Author's response to reviews

Title: Developmental Trajectories of Physical Activity and Television Viewing in Adolescence among Girls: National Growth and Health Cohort Study

Authors:

Soyang Kwon (skwon@luriechildrens.org)
Jungwha Lee (jungwhalee@northwestern.edu)
Mercedes Carnethon (mcarnethon@northwestern.edu)

Version: 2 Date: 12 May 2015

Author's response to reviews: see over
Dear BMC Public Health Editors,

Thank you for your consideration of our manuscript titled “Developmental Trajectories of Physical Activity in Adolescence among Girls: National Growth and Health Cohort Study” (MS: 2055433574157078) for publication in BMC. Please find a point-by-point response to the reviewer’s comments below.

**Referee 1:**

**Reviewer’s report:**
This longitudinal study was a secondary analysis of self-reported physical activity data collected between 1987 and 1997 from adolescent girls in the US. The study attempts to use a novel methodology to address the important and complex issue of how physical activity changes during adolescence. The study clearly demonstrates how group-based trajectory analysis could be used to address research questions in this field. However, due to limitations of the data used for analysis the ability of the study to contribute answers to this field is questionable. Had this study been conducted using up-to-date and objectively measured physical activity data it would have been extremely interesting and important for the field.

Response: We appreciate the reviewer’s recognition of the clear demonstration of the innovative analytic approach. Responses related to the comments regarding the limitations of using older and self-reported physical activity are discussed below.

- **Major Compulsory Revisions**
In its current form the relevance and contribution of the study for addressing the research question is questionable due to the limitations of the data used for analysis (highlighted below). Ideally this study would be conducted using up-to-date and objectively measured physical activity data. Despite this, the study clearly describes and demonstrates the application of a novel methodological approach to the research question, which could be an important tool for the field.

Response: We acknowledge the limitations that the physical activity data used were relatively old and self-reported. Use of self-report data was noted in the Limitations section in the original manuscript. In this revision, we have added the use of older data as a limitation. In addition to acknowledging these limitations, we would also like to point out that, to our knowledge, no other cohort study using repeated measured-objective PA data and a long follow-up duration that covers the entire adolescent period in a large sample of girls currently exists. The NGHS dataset that we used in this study is the only...
existing dataset that includes multiple PA assessments over the entire adolescent years in a large sample of girls (n > 2000 girls). Multiple PA assessments and a large sample size are required to apply the innovative analytic approach that we used, a group-based trajectory model.

Limitations of data used for analysis
Due to the substantial changes in social, cultural, technological and environmental landscapes over the last 20-30 years, data collected on adolescents between 1987 and 1997 has limited relevance for understanding changes in physical activity and sedentary behaviour in adolescence today.

Response: Thank you for the comments. We agree that the use of this older data is a limitation of this study. Although this study used older data and, therefore, both the absolute level of physical activity and the distribution of PA trajectory subgroups may not be applicable to the today’s adolescent population, we believe that the knowledge on distinct physical activity developmental patterns identified through use of the innovative analytic approach largely contributes to our understanding of the developmental patterns of physical activity behaviors during adolescence in today’s population.

The rational behind the sampling strategy is somewhat unconvincing and the extent to which the sample may be representative of any broader population is unclear.

Response: In this secondary dataset, each of the three study sites used different sampling approaches. The sample is not representative of any broader population such as U.S. adolescents. In this revision, we have added this as a limitation: “because the sample is not representative beyond the source population, the study results may not be generalizable to other populations.”

The authors state “The HAQ is a validated instrument against 3-day activity diary and accelerometry data to assess…PA in the past year”. It does not seem possible that 3 days of activity diary and accelerometry data can be appropriate validation criterion for PA in the past year.

Response: We agree that an activity diary or accelerometry data are not a gold standard for PA level in the past year. Each of the HAQ, activity diary, and accelerometer measures used slightly different dimensions and constructs of PA. Unfortunately, in the physical activity research field, there is
no gold standard for the past year PA level, and accelerometer and activity diary data are often used to validate a physical activity questionnaire.

Moreover, in the paper referenced by the authors [27] the correlation between the accelerometer data and HAQ is very low (rs = 0.09) which suggests that the HAQ does not reflect the actual physical activity that has been performed. Although questionnaire data may be adequate to address some research questions, for the current study, which attempts to assess detailed patterns of physical activity over time, it seems fundamental to use a more valid and precise measure of physical activity.

Response: As the reviewer has pointed out, it is true that the HAQ data had a low correlation with the accelerometry data. However, as described in the referenced paper [27] and another paper noted below (Kimm et al.), longitudinal trends of activity levels were parallel among the three methods—HAQ, activity diary, and accelerometry—which strengthen the assumption that the HAQ data is valid to examine longitudinal patterns over time. Therefore, while HAQ may be inadequate to examine absolute PA levels, is adequate to examine longitudinal trajectory patterns of PA levels.


The HAQ score in “MET-times per week” is particularly problematic. Aside from the assignment of METs to children’s self-reported activities – which is likely to vary considerable between children and activity context - to multiply the assigned METs by a “frequency” score and then a three level “fraction of the year” score seems unlikely to result in much more than measurement error. Moreover, duration of activity participation was not taken into account, so it is unknown whether those children with a higher number of different activities (and thus high HAQ score) were actually doing more activity than a child with a low number of different activities (and thus low HAQ score) or if they spent less time on each individual activity. It seems that a high HAQ score could be achieved by doing many different activities of low MET value, infrequently, or by doing a smaller number of different activities of high MET value, frequently. These possibilities may represent distinct groups with very different implications for policy, practice and health outcomes, however, it is not possible to separate them using the HAQ score. The HAQ seems highly dependant on how each child interpreted the question for example one child may report “dancing” 4 times per week where another may report, “ballet”, “tap” “modern” and “jazz” as separate activities resulting in very different HAQ scores.
Response: The duration of activity participation was not taken into account in this study, because, as we described in the first paragraph under the Measurements section, the “pilot testing revealed that 9 or 10 year-old girls were unable to reliably recall the duration of activities during the previous year [6].” Nonetheless, as the reviewer has commented, the HAQ scoring system certainly has several limitations. However, it is important to point out that a previous NGHS study published in Lancet (noted below) demonstrated that a decline in the HAQ score in MET-times per week was associated with increased body mass index and sum of skinfolds. In addition, as we mentioned above, the HAQ score data in MET-times per week showed similar longitudinal trends with both the activity record and accelerometer data.

[Citation: Kimm SY, Glynn NW, Obarzanek E, Kriska AM, Daniels SR, Barton BA, Liu K: Relation between the changes in physical activity and body-mass index during adolescence: a multicentre longitudinal study. Lancet 2005, 366(9482):301-307.]

The authors acknowledge that: “future research should confirm the existence of maintenance trajectories in a large cohort study using objective PA measures”. However, I suggest that a different data set with objective measures of physical activity should have been used for this analysis. Due to the limitations of the self-reported data, any number of speculations could be made to explain the activity trajectories reported in the manuscript. For example the ‘substantially decreasing high PA’ group may simply be a group of children with the propensity to over report their activity level in early questionnaires and those children that ‘maintained’ their activity level could be children more susceptible to social desirability bias at older ages and thus over reported their activity in the later questionnaires.

Response: Since the first author submitted the original manuscript, the first author has conducted a study to explore physical activity trajectories over childhood and adolescence using accelerometer-measured PA data from 537 Iowa Bone Development Study (IBDS) participants (50% girls). This IBDS manuscript has been accepted for publication in JAMA Pediatrics. Although the IBDS had a smaller sample size (269 girls in IBDS vs. 2,155 girls in the current manuscript), the IBDS identified a ‘maintenance’ trajectory and a ‘substantially decreasing from high PA’ trajectory, which confirmed the current study findings. Although the use of self-reported data is certainly a limitation of the current study, the study results, which have already been replicated in a subsequent study,
contribute to growing knowledge on PA developmental patterns during childhood and adolescence, using the innovative analytic approach.

As acknowledged by the authors, the methods used to collect data on TV watching changed over time, which may have led to differential bias.

Response: To estimate any potential bias associated with a change in the TV watching questions, we conducted group-based trajectory analysis, only using the data collected after the question change (study years 7, 8, 9, and 10) and found the four TV watching trajectory patterns to be similar to the four trajectories reported in the current manuscript.

Minor Essential Revisions
Background, para 2: Remove “such” in sentence “An advanced analytic approach that could complement such traditional analytic approaches…”

Response: Thank you for the editing suggestion. We have moved “such” for this sentence.

Background, para 4: Rephrase to “…in larger, more diverse, study populations…”

Response: Thank you for the editing suggestion. We have rephrased this sentence as suggested by the reviewer.

Background, para 4: If stating “national debate”, please mention which nation you are referring to. I believe the debate about sedentary behavior recommendations is international, so this may be more accurate.

Response: Thank you for the insight. We agree that international would be more accurate. We have revised this sentence to read “international debate”.

Background, para 4: In the last sentence, please rephrase to clarify what is meant by “and their risk factor”.

Response: We have rephrased the indicated sentence to “the risk factor of the PA trajectories”

Methods, para 1: Please include further details regarding the selection procedure e.g. How were the schools selected for invitation to the study? How many schools were
invited? How many school participated? Within each school who was invited to participate? What is the reported participation rate based on? Further clarification of the external validity is necessary.

Response: There was no school selection for invitation to the study in the Richmond area: all of the 43 elementary schools in the Richmond school district were invited and accepted the invitation. In the Cincinnati area, 6 traditional public elementary schools and 6 alternative public elementary schools were randomly selected. In addition, 6 parochial elementary schools that “feed” 2 parochial high schools that had partnered with the Cincinnati study center in previous studies were selected. All of the 18 selected schools accepted the invitation. Within each school, girls who were self-reported White or Black race and aged 9 or 10 years were invited to participate until the target sample size was attained. The participation rate of 78% is based on the percentage of girls who completed the first clinical assessment, out of all girls who were asked to participate (i.e., given a consent form in Berkeley and Cincinnati) or who were determined to be eligible by a telephone interview (in Washington, DC). In the revision, we had added “All of the 43 elementary schools in the Richmond school district were invited to participate. In the Cincinnati area, 6 traditional public elementary schools, 6 alternative public elementary schools, and parochial elementary schools that “feed” 2 parochial high schools that had partnered with the Cincinnati study center in previous studies were invited to participate.”

Methods, para 1: Please clarify what is meant by “census track data showed similar percentages of Black and White children with the least degree of income disparity between races”. What is it “the least” out of? What were the other choices of areas?

Response: To clarify this issue, we have added “The three areas were chosen based on U.S. census tract data to include a wide distribution of household incomes and parental education levels within each race.”

Methods, para 2: Please state the time-frame for the HAQ.

Response: As noted in the Measurement section, the HAQ was designed to assess PA during the past year.

Methods, para 2: Please provide a definition for METs.
Response: we have added the following definition for METs in the Measurement section. “…the ratio of metabolic rate during a specific PA to a reference metabolic rate; 1 MET=3.5 ml O$_2$·kg$^{-1}$·min$^{-1}$”

Methods, para 2: Please state the potential range for the weekly frequency score. Was it possible for a child to participate in an activity more than once per day e.g. they may run around at multiple break times at school, then run around when they get home before dinner, and then run around again after dinner, resulting in a reported frequency of “running” 20 times per week?

Response: Participants were asked to report the weekly frequency of each type of activity. The range of the weekly frequency for all of the activities engaged in was zero to 21 and its interquartile range was 0 to 4 times/week. It was possible for a child to participate in a particular type of activity multiple times per day. However, the frequency question had four category options: never, less than once a week, 1 or 2 times a week, or ≥ 3 times/week, and therefore the max frequency counted for a particular activity was 3 times/week (the frequency data were truncated). In this revision, we have added a description of the four category options for the frequency question in the Measurement section, “never=0; less than once a week=1; 1 or 2 times a week=2; or ≥ 3 times a week=3”.

Methods, para 2: Please report the range of MET values possible for reported activities – in the discussion you state that you also included lower intensity PA – please give some examples of the lower intensity activities in the methods.

Response: The MET values ranged from 1 to 8. The NGHS used a “group” approach to assign a uniform MET value to activities at a similar level of intensity. For example, 4.2 METs were assigned to kickball, volleyball, baseball, softball, and Frisbee. In the revision, we have deleted “lower intensity PA” from the Discussion.

Methods, statistical analysis: Please clarify whether HAQ scores were treated as a continuous or categorical variable for determining the group-based trajectories—currently categories are first mentioned in the results section for labelling the trajectory groups.

Response: HAQ was treated as a continuous variable. In the revision, we have added “continuous variable”: “The sum of HAQ scores for all activity categories (continuous variable) was used as an indicator of PA level.”
Methods, model diagnostics: Please clarify what is mean by “reasonably narrow”
confidence intervals.

Response: “Reasonably narrow” is the language borrowed from the referenced
book written by the group-based trajectory model developer, Dr. Najin. As
presented in Table 3, the width of the 99% confidence interval was ≤0.5.

Results, para 4: The authors give an illustration of how the HAQ score can be
interpreted using the example of brisk walking. They state that this is assuming
30 minutes per bout. Activity duration is not included in the calculation of HAQ score,
therefore there should be no assumption about the bout duration included in this
illustration. In addition, the authors must have assumed a “fraction of the year” score to
calculate the HAQ score, this is not mentioned in the illustration, but should be included.
It would be useful to also include what MET value was assumed so the reader can work
through the calculation himself or herself.

Response: The interpretation using the example of brisk walking has been
deleted.

Results, para 5, last sentence: It is stated that those with the unhealthiest PA pattern
followed declining patterns of TV viewing (TV groups 3 and 4). However,
TV groups 3 and 4 were stated to be increasing – please correct this error. Also, please
clarify what is meant by unhealthiest PA pattern – maybe use the group label “declining
from moderate” instead?

Response: Thank you for pointing out the error. The noted sentence was
corrected as “…increasing patterns of TV viewing (TV groups 3 and 4).”

Discussion, para 1: Please mention the declining trajectories as well as the
maintenance trajectories.

Response: We had added “two declining patterns” to this paragraph.

Discussion, para 2: Please rephrase “landed at a similar level of PA” to something less
colloquial.

Response: We have rephrased this to “reached a similar level of PA”
Discussion: Please extend the discussion to include the impact that using self-reported data might have had on the results.

Response: In the second paragraph of the Discussion section, we have added: “Self-reported PA data are prone to measurement error and often overestimate PA level among high-risk individuals such as children with obesity [35].”

Table 2: P-value rather than P.

Response: All Ps have been changed to P-values.

Table 3: Please be consistent with capitalisation of column headers.

Response: The first letter of the column headers have been capitalized in a consistent manner.

• Discretionary Revisions

Background para 1: It may be useful to add some additional context about why physical activity is important to understand and why insight about changes in PA behaviours over time would be beneficial.

Response: In the first paragraph of the Background section, we have added: “Habitual moderate- to vigorous-intensity physical activity (MVPA) during childhood provides numerous physical, psycho-social, and cognitive health benefits [1-3],” followed by a description of why insight about changes in PA behaviors over time would be beneficial: “Longitudinal investigation of PA can provide insight about changes in PA behaviors over time and the relationship of those changes with health outcomes.”

Background, para 4: The second half of this paragraph doesn’t seem to fit well here – consider including this earlier.

Response: Thank you for the suggestion. We have moved the second half of the 4th paragraph to the 1st paragraph.

Methods: Did you consider including potentially confounding variables in your analysis?

Response: We delimited the purpose of this study to describe the diverse trajectories of physical activity and TV viewing behaviors, but not to explore the
determinants or correlates of those trajectories. In a future study, we will investigate the potential factors associated with the trajectory assignment.

Results, para 4: For clarity I suggest calling the ‘substantially decreasing high PA’ group ‘substantially decreasing from high PA’ and the ‘decreasing moderate PA’ group ‘decreasing from moderate PA’, as these groups are in the low PA band by the end of the study. Similar changes would be beneficial for TV viewing labels. Update this in Table 4.

Response: We think that this is a great suggestion. We have changed the labels to “substantially decreasing from high PA” and “decreasing from moderate PA.” Similar changes have been made for TV viewing labels in the text and tables.

Results: It would be interesting to re-run analyses without including METs in calculation of the HAQ score to give an analysis of patterns of activity frequency over time. This would remove one source of measurement error from the exposure.

Response: We conducted group-based trajectory analysis for weekly activity frequency. Because of the lack of variability in the weekly activity frequency, the identified trajectory patterns were homogenous. Therefore, we did not present this result in the current manuscript.

Results: It would be interesting to re-run analyses separately for classes/lessons and unstructured PA to assess whether patterns are similar for these potentially distinct categories and contexts of activity.

Response: We conducted group-based trajectory analysis for classes/lessons, sports, and unstructured PA, separately and the trajectory patterns were not similar for these potentially distinct categories and contexts of activity. For example, we identified two sport activity score trajectories (see the Supplemental Figure below); these two trajectory patterns were not similar to the four overall HAQ score trajectory patterns reported in the current study.
Table 1: consider including p-values for the comparison characteristics.

Response: We have added p-values to Table 1.

Level of interest: An article of importance in its field
Quality of written English: Acceptable
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.
Referee 2:
This manuscript addresses an important public health issue, i.e. the physical activity patterns over time on youth population. The stronger value of the study was the use of group-based trajectory analyses to identify different PA patterns among a heterogenous population. However, the manuscript would need a deep and meticulous work to be clearly understood. Therefore, I believe that several major and minor revisions are warranted as described below.

Major Compulsory Revisions:
1. It is strongly recommended shortening the methods section, since there are too many information. The same information is repeated sometimes and it is difficult to follow the article (e.g in fifth or seventh paragraph). The introduction also contains a few redundant statements and unnecessary aspects (e.g line 60 to 62 or 81 to 85).

Response: In the Method section, we have deleted the following redundant statements: “each of which followed a distinct HAQ trajectory” and “The largest trajectory group was used as the reference group.” In the Introduction, we have deleted the following redundant statements: “In summary, each of these approaches presents a limitation to fitting statistical models to represent the potential diverse patterns of PA change over time within a population” and “Group-based trajectory modeling utilizes multi-nominal modeling strategies for identifying distinctive clusters of individual trajectories within a population. In the group-based trajectory model, a separate set of parameters is estimated for each group”.

2. I strongly suggest discuss the most relevant results such as the mean of PA levels at each assessment which was higher among White than Blacks girls. It is suggested rewriting the third paragraph and include more information about this relationship between PA and TV viewing.

Response: Thank you for the suggestion. We have rewritten the third paragraph to include discussion on the PA pattern comparison between Black and White girls, and the relationship between PA and TV viewing by adding the following: “Our finding of an unhealthy PA pattern among Black girls is not surprising. Previous studies have consistently reported lower PA levels among Black girls compared to White girls [36, 37]...” and “Most girls (86.1%) who presented the most common PA pattern of decreasing from moderate PA concurrently developed an increasing pattern of TV viewing. Conversely, most girls (87.7%) with the healthiest PA pattern of maintaining high PA concurrently developed a decreasing pattern of TV viewing.”
- Background.

   Response: The following sentence has been added to the Background section:
   “Habitual moderate- to vigorous-intensity physical activity (MVPA) during childhood provides numerous physical, psycho-social, and cognitive health benefits [1-3].”

4. It is strongly recommended clarify whether the results shown were for boys or girls. (line 96 to 98 and 104 to 109). It should also be clarified what kind of sample was measured in longitudinal studies, i.e. childhood and/or adolescents (line 58).

   Response: Thank you for the suggestion. To clarify, we have added “men and women” (line 96 to 98) and “boys and girls” (line 104 to 109). We also revised the sentence to specify the kind of sample: “Recently, a growth curve model approach has been used to analyze longitudinal PA data over ages 8 to 15 years.”

5. Why was an unrealistic assumption?, it suggest that you tone down a bit (line 54 to 56).

   Response: Thank you for the suggestion. We have deleted “unrealistic.”

6. I suggest removing the last sentence of the first paragraph of the introduction, since it contains redundant information.

   Response: Thank you for the suggestion. We have removed the last sentence of the first paragraph of the Background section.

7. I would recommend include the hypothesis of the study. This could facilitate the understanding of the manuscript.

   Response: We have added the following hypothesis in the last paragraph of the Background section: “…the developmental patterns of PA and TV viewing behaviors over adolescence are heterogeneous within the NGHS population.”
Methods

8. Several important information are missing in the methods section. Participants: the decision that not measure both ages 11 and 13 is an analytical decision that requires justification. Please, clarify.

Response: Because the NGHS did not collect PA and TV viewing data at age 11 and 13 years, the current secondary analysis using the existing NGHS dataset could not analyze PA data at age 11 and 13 years. We want to acknowledge that the NGHS was originally designed to collect PA data at age 11, 13, and 15 years (the first budgetary period). However, later on and with additional funds (the second budgetary period), the NGHS was able to continue PA data collection annually until age 19 years. The follow-up assessment time points were set based on a budgetary (administrative) decision, rather than an analytic decision. Nonetheless, the NGHS is one of the cohort studies to most frequently measure PA over time during adolescence in a large sample of girls.

Further, why Cincinnati area was racially representative? (line 123).

Response: Because the statement was unclear we have deleted “The Cincinnati area selected was racially and socioeconomically representative of Hamilton County.”

Were compared girls who were additionally recruited with prior recruitment? (line 126).

Response: The additionally recruited White girls had no significant differences in terms of distribution of income and parental education levels, when compared to prior-recruited White girls.

What measurements were performed related concordant household?. Were parents informed and signed a consent to accept the participation of his girls?. Please address.

Response: To clarify the informed consent procedure, we had added the following statement in the Participants section: “Written informed consent was obtained from the parents until the child became 18 years old, when she also gave written consent.”

9. Further, data were collected on sociodemographic characteristics of each area?, if not, it must be emphasized, since sociodemographic characteristics could influence the practice of regular physical activity (see the reference: “Sociodemographic, developmental, environmental, and psychological correlates
of physical activity and sedentary behavior at age 11 to 12, Brodersen NH, 2005”).

Response: As the reviewer commented, the socio-demographic characteristics are important correlates of regular physical activity behavior. The socio-demographic data were collected and parental education data were presented in Table 1.

10. Measurements: it is unclear who were local trainers. They were students or researchers? How did trainers “help” girls to complete the questionnaires? If trainers provided assistance collecting data, then they have become engaged in the research enterprise, and should have been identified as such in the human subjects protocol. Please address.

Response: Thank you for the clarifying question. The local trainers were research staff who administered interviews and questionnaire surveys. The local trainers were not human subjects in the NGHS. To clarify, we have added “local trainers (research staff)” to the revised manuscript.

Could you specify why you decided that 16 years was the appropriate age to self-administered the HAQ questionnaire?. If you meet previous studies to justify this decision, please mention here.

Response: When the NGHS was redesigned for the second budgetary period, NGHS researchers judged that girls were familiar with the HAQ after three times of administration, and hence they self-administered the HAQ in the second budgetary duration.

11. Moreover, i suggest that you clarify “fraction of the year of the participation” in the first mention (line 146). It also suggest provide a citation in the line 155 (perhaps you should consider moving the citation Kimm S., 2012 at the end of the paragraph) and in the line 160.

Response: Thank you for the suggestion. For the first mention of the “fraction”, we have added “(i.e., most, half, or small part)”

12. Statistical analysis: could you addressed more detail regarding to “four of seven HAQ”?. I also recommended add more information about a dual trajectory model.
Response: We considered that having at least four data points per individual over time would be necessary to fit a quadratic model. To add more information about a dual trajectory model, we have revised the dual trajectory statistical analysis paragraph: “To investigate the relationship between the development of PA and TV viewing behaviors during adolescence among girls, we conducted a dual trajectory model that summarizes the dynamic interrelationship between two variable series across various trajectory groups, instead of a traditional association analysis that estimates the overall association between two variables over heterogeneous subpopulations.”

- Results
13. I also strongly suggest that you make more clear how the results from table 2 and 3 should be interpreted.

Response: Table 2, which shows the model search process, is described in the third paragraph of the Results section in detail. For interpretation of Table 3, we have added, “The four group model was judged to be adequate based on the four model diagnostic criteria (Table 3).”

14. It addressed information in the results that belongs to the section methods (e.g. line 249 to 250).

Response: We have moved the indicated sentence to the Methods section.

15. From my understanding, the research design involved girls within several areas; therefore, the authors should discuss whether their outcomes of interest vary between them.

Response: Thank you for the insight. We conducted analysis separately for each of the three sites. Four distinct patterns were similarly identified in each of the site analyses, although the distribution of the trajectory groups was slightly different across the sites.

- Discussion
16. It strongly recommended include more detail about why the mean of PA levels at each assessment was higher among White than Blacks girls. This is shown in results, but you should hypothesize about it. Please, address.
Response: Thank you for the suggestion. We have added the hypothesis to the last paragraph of the Introduction section: “White girls are more likely to maintain a healthy PA level than Black girls.”

17. “Future research should confirm the existence of maintenance trajectories in a large cohort study using objective PA measures”. This should be acknowledged as a limitation of the study, due to this method are still up for debate.

Response: The use of self-reported PA was acknowledged as a limitation of the study in the Limitations section.

18. I would recommended include more detail from previous observational studies, since it ucknown if the non-association was for boys or girls (line 286 to 289).

Response: To clarify, we have added “in boys and girls”.

19. Authors must especulate about the relationship between the behavioral development of PA and TV viewing. It is suggested rewriting the third paragraph and include more information about this relationship.

Response: To include more information about the relationship, we have added the following to the third paragraph of the Discussion section: Most girls (86.1%) who presented the most common PA pattern of decreasing from moderate PA concurrently developed an increasing pattern of TV viewing. Conversely, most girls (87.7%) with the healthiest PA pattern of maintaining high PA concurrently developed a decreasing pattern of TV viewing.

In summary, the authors do a good job intergrating findings with the existing literature. However, they do not present any compelling or plausible explanations for their results.

Response: We agree that it is very important to explain our findings: e.g., why some girls are consistently active and others decrease PA during adolescence. However, the purpose of the current study was to describe the trajectory patterns of PA and TV viewing behavior during adolescence, but not to identify explanatory factors. Discussing plausible explanations would be beyond the scope of the current study.

Minor Compulsory Revisions:
20. Title: Regarding your purpose; “demonstrate the group-based trajectory analysis process for identifying developmental physical activity (PA) trajectories and their risk factor, and for examining a relationship between PA and television (TV) viewing trajectories among adolescent girls, it is suggested to include “TV viewing” as a secondary variable in the title. (i.e. of Physical Activity and TV viewing).

Response: We have changed the title of the manuscript as suggested.

21. It suggest include percentages in the line 235 and 236.

Response: Thank you for the suggestion. We have added the percentages.

22. I would advise to include the percentages of Blacks and Whites girls at baseline (line 129).

Response: Thank you for the suggestion. We have added these percentages.

23. I recommend clarify the meaning of “medical conditions”. It refers to injuries or special conditiones such as diseases?

Response: Thank you for the suggestion. We have clarified medical conditions by specifying “heart disease.”

Level of interest: An article of importance in its field
Quality of written English: Acceptable
Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests: I declare that I have no competing interests.

If you have any additional questions or concerns, please do not hesitate to contact me.

Sincerely,

Soyang Kwon
Soyang Kwon, PhD
Research Assistant Professor, Stanley Manne Children’s Research Institute
Ann & Robert H. Lurie Children’s Hospital of Chicago
Northwestern University Feinberg School of Medicine
T 312.227.7033 | F 312.227.9523 | skwon@luriechildrens.org | luriechildrens.org
225 East Chicago Avenue, Box 157, Chicago, Illinois 60611-2991