i.e. …)' Thank you for this relevant comment. The suggestion improves the abstract. We have now rewritten this part of the manuscript (please see lines 32-36).

Introduction 'In addition to the harmful health impacts of screen time, concurrent evidence exists that children from low socioeconomic status (SES) backgrounds have more screen time in early childhood than children from higher SES backgrounds [6].' Can the authors specify the difference in time spent in front of a screen between the two groups by giving mean values? Thank you for this comment. We aimed to find mean values about the differences between the two groups, but we noticed that many of these studies have either dichotomized or categorized the screen time making it hard to give mean values. We found only very few studies with limited sample size that had also mean values to be included, but we felt that we would give too strong a statement in the introduction about the difference. However, we modified this part of the introduction (see the lines between 64 and 69) so that we refer more to higher risks of exceeding the recommendations among children with low SES backgrounds.

Introduction. '… and this environment affects children's choices and behavior.' I agree for older children, but do preschoolers already really have the choice to engage in specific behaviors? Thank you for this comment. We have modified this part of the manuscript by writing that this environment affects the children’s possibilities for different types of behaviors (lines 81-82).

Introduction. I acknowledge that there are not many studies in preschoolers, so I would specifically add the age (range) of the population in the studies that the authors refer to. (e.g. line 68-71; line 82-85;…) Thank you for this comment. Each study that we refer to in this manuscript has a bit different age range depending on the study context, and therefore, we decided to
highlight that studies are less conducted among children that are the focus in our study (aged 3-6 years). We made some structural changes to our manuscript in several parts of the introduction (see lines 91-96 and 100-117). In addition, we unified our concepts so that instead of early childhood we use the term preschool children consistently in the introduction. We hope that these changes add value and uniqueness to our work, which was recommended by another reviewer.

Introduction. 'Mothers with high education also restrained from watching television in the presence of their children' Did they restrain more than lower educated mothers? Or did the lower educated mothers not restrain at all? Thank you for this comment. We have modified this sentence so that the results of the study are clearer to understand that the mothers with higher education restrained more often watching TV with their children compared to mothers with lower education (lines 92-94).

Introduction. The authors may already add in the introduction why the results of mediation analyses could be relevant? (This could for example be added after the sentence on line 78-80) We have added the explanation about the relevance of mediation analyses in the introduction (lines 97-98).

Methods. 'A total of 86 preschools in 8 municipalities agreed to participate in the study'. How were the municipalities selected? The selection of municipalities for this study was based on SES indicators (larger variation of educational level, income level, and higher Gini coefficient) according the national statistics (Welfare Compass for monitoring regional welfare) by the National Institute of Health and Welfare. We have added information about this selection into the manuscript (please see lines 126-129).

Methods. 'We modified the original version so that we asked separately television watching and DVD/video watching,' Why is it necessary to separate this? Thank you for your comment. One of our original aims in the DAGIS study was to get a specific and detailed information about preschool children’s screen time and how this time is split between different devices. We considered that there might be a difference between how much a preschool child is watching television or DVDs/videos and if the purposes behind watching these devices are different. If a child at this age is watching DVDs/videos, a parent usually turned the DVD/video on. The time in front of DVDs/videos might replace time in other activities, such as time outdoors (e.g., due to poor weather). Some parts of the television watching might, on the other hand, be more habitual (e.g., children’s cartoons in the mornings). In addition, every family might currently have a television in Finland, whereas DVDs/videos might not be found at every family’s home. Therefore, we decided to separate television watching and DVD/video watching. Although it is not relevant in this manuscript, we might later in another study look separately at factors associated with children’s use of different devices.
Results. '…93% of those who returned diaries; 49% girls; mean age 4.7 years' What was the SD for age? The standard deviation was 0.89. We have added this information to the manuscript (line 224).

Results. 'Children's screen time was correlated with all of other variables'. There is always a correlation coefficient, so the authors probably mean significantly correlated? Thank you for this comment. We have added word “significantly” to the sentences (lines 241 and 243).

Results. 'Parental education level was correlated with descriptive norm for children's screen time, parental use of screens in front of children, parental importance for limiting children's screen use and parental attitude towards societal pressures for children's screen use.' The correlation coefficients could be placed between brackets after every mediator. We have added the correlation coefficients in brackets after every mediator (lines between 242 and 246).

Results. The authors often talk about 'among children with higher parental education'. This is not 100% correctly worded, it should be children from parents with a higher education level. Thank you for this comment. We have now replaced the parts “among children with higher parental education” with “children from parents with a higher educational level.” The changes were made in lines 267 and 274.

Discussion. 'Our results propose that parents with high education value the importance of limiting screen time more and can offer alternative options at home. These alternative options might be, for example, hobbies outside home or playing with PA equipment, which have been found as significant mediators…' It could also be that the alternative options are also sedentary activities, for example, quiet play? Yes, you are correct. This part of the discussion was modified a bit, and we elaborated more on the role that the physical environment in home settings has on children’s screen time. This change was made because your comments together with comments from other reviewers asked us to add more practical implications of our findings in the discussion (please see lines 319-331).

Discussion. I would suggest to be more cautious about some statements in the discussion. For example, ‘they believe that learning to use screens at an early age is beneficial for the children's future possibilities in work life and school, especially if the parents feel less capable of using screens and consider that children's sports and the related costs are too expensive.’ Thank you for this comment. We have removed this sentence in our discussion and added some new sentences to this paragraph. We hope that our changes are more suitable to be used (lines between 295 and 303).
Discussion. 'Other indicators of SES such as relative income could bring more additional knowledge of relevant mediators in the associations between parental SES and children's screen time.' The authors might elaborate somewhat more on this issue, as it might be that other indicators of SES are differently associated with children's screen time (see review Mielke et al.). In addition, it might be that the association between SES and specific screen-based behaviours is different as well. You are right that the different screens and specific indicators of SES might influence the associations between parental SES and screen time. Thank you for the tip about review as well. We have familiarized with it and modified a bit based on the article about our manuscript. (please see the changes in lines 389–395).

The discussion is well-structured and to the point, however, I miss some implications. Which actions, strategies or interventions could be developed to decrease screen time behaviour in children from lower educated parents? Thank you for this comment. Other reviewers made similar comments as well. Therefore, we added a new paragraph to illustrate the possible implications of our findings (lines between 350 and 367). We also added some new sentences in different parts of the discussion with possible practical implications of our findings. Because other reviewers also had ideas about how to improve the discussion, we combined these comments to form a more cohesive structure in the discussion.

Discussion. There are almost no studies investigating the mediating role of parental factors in the association between parental education level and preschoolers' screen time. However, there are studies that investigate this topic related to preschoolers' beverage consumption (see reference Pinket et al.). Are there consistencies between studies? Yes, the mediational studies among preschool children are scarce. We added some consistent results of these studies into our manuscript (lines between 344 and 349) and also some new thoughts to be considered that were raised by the Pinket et al. study. We would like to thank you for this reference as well.

There are some typos and inconsistencies in the manuscript (e.g. screen-time vs. screen time), please correct. We have double-checked our manuscript and asked advice from our native language editor. She stated that screen time was hyphenated when it was used a compound modifier. Therefore, we followed her advice and left the hyphen in certain parts of the manuscript.

Reviewer 3

Thank you for the opportunity to review this paper, which examined whether factors in the home environment mediated the association between parental education and preschool children's screen time. The study had a number of strengths and examined a topic where evidence is lacking in this particular age group. I have provided some comments to consider below.
Major Comments

Introduction (lines 72-73) - The Authors state, parental educational level is an important indicator for SES. One of the references provided indicates parental education is the most commonly used indicator of SES. Please add further justification as to why parental education was chosen over other indicators of SES. Thank you for this comment. We have now added more justification as to why parental education was chosen over other indicators of SES by making some structural changes to these sentences (please see the changes in lines 88–90). We also changed some references so that they fit better to the meanings in the sentences. We hope that these changes will justify why parental education was chosen as an indicator of SES. However, we also acknowledge that other indicators of SES might produce different results, but we decided to leave this discussion in discussion section (please see lines 387-389).

Methods (line 121) - Are any psychometric properties available for the modified diary? If not, please expand on the validity information from the diary the modified version is based on. Thank you for this comment. We have not looked more profoundly at the psychometric properties of our diary. Therefore, we added more information about validity of this diary into the manuscript by adding the sentence: “This diary has shown to have an acceptable correlation coefficient with accelerometer measures, and therefore, it is recommended to use this diary as measure of 3–5-year-old children’s sedentary behavior [21] in the lines 150–152.

Method (126-127) - In the introduction, the Authors highlight that most research has focused on television viewing only. A strength of this study is the addition of other types of screens within the diary. However, all these types of screens were combined into one measure. Did the Authors examine whether the mediators were consistent across different types of screens? Thank you for the question. We have not analyzed the data by looking if the mediators are consistent across different types of screens. We considered that we are more interested in overall screen time (time in minutes) and what factors separate the children with high or low screen time. Our study also shows that there were no SES differences in the number of screens at home, and on average there were five different types of screens available at home. Based on this information, we considered that it was more relevant to focus on overall time rather than look at screen-specific results. However, we acknowledge that this is a relevant comment to consider in the future. We made some modifications to our manuscript based on this comment (lines 389-395). In addition, we removed the sentence (in lines 104 and 106) in the introduction because the other reviewer hoped to have a stronger introduction section. We considered that this sentence is not anymore coherent with other new sentences added in this paragraph.

Methods (line 146) - Some of the mediators include two items and were combined but the Cronbach’s Alpha values were low, should these items be combined? Are there any other psychometric properties available for the mediator variables? Thank you for this comment. We hope that we have understood your question correctly. We acknowledge that the Cronbach alpha values are low, and the small number of items in a certain mediator might explain this low value.
We decided, however, to keep these items together because they illustrate the same phenomena. On the other hand, combining all these items together into one variable might not illustrate the same theme. We did check some other psychometric properties (e.g., inter-item correlations), but the other properties were not better than the Cronbach alpha. We decided to report Cronbach alpha because it is a well-known psychometric property.

Methods - Some of the variables in the mediation models were dichotomous or ordinal, how were these handled in the mediation models? Thank you for this comment. Yes, there were dichotomous or ordinal mediators in the models. In Mplus, there are several estimators available to use, and the WLSMV estimator is often recommended to use with dichotomous or ordinal mediators. However, Muthen & Muthen recommend using the MLR estimator instead of the WLSMV in cases with categorical mediator and continuous outcome (see e.g., discussion http://www.statmodel2.com/discussion/messages/11/657.html?1378560237).

Because all other mediators were treated with the MLR estimator, we decided to also run through the dichotomous and ordinal mediator analyses with MLR. Therefore, the comparison between studied variables and their regression coefficients are easier to make. However, we acknowledge that this is a relevant theme, and we have added the information about the estimator into the methods section (see lines 200 and 201).

Was screen time normally distributed? We added information about normal distribution into the manuscript (see lines 199 and 200).

Results - The Authors indicate which paths has significant associations, were these significant associations meaningful in terms of the size of the coefficients? Thank you for the comment. We are not sure if we understood this comment correctly. Generally, the indirect effects in our study were small, as we state in our discussion (line 382), and therefore, it is relevant to consider how much a certain indirect effect can actually have on practical meaningfulness in children’s screen time. However, we consider that our mediators illustrate the relevant themes around screen time and give some thoughts about how to diminish the socioeconomic gradient in preschoolers’ screen time. Therefore, we decided to point out more the comparison between different educational levels in the results section (see lines 268-271) to illustrate this socioeconomic gradient of these factors in relation to screen time. In addition, we emphasize more the practical meaningfulness of our results in the discussion section (please see lines 350 and 367).

Conclusions (line 315-316) - The Authors speak to interventions briefly in the conclusion section, the Reviewer was hoping to see more detail regarding this point in the Discussion section. Thank you for this comment. The other reviewers also wished to see more practical
implications added to the discussion section. Therefore, we have made some modifications to several parts of the discussion (please see the lines between 350 and 367).

Minor comments

Introduction (line 56) - Sentence suggests recommendations on their own limit children's screen time. Change "several national recommendations limit..." to "several national guidelines include recommendations on limiting..." OK.

Introduction (line 63) - Change "associated between" to "that explain the association between". OK.

Introduction (line 69) - Should "efficacy" be "self-efficacy"? OK.

Introduction (line 81) - Please clarify what age you are referring to here when you use the term "children". Similarly throughout the introduction several terms to define age including preschool children, school-aged children, and early childhood are used. Please ensure the terms are being used consistently and define the age groups with the first use of each term. Thank you for this comment. Other reviewers pointed out this age issue as well. Therefore, we made some changes to our introduction so that we consistently use the term preschool-aged children or preschool children instead of early childhood (please see the changes made to the lines between 61 and 105). We also added some age information when referring to other studies that are not studying preschool age. We hope that these corrections make it easier to understand our manuscript.

Methods (line 102) - Please change "autumn" and "spring" to actual months or add in the months, to benefit readers from other countries where seasonal timing may differ. OK.

Methods (line 103) - A total of 83 preschools agreed to participate, what was the total number of preschools approached to participate. Thank you for this comment. We have added the percentage in brackets (line 125).

Methods (line 105-107) - Please clarify why preschools were excluded if less than 30% of families agreed to participate. Does the 27% indicated on line 107 include the parents that were excluded for this 30% cut-off? If not, it is unclear why this number is below the 30% cut-off exclusion criterion. Thank you for this comment. It is true that this section was not stated clearly in our previous version, and therefore, we have now modified this section a bit. Our recruitment criteria in this cross-sectional study was to include all the preschools who had at least one preschool group with over 30% participation rate. We have now added additional sentences to this part to clarify the findings (please see the lines between 129 and 136).

Methods (line 137) - Please briefly expand on what the theoretical framework for the DAGIS study is. OK (line 169).
Results (line 191) - Change "participated" to "participating". OK.

Tables 2-3 - Please indicated in the legend for Tables 2 and 3, what the bold means. OK. Also, please clarify what the statistics is for the different paths, in addition to the 95% CI. OK.

Results (line 220) - change "Parental" to "parental" OK.

Results (line 222) - delete extra period OK.