

Dear Editor and Reviewer(s),

Thank you very much for your thoughtful feedback on our manuscript, “Gross Motor Proficiency and Reading Abilities among Chinese Primary School Students” (Manuscript ID: behavsci-3929365). We sincerely appreciate the time and effort you have dedicated to providing constructive comments and valuable suggestions, which have been highly insightful in helping us improve the paper.

The insightful critiques have undeniably enhanced the caliber of our manuscript. We have diligently addressed each raised point and integrated the recommended modifications to the best of our abilities. Additionally, we have meticulously proofread the document, with **the newly added part being indicated in Red** and **the revised part being indicated in Green**. We trust that the revised version adheres to the exacting standards of your publication.

Enclosed herewith is a comprehensive response to your comments and concerns. Attached, you will find the revised manuscript for your reference.

We eagerly anticipate your feedback and remain optimistic about the possibility of disseminating our research findings through publication in *Behavioral Sciences*.

We express our sincere appreciation for your invaluable guidance and thoughtful consideration.

Best regards,

Tongtong Shao, Feng Lu, Dingzhou Liu, Hongfan Chen and Haomin Zhang*

Responses to Reviewer 1's Comments

Reviewer's Comments Reviewer 1#	Authors' Responses (All newly added parts were highlighted in red. All revised parts were highlighted in green.)
1. I fail to see the relevance of gross motor proficiency connection to reading abilities from the theoretical background you offered in the text-why do you presume there is a connection, why would it be relevant, etc. since the connection is not well defined, the purpose of the research is not clear.	Thank you for your comments and suggestions. The relationship between motor proficiency and reading abilities among young children has been explored in many studies (Julius et al., 2016; Milne et al., 2018; Mohamed & O'Brien, 2021; Sayekti et al., 2024; Son & Meisels, 2006). As the section of 1. Introduction demonstrated, the positive association between fine motor skills and reading achievements has been verified (Barghandan et al., 2023; Mohamed & O'Brien, 2021; Suggate et al., 2019), but some inconsistent findings were found in terms of the connection between gross motor skills and reading performance (Macdonald et al., 2022; Milne et al., 2018; Wang & Wang, 2024; Westendorp et al., 2011). Some have shown a positive association between gross motor skills and reading abilities (Knight & Rizzuto, 1993; Macdonald et al., 2018; Westendorp et al., 2011; Sayekti et al., 2024), while others argued there was no connection (Macdonald et al., 2020; Son & Meisels, 2006; Wang & Wang, 2024) or even a negative link (Milne et al., 2018). Therefore, this study aimed to investigate the relationship between gross motor proficiency and reading abilities among Chinese primary school students.
2. You should explain why the Chinese language context of your research would contribute to the existing load of similar research among the alphabetical languages.	The differences between Chinese, a morphosyllabary language, and English, an alphabetic language, were added in the section of 1. Introduction as follows: Page 2, Line 83–93 Chinese is a morphosyllabary language relying on the mapping principle of graph to word, which is distinct from the alphabetic languages, like English, that transform graph to phoneme (Chang et al., 2016; Perfetti & Dunlap, 2008). Meanwhile, Chinese morphology contains fewer alterations of inflectional and derivational affixes (Chen & Schwartz, 2018; Ku & Anderson, 2003), whereas there is a productive derivational system in English, including inflection,

	derivation, and compounding (Plag, 2003; D. Zhang et al., 2017). Additionally, phonological priming tends to contribute to English reading, but morphological awareness shows a stronger power in Chinese literacy acquisition (Li et al., 2002; McBride-Chang et al., 2006; Perfetti et al., 2005). It indicates the great differences between Chinese and English reading mechanisms.
3. The methodology of the paper lacks a description of how and when the data was collected, the scientific proof of researchers who conducted the research, the socio-demographic data on participants- was it collected/why/was it analyzed/what are the results of those analysis.	The section of 2.2 Data collection and Measures was supplemented as follows: Page 4, Line 158–165 The data has been collected between June and July 2025, before the end of each grade’s last semester. All participants were assessed by their Physical Education teachers or coaches who had received rigorous research training and instruction. To begin with, the test of gross motor proficiency was conducted with specialized equipment, such as exercise mats, balanced beams, and basketballs and administered at the gym or playground of their schools. Moreover, the other paper-and-pencil tests including non-verbal intelligence and reading abilities were completed in a group setting at participants' regular classrooms. Out of considerations for participants’ privacy and ethics, the socio-demographic data was not collected, which could be added as the confounding variables in the future research.
4. The instruments used-why was there a need to construct four new scales? The reliability of all the used scales was below the threshold- very low reliability makes the result analysis close to irrelevant.	The issue of reading tests was revised and added in the section of 2.2.3 Reading Abilities Tests as follows: Page 5, Line 205–209 Reading, a multifaceted cognitive process, is related to metalinguistic awareness, like phonological awareness (Cárnio et al., 2017; Shu et al., 2008) and morphological awareness (Deacon et al., 2014; Zhang et al., 2023), as well as vocabulary knowledge (Nagy, 2007; Zhang, 2020). All reading instruments were adapted and modified based on existing measurements and participants’ proficiency. The discussion of reliability was added in the section of 2.2 Data Collection and Measures as follows:

	Page 6, Line 254–266 Alpha is defined as the estimate of the reliability (Cortina, 1993), which can be affected by the homogeneity or the heterogeneity of the scores of the tested population (Thompson & Vacha-Haase, 2000). It means that the score reliability can vary in different samples (Guilford & Fruchter, 1978). The reliability of tests in this study was calculated based on the random sampling of participants and a set of items showed a high level of consistency in their scores (e.g., Item 1 and 10 in the Gross Motor Proficiency Test, Item 1,2, and 3 in the Chinese Vocabulary Knowledge Test, and Item 1,2, and 3 in the Chinese Reading Comprehension Test). Therefore, the reliability was negatively influenced to some extent. Nonetheless, all the items, except for Item 1 and 10, in the Gross Motor Proficiency Test were significantly and highly related to the sum score ($r=0.350-0.607$, $p < 0.05$), demonstrating the high internal consistency. Meanwhile, based on the correlational results, there were such strong and significant associations among subtests of reading abilities ($r=0.260-0.593$, $p<0.01$) that the robust construct validity was ensured.
5. Some of the conclusions are merely speculations (high gross motor skills related to less homework writing and less reading exercises- no soundproof of such a conclusion).	The sections of 4. Discussion and 5. Conclusion were revised and supplemented to provide more reasonable evidence as follows: Page 10, Line 371–406 The negative relationships between gross motor proficiency and reading abilities among Chinese primary school students can be explained from cognitive and sociocultural frameworks. On the one hand, a series of seemingly unrelated behaviors share a common resource that is limited, drawing on a cognitive perspective. It is noteworthy that ego depletion in one domain can result in impaired performance in another (Baumeister et al., 1998). Given this, high physical exertion like gross motor exercise may impair the cognitive resources for reading. Moreover, Cooper (1973) claimed that acute exercise could lead to the increased neurotransmitter concentrations, which may positively improve the speed of processing and negatively affect the accuracy of processing working memory tasks based on

	McMorris et al. (2011; McMorris & Hale, 2012). Therefore, there is a possibility that gross motor activities can interfere with reading abilities relying on cognitive processing skills. On the other hand, from the sociocultural aspect, safe physical outdoor environments to move and explore freely were limited in China, despite of their important role in gross motor development (Li et al., 2023). Additionally, school-aged Chinese children, particularly those living in urban areas, were reported to have low physical activity and high sedentary behavior engagement (C. Wang et al., 2013; J. Wang et al., 2025; Zhu et al., 2019), because a large amount of time was required for additional study and homework (Zhao et al., 2015). Children who had better gross motor skill performance spent significantly more time in either moderate-to-vigorous physical activity or vigorous physical activity and spent significantly less time in sedentary behaviors than peers with lower scores (Williams et al., 2008). However, a positive association existed between sedentary time, particularly non-screen time (reading or homework), and academic performance (Carson et al., 2016; Haapala et al., 2014; Huang et al., 2019). It indicates that sedentary behavior may result in improved academic achievements like reading and decreased physical activities, which was negatively connected with gross motor competence in elementary school children.
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