Author’s response to reviews

Title: Gender differences in the associations between age trends of social media interaction and well-being among 10-15 year olds in the UK

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Author’s response to reviews:

Dear Professor. Kondo,

Reply to Reviewers Comments: Gender differences in the associations between age trends of social media use and well-being among 10-15 year olds in the UK

Thank you again for your comments and those of the reviewers. We have set out our detailed response to each point below. We have also tracked the changes in the manuscript.

Yours sincerely,

Cara Booker
(on behalf of all authors)

Reviewer reports:

Eline Frison, Ph.D. (Reviewer 1): The present paper investigates gender differences in the associations between age trends of social media use and well-being among 10-15 year olds in the
UK. The study is well written and well done. Although I reviewed this submission with great interest, I have some remarks and questions based upon my reading of the manuscript.

1. Although the authors argue that the literature on social media use and well-being is primarily based on cross-sectional evidence, there have been some longitudinal studies on this topic:


- Interesting study about how different types of Facebook use function over the course of adolescence: Frison & Eggermont (2016). Gender and Facebook motives as predictors of specific types of Facebook use: A latent growth curve analysis in adolescence. Journal of Adolescence, 52, 182-190.

The claim that "this literature is mostly based on cross-sectional evidence" should be tempered and authors should refer and discuss some of these studies in their introduction and discussion.

Provision of these references is appreciated and have been included in the introduction, page 3, and discussion where appropriate. We have changed the introducing text to “While much of the early evidence linking social media interaction and well-being was based on cross-sectional data making causal inference impossible, evidence from longitudinal studies is increasing.” Thus
while many of these studies are longitudinal, only those which examined the association between social media use and well-being were included in the introduction.

2. The authors may want to add references to justify the risks to using social media (see sentence 32).

We have added references to this sentence.

3. Although the primary aim of this study is to investigate changes in social media use and positive and negative markers of well-being with age, the manuscript primarily discusses studies focusing on the association between screen-based media and adolescents' well-being. As a result, there is some kind of discrepancy between the studies referred to in the introduction and the research aims. Social media, however, clearly differ from more traditional screen media such as television. Authors currently ignore the specific characteristics and affordances of social media. This is an important limitation of the introduction.

We have included this limitation in the introduction and have added more studies that have looked solely at social media use and well-being.

4. Social media use was operationalized using direct estimates of the frequency of "chatting or interacting with friends through a social website". Although authors refer to social media use, in fact, a specific type of social media use was measured, often referred to as active Facebook use (Verduyn et al., 2015).

- It seems more correct to refer to 'interacting on social media', rather than 'social media use'.

We have changed the term “social media use” to “social media interaction” or “interacting on social media”

- Why did the authors focus on this specific type of social media use? Can the authors comment on that.

These were the only questions available in the data. Additionally, the questions were developed in 2008 before many of the current typologies of use were developed.
• Research has shown that adolescents mainly use social media in a passive way (not for interaction with others). Did the authors also measure passive social media use (e.g., lurking, browsing through others' social media profiles, etc.)? It would be interesting to compare the current findings with passive social media use.

There are no questions on the survey that are able to assess how individuals interact with social media. This has been noted in the limitations. “Additionally, there are no questions on how or why young people interact with social media. Recent studies have identified typologies of use and have examined how different types of use are associated with well-being.”

• As a result, the introduction should be more focused on this specific way of using social media, rather than focusing on general social media use.

We have added additional studies and a recent review that focus on interacting on social media via messaging or chatting and patterns of use and the association with well-being.

5. The inclusion of control variables in the model is, in my opinion, not clearly justified. In theory, the control variable should be associated with both the exposure and the outcome variables. Thus, I suggest to justify your control variables or to run new analyses with those control variables that can be justified.

We have added some references that add to the justification of the inclusion of the control variables.

6. The introduction and discussion lack any reference to theory. Although I agree that the focus and strengths of this article are the empirical findings, some reference to theory in explaining the results (in the discussion) would strengthen the manuscript.

We have added to a third paragraph to the introduction that expands on possible theoretical frameworks for the relationship between social media interaction and well-being.

Regina van den Eijnden (Reviewer 2):

Although the topic of this paper is of great interest and the longitudinal sample with 5 measurement waves is very suitable for answering the research questions, there are several aspects of this paper that I find less satisfactory. The main issue I have with the paper is that it
really misses a theoretical underpinning of why social media use would affect well-being, both in the introduction and in the discussion.

Below you find an overview of my comments regarding the paper.

Abstract

The abstract suggests that this longitudinal sample has 5 measurement waves among a total of 9859 participants, while this is not the case. It should be clearer to the reader about how many participants were involved in each measurement, and how many participants had longitudinal data on, for instance, at least 3 measurement waves.

We have added ‘pooled’ to the abstract to identify that the number provided included any participant in all five waves. Due to abstract word limitation we discuss longitudinal participation in the discussion of the sample. “The number of adolescents who participated in just one wave was 3,674; 2,521 participated in two waves, 1,874 in three, 1,280 in four waves and only 510 have participated in all 5 waves.”

Introduction

1. The authors use the term "young people" consistently throughout the paper but in the discussion the term "adolescents" is used. Maybe use the term "adolescents" consistently. We have changed ‘young people’ to ‘adolescents’.

2. It is interesting to mention previous research on the relationship between media and physical health, but you should clarify earlier, or more precisely from the beginning on, that this study concerns mental health/mental well-being.

We have moved a sentence from the bottom of the paragraph to the become the third sentence that states more clearly that this study explores the link between social media interaction and well-being.

3. The introduction paper really misses a theoretical underpinning about why social media use would affect well being. Why would this be the case? What are the expected mechanisms,
having in mind that active use of social network sites is much more than simply screen time and sedentary behaviour? These questions are not answered in the introduction.

We have added to a third paragraph to the introduction that expands on possible theoretical frameworks for the relationship between social media interaction and well-being.

4. p. 3, line 30: "..social media is…” should be "..social media are..". Social media is a plural.

We have changed this.

5. p. 3, line 52-53. What exactly are the results of these longitudinal studies? Also I am missing relevant longitudinal studies, such as Kross et al., 2013!

While we don’t specifically mention Kross et al. in the introduction it is included in a review that is cited, see Verduyn et al., 2017.

6. p. 4, 7-16: This section about the meta-analysis on the longitudinal studies with the « negative but non-significant » and « positive and significant when lower quality studies are removed » is a bit confusing and could be improved.

We have re-worded these sentences to include what denoted quality and further expand on the findings.

7. p. 4, line 12-16: What does a positive longitudinal association between increased screen time and depression risk exactly mean. Is screen time predicting later depression, or is depression predicting later screen time?

In editing this paragraph for clarity, this sentence is no longer included. We have included direction of the association in the new text.
8. p. 4, line 48-54: The conclusion that there may be differences in the relationship between social media use and positive and negative markers of well-being is in my view not sufficiently substantiated by the described literature in this paragraph.

We have changed the wording of this sentence to state that “future research should investigate whether differences in the relationship between social media use interaction and positive and negative markers of well-being differ.”

Methods

1. As a reader, I would like to have more information about the longitudinal sample. How many adolescents are included in all 5 measurement waves, and how many adolescents participated in at least 3 (or 4) waves? Also, during which years the measurements took place (this is important because of the rapid changes in social media use)?

We have provided dates for data collection, 2009/10-2014/15. And we have included numbers for longitudinal participation at the end of the second paragraph.

2. p. 5, line 24-25: Information about the adult sample is confusing, since the paper focusses on the youth sample.

We include this information because some of the covariates come from the adult sample and Understanding Society is not just a study of youth.

3. p. 5, line 24: 16 year olds are not adults.

We have replaced the word ‘adult’ with ‘individual’.

4. p. 5, line 30: Is it really ethical to only get verbal consent from the parents? How do you check this?
Verbal consent was all that was required by our ethic committee. Interviewers were responsible for explaining and obtaining parental consent.

5. p. 5, line 54-60: The measurement of social media use is somewhat problematic. The first question about 'belonging to a social web-site' is oddly phrased. I would say that one has a profile on a social network site, and not that one belongs to a social media web-site. Also, the follow-up question is not including all forms of social media use. Why do the authors not include passive use of social network sites? A proportional amount of people do not chat or interact with others while being on a social media web-site, they just look at the posts of others. Additionally, the concept 'friend' is used. With this word you exclude interacting or chatting with for instance family members. Finally, what the authors call social media use is actually only the 'active use of social network sites' since it is not measuring the use of instant messenger functions, which is another important social media platform. I would therefore suggest to systematically use the term 'active use social network sites' or 'chatting on social network sites'.

The authors did not have any involvement in the development of the social media questions used in the study. While we agree that it would be useful to know the patterns of use or whether participants have a profile and which sites they use we cannot ascertain this from the study. We have changed ‘use’ to ‘interaction’ or ‘interacting on’.

6. p. 6, line 27: Which responses were possible with the 3-point scale?

We have replaced ‘all scored on a 3-point scale’ with “‘responses were ‘not true’, ‘somewhat true’ and ‘certainly true’”.

7. p. 7, line 48-50: Do the authors have references for this specific method of model testing (change by age averaged across individuals)?

We have added a reference to the method of model testing, Singer and Willett, 2003.
8. p. 7, line 52: "Four models were estimated, one for each well-being outcome, i.e. happiness and SDQ-models". Which four SDQ-models do the authors mean? In the method section the authors are not very clear about these four concepts. Also, in the result section the authors report on two models, the happiness and the SDQ total difficulties model. The authors are not consequent in the use of variable names and in the number of reported models, which I regard rather sloppy.

We have changed this to “We estimated four models two for happiness, one for females and one for males and two for and SDQ, one for females and one for males”.

Results

1. In my view, the first paragraph of the result section should be included in the method section under participants.

We appreciate this comment, however we have decided to keep this paragraph in the results section.

2. p. 8, line 44-46 and 58-60: Please clearly specify which differences are significant (like is done later in the results section).

We tested for differences between the distribution of social media interaction between males and females across the age groups using chi-square, thus we know that distributions were different. We have included 95% confidence intervals for other differences.

3. p. 8, third paragraph: Concerning the happiness standard deviation, I would suggest to put these values between brackets after the score (SD = 0.73). The point difference and SD for females should also be accompanied by the description of the decrease in happiness scores (now line 50-52), to make the reading of the results somewhat easier. Thus something like: "A decrease in happiness scores was observed for females with a 3.60 point difference (SD = 0.73) from a high of 36.93…."
The standard deviation difference does not refer to the difference in score, rather it refers to the standard deviation for happiness among females from age 10-15. We have added to the text to clarify this point.

4. p. 9, line 24-25 and 30-32: Either write age in words or in numbers, not do both.

Because the sentence starts with a number have written it out, and to preserve consistency other numbers in that sentence are written out. We have decided not to restructure the sentence as it would require a change to passive voice.

5. p. 11: Although I appreciate that the authors controlled for education level and ethnicity, I think the authors put too much effort in describing the results regarding these control variables, both in the result section as well as in the discussion. In my view, these analyses are of minor importance given the focus of this study as outlined in the introduction. Also the authors report quite some information about differences between ethnic groups, although I expect that the sample size is rather small. Are all ethnic groups of females and males large enough to report these findings? Please report n's in Table 3.

We have cut some of the description of the covariate effects and have added the numbers of males and females to the tables. The distribution of the covariates are provided in table 1, there are approximately 550 Asian, 250 Black African/Caribbean and 200 Other/Mixed adolescents in each gender.

Discussion

1. First paragraph, conclusions could be stated more precisely. For instance the sentence "In the SDQ model only…… at age 10" (p. 12, line 4-5) could be written more clearly.

We have restructured this sentence to increase clarity.
2. p. 12, line 9: "The findings indicate that….." Please add a sentence that this is not the case for males.

We have added “…; this was not the case for males” to this sentence.

3. p. 12: I really miss a theoretical discussion about reasons why well-being at older ages is associated with active use of social network sites at age 10 among females. Why would this be the case? What are the expected mechanisms; having in mind that active use of social network sites (online communication with peers) is much more than simply screen time and sedentary behaviour? And what about third factor explanations?

We have added some theoretical discussion regarding the findings of the associations found for females.

4. p. 12, line 26-28 and 42: Is it allowed to refer to non-published data? I think not!

We have deleted this sentence.

5. p. 13, line 16: It was unclear from the measurement section that the questions about social media use were specifically targeted for computer use, rather than smartphone apps.

The limitation discussion has been edited and this limitation has been deleted.

6. p. 13, line 28-34: This particular limitation was not clear to me from the method section. This could be improved p. 14, line 9: It is recommended to educate young people about the consequences of high levels of social media use. However, on basis of these data it seems advisable to educate parents (of 10-year olds) about strategies to prevent excessive social media use in their children as well.

We have edited the limitations section and added parents to the recommendations for education.
References
1. p. 17 line 18 and 24. There is no time indication in the reference.
Year of publication has been added to references.

Text and grammar
1. p. 2, line 15: "The aim of this study is to…" should be "The aim of this study was to…".
The sentence has been edited to be past tense.

2. p. 4 line 41-44. The construction of this sentence can be improved.
The sentence has been edited for construction and clarity.

3. p. 4 line 52: "…but not with lower levels of…"
The word ‘with’ has been added to the sentence.

4. p. 5 line 16. Sentence needs to be in the past tense.
The sentence has been changed to past tense.

5. p. 5 line 42. The grammar in this sentence is not correct.
The sentence has been edited for correctness and clarity.
6. p. 5 line 46. Missing a 'dot' at the end of this sentence.
A period has been added the end of the sentence.

7. p. 5 line 52. Add the word question in the sentence and change the word asked to was: 'The first question was…'.
We have added ‘question’ to the sentence.

8. p. 7 line 2-6. This sentence is not correct.
We have edited this sentence for correctness and clarity.

9. p. 9 line 57: 'was' should be 'were'.
Replacement has been made.

10. p. 12, line 2: 'was' should be 'were'. Social media is plural.
We have changed this.

11. p. 13 line 22-26: This sentence is not correct.
We have restructured this sentence for clarity.