Author’s response to reviews

Title: Socioeconomic position and work, travel, and recreation-related physical activity in Japanese adults: a cross-sectional study

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Author’s response to reviews: see over
Responses to the comments of Reviewer #1

<General comments>
Major strengths of the study were large sample size and assessing physical activity domains. This study contributes to develop this area. However, because there are some concerns, some revisions would be necessary. I also recommend to use an English editing service.

Response: Thank you for your comment. We used an English editing service for the first submission, and have also used the same service for the second submission.

<Specific recommendations>

- Abstract
  
  Comment 1
  
P2 “demographic variables (age, material status, household motor vehicles) were obtained” and Table 1. The “material status” would be miswriting; right may be “marital”.

  Response: You are right that we meant “marital status”. However, Reviewer 2 (comment: 2.3) commented that we should adjust the household income based on the number of individuals living in the same household. We have therefore re-analysed using the household income adjusted for the size of household, and used “size of household” instead of “marital status”.

- Background

  Comment 2:

  P4 “Moreover, it is important to examine the association between SES and DPA domains of work,” Since DPA is abbreviation of physical activity in each domain, the “DPA domains” would be miswriting.

  Response: We have rewritten the sentence as follows (p. 4, lines 19–22):
  “It is also important to examine the association between SEP and domains of physical activity (DPA) such as work, travel, and recreation, to identify lifestyle factors which can be targeted to increase physical activity.”

  Comment 3

  P5 “The association between SES and health behaviors varies according to sex;” This sentence needs a citation.

-METHODS-

- Measurements

Comment 4

P6 "three separate SES domains (work, travel, and recreational) performed" The “SES” would be miswriting; right is “physical activity”.

Response: We have corrected the sentence as follows (p. 6, lines 59–61):

“GPAQ v2 was used to estimate the total weekly quantity (in minutes) of moderate-to-vigorous physical activity across three separate domains (work, travel, and recreation) lasting at least 10 minutes per session.”

- Participants and data collection

Comment 5

P5-6 “A total of 8,284 potential respondents were randomly and blindly selected and were subsequently invited via e-mail to participate in the internet-based survey (response rate = 39.5%); participants with missing values (n =57) were excluded.” This sentence lacks some important information: response numbers and final analysis numbers should be included. For analysis number currently presented in Data analysis, I suggest to move here.

Response: We have added the number of respondents and the final number analysed (p. 5, lines 41–44):

“A total of 8284 potential respondents were randomly and blindly selected and subsequently invited via e-mail to participate in the Internet-based survey. There were 3269 respondents, a 39.5% response rate. Of these, 137 were excluded because of missing data, leaving 3132 participants (final response rate: 37.8%).”

- RESULTS

Comment 6

P8-9 “Basic characteristics of the respondents” The mentioned characteristics may be high volume. Please focus to important characteristics.

Response: We have selected the most important characteristics, and rewritten the
Table 1 presents the demographic and socioeconomic data of the participants. A total of 3132 subjects, 1579 men (50.6%) and 1553 women (49.4%), participated in this study. The proportion in each class for age, size of household, and BMI were significantly different for men and women. The proportion who reported each class of household income (< 3 million yen, 3–7 million yen, and ≥ 7 million yen) was 31.7%, 40.7%, and 27.5% in men, and 30.9%, 41.7%, and 27.4% in women. The proportion who reported each educational level (junior high and high school graduation, 2-year college degree or equivalent, and 4-year college or higher degree) was 26.1%, 16.3%, and 57.6% in men, 26.7%, 39.2%, and 34.1% in women. The proportion reporting each employment status (not employed and employed) was 23.7% and 76.3% in men, 70.2% and 29.8% in women. Men showed significantly higher work-related, recreational, and total physical activity than women.

Comment 7
Table 1. I suggest to calculate statistical gender difference in each item.

Response: We have added an analysis of statistical gender difference for each item (see Table 1).

Comment 8
Table 1. Sample numbers are different by independent variables. It is better to use same sample number between “age” to “education status”, because these variables would be commonly used via all analyses.

Response: We have corrected the sample number in Table 1 as suggested.

Comment 9
P9 “The proportion of participants who reported household income (junior high and high school graduation, 2 years college degree or equivalent, and 4 years college or higher degree)” The “household income” would be miswriting; right is “educational status”.

Response: We have revised this sentence (p. 7, line 100):
“The proportion who reported each educational level (junior high and high school graduation, 2-year college degree or equivalent, and 4-year college or higher degree)…”
1 **Comment 10**

P14 “Because the aim of this study was to examine the association between SES and domain of physical activity, a self-report questionnaire was used.” Further kind explanation is needed to this sentence.

**Response:** We have revised this section, and it now reads (p. 11, lines 178–181):

“Objective measurements (using, for example, a pedometer) are generally recommended, but cannot provide data about physical activity in each domain. A self-report questionnaire was therefore used in this study to examine the association between SEP and the different domains of physical activity.”

1 **Comment 11**

Table 2 and P10 “Total physical activity was borderline significant, with greater activity in the high-income group (OR, 1.36; 95%CI, 1.00–1.84).” For the P value of this OR, I recommend to indicate further decimal points (e.g., 0.0501 and 0.0498). Additionally, for the P value please add to main text.

**Response:** We have re-examined the relationships between SEP and physical activity in total and in each domain, using a logistic regression analysis and adding a new confounding factor. The results of the analysis are shown in Table 2.

- **Conclusion**

1 **Comment 12**

P15 “Although this study has some limitations, it does suggest that there are associations between SES and physical activity, but that the association varies according to the domain of physical activity and sex in Japanese adults. Thus, lower SES was associated with more work physical activity, and less travel and recreational activity, and less total physical activity, and this was more pronounced in men than in women.” This paragraph is lengthy. Please modify more clearly.

**Response:** We have rewritten the conclusion to make it clearer (p. 11, lines 191–196):

“Although this study has some limitations, it suggested that lower SEP was associated with more work-related physical activity, and less travel-related, recreation, and total physical activity, and this link was more pronounced in men than women. To increase physical activity in Japanese adults with lower SEP, it will therefore be important to focus on increasing travel and recreational physical activity. In a follow-up study, the mechanism of
the association between SEP and DPA will be examined."
Responses to the comments of Reviewer #2

<Major Compulsory Revisions>

1.1 Why do you use SES (socioeconomic status) instead of SEP (socioeconomic position)?

The background of these two concepts lies in the sociological theories of Marx and Weber. As for Marx, the status relates to social class and class relations based on the conflict of workers and capitalist in the means of production. For Weber, the position is related to society that is hierarchically stratified to groups that share the same “life chances”. From my point of view the physical activity is not so much determined on the Marxian class theory but rather on the Weberian “life chances” and whether individual based on his/her chances chooses to be or not to be physically active. Can the authors comment on this from the Japanese cultural point of view whether this theory is applicable and add also something to the manuscript?

Response: Thank you for your informative comments on the SEP and SES concepts. We have now changed this throughout to refer to socioeconomic position (SEP) as this better fits with the philosophical underpinning of the study. We have chosen not to include a detailed philosophical background section, to keep the paper as concise as possible.

1.2 The data possess a large non-participation rate, only 39.5% of sample participate to the survey. Do you have information of the non-respondents and Whether this would influence on your results in some way? From my experience the non-respondents are more likely to be young, men and those with low socioeconomic position. I wonder whether this is the case also in Japan?

Response 1: Unfortunately, we do not have any data on the non-respondents, but questionnaire surveys often suffer from this problem. We have therefore added the response rate to the study limitations (p. 11, lines 187–189):

“This study may also have shown selection bias, since the response rate was lower in women, people who were younger and those with a lower income.”

1.3 DISCUSSION, page 13

“However, the reasons why the indicators of SES that are associated with travel physical activity are different in men and women in this study is unknown, and further study is required”. This might explained on the basis of what the different SEP indicators are assumed to present from theoretical perspective or cultural perspectives.
Education as usually assumed to present the “knowledge of related assets of the person” whereas income presents more of the “material circumstances” that could also income ownership of car. So my question is this related to over-adjustment, did you check the multi-correlation between SEP-measures, especially car ownership and income? Moreover, from the theoretical perspective, lower educated women and men vs low income women and men might possess quite different “life chances” to physically active, as you already discuss from the environmental or also cultural perspective, what is seen as “suitable” PA for each group. The inclusion of some theoretical perspectives would benefit contents to the discussion.

Response: We have carried out some additional analysis to check the possibility of over-adjusting for SEP. We examined the relationship between physical activity in each domain and each factor in SEP using two different analytical models. Model I included age, size of household, and BMI as adjusting factors. In Model II, household motor vehicle ownership, educational level, and employment status were added to Model I. We found the same results for both models when we analysed the associations of each SEP factor with physical activity in each domain. We therefore concluded that our analysis was not over-adjusted for SEP.

<Minor Essential Revisions>

2.1 Abstract: please use same PA-concepts throughout the abstract. For example travel-related PA, work-related PA, recreational PA etc.

Response: We have revised the wording to ensure that it is consistent throughout the paper, using “work-related”, “travel-related”, “recreational”, and “total” physical activity.

2.2 The abbreviation DPA = physical activity in each domain with my language skills this does not sound right? I would suggest to or different domains of physical activity = DPA.

Response: We have used the abbreviation “DPA” for domains of physical activity.

2.3 Methods, page 7, it would be useful for the non-Japanese reader to have the household income to be presented in euros (€), at least in the methods section? This would help reader to relate and compare the income inequalities in PA to other countries as well. Moreover, what does the household income include salary, capital income, social and transfer benefits? and is the household income adjusted based on individuals living in
the same household as this would in my thinking influence how much income is usable for each person for example leisure-time activities and whether one should commute or not?

Response: In this study, household income includes all sources of income, including salary, capital income, social and transfer benefits. We have revised the analysis to adjust for the size of household, and also added information about the euro exchange rate (p. 6, line 49): “1 U.S. dollar was approximately equivalent to 102 yen and 1€ to 140 yen at the time.”

2.4 Methods, page 7, the “educational status”, to me it is unclear, without the knowledge of Japanese educational system is unclear what the educational categories include and how comparable this to other countries and, moreover, why do the authors used the concept “status” also here? I would suggest that the authors give clearer definition and explanation of the education variable.

Response: We have revised the wording to “educational level” instead of “educational status”. The Japanese educational system has five levels (elementary school, junior high school, senior high school, college, and university). Most Japanese people graduate from senior high school after 9 years of compulsory education, so this was categorized as the lowest educational level in this study. A 4-year degree or higher degree from university was categorized as the highest level, and a 2-year college degree as the middle level. This is covered in p. 6, lines 74–75.

2.5 TABLE 1, the table includes variables “body mass index” (BMI) and “material status”. BMI come by a total surprise for the reader as this has not been described in the methods. By “material status” the authors mean “marital status”. Please correct the typo and include short description of the BMI to the methods.

Response: We have added a description of the method used to estimate BMI in the methods section (p. 7, lines 71–72):

Body Mass Index (BMI) was calculated from self-reported body height and body weight using the equation BMI = body weight in kg / (body height in m)³

We also used the number of family members living in the household (described as “size of household” instead of marital status.)
2.6. RESULTS, page 10, Authors use also “marriage status”, please use same words logically.

Response: We have now amended the analysis to use size of household, rather than marital status, so the term is no longer used.

2.7. DISCUSSION, page 11, I would re-edit the phrase: “This study found a significant negative association between SES and work physical activity in men, but not in women” differently to better illustrate the main result as “Men with low SES were more likely to physically active at work.”

Response: Thank you for your comments. We have changed the phrase and it now reads (p. 9, lines 142–143):
“This study found that men with low SEP were more likely to be physically active at work.”

< Discretionary Revisions >

3.1. TABLE 2, May I suggest a more descriptive title for the table 2 such as “Socioeconomic inequalities in different domains of physical activity among Japanese men and women”

Response: We have changed the title of Table 2 to:
“Table 2. Socioeconomic inequalities for different domains of physical activity among Japanese men and women”
Responses to the comments of Reviewer #3

<Major Compulsory Revisions>

1. There is a concern about the novelty and scientific contribution of the current study. The associations between socioeconomic status and physical activity have been quite extensively studied, at least in Europe and Western countries, as also the authors have acknowledged. They further state that their study is the first to examine these associations in Japan, and therefore have important contribution to our knowledge about the subject. However, there are to my best knowledge also other studies (e.g. Inoue et al. 2011. J.Epidemiol. 21 (6) 481-90; Kondo et al. 2009. Environ Health Prev Med 14 (3): 196-206; Murakami et al. 2011. Soc Sci Med 73 (12): 1683-8; Fukuda et al. 2005. BMC Pub Helath. 5:53;), in addition to some of those cited by the authors, that have studied the associations between socioeconomic status and physical activity in Japan. The findings of the current study should be discussed more detailed in the light of these previous findings. The authors are therefore kindly asked to specify what is the novelty and scientific importance of the current study and to discuss their findings in relation to previous findings in Japan.

Response: Thank you for your comments. We agree that there have been several publications that have examined the relationship between socioeconomic position and physical activity in Japan. However, none of these publications examined the relationship between socioeconomic position and physical activity in each domain of life. There are also very few studies that have examined the association between SEP and DPA according to gender anywhere in the world. The contribution is now fully set out in the last paragraph of the background section (pp. 4–5, lines 23–30).

2. The assessment of physical activity leaves many unanswered questions to the reader. I would expect a little more detailed description about the use of the GPAQ v2. The GPAQ is not that widely used to assess physical activity, different to what the authors claim. The GPAQ is a version of the International Physical Activity Questionnaire (the IPAQ), constructed to be used in developing countries. Why was the GPAQ chosen as the questionnaire instead of e.g. the more widely used IPAQ? Further, were the participants classified as active and inactive according to the median in different domains of physical activity? There is a discrepancy regarding this and the results in table 1, as the median refers to the 50% limit and in the table 1 the percentages for active and inactive groups are not 50-50%. Perhaps the authors have used the mean but mistakenly written median? However, to my best knowledge, the GPAQ provides information about days
and duration of physical activity so why is not a continuous variable of physical activity for each domain utilized? Continuous data would provide more valuable information about the amounts and differences in amount of physical activity for different socioeconomic groups. Also, the classifications of individuals with respect to their total activity is said to be done according to WHO recommendations. In that case, the classification should take into account also those meeting the vigorous intensity level or the combination of moderate and vigorous. Now the individuals are only classified as active based on the moderate intensity recommendation of 150 minutes/week.

Response: IPAQ has certainly often been used in physical activity research. The reason for using GPAQ in this study is twofold: 1) GPAQ is shorter than the IPAQ long version, so places less of a burden on respondents; and 2) GPAQ is used by the WHO for global physical activity surveillance. It is therefore expected to be more frequently used in physical activity research in the future.

We used the median, because physical activity is not normally distributed in every domain and total. Where an objective variable is not normally distributed, it is not possible to use a multiple regression analysis. We therefore categorized responses into a bivariate distribution so that we could use a logistic regression model. GPAQ measures physical activity of at least 10 minutes’ duration. The proportion of inactivity (0 min) is therefore over 50%.

We agree with the comments on classification of physical activity. GPAQ provides for physical activity of both moderate and vigorous intensity. We have included an additional sentence in the Methods to explain a little more about GPAQ (see p. 6, lines 59–61):

“GPAQ v2 was used to estimate the total weekly quantity (in minutes) of moderate-to-vigorous physical activity across three separate domains (work, travel, and recreation) lasting at least 10 minutes per session.”

3. The use of terminology in the manuscript is confusing and not following common terms e.g. regarding physical activity. There is variation in which terms are used, e.g. both “marriage status” and “marital status” occur, and also inaccurate wording such as “physical activity associated with work” has been used. The authors are asked to revise the manuscript for the consistency and correct use of terms throughout the text. Regarding the physical activity terminology, I would suggest the authors to choose either the terms “occupational”, “commuting” and “leisure time physical activity” or
“work-related”, “travel-related” and “recreational physical activity”.

Response: We agreed with your comments and have revised the manuscript to make the terminology more consistent. For example, we have spelled out “physical activity” throughout, and also used the terms “work-related”, “travel-related”, “recreational”, and “total” physical activity for consistency. The only place that we have left “recreation-related” is in the title, to make it more concise.

4. There are some issues regarding the data sampling and data handling that need to be clarified. First of all, what year was the data collected? From what area or areas of Japan were the respondents? What was the representativeness of the final sample compared to the general population in Japan? Of the 8284 selected persons, 39.5% responded and 57 further had missing data. This leaves 3215 participants according to my calculations, but the authors report the number of subjects to be 3264. Where does this discrepancy come from?

Response: We have revised the manuscript and it now reads (p. 5, lines 43–47):

“A total of 8284 potential respondents were randomly and blindly selected and subsequently invited via e-mail to participate in the Internet-based survey. There were 3269 respondents, a 39.5% response rate. Of these, 137 respondents were excluded for missing values, leaving 3132 participants (final response rate: 37.8%).”

We have also added information about the area and research year (p. 5, line 34-36):

“…a Japanese Internet research company, which had a list of approximately 106,281 voluntarily-registered subjects across Japan in 2014.”

We also compared the characteristics of the final set of respondents with the general population of Japan (see Table 2).

5. Measurements and data analysis. I am confused whether the statistical analyses included only logistic regression or also linear regression modelling? Now both are mentioned but the results are only presented for the binary logistic models. The measures of SES that have been used are very simple (educational level and household income) and the variable “household income” is perhaps not the most informative. Could it have been possible to calculate a more detailed variable for income that take into account the
household size and number of children, such as e.g. “the Household income by consumption unit”, as recommended by the OECD. And why was not employment controlled for in the analyses? Employment status is crucial for both occupational and commuting physical activity, and also impacts the income level of the person, so that working part-time results in a lower income level than working full time. As the authors themselves discuss, the reason for a lack of significant associations between SES and occupational physical activity in women in this study can be due to the fact that 70% of the women were not working. If a person is not working, and spends his or her time mostly at home, there is likely less commuting physical activity. The authors state in their discussion that “the reasons why the indicators of SES that are associated with travel physical activity are different in men and women in this study is unknown”, but perhaps employment would be one reason? Saito et al. 2013. Int J Environ Res Pub Health 10(5) has reported on an association between working status and recreational and transportation walking among middle-age and older Japanese men and women.

Response: We only used a binary logistic regression model in this study. We also adjusted this model for the size of household and examined the relationships between employment status and physical activity (see Table 2).

<Minor Essential Revisions>
- The Abstract and Methods:
  1. Should “material status” be marital status?

Response: You are right, but Reviewer 2 commented that we should adjust the household income based on number of individuals living in the same household. We have therefore re-analysed using the household income adjusted for the size of household, and the term “marital status” has been removed.

  1. Are the ages presented as mean ± standard deviation or standard error?

Response: We have added information about the standard deviation (see the first line of the Methods section in the Abstract):
“A total of 3264 subjects, 1650 men (mean ± standard deviation; 44.2 ± 8.1 years) and 1614 women (44.2 ± 8.2 years), responded to an Internet-based cross-sectional survey.”
- **The Abstract and Results:**

1. **Unnecessary duplication in the first sentence: “over” and “#”**

   **Response:** We have removed the word “over”.

1. *The term association/associate is used confusingly for describing domains of physical activity in the same sentence with results from the logistic regression models. Consider the use of terms such as “occupational physical activity”, “commuting physical activity” and “leisure time physical activity” or equivalent.*

   **Response:** We have revised the wording throughout to “work-related”, “travel-related”, “recreational” and “total” physical activity.

1. *The first sentence starts with “Men” and ends with “in men”. Please remove the other.*

   **Response:** We removed “in men” from the first sentence.

- **The Abstract and Keywords:**

1. *Physical activity is not usually used as “activities”. Please correct.*

   **Response:** We have corrected the term “physical activities” to “physical activity”.

- **Background:**

1. *paragraph 1: Rather specify “inactive” as “physically inactive”. The term inactive has a wider meaning referring to all sorts of activity such as social and cultural activity.*

   **Response:** We have revised it to read “physically inactive”.

1. *paragraph 2: “determinant factor” should be either “determinant of” or “determining factor of”*

   **Response:** We have corrected “determinant factor” to “determining factor”.

1. *paragraph 2: “PAD domains”, should be either “PAD of work, travel and recreation” or “domains of work, travel and recreation”.*
Response: We have corrected the terminology, and p. 4, lines 18–19 now reads: "... physical activity across the domains of work, travel, and recreation."

Response: We have checked the reference and are confident that it is correct.

Response: We have revised this sentence to make the position clearer. It now reads (p. 4, lines 25–27):

“Japanese culture and lifestyles are different from those in Europe, so examining the relevant association between socioeconomic position and physical activity in each domain of life in Japan is important for improving health promotion activity.”

- Methods:

Response: We corrected the text to “domains”.

Response: In this study, we did not use any data on sedentary behavior, so we have therefore deleted this sentence altogether.

Response: We deleted “which is”.

Response: We gave a reference to the statement that GPAQ is validated and widely used.
Response: We have inserted the following reference:

Measurements, paragraph 3: it is said that the demographic variables are obtained from the research company, according to the International Physical Activity Questionnaire Environmental Module. What is this module and how was it used? Please specify how the demographic variables were obtained.

Response: We did not, in fact, use this information, so have deleted this sentence.

Measurements, paragraph 3: please specify the classification of income levels. As it is now, it is not clear where those with an income of 7 million yen belong, to the category 3-7 million or the category #7 million?

Response: We divided household income into tertiles. The first was less than 3 million yen, the second from 3 to 7 million yen, and the third more than 7 million yen. This information is set out at p. 6, line 73-74.

Data analysis, paragraph 4: please correct “marriage status” to “marital status”. See major comments for the comment on the use of terminology.

Response: Reviewer 2 commented that we should adjust the household income based on the number of individuals living in the same household. We therefore re-analysed using the household income adjusted for the size of household, and used “size of household” instead of “marital status”.

- Results:

paragraph 1: please consider the way to report the background characteristics. Now the paragraph is very hard to read because of so much numbers. It is suggested that more parentheses are used and maybe the information can be reduced since the same is also presented in table 1.
Response: We have revised the relevant paragraph, and it now reads (p. 7, line 97):
Table 1 presents the demographic and socioeconomic data of the respondents. A total of 3132 subjects, 1579 men (50.6%) and 1553 women (49.4%) participated in this study. The proportion in each class for age, size of household and BMI were significantly different for men and women. The proportion who reported each class of household income (< 3 million yen, 3–7 million yen, and ≥ 7 million yen) was 31.7%, 40.7%, and 27.5% in men, and 30.9%, 41.7%, and 27.4% in women. The proportion who reported each educational level (junior high and high school graduation, 2-year college degree or equivalent, and 4-year college or higher degree) was 26.1%, 16.3%, and 57.6% in men, and 26.7%, 39.2%, and 34.1% in women. The proportion reporting each employment status (not employed and employed) was 23.7% and 76.3% in men, and 70.2% and 29.8% in women. Men showed significantly higher work-related, recreational and total physical activity than women.

1 paragraph 1: Household income has been mentioned twice in the list of proportions. The latter should be replaced by “educational level”.

Response: We have corrected “household income” to “educational level”.

1 paragraph 1: Where does the information about body mass index or weight and height come from? Presumably this is also self-reported information but this is not stated in the methods.

Response: We have added a description of the BMI estimation method (p. 6, lines 71–72): Body Mass Index (BMI) was calculated from self-reported body height and body weight using the equation \[ \text{BMI} = \frac{\text{body weight in kg}}{\text{body height in m}^2}. \]

- Discussion:

1 paragraph 1: please correct the following sentence: “the present study found that the associated between SES and physical activity…”

Response: We have corrected this sentence and it now reads (p. 9, lines 143–144): “…this study found various associations between SEP and different DPA in Japanese adults.”

1 paragraph 2: there cannot be a “negative association”, please correct and use “inverse”
Response: We have corrected “negative association” to “inverse association”.

1 paragraph 3: please revise the sentence beginning with “Ishii et al. (2010) and Inoue et al. (2010) reported that…” The sentence is too long and complicated and could be cut after “Japanese subjects”.

Response: We have revised this sentence as follows (p. 10, lines 155–159):
“In Japan, previous studies reported a significant association between the neighbourhood environment and travel-related physical activity.”

1 paragraph 3: please revise and do not use “positive association” but “direct association”

Response: We corrected positive association to direct association.

1 paragraph 3: It is not clear if the conclusion about the environmental effect on the association between SES and commuting physical activity refers to the current findings or previous literature. If it refers to the current study the claim is not supported by the analyses, but is rather a speculation based on previous findings in the literature and should be stated as one.

Response: We have revised this sentence to make it clearer and it now reads (p. 10, lines 157–159):
“The significant direct association between SEP and travel-related physical activity found in this study might therefore be affected by environmental factors.”

1 paragraph 4: please the sentence “Leslie et al. reported that high SES residents had more access to parks than lower SES residents and used them more”

Response: We have revised this sentence and it now reads (p. 10, lines 165–167)
Leslie et al. reported that high SEP residents had easier access to parks than lower SEP residents and used them more.

1 paragraph 5: please insert “for” after “compensated”

Response: We inserted “for” after “compensated”. 
paragraph 6: please specify that education measures SES in the sentence “Education is a frequently used indicator in epidemiology”

Paragraph 6: please give a reference to the sentence: “Formal educational level is strongly determined by parental characteristics.”

paragraph 6: please correct: “each SES indicator with each PAD” to better describe the current setting and results. Suggestion: “of the two SES indicators with the different physical activity domains.”

Response: Because we have added extra analyses, examining the relationship between employment status and physical activity, we have removed the paragraph explaining about the SEP indicators.

paragraph 7: Please give a reference to the sentence “However, GPAQ has been standardized and is used worldwide.”

Response: We have inserted the following reference (Reference Number 30):

- Conclusion

paragraph 1: It would be more appropriate to write the conclusions in the same way that the results are given, i.e. higher SES was associated with less work-related physical activity etc.

paragraph 1: it is not correct to draw the conclusion that SES was associated with total physical activity since this association was seen only for men regarding the highest income level (#7million yen) and it is also questionable to draw the conclusion for recreational physical activity since only income level (the highest) was associated with higher physical activity

Response: As shown in Table 2, the results of the analysis using a new model showed significant relationships between physical activity in total and in each domain (except for
work-related activity) and for both household income and educational level (i.e., every indicator of SEP except for employment status) in both sexes. Higher socioeconomic position was associated with increased travel-related, recreational and total activity. This is set out clearly in the Results section (see p. 8 lines 104–116 and p. 8 lines 117-129).

We have therefore revised the conclusion, and it now reads (p. 11, lines 191–196): Although this study has some limitations, it suggested that lower SEP was associated with more work-related physical activity, and less travel-related, recreational and total physical activity, and that this link was more pronounced in men than women. To increase physical activity in Japanese adults with lower SEP, it will therefore be important to focus on increasing travel and recreational physical activity. In a follow-up study, the mechanism of the association between SEP and DPA will be examined.

References:
-please fulfill the reference nr 29, Lehto et al.

Response: We have added the full reference for Lehto et al. (Reference No. 26)

<Discretionary Revisions>
- Keywords: I am not sure whether “Health Status Disparities” is an appropriate keyword for this study

Response: We have removed “Health Status Disparities” from the keywords.

References:
- The style of the reference list should follow the style recommended by the Journal

Response: We have revised the style of the references to fit the journal’s house style.

All manuscript:
-The text is partly centered and partly aligned to left resulting in an unfinished Look

Response: We have revised the text format to fit the guidelines of the journal.