Author’s response to reviews

Title: Trends in television time, non-gaming PC use and moderate-to-vigorous physical activity among German adolescents 2002-2010

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Author’s response to reviews: see over
Thanks to all three reviewers for their valuable comments. The revised version has clarified important aspects. All changes within the revised manuscript have been written in red fonts. The responses to reviewers’ comments can be found in the following:

Reviewer: Carol Maher

Reviewer’s report:

Overall impression
In general, this is a well written study with appropriate analyses, which makes the most of the data available from the HSBC study. It is a major flaw that video gaming was not measured in the latter waves of the HSBC survey, and thus was not included in screen time calculations in this study. As the authors comment in the discussion, this is likely to have underestimated screentime, and particularly in boys, who are well known to have much higher gaming time than girls. For this reason, I think it is most important that throughout the paper, the authors qualify the term “screentime” (ST). I would favour avoiding this term, which implies total screentime, which you do not have. Rather, I would try to refer to “TV” and “non-gaming PC use”. I think you should qualify in the methods that videogaming was not gathered so the reader is clearer of this from the outset rather than discovering it in the discussion (which many readers will overlook, unless they read the manuscript in its entirety). I also think it is important that this is clarified in the title and abstract, hence some of my comments below.

Authors:
Thank you for the description of your overall impression about our manuscript. As indicated below we agree that it is important to clarify which screen-time behaviours we focus on, because screen-time can cover a range of behaviours which are not all included here. Following your suggestions, we have labeled screen time, in cases we are talking about our study, with the specific behaviours TV viewing and non-gaming PC use.

Compulsory revisions

1. Title. you are not presenting trends in total screentime (since gaming behaviour is not included). I believe it is important this is clear in the title. Suggest changing it to “Trends in television time, non-gaming PC use and moderate-to-vigorous physical activity among German adolescents 2002-2010”

Authors:
Thank you for this nice idea. We changed as suggested.

2. Abstract
I think it should be clear in the methods of the abstract that time trends in computer and console gaming were not examined.

Authors:
We clarified and discussed it more deeply (see below).

Minor essential revisions

1. Abstract: Recommended not using the acronym FAS for family affluence. It is not common, and makes it hard for the reader. In general, I would prefer this manuscript to use far fewer acronyms.

Authors:
We did not use anymore the acronym of FAS. We also checked the manuscript for further acronyms that can be avoided. We also decided to abandon ST. Instead we use the specific description of the behaviour being reported or we use the term screen time in case we are talking in general about it.

2. How much did MVPA increase? please add numbers to the results in the abstract to make this meaningful.

Authors:
As suggested we have added numbers on MVPA increase.
3. This sentence is confusing: Interactions " showed that the degree of change over time varied but there was no variation in the direction of change". I have no idea what this means. I would recommend removing the sentence on interactions from the abstract, since they didn't show clear patterns.

Authors:
Thank you again for this suggestion. We have removed this sentence and instead elaborate more on MVPA changes including presenting percentage changes (as per previous comment). The abstract is now clearer in our opinion.

4. background: I wouldn't say that reviews published in 2005 and 2009 are "recent". Suggest reword.

Authors:
We agree and reworded.

5. "Recent findings on total screen time using data from 2000 to 2010 among adolescents found a decrease in TV viewing that was replaced by an increase in PC use. This increase was steeper in girls. The overall time using screens remains about the same over these ten years [15]." These sentences could do with some additional referencing, and clarification - it is only when I look at the reference list, I see you are talking about a Czech study. At first I thought you might have been referring to the findings of your own study!

Authors:
We reworded this paragraph to make clear that we are not talking about our study and added a reference on Brazilian adolescents that was published a few weeks ago.

6. End of background: It is unconventional to phrase your research aims as hypotheses, without stating the aims first. I would prefer to see them written as aims.

Authors:
The last paragraph of the background was rephrased as suggested.

7. Methods: with this sentence "The sample was slightly reduced due to missing values in physical activity, sedentary behaviours as well as covariates (range between 5.0 [PC weekday] and 7.3 [TV weekend day])." what does the part in parentheses mean? (range between 5.0 [PC weekday] and 7.3 [TV weekend day])."

Authors:
Thank you for highlighting this – we forgot to include percentages signs. We are showing in parentheses the range (lowest to highest) in percentages of missing cases for the variables reported.

8. typo: adolescentst

Authors:
We corrected it.

9. "This question was developed by Prochaska et al. [22] and in a slightly modified version asking in addition "how many days in a typical week"." This sentence is grammatically incorrect. Please address.

Authors:
We corrected the sentence.

10. "For this version test-retest stability [22- 23] and validity in terms of substantial correlations with accelerometers was shown [22, 24]. Due to the limited space in the HBSC survey and high correlation
between activity in the "past 7 days" and "a typical week", only the "past week" item was used in 2005/06 and 2009/10. Please provide the reliability and validity coefficients.

Authors:
We provide now coefficients on reliability and validity.

11. I would like further detail on the family affluence scale. Who completes it? How is the scale scored? What is the evidence that it is valid?

Authors:
We give more information about the family affluence scale in terms of who is completing it, how it is scored and what is known about validity.

12. Analysis: what was the relationship between MVPA and ST? Should these variables be treated as potential confounders in the models (e.g. the MVPA analyses should be adjusted for ST and vice versa?)

Authors: From a theoretical point we did not treated MVPA and screen time behaviours as confounders in the models because different studies show that MVPA and screen time are often unrelated and can be recognized as unique behaviours. In our national German HBSC report 2010 we looked at the association between MVPA and TV viewing, non-gaming and gaming computer use and did not observe a meaningful correlation. We also re-analysed the combined data for all three waves (2002, 2006, 2010) and found only marginal correlations ranging from .002 to -.059 supporting our theoretical assumptions. Taking these results into account we have kept our original analyses.

13. Discussion:
The sentence is grammatically incorrect: "In 2002 the question did not list "homework" but list in an unspecific way to use the computer for playing." I am a bit confused. You wrote: "We did not have trend information about time playing games on a computer or games console because this differentiated information have been used since 2006." does this mean data on computer and console gaming was available in the 2006 and 2010 waves of HSBC? If so, you could report time trends. Please clarify.

Authors:
Thanks for this comment. We have added a sentence to the methods section to clarify. "We did not report on trends for an item asking about computer and console games since this item only exist since 2006." The aim of the paper is to show trends for the decade. Since for gaming we only have data for the last four years, we are not convinced to show a robust trend and decided not reporting on gaming to present on a consistent time frame.

Minor discretionary changes
1. Methods: confounders: surprising to see age used as a categorical variable rather than continuous. Why was it done this way, and would it change findings?

Authors:
That is a good point. However, in HBSC the sample consists of 11-, 13- and 15- years-old boys and girls. We did not capture the full range. That means we do not have data for 12 and 14 year-olds. Therefore age is used as a categorical variable.

2. Discussion: explanation of increasing PC use in lower socioeconomic status groups: You wrote "One explanation for this might be that in the last decade PC use has shifted away from academic to more social purposes leading to higher participation among all groups of socioeconomic background". An alternative explanation may be that PC have become increasingly affordable over the past decade.

Authors:
Thank you for this alternative explanation and yes we agree with this point. We added this point to the discussion section.
3. There seems to be an over-emphasis on comparisons to Czech data, to the exclusion of other European countries. I would like to see a more balanced mix of countries included in the discussion (or perhaps add an explanation as to why Czech comparisons are more relevant than other countries).

Authors:
There is not much published data on trends in MVPA and screen time behaviours throughout Europe. So the Czech data is an important source. However in response to your comment we have reworded the section and have added a further reference.

4. You could consider commenting that while combined non-gaming PC time and TV time remained constant (or increased in girls) the slight decline in TV viewing is promising, given that television time but not computer use is associated with unfavourable health behaviours such as snacking and exposure to food advertising.

Authors:
Great point. Thank you for this. We integrated this point to our conclusions.

Reviewer: Tim Olds
Reviewer's report:
This study provides secular trend data on German adolescents' physical activity and screen time. It draws data from the long-running HBSC study, uses a very large sample (about 17,000), covering a 9-year period (2002-2010). The response rate is very respectable. The statistical analysis is careful, conservative and appropriate. The question addressed is of considerable interest and importance. The findings are consonant with recent studies showing (a) a plateau in the prevalence of overweight and obesity; (b) a bottoming-out of the decline and slight improvement in children's fitness levels; (c) small increases in children's physical activity levels. The authors acknowledge the shortcomings of the survey methodology, particularly in relation to not capturing videogame playing, but even so the data are of great interest.

Authors:
Thank you very much.

(2) Minor Essential Revisions
• I think the authors are too quick to call for screen time interventions. Different kinds of screen time have different effects on different outcomes. For example, sedentary time is associated with BETTER academic results, and TV appears to be the main culprit in the screen time-obesity link. The authors should point out that screen time should not be considered as a homogeneous activity.

Authors:
We fully agree that screen time is not one unique behaviour and we have tried to emphasize this in the manuscript. However, we did not differentiate between negative and positive outcomes. In the revised version we added in the conclusion part (last paragraph) the following:
"This has important implications for the current and future health of young people and it is essential that steps are taken to develop and disseminate interventions that reduce overall screen time from a sitting-health perspective [49]. However, it is important to recognise that screen time is not a homogenous behaviour and that different types of screen time may be associated with different health outcomes. For example computer use is related to the quality of peer relationship [Iannotti, 2009 #2856] and using electronic media is positively associated with the time spent together with friends [Kuntsche, 2009 #4039]." Hope you are happy with this more differentiating comment.

• I did not understand the sentence beginning "The ample was slightly reduced..." What do these numbers mean?

Authors:
Thank you for this nice comment. We have looked for German data and find some sources showing that girls do use internet and online communities more often than boys. In addition there is one annual German survey that shows that internet use has increased tremendously over the last fifteen years. We have added this information in the discussion section.

Authors:

I wonder if the authors have considered looking at subgroup analyses by BMI? Sex and socio-economic status have been considered. It would be interesting to know if there are differences across SES levels.

Authors:

Again a nice comment. We did not look at BMI subgroup analyses or interactions for two reasons. First we have self-reported Height and weight (with issues around validity) and we have a lot missing values for height and weight, so that these analyses would not be comparable to the presented ones.

Authors:

This is an interesting point. However, we do not think this is an issue for Germany. In Germany there have not been any advertising campaigns emphasizing the usefulness of daily life activities. We have a greater problem in understanding the term physical activity because for most Germans, also in science, this term often means/equals sporting activity. So we are not convinced that the slight increase (and we are still seeing in 2010 low prevalence) we found can be explained by such an effect you describe.

Authors:

Replace “constantly” with "consistently"

Authors:

We changed it.

Authors:

Replace “number computers” with "number of computers"

Authors:

We changed it.

Authors:

I would like to see some comment about how recent developments in portable media devices (smartphones, tablets) may have affected the results. Has screen time shifted from TV and PCs to these other devices in this 9-year period?
We have added a comment on this in the discussion section and give a few numbers for Germany.

- p8 line3
  Increase? Should this be decrease?

  Authors:
  *We double checked and think that “increase” should be right.*

- p9 line1
  I think “times” should be “types”

  Authors:
  *We changed it.*

- p9 para3 line6
  Replace “times” with “time”

  Authors:
  *We changed it.*

- p9 para3 line9
  Replace “as” with “than”

  Authors:
  *We changed it.*

- p11 para2 line15
  Replace “have” with “has”

  Authors:
  *We changed it.*

**Reviewer:** Vincent Busch

**Reviewer’s report:**
No major revisions are required. Some minor revisions I think are needed though. Firstly, in the introduction it should be made clear why you look at these two behavior types (exercise and st). It is somewhat too implicit. There are several recent studies that show their clustering and explain (e.g. via Transfer Learning) how these behaviors might be more effectively tackled simultaneously. This increases the “so what?” aspect of you introduction and makes an even stronger case to be interested in these behaviors in teens.

Authors:
*Thank you for this interesting comment. We tried to integrate this into the introduction part to provide a stronger rationale for our combined consideration of MVPA and screen time.*

The same goes for the end of the first paragraph of the Discussion Section. There you state that better interventions are needed, but state no suggestions for them. Use of Transfer Learning may also be interesting there. References for the mentioned cluster papers are for example Clustering of health-compromising behavior and delinquency in adolescents and adults in the Dutch population. van Nieuwenhuijzen, M.; Junger, M.; Velderman, M.K.; Wiefferink, K.H.; Paulussen, T.W.G.M.; Hox, J.;
Reijneveld, S.A. Clustering of health-related behaviors, health outcomes and demographics in Dutch adolescents: a cross-sectional study Vincent Busch*, Henk F Van Stel, Augustinus JP Schrijvers and Johannes RJ de Leeuw

Authors:
Thank you again. We integrated your comment into the conclusion section to make a case for future intervention.

Secondly, the last line of the "sample" heading. It should be clarified what the values mean 5.0 and 7.3

Authors:
Thank you for highlighting this – we forgot to include percentages signs. We are showing in parentheses the range (lowest to highest) in percentages of missing cases for the variables reported.

Thirdly, in the third paragraph of the discussion it is implied that the often assumed relationship between being able to afford more facilities, stuff and sports club membership (in other words SES) and MVPA levels is not existent? This section could be made somewhat clearer and more explicit.

Authors:
We rephrased the paragraph and gave more details.