PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Dietary intake, physical activity and muscle strength among adolescents: the Malaysian Health and Adolescents Longitudinal Research Team (MyHeART) study
AUTHORS	Ng, Ai Kah; Hairi, Noran; Jalaludin, Muhammad Yazid; Majid, Hazreen

VERSION 1 - REVIEW

REVIEWER	Juan Mielgo Ayuso Department of Biochemistry, Molecular Biology and physiology University of Valladolid 42003 Soria (Spain) E-mail: juanfrancisco.mielgo@uva.es Tel: +34 975129189
REVIEW RETURNED	16-Sep-2018

GENERAL COMMENTS	The manuscript entitled Dietary intake, physical activity and muscle strength among adolescents: the Malaysian Health and Adolescents Longitudinal Research Team (MyHeART) study and conducted by AK Ng aim to examine the association between hand grip strength, dietary intake and physical activity among adolescents in Malaysia. Although it is a very well-done study from the methodological point of view, it presents very inconclusive results even though these show significances. The presentation of a r less than 0.200 indicates that this association is minimal and without relevance. Therefore, discussing and guiding the manuscript in trying to justify this significance is not adequate. The authors should look for other outcomes that allow them to increase be r.

REVIEWER	Sandra Abreu Faculty of Sport, University of Porto, Portugal Faculty of Psychology, Education and Sports, Lusófona University of Porto, Porto, Portugal
REVIEW RETURNED	29-Oct-2018

GENERAL COMMENTS	The purpose of this study was to determine the association between energy, carbohydrate and fat intake, physical activity and muscle strength among Malaysian adolescents. This study offers interesting data on the cross-sectional relationship between total dietary intake, physical activity and muscle strength. However, I have several concerns that must be clarified.

	MAJOR REVISIONS 1. In the introduction, it is not clear why the authors considered exploring only the relationship between energy and macronutrient intake and muscle strength. The consideration of isolated nutrients is limitative and must be considered in the limitations. 2. Page 8, lines 41–42: Regarding muscle-strength assessment, please refer to how many repetitions were done for each hand and which value was considered. 3. Page 9, lines 8–11: Please explain the process of cross-checking diet history and how the margin of error was determined. Additionally, were all of the participants plausible energy reporters? Did the authors check for misreporting regarding energy? If so, how was this accomplished? 4. Page 9, lines 17–19: The authors noted that they used a Malaysian version of the validated physical-activity questionnaire for older children. However, the use of a questionnaire for a population different from that for which it was originally designed presupposes adapting the language and testing its validity. 5. Page 10, line 20: Why did the authors include several indicators of obesity as covariates in the partial correlation coefficients? 6. Did the authors test the interaction between energy and macronutrient intake with physical activity? Please elucidate. 7. The association of macronutrients using their absolute quantity (g/day) does not consider their correlation with energy intake, and the results may be due to the confounding of total energy intake. For protein, since adolescence is a critical period, the use of g/kg/day may be more informative. 8. Page 11, lines 19–21: Please check the value of R2; the authors may have incorrectly transcribed the value. 9. Table 1: For the categorical variables, the p-values are missing. For muscle strength, since in the methods section you refer to the dominant and non-dominant hands, please add this information to the table rather than right and left hands. Additionally, since the sample studied is adolescents, anthropometric measures used must account for age and gender. 10. Table 2: Since the authors found a positive association of carbohydrate and fat with hand-grip strength in males in partial correlation, why are these nutrients not considered in the multiple linear regression? 11. Page 16, lines 36–38: How can the authors conclude that the average BMI of male participants is below the IOTF cut-off without accounting for age? 12. Page 17, line 27: What is meant by “…the majority of the males reached the puberty stage”? How was maturity evaluated specifically? 13. Page 17, lines 51–53: Why did the authors consider the use of questionnaires as objective measurements? And how can using these questionnaires minimize the risk of bias? What types of bias might be involved?

REVIEWER	Rey Aix Marseille Univ, CNRS, ISM, Marseille, France
REVIEW RETURNED	16-Dec-2018

GENERAL COMMENTS

Considering a health subject in youth, the aim of this study is relevant. The objective was to examine the role of self reported daily dietary intake and self reported physical activity habits in muscle strength measures among 1012 fifteen years-old Malaysian boys and girls. The anthropometric measures were done with an impedancemetric's weighing scale. All dietary, activity and socio-demographic registers were done with questionnaires. The muscle strength was reduced to hand grip performance of the two hands with a hand dynamometer. The main results could have been expected. In sum, firstly, girls reported lower activity level performance and energy intake than boys with lower energy, carbohydrate and protein. Secondly, a positive and significant correlation was highlighted between hand grip results and energy intake, carbohydrate, fat and physical activity scores for boys only excluding girls without any effect of proteins.
The manuscript is very well constructed and written. The background is well reviewed and references are strong. However, the results could be more highlighted with a figure of the main results. The discussion is of quality and well storied.

Some concerns can be reported :
Firstly, even if the panel of participants is large, we can see that the objective measures are not sufficient in a such subject. Most of the observations are done with questionnaires and related estimation of nutrients. Moreover, the design doesn't explain who did the measures and tests, how were they instructed and controlled for such a large sample.
Secondly, any information or objective measure can explain the effect of dietary intake on the muscle strength. If this point is indicated as a limitation, a causal interpretation could have been expected from the beginning of the protocol because this question is central in this research.
Thirdly, this study seems to be done with data which have already been used for a first published study. Especially, handgrip strength, activity level, socioeconomic status, diet history and anthropometric measurements were already used for a larger sample. So, it can be thought that the same measures could have been used for a lower sample issued of the same data and the same participants. Moreover, the number of ethical approval is the same. This ethical point is important considering the lack of objective measures for this second part of the research.

In conclusion, this study is more an observation than an investigation on the health level of the Malaysian adolescents. Even if the sample is large, quantitative measures miss in this design.

Specific comments

Introduction

pp.	ll.	Comments	Concern

	7	11-22	At the beginning of your paper, the most cited studies don't focus on the link handgrip strength and dietary intake. Please is it possible to focus on (1) the nutrients only and not on cultural food, (2) on handgrip strength and not on general muscle strength, (3) on physical activity habits and not on health related blood incomes that you don't use in your present study.	Minor
	7	40-42	In the relation between dietary intake and handgrip strength, only the study of Silva & Martins (2017) is relative to hand strength. Please, could you focus this special strength of your questions review.	Minor
	Methods			
	pp.	ll.	Comments	Concern
	8	21-24	Please can you explain how this study is not based on the same measures and data.	Major
	8	24-25	Why 82.3% only was valid?	Minor
	8	26	Could you explain why the term « gender » is used instead of sex? Taking into account that the participants declare ourselves their « sex » (male or female), you could indicate that you don't verify the biological sex according to the reproductive organs and functions or other argues.	Minor
	8	26-30	Could you precise what sort of schools were involved in this study and if the academic community approved the study.	Minor
	8	26-30	Please, could you increase information about the design of the study. In particular, the sample and the measures seem to be the same and we can have a doubt about the additional value of the present study.	Major
	8	44	Precise who were the assistants (school teachers, scientists etc.)	Minor
	9	10	Please precise why only 10% of the data were cross-checked.	Minor
	9		Please precise if you made a consistency analyse and what was the α-Cronbach.	Major
	9	42-43	Could you precise who made the anthropometric measures?	Minor
	10		Statistics: why did you not use ANOVA for your analyses controlling ethnicity, residency, BMI, %Fat and waist circumference?	Minor
	Results			
	Tables & figures		Table 1: add « estimated » for physical activity score and level ; energy and macronutrients intake. Could you add a figure to show the main results of the study, that is the positive correlation between estimated energy, carbohydrate, fat intake, physical activity score and handgrip strength in males but not in females?	Minor

10	40-42	Delete the two sentences: « Of the 1012 participants, 395 were male and 617 were female. The study population was predominantly Malay (78.6%) followed by Indian (8.8%),	Minor
		Chinese (7.2%) and others (5.5%). » This information is shown in the Table 1.	
10	43-45	If data are not shown or used, delete this information: « At this stage of the MyHeART study, the majority of the participants had reached puberty (data not shown). (…) and the remainder were left-hand dominant (data not shown). »	Minor
11	7-8	Delete this sentence : « This result is statistically significant. » the table 2 shows the p values.	Minor
Discussion			
pp.	ll.	Comments	Concern
15	18-21	« Our study has shown that the muscle strength of Malaysian adolescent was much lower than their counterparts as reported by studies from Europe, United Kingdom and Columbia of South America. » You did not compare your results in a table with others. It could be a major benefit to highlight this in the discussion section remembering the main results of other studies.	Minor
15	21-38	Your study highlights only hand grip strength and not others muscles strength. It's important to specify that: - First, self-reported activity influence differs of solicitations on muscle and correlated strength - Second, muscle strength has to be studied with BMI and %fat	Major
17	50-53	Dietary intake and physical activity were not objective measurements. This can't be argued as a minimal measurement bias.	Major

I hope that the comments made to this article will find the interest of the authors and the editor and that they will improve the quality of the manuscript.

Kind regards.

VERSION 1 – AUTHOR RESPONSE

Reply to the reviewer's comments

Reviewer: 1

Reviewer Name: Juan Mielgo Ayuso

Institution and Country: Department of Biochemistry, Molecular Biology and physiology, University of Valladolid, 42003 Soria (Spain)

Comments	Reply
The manuscript entitled Dietary intake, physical activity and muscle strength among adolescents: the Malaysian Health and Adolescents Longitudinal Research Team (MyHeART) study and conducted by AK Ng aim to examine the association between hand grip strength, dietary intake and physical activity among adolescents in Malaysia. Although it is a very well-done study from the methodological point of view, it presents very inconclusive results even though these show significances. The presentation of a r less than 0.200 indicates that this association is minimal and without relevance. Therefore, discussing and guiding the manuscript in trying to justify this significance is not adequate. The authors should look for other outcomes that allow them to increase be r.	We take note of the comment and have looked for other outcomes as per advised by reviewer. We found out that when physical factors were added, the r value improved. When the length of hand span of dominant hand and height were added, the prediction improved with adjusted R2=0.339. F(7,387)=29.875, p<0.001 We have discussed this under discussion section. “Besides dietary and physical activity factors, the literature has also shown that physical factors such as height and length of hand span can influence hand grip strength.(Jurimae, Hurbo, & Jurimae, 2009; Ploegmakers, Hepping, Geertzen, Bulstra, & Stevens, 2013; Diego Augusto Santos Silva & Martins, 2017) Although assessing the influence of physical factors was not one of this study’s objectives, physical factors were found to play a role in influencing hand grip strength.”

Reviewer: 2

Reviewer Name: Sandra Abreu

Institution and Country: Faculty of Sport, University of Porto, Portugal; Faculty of Psychology, Education and Sports,

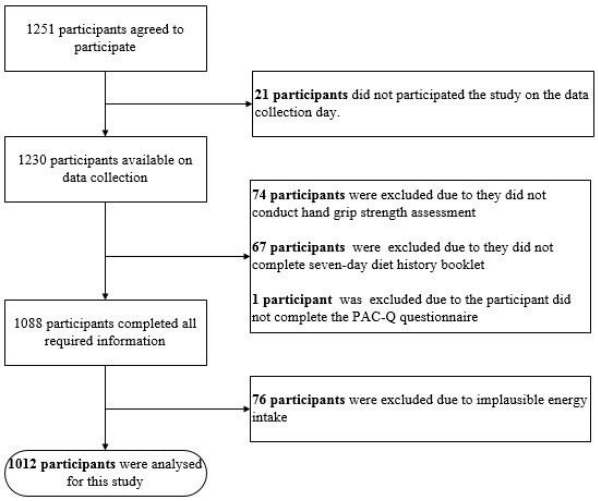
Lusófona University of Porto, Porto, Portugal

Activity and muscle strength among Malaysian adolescents. This study offers interesting data on the cross-sectional relationship between total dietary intake, physical activity and muscle strength. However, I have several concerns that must be clarified.

MAJOR REVISIONS

Comments	Reply

1. In the introduction, it is not clear why the authors considered exploring only the relationship between energy and macronutrient intake and muscle strength. The consideration of isolated nutrients is limitative and must be considered in the limitations.	We take note of the input and we have revised it as per suggested by the reviewer. "In view of the changes that take place in the skeletal muscle in response to energy and macronutrient intake particularly carbohydrate and protein intake, in normal physiology(Argilés, Campos, Lopez-Pedrosa, Rueda, & Rodriguez-Mañas, 2016), it is worthwhile to further investigate the relationship between dietary intake, particularly energy and macronutrients, and muscle strength. While previous studies have provided some evidences to demonstrate that low level of physical activity level(Otero et al., 2017; Diego Augusto Santos Silva et al., 2017) and being overweight(Diego Augusto Santos Silva et al., 2017) are associated with low hand grip strength, it seems that no studies have evaluated the influence of dietary intake and physical activity on hand grip strength among adolescents specifically."
2. Page 8, lines 41–42: Regarding muscle-strength assessment, please refer to how many repetitions were done for each hand and which value was considered.	We have added this information in the manuscript as below. "The dominant and non-dominant hands of the participants were each tested three times and the readings were recorded to the nearest 0.1 kg. The average of the three readings for the dominant hand was used in analysis."
3. Page 9, lines 8–11: Please explain the process of cross-checking diet history and how the margin of error was determined.	We take note on the comment and have added in the manuscript as below. "After the diet history had been analysed, 10% of the data was randomly cross-checked by an independent qualified dietitian who was not involved in analysing the dietary data. The margin of error was 4.4%. It was seemed acceptable as it has been stated that a 10% margin of error is acceptable.(Day, Fayers, & Harvey, 1998) Implausible energy intakes <500 kcal/day or >5000 kcal/day were excluded from this analysis.(Berkey et al., 2000)"

Additionally, were all of the participants plausible energy reporters? Did the authors check for misreporting regarding energy? If so, how was this accomplished?	Originally, there were 1230 participants. After further data cleaning and researcher was left with 1088 participants. Any implausible energy intakes <500 kcal/day or >5000 kcal/day were excluded from this analysis (Berkey et al., 2000). This leads to further removal of 76 participants. This left researcher with 1012 participants for the analysis. Refer to below diagram. 
4. Page 9, lines 17–19: The authors noted that they used a Malaysian version of the validated physical-activity questionnaire for older children. However, the use of a questionnaire for a population different from that for which it was originally designed presupposes adapting the language and testing its validity.	Thank you for the comment. The use of translated version has been validated in a local setting with an αCronbach of 0.79. (Dan & Zalilah, 2007) We have added this information in the manuscript as below. “The translated version has been validated in a local setting, achieving an α-Cronbach of 0.79.”
5. Page 10, line 20: Why did the authors include several indicators of obesity as covariates in the partial correlation coefficients?	Noted on some concerns about using several indicators of obesity (e.g. body composition, waist circumference and %of body fat) can lead to over adjusting. Therefore, we have decided to use BMI as indicators of obesity. According to Pelegrine et al (2015), BMI was able to discriminate body fatness in adolescents.(Pelegrini, Silva, de Lima Silva, Grigollo, & Petroski, 2015) We have revised the covariates in the partial correlation coefficients as below. “The hand grip strength of the dominant hand was entered as the dependent variable and (i) energy and macronutrient intake and (ii) physical activity score were entered as the independent variables while controlling for ethnicity, place of residency and BMI. Body mass index was chosen as the covariate despite there being several other indicators of obesity because BMI is able to discriminate body fatness in adolescents.”

6. Did the authors test the interaction between energy and macronutrient intake with physical activity? Please elucidate.	Thank you for the comment. In view of it was not part of the objective in this paper, therefore it was not shared. Nevertheless, it was found no significant relationship between energy and macronutrients intake with physical activity.
7. The association of macronutrients using their absolute quantity (g/day) does not consider their correlation with energy intake, and the results may be due to the confounding of total energy intake. For protein, since adolescence is a critical period, the use of g/kg/ day may be more informative.	Thank you for the comment. We noted the potential of confounding effect of total energy intake. Therefore, only energy intake was entered into multiple linear regression. Nevertheless, we agree with the idea of using g protein per body can be more informative. We have added the information of g protein/kg.
8. Page 11, lines 19–21: Please check the value of R2; the authors may have incorrectly transcribed the value.	We take note of the comment and we have make the amendment accordingly.
9. Table 1: For the categorical variables, the p-values are missing. For muscle strength, since in the methods section you refer to the dominant and non-dominant hands, please add this information to the table rather than right and left hands. Additionally, since the sample studied is adolescents, anthropometric measures used must account for age and gender.	Thank you for the highlight and the p-values were added into table1 accordingly. Thank you for the highlight and we have conducted the descriptive analysis to get non-dominant hands information. The information was added into table 1 accordingly. Thank you for your comment. We agree that anthropometric measures used must account for age and gender. In this paper, all the subjects were 15-year-old and data was presented separately according to sex.
10. Table 2: Since the authors found a positive association of carbohydrate and fat with hand-grip strength in males in partial correlation, why are these nutrients not considered in the multiple linear regression?	Thank you for the input. It was considered in the multiple linear regression. However, it was not found to be significant association between carbohydrate, fat and hand grip strength in males.
11. Page 16, lines 36–38: How can the authors conclude that the average BMI of male participants is below the IOTF cut-off without accounting for age?	We take note of the comment. For your kind information, all the participants were 15-year-old in this study as described under METHODS section.
12. Page 17, line 27: What is meant by "…the majority of the males reached the puberty stage"? How was maturity evaluated specifically?	There was about 95% males reached the puberty stage. The maturity stages was self-reported using Tanner Staging. The self-reported puberty stage has been found to be reliable in a school-based survey with a weighted kappa coefficient of 0.68 for males and females. (Jaruratanasirikul, Kreetapirom, Tassanakijpanich, & Sriplung, 2015). Besides that, there was a peadiatrician throughout the data collection.

13. Page 17, lines 51–53: Why did the authors consider the use of questionnaires as objective measurements? And how can using these questionnaires minimize the risk of bias? What types of bias might be involved?	We agree with the reviewer's comments in which dietary intake and physical activity were not objective measurements and cannot be argued as a minimal measurement bias. What we meant was for objective measurement refers to hand grip strength, weight, height, BMI whereas questionnaire such as PAQ-C and sevenday diet history are considered as subjective measurements.
	To improve the clarity, we have rephrase the sentence as below. Secondly, it used the standard protocols for hand grip strength, dietary intake and physical activity assessment as well as data monitoring processes during data collection, data entry and data analysis in order to minimise the risk of bias. Moreover, to the best of the authors's knowledge, this study may be the first to investigate the association between hand grip strength, dietary intake and physical activity among adolescents in Asia. However, it should be noted that this study is somewhat limited because it was cross-sectional in design, so the presence or otherwise of a causal relationship could not be established. In addition, the sample covered a narrow age range. Also, several variables such as dietary intake, physical activity and maturity stages were collected via self-completed questionnaire, which may be a limitation due to the potential for misreporting. However, no method is without its limitations and this method was pilot tested on adolescents, it was expected that it would be a reasonable approach. First, seven-day dietary record seemed the most appropriate in view of adolescents memory processing capability(Burrows, Martin, & Collins, 2010) and because other approaches such as indirect calorimetry were not possible in this population-based study. Second, the translated PAQ-C had previously been validated in a local setting.(Dan & Zalilah, 2007) Third, the self-reported puberty stage has been found to be reliable in a school-based survey with a weighted kappa coefficient of 0.68 for males and females.(Jaruratanasirikul et al., 2015)

Reviewer: 3

Reviewer Name: Rey

Institution and Country: Aix Marseille Univ, CNRS, ISM, Marseille, France

Considering a health subject in youth, the aim of this study is relevant. The objective was to examine the role of selfreported daily dietary intake and self-reported physical activity habits in muscle strength measures among 1012 fifteen years-old Malaysian boys and girls. The anthropometric measures were done with an impedance metric's weighing scale. All dietary, activity and sociodemographic registers were done with questionnaires. The muscle strength was reduced to hand grip performance of the two hands with a hand dynamometer. The main results could have been expected. In sum, firstly, girls reported lower activity level performance and energy intake than boys with lower energy, carbohydrate and protein. Secondly, a positive and significant correlation was highlighted between hand grip results and energy intake, carbohydrate, fat and physical activity scores for boys only excluding girls without any effect of proteins. The manuscript is very well constructed and written. The background is well reviewed and references are strong. However, the results could be more highlighted with a figure of the main results. The discussion is of quality and well storied.

Some concerns can be reported:

Comments	Reply
Firstly, even if the panel of participants is large, we can see that the objective measures are not sufficient in a subject. Most of the observations are done with questionnaires and related estimation of nutrients. Moreover, the design doesn't explain who did the measures and tests, how were they instructed and controlled for such a large sample.	The objective measures inclusive of handgrip strength which measured using JAMAR hand dynamometer and calibrated each time of data collection. We have added further details into METHODS section "The data collection was conducted by the MyHeART team, which was led by the principal investigator. The team consisted of 20 research assistants (medical doctors, nurses and dietitians) who collected the data at various stations such as anthropometry, hang grip strength and dietary stations. The data was collected between March and May in 2014. Prior to conducting data collection, Principle Investigator provided orientation and training sessions for the research assistants in order to familiarise them with the objectives and methodology of the study as well as hands-on practice in measuring the anthropometrics and hand grip strength. In addition, the researcher assistants who were dietitians received training on how to conduct the sevendays diet history using standardised portion of food and how to translate the diet history into a coding sheet in order to ensure the consistency and quality of the collected data."

Secondly, any information or objective measure can explain the effect of dietary intake on the muscle strength. If this point is indicated as a limitation, a causal interpretation could have been expected from the beginning of the protocol because this question is central in this research.	Thank you for the highlight. For your kind information, we do have blood samples, however it was not tested for the blood urea nitrogen in view of financial constraints. On the note, we have not conducted doubly labeled water (DLW) as it was too expensive to carry out the test. We take note of this as one of the limitations in this paper. We have added this limitation as per advised by reviewer under Strengths and limitations section.
Thirdly, this study seems to be done with data which have already been used for a first published study. Especially, handgrip strength, activity level,	Thank for your comment. We have added further details under methodological section.
socioeconomic status, diet history and anthropometric measurements were already used for a larger sample. So, it can be thought that the same measures could have been used for a lower sample issued of the same data and the same participants. Moreover, the number of ethical approval is the same. This ethical point is important considering the lack of objective measures for this second part of the research	For your kind information, MyHeART was a prospective open cohort study to identify the noncommunicable diseases' (NCD) risk factors among adolescents in Peninsular Malaysia to enable early detections and prevention of NCD (Hazreen et al., 2014). Participants were recruited at the age of 13 in year 2012 and followed up at the age of 15 and 17 respectively. The first published study was based on preliminary findings when the participants were 13-year-old with the aims to describe the prevalence of high-risk behaviours among young adolescents. Whilst this study was analysed cross sectionally based on first follow up (15year-old). Therefore, it was looking at different data sets. On the note, consent was collected every time of the data collection. It was stated under "patient and public involvement" section.
In conclusion, this study is more an observation than an investigation on the health level of the Malaysian adolescents. Even if the sample is large, quantitative measures miss in this design.	Thank you for the input. Noted that this is an observational cohort study, however MyHeART team took a list of measures including blood samples as reported in the published protocol (Hazreen et al., 2014). The team took as adequate as possible to look at blood profile, anthropometry and seven-day diet history.

Argilés, J. M., Campos, N., Lopez-Pedrosa, J. M., Rueda, R., & Rodriguez-Mañas, L. (2016). Skeletal muscle regulates metabolism via interorgan crosstalk: roles in health and disease. Journal of the American Medical Directors Association, 17(9), 789-796.

Berkey, C. S., Rockett, H. R., Field, A. E., Gillman, M. W., Frazier, A. L., Camargo, C. A., & Colditz, G. A. (2000). Activity, dietary intake, and weight changes in a longitudinal study of preadolescent and adolescent boys and girls. Pediatrics, 105(4), e56-e56.

Burrows, T. L., Martin, R. J., & Collins, C. E. (2010). A systematic review of the validity of dietary assessment methods in children when compared with the method of doubly labeled water. J Am

Diet Assoc, 110(10), 1501-1510. doi:10.1016/j.jada.2010.07.008

Dan, S., & Zalilah, M. (2007). Sex and ethnic differentials in physical activity levels of adolescents in Kuantan. Malaysian journal of nutrition, 13(2), 109-120.

Day, S., Fayers, P., & Harvey, D. (1998). Double Data Entry: What Value, What Price? Controlled Clinical Trials, 19(1), 15-24. doi:https://doi.org/10.1016/S0197-2456(97)00096-2

Hazreen, M. A., Su, T. T., Jalaludin, M. Y., Dahlui, M., Chinna, K., Ismail, M., . . . MyHe, A. R. T. S. G. (2014). An exploratory study on risk factors for chronic non-communicable diseases among adolescents in Malaysia: overview of the Malaysian Health and Adolescents Longitudinal Research Team study (The MyHeART study). BMC Public Health, 14 Suppl 3, S6.

doi:10.1186/1471-2458-14-S3-S6

Jaruratanasirikul, S., Kreetapirom, P., Tassanakijpanich, N., & Sriplung, H. (2015). Reliability of pubertal maturation self-assessment in a school-based survey Journal of Pediatric Endocrinology and Metabolism (Vol. 28, pp. 367).

Jurimae, T., Hurbo, T., & Jurimae, J. (2009). Relationship of handgrip strength with anthropometric and body composition variables in prepubertal children. Homo, 60(3), 225-238.

doi:10.1016/j.jchb.2008.05.004

Otero, J., Cohen, D. D., Herrera, V. M., Camacho, P. A., Bernal, O., & Lopez-Jaramillo, P. (2017). Sociodemographic factors related to handgrip strength in children and adolescents in a middle income country: The SALUS study. Am J Hum Biol, 29(1). doi:10.1002/ajhb.22896

Pelegrini, A., Silva, D. A. S., de Lima Silva, J. M. F., Grigollo, L., & Petroski, E. L. (2015). Anthropometric indicators of obesity in the prediction of high body fat in adolescents. Revista Paulista de Pediatria (English Edition), 33(1), 56-62. doi:https://doi.org/10.1016/S2359-3482(15)30031-2

Ploegmakers, J. J., Hepping, A. M., Geertzen, J. H., Bulstra, S. K., & Stevens, M. (2013). Grip strength is strongly associated with height, weight and gender in childhood: a cross sectional study of 2241 children and adolescents providing reference values. Journal of physiotherapy, 59(4), 255-261.

Silva, D. A. S., & Martins, P. C. (2017). Impact of physical growth, body adiposity and lifestyle on muscular strength and cardiorespiratory fitness of adolescents. Journal of Bodywork and Movement Therapies. doi:10.1016/j.jbmt.2017.01.007

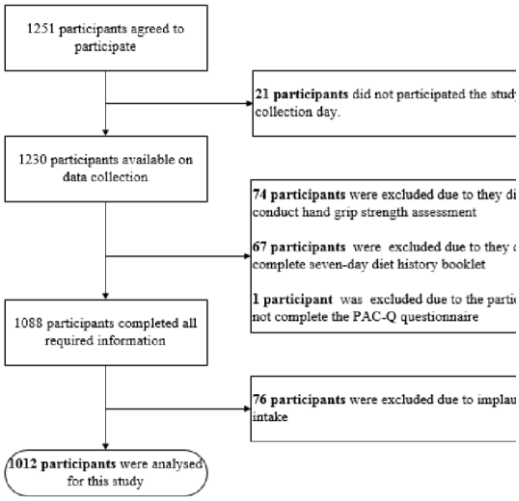
Silva, D. A. S., Pelegrini, A., Chula de Castro, J. A., Rodrigues de Lima, T., Renaldo de Sousa, G., Ferreira de Lima Silva, J. M., & Petroski, E. L. (2017). Low handgrip strength levels among adolescents in a city in Southern Brazil. Journal of Bodywork & Movement Therapies. doi:http://dx.doi.org/10.1016/j.jbmt.2017.03.004

Specific comments

Introduction

Introduction				
page	line	comments	concern	Author reply
7	11-22	At the beginning of your paper, the most cited studies don't focus on the link handgrip strength and dietary intake. Please is it possible to focus on (1) the nutrients only and not on cultural food, (2) on handgrip strength and not on general muscle strength, (3) on physical activity habits and not on health related blood incomes that you don't use in your present study.	Minor	We take note of the suggestion and have revised it as per suggested under INTRODUCTION section. (1) Focus on nutrients-based studies and omitted studies on cultural food (Mediterranean) (2) Focus on studies which reported nutrients and hand grip strength and omitted those on general muscle strength (3) Focus on physical activity habit and omitted those studies on health related blood outcomes. Nevertheless, we would like to keep the first paragraph to reflect about studies of muscle strength among adolescents in populationbased studies.
7	40-42	In the relation between dietary intake and handgrip strength, only the study of Silva & Martins (2017) is relative to hand strength. Please, could you focus this special strength of your questions review.	Minor	We take note of the suggestion and have revised it as per suggested under INTRODUCTION section. "While previous studies have provided some evidences to demonstrate that low level of physical activity level and being overweight are associated with low hand grip strength, it seems that no studies have evaluated the influence of dietary intake and physical activity on hand grip strength among adolescents specifically."
Methods				

8	21-24	Please can you explain how this study is not based on the same measures and data.	Major	Thank you for the input. For your kind information, MyHeART was a prospective open cohort study to identify the noncommunicable diseases' (NCD) risk factors among adolescents in Peninsular Malaysia to enable early detections and prevention of NCD (Hazreen et al., 2014). Participants were recruited at the age of 13 in year 2012 and followed up at the age of 15 and 17 respectively. The first published study was based on preliminary findings when the participants were 13-year-old with the aims to describe the prevalence of high-risk behaviours among young adolescents. Whilst this study was
				analysed cross sectionally based on first follow up (15-year-old). Therefore, it was looking at different data sets. We have added further details in the METHODS section of the manuscript as below. "This cross-sectional study is a secondary analysis of data derived from the first followup of the Malaysian Health and Adolescents Longitudinal Research Team (MyHeART) study."

8	24-25	Why 82.3% only was valid?	Minor	Originally, there were 1230 participants. After further data cleaning and researcher was left with 1088 participants. Any implausible energy intakes < 500 kcal/day or > 5000 kcal/day were excluded from this analysis (Berkey et al., 2000). This leads to further removal of 76 participants. This left researcher with 1012 participants for the analysis. Refer to figure 1. We have rephrase the sentence as below. "In 2014, 1230 adolescents were recruited for the MyHeART study. Out of the total participants in 2014, 1012 (82.3%) were included in the analysis for this paper. A flowchart of the sampling procedure used to select the participants for this study is provided in Figure 1. "  Figure 1: Flowchart of the participant sampling procedure
8	26	Could you explain why the term « gender » is used instead of sex? Taking into account that the participants declare ourselves their « sex » (male or female), you could indicate that you don't verify the biological sex according to the reproductive organs and functions or other argues.	Minor	Thank you for the explanation. We take note the comment and rephrase it as sex.

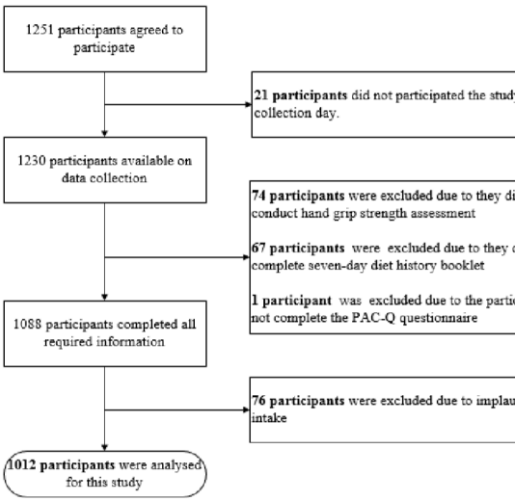
8	26-30	Could you precise what sort of schools were involved in this study and if the academic community approved the study.	Minor	Thank you for the enquiry. For your kind information, subjects were recruited from the public schools of Malaysia whereby 90% of Malaysian adolescents studying. And approval was done in several stages as listed below: 1) Firstly, approval by Ethics (UMMC) 2) Secondly, formal approval by the Ministry of Education (MoE) 3) Thirdly, formal approval from the state level administrative authorities of MoE 4) Finally, formal approval from respective Head Masters/Mistresses of selected schools We have added further clarification in the methodological section of the manuscript. "The MyHeART study was approved by the Ethics Committee of the University Malaya Medical Centre (MEC Ref. No. 896.34). Subsequently, formal approval was obtained from the Ministry of Health and Ministry of Education and then approval was sought from the relevant state level administrative authorities before approaching the Headmasters and Headmistresses of the selected schools."
8	26-30	Please, could you increase information about the design of the study. In particular, the sample and the measures seem to be the same and we can have a doubt about the additional value of the present study.	Major	We have added this information in the manuscript as advised by the reviewer under the METHODS section. This cross-sectional study is a secondary analysis of data derived from the first followup of the Malaysian Health and Adolescents Longitudinal Research Team (MyHeART) study. The population for the current study was comprised of 15-year-old adolescents attending public secondary schools in the central and northern regions of Peninsular Malaysia. The sampling method used was multistage random sampling. The primary sampling units were the schools and the secondary sampling units were the students. In the first stage, the study frame was a complete list of public schools in the two

above-mentioned regions from which total of 15 public secondary schools were selected. In the second stage, the defined study population was selected from a complete list of Form Three students in each of the selected school. Full details of the original MyHeART study protocol have been published elsewhere.26

In 2014, 1230 adolescents were recruited for the MyHeART study. Out of the total participants in 2014, 1012 (82.3%) were included in the analysis for this paper. A flowchart of the sampling procedure used to select the participants for this study is provided in Figure 1.

The MyHeART study was approved by the Ethics Committee of the University Malaya Medical Centre (MEC Ref. No. 896.34). Subsequently, formal approval was obtained from the Ministry of Health and Ministry of Education and then approval was sought from the relevant state level administrative authorities before approaching the Headmasters and Headmistresses of the selected schools.

The data collection was conducted by the MyHeART team, which was led by the principal investigator. The team consisted of 20 research assistants (medical doctors, nurses and dietitians) who collected the data at various stations such as anthropometry, hang grip strength and dietary stations. The data was collected between March and May in 2014. Prior to conducting data collection, Principle Investigator provided orientation and training sessions for the research assistants in order to familiarise them with the objectives and methodology of the study as well as hands-on practice in measuring the anthropometrics and hand grip strength. In addition, the researcher assistants who were dietitians received training on how to conduct the seven-days diet history using standardised portion of food and how to translate the diet history into a coding sheet in order to ensure the consistency and quality of the collected data.

				 Figure 1: Flowchart of the participant sampling procedure
8	44	Precise who were the assistants (school teachers, scientists etc.)	Minor	Thank you for the highlight. We have added this information in the manuscript under the METHODS section. “The data collection was conducted by the MyHeART team, which was led by the principal investigator. The team consisted of 20 research assistants (medical doctors, nurses and dietitians) who collected the data at various stations such as anthropometry, hang grip strength and dietary stations.”
9	10	Please precise why only 10% of the data were cross-checked.	Minor	Noted with thanks. We have added in as below: “After the diet history had been analysed, 10% of the data was randomly cross-checked by an independent qualified dietitian who was not involved in analysing the dietary data. The margin of error was 4.4%. It was seemed acceptable as it has been stated that a 10% margin of error is acceptable(Day et al., 1998)”
9		Please precise if you made a consistency analyse and what was the α-Cronbach.	Major	Thank you for the highlighted concern. The use of translated version was validated in local setting. The α-Cronbach was 0.79. (Dan & Zalilah, 2007) We have added in as below: “The translated version has been validated in a local setting, achieving an α-Cronbach of 0.79.”
9	42-43	Could you precise who made the anthropometric measures?	Minor	Thank you for the highlight. We have added this information in the manuscript under the METHODS section. “The data collection was conducted by the MyHeART team, which was led by the

				principal investigator. The team consisted of 20 research assistants (medical doctors, nurses and dietitians) who collected the data at various stations such as anthropometry, hang grip strength and dietary stations."
10		Statistics: why did you not use ANOVA for your analyses controlling ethnicity, residency, BMI, %Fat and waist circumference?	Minor	Thank you for the enquiry. The reason of not using ANOVA is because all predictor variables used were in the form of continuous.
Results				
Tables & figures		Table 1: add « estimated » for physical activity score and level ; energy and macronutrients intake. Could you add a figure to show the main results of the study, that is the positive correlation between estimated energy, carbohydrate, fat intake, physical activity score and handgrip strength in males but not in females?	Minor	We note of the input. The main results of the study were presented in Table 2.
10	40-42	Delete the two sentences: « Of the 1012 participants, 395 were male and 617 were female. The study population was predominantly Malay (78.6%) followed by Indian (8.8%),	Minor	Noted with thanks. We have deleted as requested.
10	43-45	If data are not shown or used, delete this information: « At this stage of the MyHeART study, the majority of the participants had reached puberty (data not shown). (…) and the remainder were left-hand dominant (data not shown). »	Minor	Noted with thanks. We have deleted as requested.
11	7-8	Delete this sentence: « This result is statistically significant. » the table 2 shows the p values.	Minor	Noted with thanks. We have deleted as requested.
Discussion				
15	18-21	« Our study has shown that the muscle strength of Malaysian adolescent was much lower than their counterparts as reported by studies from Europe, United Kingdom and Columbia of South America. » You did not compare your results in a table with others. It could be a major benefit to highlight this in the discussion section remembering the main results of other studies.	Minor	Noted with thanks. We have added this information in the manuscript as advised by the reviewer. "This study showed that the muscle strength of Malaysian adolescents is much lower than that of their counterparts as reported by studies in Europe (males:35.9kg; females:26.2kg), the United Kingdom (males:25.7kg; females:21.8kg) and Colombia of South America (males:33.6kg; females:24.9kg)."

15	21-38	Your study highlights only hand grip strength and not others muscles strength. It's important to specify that:	Major	We take note of the comments and we have added this under discussion section in the manuscript as advised by the reviewer.
		- First, self-reported activity influence differs of solicitations on muscle and correlated strength - Second, muscle strength has to be studied with BMI and %fat		"It is also important to acknowledge that the type of physical activity may have an influence on the hand grip strength. A crosssectional study has suggested different types of physical activity influence hand grip strength rather than the amount of time spent in physical activity per se.(Mattioli, Cavalli, Ribeiro, & Silva, 2015) Often, studies on muscle strength have included obesity parameters such as BMI and percentage body fat. Some of these studies have found that obese adolescents exhibit lower relative muscle strength to body mass as compared to their non-obese counterparts.(Thivel, RingDimitriou, Weghuber, Frelut, & O'Malley, 2016; Tomlinson, Erskine, Morse, Winwood, & Onambele-Pearson, 2016) Some studies have found otherwise.(Ceschia et al., 2015; Ravisankar, Udupa, & Prakash, 2005; Diego Augusto Santos Silva et al., 2017) For instance, one such study reported that girls with normal BMI have a low hand grip strength as compared to overweight/obese girls,(Diego Augusto Santos Silva et al., 2017) and the author postulated that the overweight/obese females may have increased their muscle mass due to physical growth. However, this findings and postulation needs to be interpreted cautiously because BMI does not differentiate between fat mass and fat-free mass. Moreover, the finding of that study could be due to discrepancies when examining the absolute strength and muscle strength relative to muscle mass and muscle quality."

17	50-53	Dietary intake and physical activity were not objective measurements. This can't be argued as a minimal measurement bias.	Major	Thank you for highlighting this. We agree with the reviewer's comments in which dietary intake and physical activity were not objective measurements and cannot be argued as a minimal measurement bias. What we meant was for objective measurement refers to hand grip strength, weight, height, BMI whereas questionnaire such as PAQ-C and seven-day diet history are considered as subjective measurements. To improve the clarity, we have rephrase the sentence as below. "Secondly, it used the standard protocols for hand grip strength, dietary intake and physical activity assessment as well as data monitoring processes during data collection, data entry and data analysis in order to minimise the risk of bias."

Argilés, J. M., Campos, N., Lopez-Pedrosa, J. M., Rueda, R., & Rodriguez-Mañas, L. (2016). Skeletal muscle regulates metabolism via interorgan crosstalk: roles in health and disease. Journal of the American Medical Directors Association, 17(9), 789-796.

Berkey, C. S., Rockett, H. R., Field, A. E., Gillman, M. W., Frazier, A. L., Camargo, C. A., & Colditz, G. A. (2000). Activity, dietary intake, and weight changes in a longitudinal study of preadolescent and adolescent boys and girls. Pediatrics, 105(4), e56-e56.

Burrows, T. L., Martin, R. J., & Collins, C. E. (2010). A systematic review of the validity of dietary assessment methods in children when compared with the method of doubly labeled water. J Am

Diet Assoc, 110(10), 1501-1510. doi:10.1016/j.jada.2010.07.008

Ceschia, A., Giacomini, S., Santarossa, S., Rugo, M., Salvadego, D., Da Ponte, A., . . . Lazzer, S. (2015).

Deleterious effects of obesity on physical fitness in pre-pubertal children. European Journal of Sport Science, 16, 1-8. doi:10.1080/17461391.2015.1030454

Dan, S., & Zalilah, M. (2007). Sex and ethnic differentials in physical activity levels of adolescents in Kuantan. Malaysian journal of nutrition, 13(2), 109-120.

Day, S., Fayers, P., & Harvey, D. (1998). Double Data Entry: What Value, What Price? Controlled Clinical Trials, 19(1), 15-24. doi:https://doi.org/10.1016/S0197-2456(97)00096-2

Hazreen, M. A., Su, T. T., Jalaludin, M. Y., Dahlui, M., Chinna, K., Ismail, M., . . . MyHe, A. R. T. S. G. (2014). An exploratory study on risk factors for chronic non-communicable diseases among adolescents in Malaysia: overview of the Malaysian Health and Adolescents Longitudinal Research Team study (The MyHeART study). BMC Public Health, 14 Suppl 3, S6.

doi:10.1186/1471-2458-14-S3-S6

Jaruratanasirikul, S., Kreetapirom, P., Tassanakijpanich, N., & Sriplung, H. (2015). Reliability of pubertal maturation self-assessment in a school-based survey Journal of Pediatric Endocrinology and Metabolism (Vol. 28, pp. 367).

Jurimae, T., Hurbo, T., & Jurimae, J. (2009). Relationship of handgrip strength with anthropometric and body composition variables in prepubertal children. Homo, 60(3), 225-238.

doi:10.1016/j.jchb.2008.05.004

Mattioli, R. Á., Cavalli, A. S., Ribeiro, J. A. B., & Silva, M. C. d. (2015). Association between handgrip strength and physical activity in hypertensive elderly individuals. Revista Brasileira de Geriatria e Gerontologia, 18(4), 881-891.

Otero, J., Cohen, D. D., Herrera, V. M., Camacho, P. A., Bernal, O., & Lopez-Jaramillo, P. (2017). Sociodemographic factors related to handgrip strength in children and adolescents in a middle income country: The SALUS study. Am J Hum Biol, 29(1). doi:10.1002/ajhb.22896

Pelegrini, A., Silva, D. A. S., de Lima Silva, J. M. F., Grigollo, L., & Petroski, E. L. (2015). Anthropometric indicators of obesity in the prediction of high body fat in adolescents. Revista Paulista de Pediatria (English Edition), 33(1), 56-62. doi:https://doi.org/10.1016/S2359-3482(15)30031-2

Ploegmakers, J. J., Hepping, A. M., Geertzen, J. H., Bulstra, S. K., & Stevens, M. (2013). Grip strength is strongly associated with height, weight and gender in childhood: a cross sectional study of 2241 children and adolescents providing reference values. Journal of physiotherapy, 59(4), 255-261.

Ravisankar, P., Udupa, K., & Prakash, E. S. (2005). Correlation between body mass index and blood pressure indices, handgrip strength and handgrip endurance in underweight, normal weight and overweight adolescents. Indian journal of physiology and pharmacology, 49(4), 455.

Silva, D. A. S., & Martins, P. C. (2017). Impact of physical growth, body adiposity and lifestyle on muscular strength and cardiorespiratory fitness of adolescents. Journal of Bodywork and

Movement Therapies. doi:10.1016/j.jbmt.2017.01.007

Silva, D. A. S., Pelegrini, A., Chula de Castro, J. A., Rodrigues de Lima, T., Renaldo de Sousa, G., Ferreira de Lima Silva, J. M., & Petroski, E. L. (2017). Low handgrip strength levels among adolescents in a

city in Southern Brazil. Journal of Bodywork & Movement Therapies.

doi:http://dx.doi.org/10.1016/j.jbmt.2017.03.004

Thivel, D., Ring-Dimitriou, S., Weghuber, D., Frelut, M. L., & O'Malley, G. (2016). Muscle Strength and Fitness in Pediatric Obesity: a Systematic Review from the European Childhood Obesity Group. Obes Facts, 9(1), 52-63. doi:10.1159/000443687

Tomlinson, D. J., Erskine, R. M., Morse, C. I., Winwood, K., & Onambele-Pearson, G. (2016). The impact of obesity on skeletal muscle strength and structure through adolescence to old age. Biogerontology, 17(3), 467-483. doi:10.1007/s10522-015-9626-4

VERSION 2 – REVIEW

REVIEWER	Sandra Abreu Faculty of Psychology, Education and Sports, Lusófona University of Porto, Portugal Research Center in Physical Activity Health and Leisure, Faculty of Sport, University of Porto, Portugal
REVIEW RETURNED	13-Mar-2019

GENERAL COMMENTS	Although the authors have responded to all of my comments and improved the manuscript, they need to address the following issues: 1. On page 9 at lines 41–42, please add information about the number of respondents who misreported energy intake. 2. In Table 1, please add information about the weight status that is more informative than mean BMI. Also, the p value of "Average hand grip strength (non-dominant hand)" is missing. 3. In the Results section, the authors need to add results about protein presented in Table 2. Additionally, since the authors found a negative linear relationship between protein intake and hand-grip strength in males, why was that relationship not considered in linear regression analysis? If no association was found, then the information needs to be described in the Result sections, and similar information should be provided for fat and carbohydrates as well. 4. On page 15 at lines 44–45, the sentence contradicts results presented in Table 2. 5. The authors have identified the use of BMI as a limitation; in that case, why have the authors not used body fat as an alternative measure? 6. Although the authors have identified that the type of physical activity is an important factor of hand-grip strength, they have not explored what type of physical activity may influence hand-grip strength.

REVIEWER	REY Aix Marseille Univ, CNRS, ISM, Marseille, France
REVIEW RETURNED	03-Feb-2019

GENERAL COMMENTS	General comments This manuscript is reviewed for the second time after modifications. The present manuscript is well constructed and well written. The background is more reviewed and references are stronger than in the first version. The results have been more highlighted in better tables and p values and measures have been corrected or added. A figure representing the flowchart has been added without results figure which is missing in my opinion. The discussion is of better quality and much more storied with a stronger consistency. Some concerns were reported in the firts review : Firstly, about the lack of objective measures. More details on the method and the tools validity have been added. So this point is now obviously regulated. Secondly, about the explanation of the dietary intake effects on the muscle strength. Hypothesis about these results have been highlighted in the discussion section.

Thirdly, about the ethical link to a first published study. This point has been regulated by more explanations and arguments in the method section.
Finally, if possible, a figure showing the main results could be added for a better clarity.

In conclusion, this study has been highly increased in its quality as its precision. Especially, the added details of the method and the more qualitative discussion can be considered as sufficient to accept the manuscript taking into account with the minor comments as written on the attached table.

Specific comments

Introduction

pp.	ll.	Comments	Concern
7		Please cut and verify this sentence : While previous studies have provided some evidences to demonstrate that low level of physical activity level[8 25] and being overweight[8] are associated with low hand grip strength, it seems that no studies have evaluated the influence of dietary intake and physical activity on hand grip strength among adolescents specifically. Particularly, delete the second « level » after « physical activity » and replace « studies » with its singular word « study »	Minor
7		In the relation between dietary intake and handgrip strength, only the study of Silva & Martins (2017) is relative to hand strength. Please, could you focus this special strength of your questions review.	Minor

Methods

pp.	ll.	Comments	Concern
8		A flowchart of the sampling procedure used to select the participants for this study is provided in Figure 1. I don't see this figure in the submitted manuscript. Please insert this flowchart at the end of the submission.	Minor
9		The dominant and non-dominant hands of the participants were each tested three times and the readings were recorded to the nearest 0.1 kg. The average of the three readings for the dominant hand was used in analysis. All the measurements were done by trained research assistants. Please could you indicate the time of the day and the conditions of measure (in or outside, the seating or standing up position…)	Minor
9		The translated version has been validated in a local setting, achieving an α-Cronbach of 0.79. [39]	Minor

		The α-Cronbach of the validating study is not necessary if the reference is indicated.	
Results			
Global results		Please could you report the α-Cronbach values for your own measures.	Minor
Discussion			
pp.	ll.	Comments	Concern
15		This study showed that the muscle strength of Malaysian adolescents is much lower than that of their counterparts as reported by studies in Europe (males:35.9kg; females:26.2kg), the United Kingdom (males:25.7kg; females:21.8kg) and Colombia of South America (males:33.6kg; females:24.9kg).[9 15 42] Please could you indicate if the average values are for both, dominant or non-dominant hand. Add the standard deviation.	Minor
17		It is also important to acknowledge that the type of physical activity may have an influence on the hand grip strength. A cross-sectional study has suggested different types of physical activity influence hand grip strength rather than the amount of time spent in physical activity per se.[57] Please could you check this sentence.	Minor

I hope that the comments made to this article will find the interest of the authors and the editor and that they will improve the quality of the manuscript.

Kind regards.

VERSION 2 – AUTHOR RESPONSE

Reply to the reviewer's comments for revision#1

Reviewer: 2

Reviewer Name: Sandra Abreu

Institution and Country: Faculty of Psychology, Education and Sports, Lusófona University of Porto, Portugal;

Research Center in Physical Activity Health and Leisure, Faculty of Sport, University of Porto, Portugal

Although the authors have responded to all of my comments and improved the manuscript, they need to address the following issues:

<table>
<tr><th>Comments</th><th>Reply</th></tr>
<tr><td>1. On page 9 at lines 41–42, please add information about the number of respondents who misreported energy intake.</td><td>We take note on the comment and have added in the manuscript as below.

“Total of 76 participants with implausible energy intakes (<500 kcal/day or >5000 kcal/day) were excluded for the analysis (Berkey et al., 2000).”</td></tr>
<tr><td>2. In Table 1, please add information about the weight status that is more informative than mean BMI. “Average hand grip strength (non-dominant hand)” is missing.</td><td>We take note of the comment and we have inserted the information accordingly into Table 1. We have also inserted the missing p value for average hand grip strength (non-dominant hand).

<table>
<tr><th>BMI category</th><th>Male</th><th>Female</th><th>Total</th><th>p value</th></tr>
<tr><td>Underweight</td><td>86 (21.8%)</td><td>108 (17.5%)</td><td>194 (19.2%)</td><td><0.001*</td></tr>
<tr><td>Normal</td><td>222 (56.2%)</td><td>355 (57.5%)</td><td>577 (57.0%)</td><td></td></tr>
<tr><td>Overweight</td><td>51 (12.9%)</td><td>101 (16.4%)</td><td>152 (15.0%)</td><td></td></tr>
<tr><td>Obesity</td><td>36 (9.1%)</td><td>53 (8.6%)</td><td>89 (8.8%)</td><td></td></tr>
</table>
</td></tr>
<tr><td>3. In the Results section, the authors need to add results about protein presented in Table 2. Additionally, since the authors found a negative linear relationship between protein intake and hand-grip strength in males, why was that relationship not considered in linear regression analysis? If no association was found, then the information needs to be described in the Result sections, and similar information should be provided for fat and carbohydrates as well.</td><td>Thank you for the comment. We noted and have added result about protein under the RESULTS section as below.

“Meanwhile, protein (g/kg body weight) was found to be negatively correlated with hand grip strength among males ($p<0.01$).”

We run the multiple linear regression analysis and found out that multicollinearity was high between energy and all three macronutrients. Therefore, we only consider energy intake in the linear regression analysis. Nevertheless, we did run the model for each macronutrient (replacing energy intake), R^2 value were similar as shown table below.

<table>
<tr><th>In replacement of energy intake</th><th>R^2</th></tr>
<tr><td>Protein (g/kg)</td><td>0.157</td></tr>
<tr><td>Carbohydrate (g)</td><td>0.164</td></tr>
<tr><td>Fat (g)</td><td>0.160</td></tr>
</table>

We have added in the explanation under RESULTS: Correlation and regression section as below.
“Protein, carbohydrate and fat intakes were not used in the regression due to multicollinearity.”</td></tr>
</table>

4. On page 15 at lines 44–45, the sentence contradicts results presented in Table 2.	Thank you for the highlight. We have make the amendment accordingly. “In this study, in males, energy, carbohydrate, and fat intakes and physical activity score were positively correlated with hand grip strength, but protein was negatively weak correlated (table 2).”
5. The authors have identified the use of BMI as a limitation; in that case, why have the authors not used body fat as an alternative measure?	Thank you for the comment. The body fat percentage showed similar result after we rerun the test (variable body fat replaced BMI). With that, we will just continue with the usage of BMI for easier comparison of other future studies.
6. Although the authors have identified that the type of physical activity is an important factor of hand-grip strength, they have not explored what type of physical activity may influence handgrip strength.	Thank you for the comment. In view of it was not part of the objective in this paper, therefore it was not explored.

Reviewer: 3

Reviewer Name: REY

Institution and Country: Aix Marseille Univ, CNRS, ISM, Marseille, France

Comments	Reply

This manuscript is reviewed for the second time after modifications. The present manuscript is well constructed and well written. The background is more reviewed and references are stronger than in the first version. The results have been more highlighted in better tables and p values and measures have been corrected or added. A figure representing the flowchart has been added without results figure which is missing in my opinion. The discussion is of better quality and much more storied with a stronger consistency. Some concerns were reported in the first review : (1) Firstly, about the lack of objective measures. More details on the method and the tools validity have been added. So this point is now obviously regulated. (2) Secondly, about the explanation of the dietary intake effects on the muscle strength. Hypothesis about these results have been highlighted in the discussion section. (3) Thirdly, about the ethical link to a first published study. This point has been regulated by more explanations and arguments in the method section. (4) Finally, if possible, a figure showing the main results could be added for a better clarity. In conclusion, this study has been highly increased in its quality as its precision. Especially, the added details of the method and the more qualitative discussion can be considered as sufficient to accept the manuscript taking into account with the minor comments as written on the attached table.	We take note of the input and we would like to remain the main result as in Table 2. We have added in a brief description under the RESULTS section for better clarity. ”Table 2 illustrates the main result and the number of participants used for the analysis which was as described in Figure 1.”

Reply to the specific comments for revision#1

Introduction				
page	line	comments	concern	reply
7		Please cut and verify this sentence : While previous studies have provided some evidences to demonstrate that low level of physical activity level[8 25] and being overweight[8] are associated with low hand grip strength, it seems that no studies have evaluated the influence of dietary intake and physical activity on hand grip strength among adolescents specifically. Particularly, delete the second « level » after « physical activity » and replace « studies » with its singular word « study »	Minor	Thank you for the highlight. We have make the amendment accordingly.

7		In the relation between dietary intake and handgrip strength, only the study of Silva & Martins (2017) is relative to hand strength. Please, could you focus this special strength of your questions review.	Minor	We take note of the suggestion and have revised it as per suggested under INTRODUCTION section. While previous studies have provided some evidences to demonstrate that low level of physical activity level[8 25] and being overweight8 are associated with low hand grip strength, there was only a study by Gracia-Marco et al (2017) has evaluated the effect of amino acids (dietary protein) and physical activity on hand grip strength.[15] It seems that no study studies have evaluated the influence of dietary intake and physical activity on hand grip strength among adolescents specifically.
Methods				
8		A flowchart of the sampling procedure used to select the participants for this study is provided in itted Figure 1. this flowchart at the I don't see this manuscript. Please insert of the submissi	Minor	We take note on the comment. For your kind information, Figure 1 is already uploaded separately. Therefore, it is not required to be embedded in our main document.
9		The dominant and non-dominant hands of the participants were each tested three times and the readings were recorded to the nearest 0.1 kg. The average of the three readings for the dominant hand was used in analysis. All the measurements were done by trained research assistants. and the co e could you indicate the time of the day of measure (in or outside, ating or standing up position…)	Minor	We take note of the suggestion and have revised it as per suggested under METHODS: Muscle strength section. Prior to the measurements being taken, the dynamometer was calibrated. Then, it was adjusted for different hand sizes. Participants were gathered in a hall. Each participant was positioned in a straight back chair with both feet flat on the ground. The elbow was flexed to 90° with forearm and wrist were in neutral position. The measurement began with dominant hand once the dominant hand was identified. The measurement followed by the nondominant hand. The dominant and non-dominant hands of the participants were each tested three times and the readings were recorded to the nearest 0.1

				kg. (Malaysian Health and Adolescents Longitudinal Research Team (MyHeART) Study Handbook, 2019) The average of the three readings for the dominant hand was used in analysis. All the measurements were done by trained research assistants.
9		The translated version has been validated in a local setting, achieving an α-Cronbach of 0.79.[39] The α-Cronbach of the validating study is not necessary if the reference is indicated.	Minor	We take note on the comment and have omitted the αCronbach value. "The translated version has been validated in a local setting~~, achieving an α-Cronbach of 0.79~~.[39]"
Results				
Global results		Please could you report the α-Cronbach values for your own measures.	Minor	Thank you for the comment. We do not have αCronbach values for own measurements since the PAC-Q questionnaire already validated in local setting.
Discussion				
15		a This study showed that the muscle strength of Malaysian adolescents is much lower than that of their counterparts as reported by studies in Europe (males:35.9kg; females:26.2kg), the United Kingdom (males:25.7kg; females:21.8kg) and Colombia of South America (males:33.6kg; females:24.9kg).[9 15 42] Please could you indicate if the average values re for both, dominant or non-dominant hand. Add the standard deviation.	Minor	We take note of the suggestion and have added standard deviation as per advised. However, we will not be able to indicate either average values are for both, dominant or non-dominant hand as requested. This is because there is only one study has indicated how they get the HGS. United kingdom study was based on the best attempted score. However, studies from Europe and Colombia of South America did not indicate it. "This study showed that the muscle strength of Malaysian adolescents is much lower than that of their counterparts as reported by studies in Europe (males:35.9±9.3kg; females:26.2±4.9kg), the United Kingdom (males:25.7±kg; females:21.8±5.8kg) and Colombia of South America (males:33.6±6.85kg; females:24.9±4.29kg).[2 15 42]"

17		t is also important to acknowledge hat the type of physical activity may nave an influence on the hand grip strength. A crosssectional study has suggested different types of physical activity influence hand grip strength ather than the amount of time spent n physical activity per se.[57] Please cou check this sentence?	Minor	Thank you for the highlight. We have make the amendment accordingly as below. "It is also important to acknowledge that the type of physical activity can affect ~~may have an influence on~~ the hand grip strength. A cross-sectional study has suggested different types of physical activity influence hand grip strength ~~rather than~~ and not the amount of time spent on physical activity ~~per se~~.[57]"

Malaysian Health and Adolescents Longitudinal Research Team (MyHeART) Study Handbook. (2019). (M. A. Hazreen, T. T. Su, M. Y. Jalaludin, & A. S. Nabilla Eds.). Kuala Lumpur: University of Malaya Press.