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Examining the Association Between Cognitive Indices and Motor Proficiency in Female Students: A Structural Equation Modeling Study

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ABSTRACT

Background: Cognitive and motor abilities are interrelated during adolescence, but the contributions of individual cognitive domains to motor proficiency remain unclear.

Purpose: To examine associations between specific cognitive indices and motor proficiency in female students aged 12–15 years.

Methods: A cross-sectional correlational study involved 98 lower secondary school girls in Tehran, Iran. Cognitive functioning was assessed using the Wechsler Intelligence Scale for Children–Fourth Edition and motor proficiency using the Bruininks–Oseretsky Test of Motor Proficiency–Second Edition, Short Form. Pearson correlations and structural equation modelling were conducted.

Results: All four cognitive indices were positively associated with total motor proficiency (r = .426–.435; p = .001). Verbal comprehension showed the largest correlation (r = .435). Working memory was not significantly associated with strength (r = .179, p = .077). The reported structural pathway was positive (B = 0.235, SE = 0.017, CR = 14.161, p < .001); model indices included CFI = .987, TLI = .984, and RMSEA = .073.

Conclusion: Cognitive functioning was positively associated with motor proficiency in this sample. The findings support further study of cognitive–motor relationships but do not establish causality.

WHAT IS ALREADY KNOWN ON THIS TOPIC	WHAT THIS STUDY ADDS	HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY
Cognitive and motor abilities are related in adolescence, although domain-specific relationships remain incompletely understood.	Four cognitive indices showed positive associations with total motor proficiency; the working memory–strength relationship was not significant.	The findings support further investigation of cognitive–motor relationships and may inform integrative approaches to physical education.

1. Introduction

Adolescence is a period of substantial cognitive and motor development. Motor competence emerges through interactions among individual characteristics, task demands, and environmental opportunities, while movement experiences provide opportunities for perceptual and cognitive learning (Adolph & Franchak, 2017; Lazar, 2025). Contemporary developmental perspectives therefore regard cognitive and motor functioning as interrelated rather than independent processes. A systematic review of typically developing children identified meaningful but domain-dependent relationships between motor and cognitive skills (van der Fels et al., 2015).

Cognitive functioning encompasses distinct abilities, including verbal comprehension, perceptual reasoning, working memory, and processing speed. These domains are measured by the Wechsler Intelligence Scale for Children–Fourth Edition, which provides more differentiated information than a single overall intelligence score (Kaufman et al., 2006). The scale has also undergone psychometric evaluation in Iranian children (Sadeghi et al., 2011). Evidence from research on school performance indicates that associations involving cognition vary across developmental stages and domains (Demetriou et al., 2020).

Motor proficiency encompasses coordinated fine and gross motor skills and is relevant to participation in school activities and physical education. Associations between motor coordination, cognitive functioning, and academic outcomes have been observed in children (Fernandes et al., 2016; Macdonald et al., 2020). Cadoret et al. (2018) further reported that cognitive ability was involved in the relationship between motor proficiency and early academic achievement. These studies support the investigation of cognitive–motor associations, but findings involving younger children or academic attainment may not generalize directly to adolescent motor proficiency. A review has also discussed relationships between physical activity, cardiorespiratory fitness, and academic achievement in school-aged populations (Marques et al., 2018).

The short form of the Bruininks–Oseretsky Test of Motor Proficiency–Second Edition provides a practical assessment of motor performance through 14 items spanning eight motor domains. Research has examined its correspondence with the complete test and its measurement properties across child populations (Jírovec et al., 2019; Radanović et al., 2021; Yoon et al., 2024). Findings nevertheless warrant interpretation in relation to the age group and population being assessed. Recent studies suggest that cognitive–motor relationships may differ across specific motor domains and participant characteristics. Musálek et al. (2024) reported that fine motor and strength–agility measures showed different associations with nonverbal intelligence depending on age and sex. Mihuț and Cojocariu (2025) also examined links between balance and cognitive skills in preadolescents. Such findings emphasize that a general association between cognition and movement does not imply identical relationships for every component of motor performance.

Early adolescence is a particularly relevant period for investigating these patterns because students face increasing cognitive, educational, and movement-related demands. However, research examining multiple cognitive indices simultaneously in relation to motor proficiency among female lower secondary school students remains limited. Accordingly, the present study examined associations between four cognitive indices and motor proficiency in girls aged 12–15 years and evaluated a theoretically specified structural equation model. Because the study was cross-sectional, the estimated relationships were interpreted as statistical associations rather than evidence of causal influence.

2. Methods

2.1. Study design

A cross-sectional correlational design was used to examine relationships between cognitive functioning and motor proficiency among female lower secondary school students. Structural equation modeling was employed to estimate the relationship between two latent constructs: intelligence, represented by four cognitive indices, and motor proficiency, represented by eight motor indicators. The analysis was observational and does not establish causal direction.

2.2. Participants

The target population comprised girls aged 12–15 years enrolled in lower secondary schools in Tehran, Iran, during the 2024–2025 academic year. Multistage cluster sampling was used. One educational district was selected on the basis of accessibility, several girls' schools were randomly selected within that district, and participants were sampled proportionately from grades seven through nine. Initially, 110 students were recruited; following exclusion of 12 records with incomplete or invalid data, 98 participants remained in the analytic sample. A preliminary G*Power calculation for multiple regression with four predictors, an assumed medium effect size ($f^2 = .15$), $\alpha = .05$, and power = .80 yielded a minimum sample of 85 participants. Because this calculation was not specific to structural equation modeling, sample adequacy was also considered in relation to model complexity. The reported model comprised two latent constructs, 12 observed indicators, 25 estimated parameters, and 53 degrees of freedom.

Eligibility criteria included female sex, age 12–15 years, enrollment in a participating lower secondary school, absence of reported neurological, developmental, or orthopedic disorders, and parental consent with student assent. Incomplete assessments, absence during testing, inability to follow instructions, and conditions or medication use potentially affecting cognitive or motor performance were grounds for exclusion. Necessary permissions were obtained from the university and the Tehran Department of Education. Parents provided written informed consent and students provided assent before participation. Students were informed that their participation was voluntary and that personal information would be treated confidentially.

2.3. Measures

2.3.1. Wechsler Intelligence Scale for Children–Fourth Edition (WISC-IV)

Cognitive functioning was assessed using four index scores: Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed. Administration and scoring followed the standardized instructions for the test. Previous psychometric research supports the WISC-IV (Kaufman et al., 2006), including evidence from an Iranian evaluation (Sadeghi et al., 2011). The reported reliability coefficient for the cognitive indices in the present sample was .82.

2.3.2. Bruininks–Oseretsky Test of Motor Proficiency–Second Edition, Short Form (BOT-2 SF)

Motor proficiency was assessed with the 14-item BOT-2 Short Form, representing eight domains: fine motor precision, fine motor integration, manual dexterity, bilateral coordination, balance, running speed and agility, upper-limb coordination, and strength. Item scores were determined using the instrument's standardized procedures. Higher scores indicate greater motor proficiency. The short form has been investigated in different pediatric populations, including studies of score reliability and correspondence with the full assessment (Lucas et al., 2013; Jírovec et al., 2019; Radanović et al., 2021; Yoon et al., 2024). The reported reliability coefficient for the BOT-2 in the present sample was .77. Reliability has also been studied in youth with Down syndrome (Nocera et al., 2021), although this is a different population from the present sample.

2.4. Procedure

Data were collected during the 2024–2025 academic year at selected schools in Tehran. After institutional and educational permissions were obtained, the procedures were explained to administrators, students, and parents. Written parental consent and student assent were obtained before testing. Trained assessors administered the WISC-IV individually and then assessed motor proficiency using the BOT-2 Short Form under standardized conditions. Responses were coded, checked for completeness, and entered into the statistical software.

2.5. Statistical analysis

Data were analyzed using SPSS version 26 and AMOS. Means and standard deviations were calculated for demographic and study variables. The original analysis assessed normality using the Kolmogorov–Smirnov test and calculated Pearson correlations between cognitive indices and motor proficiency measures. Structural equation modeling with maximum likelihood estimation was used to assess the association between latent cognitive functioning and motor proficiency. Model fit was evaluated with χ^2/df, RMSEA, CFI, TLI, IFI, NFI, and GFI. Statistical significance was evaluated at $\alpha = .05$. The measurement model included four observed WISC-IV indices for the intelligence construct and eight observed BOT-2 motor indicators for the motor proficiency construct. One factor loading for each construct was fixed at 1.00 for identification, and a residual disturbance term was specified for the endogenous motor proficiency variable. The structural model included a single path from intelligence to motor proficiency, with 25 estimated parameters and 53 degrees of freedom. Reported parameter estimates and fit statistics are reproduced from the source results; the underlying dataset was not provided for independent re-estimation.

3. Results

3.1. Descriptive Statistics

Following data screening, 98 students remained in the analytic sample. The mean age was 13.32 years (SD = 1.10); mean height and weight were 157.88 cm (SD = 3.88) and 47.57 kg (SD = 4.17), respectively (Table 1). Mean WISC-IV index scores were 100.40 (SD = 10.56) for verbal comprehension, 100.84 (SD = 10.68) for perceptual reasoning, 100.71 (SD = 10.51) for working memory, and 100.73 (SD = 15.10) for processing speed.

Table 1. Demographic Characteristics of Participants

Variable	Min	Max	M	SD
Age (years)	12	15	13.32	1.10
Height (cm)	150	165	157.88	3.88
Weight (kg)	40	55	47.57	4.17

Note. N = 98. M = mean; SD = standard deviation. Means and standard deviations are rounded to two decimal places.

Pearson correlations between individual cognitive indices and motor proficiency measures are presented in Table 2. All four cognitive indices showed moderate positive correlations with overall motor proficiency (r = .426–.435; reported p = .001). The largest coefficient was observed for verbal comprehension (r = .435), followed by processing speed (r = .428), working memory (r = .427), and perceptual reasoning (r = .426). The correlations involving individual motor dimensions varied. Working memory was not significantly associated with strength (r = .179, p = .077).

Table 2. Pearson Correlation Coefficients Between Intelligence Dimensions and Motor Proficiency Dimensions

Motor domain	VCI	PRI	WMI	PSI
Total motor proficiency	.435 (.001)	.426 (.001)	.427 (.001)	.428 (.001)
Speed and agility	.250 (.013)	.232 (.022)	.206 (.042)	.260 (.010)
Balance	.249 (.013)	.258 (.010)	.223 (.028)	.249 (.014)
Bilateral coordination	.280 (.005)	.233 (.021)	.304 (.002)	.275 (.006)
Strength	.271 (.007)	.257 (.011)	.179 (.077)	.223 (.027)
Upper-limb coordination	.404 (.001)	.338 (.001)	.378 (.001)	.329 (.001)
Visuomotor control	.257 (.011)	.309 (.002)	.226 (.025)	.294 (.003)
Response speed	.307 (.002)	.285 (.004)	.387 (.001)	.318 (.001)
Upper-limb agility	.274 (.006)	.332 (.001)	.331 (.001)	.311 (.002)

Note. Cells display Pearson's r (top) and its p value (in parentheses, below); N = 98. *VCI* = Verbal Comprehension Index; *PRI* = Perceptual Reasoning Index; *WMI* = Working Memory Index; *PSI* = Processing Speed Index.

Structural equation modeling indicated a positive association between latent intelligence and motor proficiency (B = .235, SE = .017, CR = 14.161, p < .001). The reported fit statistics were χ^2/df = 1.515, RMSEA = .073 (90% CI [.037, .104]), CFI = .987, TLI = .984, IFI = .987, NFI = .964, GFI = .873, and adjusted GFI = .813. Although the incremental fit indices were comparatively strong, GFI and adjusted GFI were below .90, indicating that model fit was not uniformly strong. The indicator estimates and residual variances are reproduced in Table 3. The estimated structural path represents an association within the specified cross-sectional model, not a causal effect (Figure 1).

Table 3. Measurement and Structural Parameters of the Structural Equation Model

Indicator / path	B	SE	CR	Residual variance
Intelligence				
Verbal comprehension	1.000[a]	–	–	10.343
Perceptual reasoning	1.029	.044	23.529	6.929
Working memory	.991	047	20.881	11.045
Processing speed	.969	.044	22.220	8.142
Motor proficiency				
Fine motor precision	1.000[a]	–	–	1.094
Fine motor integration	1.126	.059	19.007	.840
Manual dexterity	1.204	.064	18.920	.983
Bilateral coordination	1.036	.061	17.095	1.156
Balance	1.084	.056	19.291	.717
Running speed and agility	1.027	.054	19.086	.682
Upper-limb coordination	1.203	.060	20.005	.709
Strength	1.067	.059	18.211	.932
Structural path				
Intelligence → motor proficiency	.235	.017	14.161	1.116[b]

Note. B = unstandardized estimate; SE = standard error; CR = critical ratio. All freely estimated loadings and the structural path had p < .001. Reference loadings were fixed to 1.00 and were not tested. [a] Fixed loading for identification. [b] Disturbance variance of the endogenous construct.

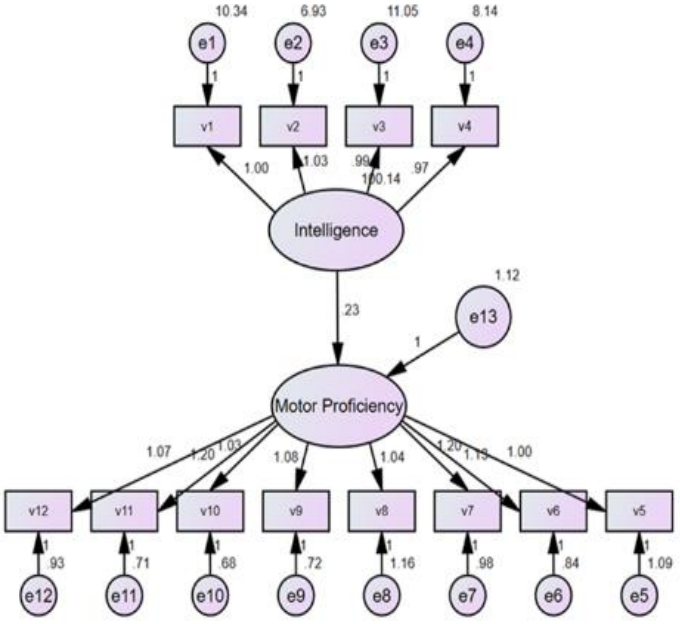


Figure 1. Structural model of the association between intelligence and motor proficiency.

4. Discussion

This study examined associations between four cognitive indices and motor proficiency among female students aged 12–15 years. All four indices were positively correlated with overall motor proficiency, with coefficients ranging from r = .426 to .435. Verbal comprehension showed the largest coefficient, although the four correlations were very similar in magnitude. The association between working memory and strength was not statistically significant. The structural equation model also showed a positive association between latent intelligence and motor proficiency. Taken together, the findings support the relevance of examining cognitive and motor functioning jointly during early adolescence.

The overall pattern is compatible with developmental accounts that emphasize reciprocal interactions between movement, perception, and cognition (Adolph & Franchak, 2017; van der Fels et al., 2015). Prior studies have reported associations between motor coordination and cognitive functioning in children (Fernandes et al., 2016), and other evidence suggests that specific motor components may be differently related to cognitive ability across age and sex groups (Musálek et al., 2024). These findings provide context for the present associations; however, methodological and demographic differences limit direct comparisons.

The correlation between verbal comprehension and total motor proficiency was numerically the largest. Verbal abilities may be relevant to understanding assessment instructions, retaining task requirements, and organizing goal-directed movement. Nevertheless, the difference between the verbal comprehension coefficient and those of the other three indices was small, and no statistical comparison of dependent correlations was reported. Thus, the present findings do not establish that verbal comprehension has a uniquely stronger association with motor proficiency. Similarly, perceptual reasoning, working memory, and processing speed may contribute to performance through distinct cognitive operations, but these mechanisms were not directly tested.

The non-significant association between working memory and strength highlights the importance of examining motor domains separately. Motor proficiency reflects multiple skills, some of which may place greater demands on memory, attention, and visuospatial processing than others. Research in preadolescents has identified relationships between specific cognitive skills and balance performance (Mihuț & Cojocariu, 2025), while Musálek et al. (2024) documented variation in the associations of fine motor and strength–agility measures with intelligence. These observations are consistent with heterogeneous cognitive–motor relationships, although the present study cannot explain the underlying mechanisms.

The structural equation analysis suggested a positive model-based association between intelligence and motor proficiency. Most incremental indices indicated relatively strong fit; however, the lower GFI and adjusted GFI values suggest that model fit was not uniformly strong. The path estimate should therefore be interpreted with appropriate caution, especially given the modest sample size relative to model complexity and the absence of independent reanalysis. More importantly, a cross-sectional structural association

cannot establish that cognitive abilities cause changes in motor proficiency.

Potential practical implications concern the assessment and planning of physical education activities rather than definitive intervention recommendations. Attention to the cognitive demands of motor tasks may help educators consider students' different strengths when explaining skills, providing feedback, and selecting learning activities. However, the study did not test an instructional intervention, and it would be premature to infer that targeted cognitive training improves motor outcomes or vice versa. Research on motor proficiency and academic performance provides a rationale for further investigation but does not establish intervention effectiveness (Cadoret et al., 2018; Macdonald et al., 2020).

Several limitations should be acknowledged. The cross-sectional design precludes causal inference. The sample consisted of girls from selected schools in Tehran, limiting generalizability to boys, other age groups, and different educational or socioeconomic settings. Relevant covariates, including habitual physical activity, organized sport participation, body mass index, maturation, and previous motor experience, were not incorporated into the reported model. The study also relied on the particular measurement structures of the WISC-IV and BOT-2 Short Form; generalization across instruments requires additional evidence (Kaufman et al., 2006; Yoon et al., 2024). Finally, standardized structural coefficients and a full set of validity diagnostics were not available for independent confirmation in the supplied results. Future studies should use larger and more diverse samples, longitudinal designs, and carefully specified measurement models.

Future research should investigate cognitive–motor relationships in larger samples encompassing both sexes, varied schooling contexts, and repeated assessments. Prospective and experimental designs could help clarify the temporal ordering of cognitive and motor changes, while the inclusion of physical activity, maturation, and socioeconomic factors may improve the precision of estimated relationships.

5. Conclusions

Among female students aged 12–15 years, four cognitive indices were moderately and positively associated with overall motor proficiency. The coefficients were similar in magnitude, and the working memory–strength relationship was not statistically significant. Structural equation modeling provided additional evidence of a positive association between cognitive and motor functioning within the specified model. These findings reinforce the relevance of considering cognitive and motor abilities together in adolescent research. However, the study does not support causal conclusions. Replication with broader samples, repeated measurements, and control of relevant developmental and activity-related factors is needed.

CRediT Authorship Contribution Statement

A.M: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft.

K.M: Methodology, Investigation, Supervision, Writing – review & editing.

A.K: Supervision, Project administration, Writing – review & editing.

All authors reviewed and approved the final manuscript.

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Declaration of competing interest

The authors declare no conflicts of interest.

Declaration of generative AI in scientific writing:

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) to assist with English-language editing and manuscript formatting. The authors reviewed and edited the content and take full responsibility for the final manuscript.

Data availability

The data supporting the findings are available from the corresponding author upon reasonable request, subject to applicable confidentiality and consent requirements.

References

Adolph, K. E., & Franchak, J. M. (2017). The development of motor behavior. *Wiley Interdisciplinary Reviews: Cognitive Science, 8(1–2)*, Article e1430. https://doi.org/10.1002/wcs.1430

Cadoret, G., Bigras, N., Duval, S., Lemay, L., Tremblay, T., & Lemire, J. (2018). The mediating role of cognitive ability on the relationship between motor proficiency and early academic achievement in children. *Human Movement Science, 57*, 149–157. https://doi.org/10.1016/j.humov.2017.12.002

Demetriou, A., Kazi, S., Makris, N., & Spanoudis, G. (2020). Cognitive ability, cognitive self-awareness, and school performance: From childhood to adolescence. *Intelligence, 79*, Article 101432. https://doi.org/10.1016/j.intell.2020.101432

Fernandes, V. R., Ribeiro, M. L. S., Melo, T., de Tarso Maciel-Pinheiro, P., Guimarães, T. T., Araújo, N. B., Ribeiro, S., & Deslandes, A. C. (2016). Motor coordination correlates with academic achievement and cognitive function in children. *Frontiers in Psychology, 7*, Article 318. https://doi.org/10.3389/fpsyg.2016.00318

Jírovec, J., Musálek, M., & Mess, F. (2019). Test of Motor Proficiency Second Edition (BOT-2): Compatibility of the complete and short form and its usefulness for middle-age school children. *Frontiers in Pediatrics, 7*, Article 153. https://doi.org/10.3389/fped.2019.00153

Kaufman, A. S., Flanagan, D. P., Alfonso, V. C., & Mascolo, J. T. (2006). Test review: Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV). *Journal of Psychoeducational Assessment, 24(3)*, 278–295. https://doi.org/10.1177/0734282906288389

Lazar, S. M. (2025). The motor development of children and soft neurological signs. In J. M. Maldonado-Duran (Ed.), Handbook of child and adolescent development and education: Retrospective and prospective (pp. 67–83). Springer. https://doi.org/10.1007/978-3-031-98319-1_6

Lucas, B. R., Latimer, J., Doney, R., Ferreira, M. L., Adams, R., Hawkes, G., Fitzpatrick, J. P., Hand, M., Oscar, J., Carter, M., & Elliott, E. J. (2013). The Bruininks–Oseretsky Test of Motor Proficiency–Short Form is reliable in children living in remote Australian Aboriginal communities. *BMC Pediatrics, 13*, Article 135. https://doi.org/10.1186/1471-2431-13-135

Macdonald, K., Milne, N., Orr, R., & Pope, R. (2020). Associations between motor proficiency and academic performance in mathematics and reading in year 1 school children: A cross-sectional study. *BMC Pediatrics, 20*, Article 69. https://doi.org/10.1186/s12887-020-1967-8

Marques, A., Santos, D. A., Hillman, C. H., & Sardinha, L. B. (2018). How does academic achievement relate to cardiorespiratory fitness, self-reported physical activity and objectively reported physical activity: A systematic review in children and adolescents aged 6–18 years. *British Journal of Sports Medicine, 52(16)*, 1039. https://doi.org/10.1136/bjsports-2016-097361

Mihuț, B. G., & Cojocariu, A. (2025). The interaction between static and dynamic balance parameters and general and specific cognitive skills in motor activities in preadolescents. *Studia Universitatis Babeș-Bolyai Educatio Artis Gymnasticae, 70(Special Issue 2)*, 133–146. https://doi.org/10.24193/subbeag.70.sp.iss.2.41

Musálek, M., Malambo, C., Chrudimský, J., Kokštejn, J., Bačáková, R., & Vokounová, Š. (2024). Strength-agility and fine motor are differently associated with non-verbal intelligence in dependency to sex and age in school children: Structural equation modelling multigroup approach. *Acta Psychologica, 251*, Article 104546. https://doi.org/10.1016/j.actpsy.2024.104546

Nocera, V. G., Wood, A. P., Wozencroft, A. J., & Coe, D. P. (2021). The test–retest reliability of the Bruininks–Oseretsky Test of Motor Proficiency–Short Form in youth with Down syndrome—A pilot study. *International Journal of Environmental Research and Public Health, 18(10)*, Article 5367. https://doi.org/10.3390/ijerph18105367

Radanović, D., Đorđević, D., Stanković, M., Pekas, D., Bogataj, Š., & Trajkovic, N. (2021). Test of Motor Proficiency Second Edition (BOT-2) Short Form: A systematic review of studies conducted in healthy children. *Children, 8(9)*, Article 787. https://doi.org/10.3390/children8090787

Sadeghi, A., Rabiee, M., & Abedi, M. R. (2011). Validation and reliability of the Wechsler Intelligence Scale for Children-IV [Article in Persian]. *Developmental Psychology: Journal of Iranian Psychologists, 7(28)*, 377–386. https://www.magiran.com/paper/922014

van der Fels, I. M. J., te Wierike, S. C. M., Hartman, E., Elferink-Gemser, M. T., Smith, J., & Visscher, C. (2015). The relationship between motor skills and cognitive skills in 4–16 year old typically developing children: A systematic review. *Journal of Science and Medicine in Sport, 18(6)*, 697–703. https://doi.org/10.1016/j.jsams.2014.09.007

Yoon, D., Choi, D., Kim, M., Ji, S., Joung, Y.-S., & Kim, E. Y. (2024). Validity of the BOT-2 Short Form for Korean school-age children: A preliminary study. *Children, 11(6)*, Article 724. https://doi.org/10.3390/children11060724