Title

Biocultural correlates of gross motor coordination in prepubescent children: A cross-sectional study

Abstract

Aim: This study aimed to explore the association of gross motor coordination (GMC) with a matrix of biocultural factors in prepubescent children, taking into account weight status, somatic maturation, sociodemographic variables, and type of school. Methods: One hundred twenty-nine prepubescent children, of both sexes, aged between 8.00 and 8.99, were assessed for GMC (Körperkoordinationstest Für Kinder - KTK), weight status, biological maturation (predicted mature stature), sex, mother's education level and type of school. Binary logistic regression was used to examine the relationship between higher values of KTK and associated biocultural factors. Results: Normoponderal children are more likely to attain better total KTK scores than those with overweight or obesity (OR: 2.942; LC 95%: 1.189, 7.280). In addition, children who are more advanced in terms of biological maturation exhibited significantly lower odds of being in the high KTK category than their less advanced peers (OR: 0.670; LC 95%: 0.474,0.946). Sex, mother's education level and the type of school are not associated with higher performance on KTK. Conclusion: Weight status and biological maturation are associated with motor competence in prepubescent children. Future studies should consider additional correlates to better understand the complex interactions between biological, psychosocial and behavioral factors in the prediction of motor competence. © 2023 Wiley Periodicals LLC.

Authors

da Silva Lima B.P.; Giudicelli B.B.; dos Santos Pinheiro I.K.A.; Santos D.H.B.;

Magalhães K.C.S.; dos Santos Henrique R.; da Silva D.R.P.; Silva M.J.C.E.; de Oliveira Luz L.G.

Author full names

da Silva Lima, Braulio Patrick (58648561900); Giudicelli, Bruno Barbosa (57213199561); dos Santos Pinheiro, Ingrid Kelly Alves (57403772300); Santos, Douglas Henrique Bezerra (57214793125); Magalhães, Kleberton Carlos Silva (57780704800); dos Santos Henrique, Rafael (57222721409); da Silva, Danilo Rodrigues Pereira (58591089400); Silva, Manuel João Coelho e (47761502000); de Oliveira Luz, Leonardo Gomes (58648050200)

Author(s) ID

58648561900; 57213199561; 57403772300; 57214793125; 57780704800; 57222721409; 58591089400; 47761502000; 58648050200

Year

2024

Source title

American Journal of Human Biology

Volume

36.0

Issue

4

Art. No.

e24002

DOI

10.1002/ajhb.24002

Link

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85174217808&doi=10.1002%2fajhb.24002&partnerID=40&md5=c26fefbc72341c44ca1b15f090dbf415

Affiliations

Kinanthropometry, Physical Activity and Health Promotion Laboratory (LACAPS), Federal University of Alagoas (UFAL), Arapiraca, Brazil; Faculty of Health Sciences, Universidad Autónoma de Chile, Providencia, Chile; Federal University of Pernambuco, Recife, Brazil; Department of Physical Education, Federal University of Sergipe, Sergipe, Brazil; CIDAF, University of Coimbra (UC), Coimbra, Portugal

Authors with affiliations

da Silva Lima B.P., Kinanthropometry, Physical Activity and Health Promotion

Laboratory (LACAPS), Federal University of Alagoas (UFAL), Arapiraca, Brazil; Giudicelli B.B., Kinanthropometry, Physical Activity and Health Promotion Laboratory (LACAPS), Federal University of Alagoas (UFAL), Arapiraca, Brazil; dos Santos Pinheiro I.K.A., Kinanthropometry, Physical Activity and Health Promotion Laboratory (LACAPS), Federal University of Alagoas (UFAL), Arapiraca, Brazil; Santos D.H.B., Kinanthropometry, Physical Activity and Health Promotion Laboratory (LACAPS), Federal University of Alagoas (UFAL), Arapiraca, Brazil; Magalhães K.C.S., Kinanthropometry, Physical Activity and Health Promotion Laboratory (LACAPS), Federal University of Alagoas (UFAL), Arapiraca, Brazil; dos Santos Henrique R., Federal University of Pernambuco, Recife, Brazil; da Silva D.R.P., Faculty of Health Sciences, Universidad Autónoma de Chile, Providencia, Chile, Department of Physical Education, Federal University of Sergipe, Sergipe, Brazil; Silva M.J.C.E., CIDAF, University of Coimbra (UC), Coimbra, Portugal; de Oliveira Luz L.G., Kinanthropometry, Physical Activity and Health Promotion Laboratory (LACAPS), Federal University of Alagoas (UFAL), Arapiraca, Brazil, CIDAF, University of Coimbra (UC), Coimbra, Portugal

Index Keywords

Child; Cross-Sectional Studies; Female; Humans; Male; Motor Activity; Motor Skills; Obesity; Overweight; child; cross-sectional study; female; human; male; motor activity; motor performance; obesity

References

Barnett L., Hinkley T., Okely A.D., Salmon J., Child, family and environmental correlates of children's motor skill proficiency, Journal of Science and Medicine in Sport, 16, 4, pp. 332-336, (2013); Barnett L.M., Lai S.K., Veldman S.L., Hardy L.L.,

Cliff D.P., Morgan P.J., Okely A.D., Correlates of gross motor competence in children and adolescents: A systematic review and meta-analysis, Sports Medicine, 46, pp. 1663-1688, (2016); Barnett L.M., Morgan P.J., van Beurden E., Ball K., Lubans D.R., A reverse pathway? Actual and perceived skill proficiency and physical activity, Medicine & Science in Sports & Exercise, 43, 5, pp. 898-904, (2011); Barnett L.M., Webster E.K., Hulteen R.M., De Meester A., Valentini N.C., Lenoir M., Rodrigues L.P., Through the looking glass: A systematic review of longitudinal evidence, providing new insight for motor competence and health, Sports Medicine, 52, 4, pp. 875-920, (2022); Bayer L.M., Bayley N., Growth diagnosis: Selected methods for interpreting and predicting physical development from one year to maturity, (1959); Cattuzzo M.T., dos Santos Henrique R., Re A.H.N., de Oliveira I.S., Melo B.M., de Sousa Moura M., Stodden D., Motor competence and health related physical fitness in youth: A systematic review, Journal of Science and Medicine in Sport, 19, 2, pp. 123-129, (2016); Cheng J., East P., Blanco E., Kang Sim E., Castillo M., Lozoff B., Gahagan S., Obesity leads to declines in motor skills across childhood, Child: Care, Health and Development, 42, 3, pp. 343-350, (2016); Cole T.J., Bellizzi M.C., Flegal K.M., Dietz W.H., Establishing a standard definition for child overweight and obesity worldwide: International survey, BMJ, 320, 7244, pp. 1240-1243, (2000); Cools W., De Martelaer K., Samaey C., Andries C., Movement skil assessment of typically developing preschool children: A review of seven movement skill assessment tools, Journal of Sports Science & Medicine, 8, 2, (2009); Coppens E., Bardid F., Deconinck F.J., Haerens L., Stodden D., D'Hondt E., Lenoir M., Developmental change in motor competence: A latent growth curve analysis, Frontiers in Physiology, 10, (2019); Cumming S.P., Standage M., Gillison F.B., Dompier T.P., Malina R.M., Biological maturity status, body size, and exercise behaviour in British youth: A pilot study, Journal of Sports Sciences, 27, 7, pp. 677-686, (2009); D'Hondt V., Deforche B., Vaeyens R., Vandorpe B., Vandendriessche J., Pion J., Lenoir M., Gross motor coordination in relation to weight status and age in 5-to 12-year-old boys and girls:

A cross-sectional study, International Journal of Pediatric Obesity, 6, sup3, pp. e556-e564, (2011); Drenowatz C., Wartha O., Klenk J., Brandstetter S., Wabitsch M., Steinacker J., Differences in health behavior, physical fitness, and cardiovascular risk in early, average, and late mature children, Pediatric Exercise Science, 25, 1, pp. 69-83, (2013); Freitas D.L., Lausen B., Maia J.A., Lefevre J., Gouveia E.R., Thomis M., Malina R.M., Skeletal maturation, fundamental motor skills and motor coordination in children 7–10 years, Journal of Sports Sciences, 33, 9, pp. 924-934, (2015); Freitas D.L., Lausen B., Maia J.A.R., Gouveia E.R., Thomis M., Lefevre J., Malina R.M., Skeletal maturation, body size, and motor coordination in youth 11–14 years, Medicine & Science in Sports & Exercise, 48, 6, pp. 1129-1135, (2016); Goodway J.D., Robinson L.E., Crowe H., Gender differences in fundamental motor skill development in disadvantaged preschoolers from two geographical regions, Research Quarterly for Exercise and Sport, 81, 1, pp. 17-24, (2010); Henrique R.S., Bustamante A.V., Freitas D.L., Tani G., Katzmarzyk P.T., Maia J.A., Tracking of gross motor coordination in Portuguese children, Journal of Sports Sciences, 36, 2, pp. 220-228, (2018); Henrique R.S., Re A.H., Stodden D.F., Fransen J., Campos C.M., Queiroz D.R., Cattuzzo M.T., Association between sports participation, motor competence and weight status: A longitudinal study, Journal of Science and Medicine in Sport, 19, 10, pp. 825-829, (2016); Hopkins W.G., Marshall S.W., Batterham A.M., Hanin J., Progressive statistics for studies in sports medicine and exercise science, Medicine and Science in Sports and Exercise, 41, 1, pp. 3-13, (2009); Iivonen S., Saakslahti A., Laukkanen A., A review of studies using the Körperkoordinationstest für kinder (KTK), European Journal of Adapted Physical Activity, 8, 2, pp. 18-36, (2015); Kakebeeke T.H., Chaouch A., Caflisch J., Knaier E., Rousson V., Jenni O.G., Impact of body mass index and socio-economic status on motor development in children and adolescents, European Journal of Pediatrics, 180, pp. 1777-1787, (2021); Katzmarzyk P.T., Malina R.M., Beunen G.P., The contribution of biological maturation to the strength and motor fitness of children, Annals of

Human Biology, 24, 6, pp. 493-505, (1997); Khamis H.J., Roche A.F., Predicting adult stature without using skeletal age: The Khamis-Roche method, Pediatrics, 94, 4, pp. 504-507, (1994); Kiphard E.J., Schilling V.F., Körper-koordinations-test für kinder KTK: manual Von Fridhelm Schilling, (1974); Lohman T.G., Roche A.F., Martorell R., Anthropometric standardization reference manual, (1988); Lopes V.P., Stodden D.F., Bianchi M.M., Maia J.A., Rodrigues L.P., Correlation between BMI and motor coordination in children, Journal of Science and Medicine in Sport, 15, 1, pp. 38-43, (2012); Luz L.G., Seabra A., Padez C., Duarte J.P., Rebelo-Goncalves R., Valente-dos-Santos J., Coelho-e-Silva M., Waist circumference as a mediator of biological maturation effect on the motor coordination in children, Revista Paulista de Pediatria, 34, pp. 352-358, (2016); Luz L.G., Valente-dos-Santos J., Luz T.D., Sousa-e-Silva P., Duarte J.P., Machado-Rodrigues A., Coelho-e-Silva M.J., Biocultural predictors of motor coordination among prepubertal boys and girls, Perceptual and Motor Skills, 125, 1, pp. 21-39, (2018); Luz L.G.D.O., Teixeira e Seabra A.F., Santos R., Padez C., Ferreira J.P., Coelho-e-Silva M.J., Associação entre IMC e teste de coordenação corporal para crianças (KTK). Uma meta-análise, Revista Brasileira de Medicina Do Esporte, 21, pp. 230-235, (2015); Machado-Rodrigues A.M., Santana A., Gama A., Mourao I., Nogueira H., Rosado V., Padez C., Parental perceptions of neighborhood environments, BMI, and active behaviors in girls aged 7–9 years, American Journal of Human Biology, 26, 5, pp. 670-675, (2014); Malina R.M., Top 10 research questions related to growth and maturation of relevance to physical activity, performance, and fitness, Research Quarterly for Exercise and Sport, 85, 2, pp. 157-173, (2014); Malina R.M., Bouchard C., Bar-Or O., Growth, maturation, and physical activity (2nd ed.), Human Kinetics, (2004); Malina R.M., Cumming S.P., Morano P.J., Barron M.A.R.Y., Miller S.J., Maturity status of youth football players: A noninvasive estimate, Medicine and Science in Sports and Exercise, 37, 6, pp. 1044-1052, (2005); Martins D., Maia J., Seabra A., Garganta R., Lopes V., Katzmarzyk P., Beunen G., Correlates of changes in BMI of children from the Azores

islands, International Journal of Obesity, 34, 10, pp. 1487-1493, (2010); Moons K.G., de Groot J.A., Bouwmeester W., Vergouwe Y., Mallett S., Altman D.G., Reitsma J.B., Collins G.S., Critical appraisal and data extraction for systematic reviews of prediction modelling studies: The CHARMS checklist, PLoS Medicine, 11, 10, (2014); Mota J., Santos R., Pereira M., Teixeira L., Santos M.P., Perceived neighbourhood environmental characteristics and physical activity according to socioeconomic status in adolescent girls, Annals of Human Biology, 38, 1, pp. 1-6, (2011); Nobre J.N.P., Morais R.L.D.S., Fernandes A.C., Viegas A.A., Figueiredo P.H.S., Costa H.S., Lacerda A.C.R., Is body fat mass associated with worse gross motor skills in preschoolers? An exploratory study, Plos One, 17, 3, (2022); Rarick G.L., Oyster N., Physical maturity, muscular strength, and motor performance of young school-age boys, Research Quarterly. American Association for Health, Physical Education and Recreation, 35, 4, pp. 523-531, (1964); Robinson L.E., Stodden D.F., Barnett L.M., Lopes V.P., Logan S.W., Rodrigues L.P., D'Hondt E., Motor competence and its effect on positive developmental trajectories of health, Sports Medicine, 45, pp. 1273-1284, (2015); Santos D.H.B., Luz L.G.D.O., Silva-Lima B.P.D., Santos-Pinheiro I.K.A.D., da Cunha-Junior A.T., Medeiros H.J.D., Effect of biological maturation on gross motor coordination in boys: A mediation analysis, Fisioterapia Em Movimento, 33, (2020); Stodden D., Langendorfer S., Roberton M.A., The association between motor skill competence and physical fitness in young adults, Research Quarterly for Exercise and Sport, 80, 2, pp. 223-229, (2009); Stodden D.F., Goodway J.D., Langendorfer S.J., Roberton M.A., Rudisill M.E., Garcia C., Garcia L.E., A developmental perspective on the role of motor skill competence in physical activity: An emergent relationship, Quest, 60, 2, pp. 290-306, (2008); Tsapakidou A., Anastasiadis T., Zikopoulou D., Tsompanaki E., Comparison of locomotor movement skills in 8–9 years old children coming from two areas of Thessaloniki with contrasting socioeconomic status, Asian Journal of Humanities and Social Studies, 2, 1, (2014); Vandendriessche J.B., Vandorpe B.F., Vaeyens R., Malina R.M., Lefevre J.,

Lenoir M., Philippaerts R.M., Variation in sport participation, fitness and motor coordination with socioeconomic status among Flemish children, Pediatric Exercise Science, 24, 1, pp. 113-128, (2011)

Correspondence Address

L.G. de Oliveira Luz; Arapiraca, Av. Manoel Severino Barbosa – Bom Sucesso, AL, 57309-005, Brazil; email: leonardoluz.ufal@gmail.com

Publisher

John Wiley and Sons Inc

ISSN

10420533

CODEN

AJHUE

PubMed ID

37843186.0

Language of Original Document

English

Abbreviated Source Title

Am. J. Human Biol.

Document Type

Article

Publication Stage

Final

Source

Scopus

EID

2-s2.0-85174217808