

The authors wish to thank all the three reviewers for their honest effort on helping our manuscript to be more readable and worthy. We tried to answer to all the requisites asked for the reviewers and the text was comprehensively changed to a much better version of it.

We kept the three answers together since some are complementary. And all the changes were highlighted in the manuscript.

Reviver 1

Introduction:

1. The TMC does indeed include a fine motor component, why is this a problem? Are the authors primarily concerned with gross motor competence? What is the difference between manipulative gross motor skills and manipulative (fine) motor skill? Please clarify in the introduction, what definitions that apply to the current study.

In the field of motor development and motor competence, the term “motor competence” is usually related to gross movements, excluding the fine motor component. But the reviewer is right on the possible confusion. Since we explained it in the following paragraph, we decided to change it to the beginning of the Introduction to be more understandable by the reader.

MC relates to human movement, its development and performance. It has been described as the ability to be skilful in a wide variety of gross motor skills (stability, locomotor, and manipulative) that are associated to multiple developmental outcomes including physical health [1-3], psychological, social-emotional, and cognition/achievement [4-7]. Importantly, it is expected that adequate levels of MC will facilitate the proficiency on novel motor tasks throughout the lifespan and the learning of new skills [8]

We also add more information on the reason why the inclusion of fine motor skills on the TMC.

2. I feel that this paper is very hard to justify since there is no argumentation/justification/rationale in the introduction for the different computational approaches towards MCA scores. Why did the authors expect differences in the computational method? Without this information, the study feels de-contextualized and hard to interpret. Please provide in the introduction, at last a couple of paragraphs on the empirical and theoretical rationale behind the various statistical methods investigated.

Thanks for the question. We added a context to the rationale at the end of the introduction.

Materials and methods

3. Although I understand that the MCA is thoroughly described in previous studies, the current paper would be easier to evaluate if at least some basic information with regard to test items and standardization is presented.

Thanks for the remark. We added this information on the text.

4. Again, the results are difficult to interpret since no argumentation/justification/rationale is provided for the Weighed Age-Group Model, the overall (?) model and the configural model. Why would these potentially classify children differently?

With the added rational in the introduction and the changes in the explanation of the scores calculation (added in the Methods section) we hope to have answered to the reviewer question.

Discussion

5. The claim that the paper aims at deciding 'on the better algorithm' (which is indeed a relevant question), cannot be justified without providing at least some empirical/theoretical rationale for it to be evaluated against. That all generated roughly the same results does not, in principle, justify any of the computational methods.

The procedure we used for deciding on the best way to score the MCA was used previously by Moreira et al (2019) on the KTK. We added this reference since it was missing in the text.

Moreira JPA, Lopes MC, Miranda-Júnior MV, Valentini NC, Lage GM, Albuquerque MR. Körperkoordinationstest Für Kinder (KTK) for Brazilian Children and Adolescents: Factor Analysis, Invariance and Factor Score. Front Psychol. 2019 Nov 19;10:2524. doi: 10.3389/fpsyg.2019.02524. PMID: 31803092; PMCID: PMC6877693.

We added information on the rationale (Introduction) and in the Statistics section.

The results for the Subscales and Total MCA according to the three tested models were compared with the values produced by the Weighed Age Group Model (WAGM), as the one selected to be our reference method. This choice relates to the fact that the WAGM model entails more information on the weight of each test to the subscale score and the total score (configural, loading coefficients and age-related information).

6. I certainly agree that no single gold standard exist for computing MC scale/subscale, this further highlights the need for additional information to evaluate against.

We agree. The added information should complete the picture.

7. It seems to me that the MCA battery includes many similar items compared to e.g., KTK, TMC and TGMD. The question therefore arises why are these other batteries are considered to be proxy measures for MC?

The KTK or the TGMD, or the MCA, are all proxi measures of motor competence, but they are not the same. The procedure we used for constituting the MCA was described earlier and the inclusion of tests from the existent batteries was intentional, but we only included tests with no ceiling effect, directly quantifiable, and possible to use on the lifelong. Furthermore we argue that stability, locomotor, and manipulative tests should be used in order to have a better MC battery.

But we agree with the author that in the final paragraph of the Discussion, the KTK 3+, TMC, M-ABC, TGMD-3, or the Bruininks-Oseretsky test, should not be mentioned as proxy measures of MC, so this part was removed.

8. It seems to me that if the authors have ambitions for deciding upon cut-off values for potentially motor impaired children, the validation process is far from finalized!

Yes, we agree that we still need to further work on several aspects of the MCA. In the manuscript we never say that the validation is concluded ... In fact, we say “the MCA is ready to be used as a classification tool for MC through the lifespan in different contexts” and added that “Further classification cut-off values for motor impaired, underperformers, and high performers can now be procured in future works”. Of course that the validation process relates to the specificity of the population, but this step is fundamental for all future work.

Reviewer 2

The authors want to provide a psychometric validation of the MCA. However, this is not a psychometric validation. They compare three models for assessing the score that should be obtained for the MCA.

The analyses are based on agreement and reliability analyses: authors try to determine whether the reliability between the three methods is high, which is the case. However, this is a truism. It is self-evident that the same individual scores used with three methods to obtain a total score will lead to total scores quite similar. I am afraid that this paper does not bring important knowledge to the scientific community, and I do not know how I could give some advice to authors to modify their manuscript to reach the minimum standard from the information given in the manuscript. At the best, it could have been a supplemental analysis in one of their previous papers. In my view, what the authors made is salami slicing, which belongs to the QRP.

We thank the reviewer’s comments in our manuscript, but we disagree.

Our seminal work on the development and validation of the MCA has been done sequentially over the years. The first paper was published in 2016 and it was on the determination of the model for MC that supports the MCA:

Luz C, Rodrigues LP, Almeida G, Cordovil R. Development and validation of a model of motor competence in children and adolescents. J Sci Med Sport 2016; 19:568-72.

The second paper was published in 2019, on the characteristics of each test along the first 23 years of age, establishing the normative values and the usefulness of the MCA components to mark MC along the growing years.

Rodrigues LP, Luz C, Cordovil R, et al. Normative values of the motor competence assessment (MCA) from 3 to 23 years of age. J Sci Med Sport 2019;22:1038-43.

The third paper, published in 2021, tested the invariance of the MCA model across age groups, establishing the usefulness of the model and the MCA to test across ages.

Rodrigues, Luis P., Cordovil, Rita, Luz, Carlos & Lopes, Vitor P. Model invariance of the Motor Competence Assessment (MCA) from early childhood to young adulthood, Journal of Sports Sciences, 2021, 39(20), 2353-2360.
<https://doi.org/10.1080/02640414.2021.1932290>

Now, in 2022, we are testing how the subscales scores and the total score should be determined, relative to the theoretical model tested, using the information from the normative values, and in accordance with the differences found between age groups on the determination of the weight loadings of each test for the MCA model.

This mean roughly one paper each two years, methodologically in sequence and using different samples each time in order to test the new problem and retest the previous findings (we are colleting about 250 new MCA tests each year, although during the Covid years that number was evidently lower). It hardly classifies our work as “salami slicing”, in our opinion.

All batteries on motor competence or motor development use subscales and total scores. In fact, the MCA has been used in the past 6 to 7 years with each author using a (different) composite of the tests to represent subscales and total MCA scores. This has been done regarding the theoretical model assumed for MCA, and long used in the field, that all tests and subscales have equal participation on the determination of the motor competence, but this was not tested until now.

When the reviewer says that testing these alternative methods is a truism, he or she does not fully understand what was done. If the participation of some of the tests for determining the latent characteristic of MC (the score) was different across ages or across the overall model of MCA, it could mean that we should account for different weights of each individual test to determine the subscale or the final MCA score. And that could be very different from just summing up all the values ... that is the purpose of this paper, to give the scientific community a sane and scientifically grounded method to provide the assessment of motor competence in its complexity.

We do believe that this study and its results are mandatory to complete this step of the MCA validation, and the expert field on motor competence and motor development is expecting these results to further expand their work on the field.

Reviewer 3

The paper looks very interesting.

Thanks

The purpose of the study is not clear.

Thanks for the comment. We added additional explanation on the purpose of the study at the end of the Introduction.

Avoid multiple paragraphs.

We try to do it by using a paragraph only when the subject of the text is changing.

Methods: First three lines are confusing. Rewrite the content. sample size calculations are not very clear.

Thanks for the comment. We rephrased the paragraphs.

Results : Well explained.

Thanks

Discussion: Discussion on the need for the development and use of the tool. Repetition of results can be avoided . Limitations have not been mentioned clearly. conclusion based on the objective.

Thanks for the comments.

We added further explanation on need for this information in the text. Not so on the need for the development and use of the MCA, since it is common knowledge on the field of motor development and motor competence, but on the reason for the need of a classification method.

We changed the text about the limitations to turn it clearer. And did the same in the conclusion to answer the reviewer comment.