FIRST REVISION

Editor and Reviewer Comments:

Reviewer #1: This study seeks to explore the longitudinal data on polyphenol intakes in an adolescent- adult population over a 10 year period in relation to Metabolic Syndrome risk. There is a vast amount of data, but overall the study is limited by the failure to indicate how the small group of followed up participants (164) were identified and selected from the original population of 3528, 10 years earlier. And of these 164, only 57 had a blood sample taken at baseline. Since blood data comprises important parts of the definition of MetS risk, this is a major limitation. Despite putting much of the detailed data into supplementary tables, the tables that have been included are too long for a publication such as Clinical Nutrition. Since this dietary analysis seems to be an essential part of this study, a Public Health nutrition journal, or a journal of nutrition and dietetics may be more appropriate.

Reviewer #3: Summary
Combining data from the HELENA study 2006 and the 10-y follow-up BELINDA study 2016, this investigation focussed on changes in dietary intake of total polyphenols and polyphenol classes at two time points, adolescence (baseline investigation in 2006, HELENA study, mean age: 14.8 years) and adulthood (10-y-follow-up investigation in 2016, BELINDA study, mean age: 24.6 years). In a vastly reduced sample (n=57), associations of dietary intake of total polyphenols and their subclasses with metabolic syndrome risk and its components were examined. The authors report that intake of lignans was associated with lower odds for having at least one MetS risk factor as well as with a lower increase in waist-height ratio between the two time points. Furthermore, phenolic acid intake was associated with a lower increase in LDL-cholesterol, whereas stilbene intake was associated with a higher increase in triglycerides between the two time points.

Overall comment
Changes in polyphenol intakes between adolescence and adulthood as well as their association with MetS are of interest. Yet, several major limitations are present: Most importantly, the data used here is not ideal for investigation of dietary trends, associations with health outcomes are based on a very small sample size and statistical analyses as well as data presentation and discussion require vast improvement.

Major Concerns
1)   Use of two 24-h recalls is insufficient to describe polyphenol intake in adolescents, as is the use of 3 24-h recalls in adulthood. For a valid description of polyphenol intake, at least 6 to 8 recorded days, corresponding to 6-8 recalls per person would be necessary [compare Ouellette et al. 2014 or for flavonoids Kent et al. 2018]. Furthermore, since you used a dietary assessment tool only representing the diet of 1 day, it is of huge importance to apply 24-h recalls on multiple time points throughout the year to capture the highly variable polyphenol intake across seasons. How far were the two 24-h recalls in adolescence apart? (have been added at line 139-142)
2)   I suppose you might have a problem with interrelated covariates in your regression models, which seems obvious since: First, you state that you chose confounders based on their association with the predictor. Second, monosaccharides, disaccharides and fibre are probably also highly correlated. Please, keep in mind that one important assumption of regressions is, that the covariates are independent. Have you checked for multicollinearity via simple correlation not being higher than 0.6 or via tolerances? It is probable that those covariates should not be together in one model. In such case, you should rather identify the most important variable representing the interrelated covariates or find another way to include this information in the model (e.g., summarized variables

(for example if monosaccharides and disaccharides have the same direction, you could use their sum) or use residuals). (have been added at line 168-169)

3)   Important determinants of metabolic disturbances are not considered in your models on Mets. Have you checked for confounding by smoking, physical activity as well as intake of fat, saturated fatty acids and polyunsaturated fatty acids? Please keep in mind as said in 2), that some of these variables are correlated and should not be included in the model together (i.e. total fat and the fatty acids).

4)   With the mass of statistical tests done, there is a huge problem with multiple testing. Please adjust for alpha-inflation.

5)   The statistical analysis and result section is unsatisfactorily described or confusing:

a.   You did not describe the test used for the results presented in L232-234. Please add.

b.   It is not clear, where you used energy-adjusted polyphenol intakes and where unadjusted, see L215 vs. L221-222 vs. L232, figure 2 and table 5. Thus, have you used energy-adjusted intake as the predictor or absolute intakes? How have you adjusted for energy intake? All such things need to be stated clearly in the method section and which variables were used needs to be mentioned in the result section and all tables and figures consistently.

c.   Adjustment is either inconsistently done or reported: In legends of table 2 you state that you adjusted for sex, age, energy and months of recall. First, this is not described in the method section. Second, if energy and months of recall is relevant, why didn't you include this in the regression models on health outcomes? Third, why haven't you adjusted also for parental education as you mention it's relevance in L233?

d.   The order in L205-214 is very confusing. Please reorder as follows: 1. Distribution of variables, 2. Transformations, 3. How data is reported (according to distribution & transformation, e.g. when normally distributed means and standard deviations, when non-normally distributed medians (25th, 75th percentiles) and when back-transformed state that here, too), 4. Which tests for differences were done and if on transformed variables

e.   Please make clear in Table 1, for which variables paired t-test and Wilcoxon signed rank test were used (e.g. by superscripts). (have been added at line 146-152)

6)   The very small sample size of only 57 is a very important limitation, which you need to make clear at more places than only in the method section and the limitations in discussion. You need to state the sample size also in your tables, figures and especially the abstract and highlights. Otherwise this is misleading.

7)   Please don't overemphasize your result for lignan intake & waist-height-ratio in the abstract (L52) and the highlights, which was only significant in your basic model, but disappeared after full adjustment. have been deleted at line 34-35

8)   Table 5 has to be changed since a table on p-values only is highly uninformative. P-values say nothing about the clinical relevance of your results, which is in fact important, especially considering the small sample size used. Thus, please include also the measures of effect (either betas (if they are interpretable, that means not if transformed variables were used) or preferably least squared means in quantiles).

9)   Figure 2 seems misleading to me. Please explain in more detail how this result was created. Have been added in figure 2 "was based on logistic longitudinal regression, adjusted for sex, age, alcohol monosaccharides and disaccharides, vitamin C, vitamin E and fibre".

10)   Tables 2-4 are way too detailed. Such detail is mostly unnecessary and rather tiring for the reader, while important messages run the risk of being overlooked. Thus, please condense the tables to the important information and report this detail (if at all necessary) only as supplementary material.

a.   Table 2: Table 2 is quite redundant considering that most of its information is already reported through figure 1. The only added information of table 2 are P-values and major food sources.

Therefore, I would suggest to keep only one of both, preferably the figure. The table 2 should be rather moved to supplementary material.

b.   Table 3: This table could be easily condensed to only important food groups, especially those with changed consumption from baseline to follow-up, while consumption of other food groups or changes which were marginal (e.g. all the zero values across the interquartile range, despite of significant differences which probably stem from few individuals at the end of the distribution) could only be mentioned in one sentence in text. Furthermore, as already mentioned above, reporting of foods void of polyphenols is questionable and could be removed.

c.   Table 4: Reporting up to 45 ranks of food groups for total polyphenols & their classes is of marginal informative value; similar applies to all the zero values or minimal contributions of specific foods. Information could be condensed to the 5 or 10 most important sources per polyphenol class. Changes in major sources from baseline to follow-up could be better visualized in figures.

11)   How come you report minimal contribution of meat, fish and eggs for lignans of 0.1% at baseline, when Phenol Explorer does not provide polyphenol contents for animal based food? Similarly, when chocolate drinks are an individual category, where do the polyphenols in dairy products come from? Phenol Explorer also does not provide polyphenol contents of dairy products except for chocolate milk. In general, why do you report animal source food anyway (in table 3 & table 4)? Yes, there are traces of polyphenols in animal based food products, but those are only reported in individual papers and so far not included in Phenol Explorer, therefore, as long as you only use Phenol Explorer for assignment, you could just remove those food items from your results and say 'plant-based food groups' in the title. Have been added at line 143-144

12)   Why haven't you used sex-specific cut-offs for HDL-cholesterol? Since HDL-levels are highly sex-specific, generally cut-offs of <40mg/dL for men and <50 mg/dL for women are applied. How do your results behave upon use of these common sex-specific cut-offs?

13)   The way results were discussed is very problematic, since papers by Sohrab 2018 and Grosso 2017 were only discussed in favour of the results presented in this manuscript (compare L317, L320-325, 350-354 and other places]. Sohrab and Grosso have conducted basically the same investigation in an adult population, and received also conflicting results to yours (e.g., in Grosso 2017 total polyphenols were associated with MetS, while in your study it wasn't, yet, you don't mention this in L316-317; Similarly, in L320-325 you do not mention that Sohrab 2018 found an association between flavonoids and MetS; Similar also applies to other results on individual MetS components and individual polyphenol classes). You have to report such differences clearly, and discuss them. You should not just pick out those results which fit yours and ignore those which do not fit. Furthermore, please note that Sohrab et al. had published also another study in 2013 [DOI: 10.3109/09637486.2013.787397]. Have been added at line 244-245; 248-249;

14)   Since you discuss that coffee (for phenolic acids) and red wine (for stilbenes) could be leading to your health associations, it would be good if you analysed those associations for comparison.

15)   Do you have data on BMI? Please add how results change if you additionally adjust for BMI or if not available for WC in models on blood pressure, lipids and homa-ir. Have been added at line 170-171

Minor concerns

1)   Please explain how you dealt with missing data for the polyphenol assignment (L369). How many foods were concerned?

2)   Please extend the information given in L191-192 on the number and percentage of individual MetS components, ideally by a table by sex. And please put this into the results section instead of methods.

3)   Please extend the flow chart in Supplementary Figure 1 by including information on the number of blood samples. Have been modified

4)   The statement in L348-349 is ambiguous, as it now reads that higher stilbene intake cannot be promoted due to effects of alcohol. But since you showed an unfavourable effect of stilbenes on

triglycerides, stilbene intake should not be promoted already for its triglyceride raising effect, independent of the alcohol effects.

5)   L371: The Phenol-Explorer was not used by Edmands et al. Edmand used the Phenol-Explorer database to annotate the food metabolome also

6)   L338-339 is rather speculative. Have been deleted

7)   Please use consistent description for baseline and follow-up time points in figures (Fig. 2 and Suppl. Fig. 2 uses HELENA & BELINDA) comparable to those used in tables and figure 1. Have been modified

SECOND REVISION

A list of changes or a rebuttal against each point which is being raised from reviewers.

In the manuscript, changed parts are marked in yellow fluo.

Comments from the Editors and Reviewers:

Reviewer #1: The authors investigated how a 10-year change in (poly)phenol intake could reflect on metabolic syndrome risk in young adults. The aim of the paper is clear and the results are appropriate.

1.   The graphical abstract should be simplified. It reports too many information, most of them in the written form.

   ANSWER: I have added the graphical abstract and followed the guidance from journal.
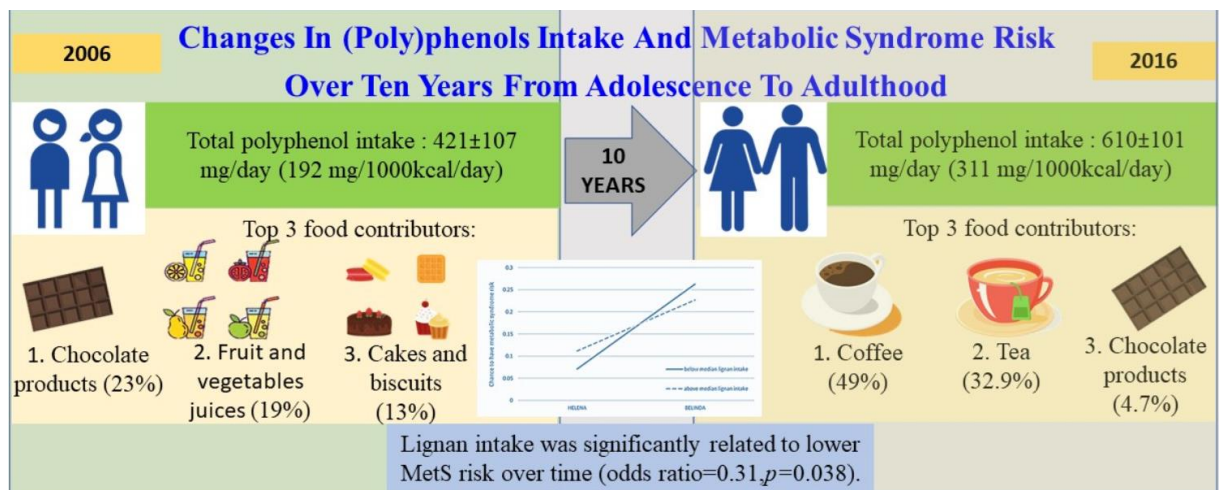
2.   The authors should use (poly)phenols instead of polyphenol: in this way the word would include both flavonoids and non flavonoid classes.

   ANSWER: I have changed polyphenol to (poly)phenols in the whole manuscript.

3.   The authors should partially revised the English:

   Abstract and Introduction

The sentences "Chocolate; fruit and vegetable juices; cakes and biscuits were the three major food sources in adolescence, while this was coffee; tea; chocolate at follow-up."

ANSWER: I have revised the sentence: "The three major food sources for (poly)phenols were 'chocolate', 'fruit and vegetable juices', 'cakes and biscuits' during adolescence and 'coffee', 'tea' and 'chocolate' during adulthood" (line 91-93).

4. and "In the longitudinal data (2006-2016), 164 participants (58% girls, 13-85 18y at baseline) from Ghent, Zaragoza and Lille, on dietary intake of polyphenol intake was retrieved via 2 or 3 24h recalls." should be re-written.

ANSWER: I have revised the sentence "In 164 participants (58% girls, 13-18y at baseline) from Ghent, Zaragoza and Lille, longitudinal data (2006-2016) on polyphenol intake was retrieved via 2 or 3 24h recalls" (line 84-86)

Lines 122-124: The sentence "studying polyphenol intake and metabolic health in adolescents is needed for CVD prevention by lifestyle modification including polyphenol intake" should be re-written.

ANSWER: I have modified "more insight is needed in the beneficial effects of (poly)phenol intake on metabolic health in adolescents to help in the prevention of CVD via dietary intake modification" (line 121-123).

M&M

5. The authors reported that among 3528 adolescents involved in HELENA study, they selected 164 from the follow-up (BELINDA study). It is not clear how the authors selected the participants. Although the authors reported "Included and excluded participants in Ghent, Lille and Zaragoza did not differ according to sex, age, education of mother, education of father, smoking status, and alcohol consumption, but more included participants had a higher material condition in the family (a socio-economic factor) and had optimal BMI." the selection should be made randomly, but it is not specify.
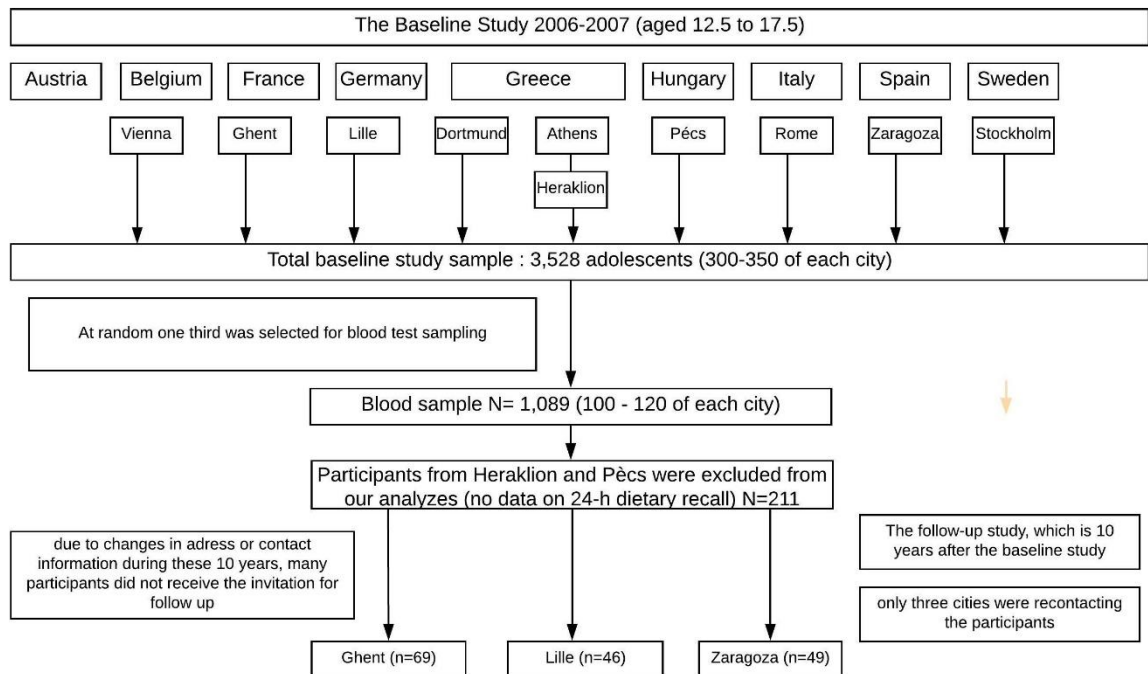
ANSWER: I have made this clearer. "In these three cities, follow-up participants and those lost to follow-up did not differ according to sex, age, education of mother, education of father, smoking status, and alcohol consumption, but more included participants had a higher material condition in the family (a socio-economic factor) and had optimal BMI (line 152-155).

I have added a sentence to explain the reason behind the sample size at follow-up, in manuscript text and supplemental figure 1.

Manuscript:

The Baseline Study 2006-2007 (aged 12.5 to 17.5)

Austria | Belgium | France | Germany | Greece | Hungary | Italy | Spain | Sweden

Vienna | Ghent | Lille | Dortmund | Athens | Pécs | Rome | Zaragoza | Stockholm

Heraklion

Total baseline study sample : 3,528 adolescents (300-350 of each city)

At random one third was selected for blood test sampling

Blood sample N= 1,089 (100 - 120 of each city)

Participants from Heraklion and Pècs were excluded from our analyzes (no data on 24-h dietary recall) N=211

due to changes in adress or contact information during these 10 years, many participants did not receive the invitation for follow up

The follow-up study, which is 10 years after the baseline study

only three cities were recontacting the participants

Ghent (n=69) | Lille (n=46) | Zaragoza (n=49)

6. Lines 152-154: the authors should justify why only a lower number of subjects were included for the blood parameters.

6. The authors did not mention the power calculation they applied to choose the number of subjects enrolled, both for (poly)phenol intake and for MetS parameters,

and they should also justify if the power calculation can support these numbers.

ANSWER: "Using glimmpse software for mixed models, a power between 72% and 82% was obtained for the observed longitudinal associations." (line 251-252)

7. Results:

Lines 263-270: the paragraph is referred to table 3 (line 263), but table 3 describes the MetS components.

ANSWER: I have revised it. "Changes in food contributors to total (poly)phenols and (poly)phenols classes are shown in Supplemental Table 2 for the total population" (line 279-280).

8. Table 1: it lacks the physical activity at 10-year follow up

ANSWER: We don't have data on physical activity at follow-up so we cannot include it in Table 1.

9. Moreover, table 1 reported the characteristics of 164 participants. However, in table 3 the authors specified that blood parameters were collected only for 57. The authors should clarify this discrepancy in table 1.

ANSWER: I have added a symbol after 3 lipids and HOMA that explains in the footnote that the sample size for these parameters is only 57.

10. Table 2: the mean value has no decimal places, whereas the S.E. has decimal place. The legend should specifies what rank refers to.

ANSWER: We removed the decimal places in the S.E. The legend now specifies what ranks refer to.

11. Table 3: It is not clear if the values reported in this table are coefficient or p values.

ANSWER: I have mentioned it in the footnote of Table 3. ª p values are based on the association between the (poly)phenols intakes and MetS risk and components by linear longitudinal mixed models regression, except for MetS and overweight which were observed using logistic longitudinal mixed model regression.

Reviewer #2: This study had the aims to evaluate within-subject longitudinal changes in food consumption and polyphenol intakes during 10 years of follow-up in European adolescents becoming young adults, while also exploring the association with metabolic syndrome risk.

The study is potentially interesting, and Has the merit of a longitudinal design. However, some limits in the study methods reduce the potential impact of the results.

1.   Introduction. Authors did not clearly describe what is the hypothesis that they wanted to test with this study and the potential implications. Please, report it.

ANSWER: The aim was already included in the introduction:

"this study aimed to evaluate within-subject longitudinal changes in food consumption and polyphenol intakes during 10 years of follow up in European adolescents becoming young adults, while also exploring the association with metabolic syndrome risk (MetS)." (line 124-127).

Now, we have also specified the hypothesis:

The hypothesis was that (poly)phenol intake would be higher during adulthood compared to adolescence and this higher (poly)phenol intake would be associated with a lower metabolic risk. (line 127-129)

We have mentioned in the introduction the following implication: help in the prevention of CVD via dietary intake modification by including more (poly)phenols (122-123).

2.   Methods. The sample size for statistical analysis is unfortunately modest, especially for the subsample with blood variables. Moreover, the BMI of the sample was correctly defined "optimal" and the SES was good.

ANSWER: Although 8.5% of the adolescents had overweight, a much higher percentage, i.e. 20% of the adults had overweight.

3.   These characteristics suggest that, probably, the sample was not representative of the "European" population.

ANSWER: Luckily, sex ratio, mean age and reported BMI were similar between non-participating adolescents (43%) and participating adolescents within each centre, and in the overall sample. Since the recruitment at baseline was a multi-stage random cluster sampling via schools, the population was representative for the involved cities. Of course, a city is not really representative for its country.

4.   Moreover, the subsample of subjects with blood variables analysed are likely not representative of the total sample.

ANSWER: Comparing the participants who had blood sample and without blood sample, we found no significant difference on BMI, waist-height, systolic blood pressure, energy intake or background variables (age, sex, education of mother, education of father, family affluence score, smoking, alcohol, and energy intake).

Therefore, the 57 participants seem more or less representative for the 164 participants.

Background variables	Having blood sampling		Without blood sampling		P value
	mean	sd	mean	sd	
Age in helena (years)	14.8	0.9	17.8	1.3	0.365
Sex: girls (%)	18.3		39.6		0.416
Education of mother: higher education or university degree (%)	35.9		15.9		0.676
Education of father: higher education or university degree (%)	34.8		13.4		0.362
High Family affluence scale score (%)	46.9		21.9		0.358
Non-smoker (%)	25.8		51.5		0.357
No alcohol use (%)	31		52.4		0.061
Physical activity: ≥60 min/day in HELENA study (%)	28.8		39.2		<0.001
Energy intake in HELENA study (kcal/day)	2408.1	1012.6	2209.2	964.6	0.242
Energy intake in BELICCA study	2179.4	694.8	2035.07	7194	0.219
BMI	23.5	4.3	23.4	3.0	0.879
Waist-heigh	0.46	0.05	0.39	0.01	0.193
Systolic blood pressure	116.3	13	115.3	13.1	0.657
Diastolic blood pressure	66.8	7.5	72.4	6.6	<0.001

P-value significant= less than 0.05 by one-way ANOVA analysis a or Mann Whitney U test

5. Diet was evaluated by 24h recall method for 2 days. It is not specified if two weekdays or if a weekend day was included. It is well known that weekend is associated to change of diet in adolescents and young adults. Please, give more details in the description of dietary assessment.

ANSWER: I have added details in the description of the dietary assessment.

"Dietary data were assessed from a 24-h recall . In the HELENA-study this was two non-consecutive days except on Friday and Saturday; in the BELINDA study this was two weekdays and one weekend day.

Moreover, how do the authors assess the validity of self-reported food intake?

ANSWER: I have added the validity of 24h recall. "The used 24h-recall has been validated in Flemish adolescents [2]. The 24h-recall tool proved to agree well with a one-day food record in categorizing subjects in consumers and nonconsumers (k=0.48–0.92) and spearman's correlations for energy and nutrient intakes ranged between 0.44 and 0.79 [3]. The used 24h dietary recall is sufficient to reflect general dietary intakes of macro- and micronutrients, compared with other measurements (interviewer-based 24h recall, 3-5 days estimated dietary record, and direct dietary observation) [4] (line 208-214).

6. How was the validity of polyphenol intake calculated from food intake assessed?

ANSWER: We realize that it would be interesting if we have total urinary polyphenol excretion or other biomarkers as the validation of polyphenol intake from 24h recalls, but we don't have the data of total urinary polyphenol excretion because of lack of budget. We have already mentioned this as our limitation. "Therefore, (poly)phenols biomarkers like in biofluids could be needed in investigating health effects [5]. (line 391-392)

Using the same methodology as in our study i.e. 24h recalls and the Phenol-Explorer database, reported polyphenol intake was in another study significantly associated with polyphenol biomarkers in urine" (page 223-225).

Data of the physical characteristics and the total energy and macronutrient intake of the sample should be also reported, also by gender.

ANSWER: Total energy intake was already specified in table 1, but now we have included information on macronutrient intake.
In supplemental material, we now also include a similar table as table 1, but split by gender.

We have mentioned it also in page 255 "Descriptive characteristics are shown in Table 1 and Supplemental Table 1 (split by sex)."

Minor comments

7. Waist circumference. The measure of waist circumference is affected by a high inter- and intra-operator variability. Moreover, a clear definition of the reference used for the measure should be provided.

ANSWER: All measures in HELENA followed the Lohman's anthropometric standardization reference manual. We have included this information and the reference in the manuscript. "The waist circumference (WC) was measured three consecutive times on the left side of the body with a circumference measuring band (Type SECA 200) to the nearest 0.1 cm, according to Lohman's anthropometric standardization reference manual (ref) [6, 7]" (line 178-180)

"In our study, good inter- and intra-operator variability was found for waist circumference (technical error of measurement 1.6cm and 0.5cm; 90.5% and 98% coefficient of reliability)."(line 181-182).

[1] Beghin L, Huybrechts I, Vicente-Rodriguez G, De Henauw S, Gottrand F, Gonzales-Gross M, et al. Main characteristics and participation rate of European adolescents included in the HELENA study. Arch Public Health. 2012;70:14.

[2] Vereecken CA, Covents M, Sichert-Hellert W, Alvira JM, Le Donne C, De Henauw S, et al. Development and evaluation of a self-administered computerized 24-h dietary recall method for adolescents in Europe. Int J Obes (Lond). 2008;32 Suppl 5:S26-34.

[3] Vereecken CA, Covents M, Matthys C, Maes L. Young adolescents' nutrition assessment on computer (YANA-C). Eur J Clin Nutr. 2005;59:658-67.

[4] Timon CM, van den Barg R, Blain RJ, Kehoe L, Evans K, Walton J, et al. A review of the design and validation of web- and computer-based 24-h dietary recall tools. Nutr Res Rev. 2016;29:268-80.

[5] Rienks J, Barbaresko J, Nothlings U. Association of Polyphenol Biomarkers with Cardiovascular Disease and Mortality Risk: A Systematic Review and Meta-Analysis of Observational Studies. Nutrients. 2017;9.

[6] Nagy E, Vicente-Rodriguez G, Manios Y, Beghin L, Iliescu C, Censi L, et al. Harmonization process and reliability assessment of anthropometric measurements in a multicenter study in adolescents. Int J Obes (Lond). 2008;32 Suppl 5:S58-65.

[7] Lohman T, Roche A, Martorell R. Anthropometric Standardization Reference Manual. Champaign, Illinois: Human kinetics Books 1988.

THIRD REVISION

Reviewer #2: The manuscript has been improved from Authors in respect to the previous one. However, I add some further comments. In particular:

Introduction. Authors described the hypothesis that they wanted to test with this study, but, perhaps, it is better to write that: "polyphenol intake would be lower in adolescence compared with adulthood and this lower polyphenol intake would be likely associated with a higher metabolic risk". Moreover, they did not provide any reasons as to what causes polyphenols should be higher in adulthood than in childhood. Please, provide it before describing the hypothesis of the study.

ANSWER: We have changed it in line 127-129 and we have added the reason before describing the hypothesis.

"For the first time, this study aimed to evaluate within-subject longitudinal changes in food consumption and (poly)phenols intakes during 10 years of follow up in European adolescents becoming young adults, while also exploring the association with metabolic syndrome risk (MetS). For our adolescents, the total polyphenol intake was lower compared to previous studies in adult populations [9-14], and in UK adolescents aged 11-18 years [15]. The lower polyphenol intake might be due to the low consumption of fruit and vegetables as our adolescents only ate half of the recommended amount of fruit and vegetables [16]. A 1 g/day of total polyphenol intake can be reached for people who eat several servings (usually 3-4 times) of fruit and vegetables each day [17]. Therefore, the hypothesis was that (poly)phenol intake would be lower in adolescence compared with adulthood and this lower (poly)phenol intake would be likely associated with a higher metabolic risk." (line 124-134)

Page 10,L227. Please, provide the reference.

ANSWER: We have added "Using the same methodology as in our study i.e. 24h recalls and the Phenol-Explorer database, reported (poly)phenols intake was significantly associated with (poly)phenols biomarkers in urine [31]."(line 230-232)

Page 15,L341-3. It is not clear why: "In contrary, …". Please clarify the second sentence.

ANSWER: In contrary, a negative association between total (poly)phenols intake and MetS was found in Poland [28].(line 347-348)

Suppl. Table 1. It should be more suitable to report initially the physical characteristics of boys and girls, followed by biochemical data and then nutrition data. Moreover, it should be useful to report height and weight of the sample. Finally, is it correct 68.4% overweight in girls? Please, check. Energy intake: interestingly, based on the high SD of energy intake, especially in boys, it is likely that a relatively high proportion of them underreported their food intake.

ANSWER: Our apologies for the potential mistake in suppl table 1. We have checked this very carefully again. We have realized that 9.5% overweight in girls and we have added also weight and height. We put macronutrient intake in the last session after biochemical data.