Cycling in Kindergarten: Highlighting Aspects of Integrating Cycling in Educational System

Jera Gregorc, Vesna Štemberger
Univetrsity of Ljubljana, Faculty of Education, Ljubljana, Slovenia
jera.gregorc@pef.uni-lj.si, vesna.stemberger@pef.uni-lj.si

In this paper we examine the importance of including cycling in the educational system, starting at pre-school age. 74 children aged 4-5 years, 74 parents of 4-5 year olds and 4 preschool teachers participated in the study. We investigated the differences in the parents' and teachers' assessment of the children's cycling skills. We found that parents rated all observed cycling skills of their children better than preschool teachers (Wilcoxon signed ranks test: TS = 184.5 (74); $p < 0.001$). Children who find better conditions for cycling in their family environment are more skillful (Mann-Whitney test: U = 844.0 (74), $p < 0.042$), but the cycling skills of the children do not correlate with the cycling frequency of their parents (Spearman's rank correlation test: ro = -0.163 (74), $p < 0.164$). We conclude that it would be worthwhile to systematically introduce cycling both in preschool and in preschool teacher education.

DOI
https://doi.org/10.18690/um.pef.2.2024.26

ISBN
978-961-286-899-4

Keywords:
movement, cycling, skill, parents, educators

University of Maribor Press

DOI
https://doi.org/10.18690/um.pef.2.2024.26

ISBN
978-961-286-899-4

KOLESARJENJE V VRTCU: OSVETLITEV NEKATERIH VIDIKOV VKLJUČEVANJA KOLESARJENJA V VZGOJNO-IZOBRAŽEVALNI SISTEM

JERA GREGORC, VESNA ŠTEMBERGER
Univerza v Ljubljani Pedagoška fakulteta, Ljubljana, Slovenija
jera.gregorc@pef.uni-lj.si, vesna.stemberger@pef.uni-lj.si

Ključne besede:
gibanje,
kolesarjenje,
spretnost,
starši,
vzgojitelji

V prispevku raziskujemo pomen vključitve kolesarjenja v vzgojno-izobraževalni sistem, in sicer že v predšolskem obdobju. V raziskavi je sodelovalo 74 otrok, starih 4–5 let, 74 staršev teh otrok in 4 vzgojitelji. Preverili smo razlike v ocenah kolesarskih spretnosti otrok, če jih ocenjujejo starši in če jih ocenjujejo vzgojitelji. Ugotovili smo, da so starši vse opazovane kolesarske spretnosti svojih otrok ocenili bolje kot vzgojitelji (Wilcoxonov test predznačenih rangov: TS = 184,5 (74); $p < 0,001$). Otroci, ki imajo v svojem družinskem okolju boljše pogoje za kolesarjenje, so spretnejši (Mann-Whitneyev test: U = 844,0 (74), $p < 0,042$), toda kolesarska spretnost otrok se ne povezuje s pogostostjo kolesarjenja njihovih staršev (Spearmanov test korelacije: ro = –0,163 (74), $p < 0,164$). Sklepamo, da bi bilo smiselno sistematično vpeljati kolesarjenje tako v predšolsko obdobje kot v izobraževanje vzgojiteljev.

Univerzitetna založba Univerze v Mariboru

1 Introduction

Cycling is anchored in the Slovenian education system (ES) both in the kindergarten curriculum (in the area of movement) and in the curricula for physical education in primary, secondary and grammar schools, but not as a compulsory subject, but only as one of the options for achieving the goals in the area of movement or sport. It is mentioned as part of additional content (e.g. Little and Golden Sunshine) and as possible content for sports days. In the second third of primary school, it is defined as a regular and extended programme of school life and work, where the school offers cycling training and a cycling test. For example, the Regulation on Norms and Standards for the Implementation of the Primary School Curriculum (Official Gazette of the Republic of Slovenia No. 57/07, 65/08, 99/10, 51/14 and 64/15) sets the standard for learning and testing practical road traffic for the cycling test in the elementary school curriculum at 5 hours per year for a group of five pupils. 5 hours per year for a group of five pupils is the standard for learning and testing practical driving in road traffic for the bicycle test as part of the elementary school curriculum.

Children, pupils and students are more likely to cycle alone or accompanied by their parents than in EC facilities. Parental cycling education is of course not required, so it may be worth considering the need for a more comprehensive introduction of cycling in EC, starting with pre-school education.

The justification for integrating cycling into the education system is driven by two fundamental challenges:

- Cycling as an independent basic motor skill that contributes to health maintenance, skill development and skill acquisition.
- Cycling as an alternative means of transportation for shorter distances that protects the environment and respects coexistence.

We believe that both challenges cannot and should not be left to parents to achieve. We base our argument on the differences in knowledge or assessment of cycling skills between preschool teachers (experts) and parents.

2 The Importance of Exercise for Maintaining Health

Research on the importance of exercise in maintaining health has focused on various aspects of health, particularly cardiovascular disease (Warburton et al., 2006; Lee et al., 2016), various mental health conditions (Schuch et al., 2016; Lubans et al.) and World Health Organization guidelines (Bull et al., 2020). Chaput et al. (2020) analyzed various studies that showed differences in the intervention programs. These programs differed in duration, training intensity, frequency and content and were aimed at different groups of people with different ages and health status.

In recent decades, systematic analyzes of these studies have increasingly been conducted to identify commonalities and provide guidelines on the importance, frequency, intensity and type of physical activity for health. For example, Guthold et al. (2018) found that a quarter of adults do not achieve the recommended level of aerobic physical activity, while more than three-quarters of adolescents do not (Guthold et al., 2020). This data underscores the urgent need to increase efforts and investment in programs to promote physical activity.

The World Health Organization updated its guidelines in 2020 based on the growing body of research (Bull et al., 2020). These guidelines apply to children, adolescents and adults.

2.1 Recommendations for children and adolescents (5-17 years)

In line with research suggesting that at least 60 minutes of moderate to vigorous physical activity daily improves physical, mental and cognitive health (Chaput et al., 2020), this is now a new recommendation for physical activity for children and adolescents. While no specific types of physical activity are prescribed, additional physical activity is associated with additional benefits. Prolonged sedentary behavior, especially in front of screens, is associated with negative health outcomes (Bull et al., 2020).

2.2 Recommendations for Adults (18-64 Years)

For adults, a weekly series of aerobic and musculoskeletal exercises is recommended. The benefits of aerobic activity are seen at 150 to 300 minutes of moderate-intensity or 75 to 150 minutes of vigorous-intensity exercise per week, a notable change from the 2010 guidelines, which prescribe at least 3 x 30 minutes per week (Bull et al., 2020).

2.3 Evaluation of the implementation of the recommendations

Measuring physical activity is challenging and requires different methods and tools to understand and evaluate the implementation of the WHO recommendations (Bull et al., 2020). Hammond-Haley et al. (2021) suggest a combination of approaches, including surveys and physical measurements (e.g. with wearable devices). Schoeppe et al. (2014) found that free play or unorganized school walks are not sufficient to achieve moderate-intensity physical exertion. Adequate training is crucial, as research shows that parents cannot properly assess their children's abilities without appropriate training (Scott et al., 2012).

2.4 Cycling as an independent component of basic movement skills

Fundamental movement skills (FMS) form the basis for more complex movements traditionally categorized as stability, locomotion and manipulation movements (Gallahue et al., 2011). Kavanagh et al. (2020) argue that cycling, especially on a bicycle without pedals, should be considered a new FMS subcomponent. Significant correlations were found between cycling ability and the FMS subcomponents (locomotor, manipulation and stability).

2.5 Cycling as a strategy to reduce the ecological footprint

In response to the global challenge of physical inactivity, the World Health Organization has set a target to reduce it by 15% by 2030 and has called on countries to formulate strategies, policies and programs (Bull et al., 2020). The main beneficiaries of these guidelines are policy makers in various sectors that have an impact on physical activity, such as curriculum developers, planners and infrastructure operators. We advocate early promotion of cycling that is consistent

with the overarching goal of reducing greenhouse gas emissions, particularly those from the transport sector. According to the European Environment Agency (2019), transport accounted for 27% of total emissions in 2017, with 15% of this share coming from vans and cars.

The current trends in commuter traffic in Slovenia underline the need for a comprehensive approach to address them. This approach should include integrated planning and infrastructure development, alternative modes of transportation (busses, minibusses , trains, etc.), integrated education and training solutions and a change in practices. Data from the Daily Traveler Mobility Survey published by the Spatial Policy Institute (2020) shows that 19% of people use cars for very short trips (up to 1 km) and 60% for trips up to 5 km.

An in-depth analysis carried out as part of a 2014 European Union study sheds light on the predominant mode of transportation on an average day. The car dominates at 54%, followed by public transport at 19%. Pedestrians and cyclists together make up 22%, with cyclists accounting for 8% of all modes of transport.

The aim of our research is to investigate possible differences in how parents and educators assess their children's cycling skills. We also want to determine whether these assessments vary according to cycling facilities (infrastructure) and whether there is a correlation between children's cycling skills and parents' cycling frequency. If there are differences in these aspects, a systematic integration of cycling skills in all educational institutions, starting with pre-school education, would be justified. In addition, we want to identify opportunities for infrastructure development to further promote and facilitate cycling.

3 Method

The study followed the paradigm of quantitative research and used a non-experimental method of pedagogical research.

3.1 Sample

A sample consist of 74 4-5 year old children and 74 parents of 4-5 year old children and 4 preschool teachers. Of the participants, 66 children and parents (44.6%) lived in areas that were conducive to cycling (e.g., bike lanes, bike polygons, large paved areas without cars, etc.), while 82 children and parents (55.4%) lived in areas that were less conducive to cycling (e.g., greater distance from roads with bike lanes, no large paved areas for cycling, steep inclines, etc.).

3.2 Variables

Two types of variables were included. The first was a questionnaire for parents that contained three types of questions. The first question related to cycling infrastructure, the second to the frequency of cycling and the third to the assessment of their children's cycling skills. The children's rating related to free riding, swerving and stopping, with parents rating on a scale of 1 (does not perform the task) to 5 (performs the task without stopping or making mistakes). The second type involved a specific assessment of cycling skills determined by a polygon test. The test included three skills (free riding, swerving and stopping) and the scoring criteria were the same as those presented to parents. Each child received between 1 and 5 points for each skill, depending on whether they completed the task with or without errors.

3.3 Method of data collection

Parents received the questionnaire with an individual code during a parents' meeting in the first week of September 2023, with instructions to complete and return it. They were informed that the questionnaires had unique codes that allowed the data to be merged with the information about their child. The codes were later permanently deleted to ensure complete anonymization of the data. Parents based their assessments on their knowledge of their children's cycling skills. The actual assessment of the children took place the following week when they rode their bicycles on a prepared polygon and were assessed according to the same criteria that had been given to the parents.

3.4 Method of data processing

The collected data was first harmonized and anonymized and then processed with the statistical software SPSS. The normality of the distribution was tested using the Kolmogorov-Smirnov test. Due to its statistical properties, the non-parametric Wilcoxon rank sum test was used instead of the parametric T-test for paired samples and the Mann-Whitney U-test instead of the T-test for independent samples. The Spearman rank correlation coefficient was used to determine the relationships between numerical variables, with statistical significance set at a risk level of 5%.

4 Results

We present the results according to the research questions. The first research question was: To what extent do children's cycling skills differ when assessed by experts or their parents?

Table 1: Differences in the mean rating of children's cycling skills by rater

Rater:	Free riding	Swerving	Stopping	Overall rating
Parent	4.64	4.43	4.45	13.51
Preschool teacher	4.32	3.81	4.08	13.05

Source: own

Table 1 shows that the ratings vary between parents and experts. The smallest differences can be found in free riding. Both rated the child's ability to ride freely about the same, while the ratings for swerving and stopping were different. Due to the non-normal distribution of the data, we used the non-parametric Wilcoxon rank sum test to find statistically significant differences. This showed that the differences in the overall ratings were statistically significant ($TS=184.5$ (74); $p < 0.001$). It can be seen that the parents rated their children better than the experts in all the skills observed.

In the following, we wanted to find out to what extent better conditions contribute to better skills.

Table 2: Differences in the children's average cycling skills (expert assessment) depending on the infrastructure in which the children live

Infrastructure:	Free riding	Swerving	Stopping	Overall rating
Poorer conditions	4.49	3.43	3.64	11.18
Better conditions	4.12	4.12	4.44	13.05

Source: own

Table 2 shows that the results of children living in better conditions differ in all tasks from those of children living in poorer conditions. The difference is again smallest in the "free riding" task. Due to the non-normal distribution of the data, a non-parametric Mann-Whitney U test was used to determine statistically significant differences, which showed that the differences were statistically significant (Mann-Whitney U =844.0 (74), $p < 0.042$).

The third research question was: To what extent are children's cycling skills related to parents' cycling frequency?

Table 3: Correlation between the overall assessment of cycling skills (preschool teachers assessment) and the frequency of cycling by parents

Spearman's rho	Frequency of cycling	
Expert assessment	Correlation Coefficient	-.163
	Sig. (2-tailed)	.164
	N	74

Source: own

Table 3 shows that there is no statistically significant correlation between the frequency of cycling by parents and the overall assessment of children's cycling competence.

5 Discussion and conclusions

Cycling, identified by Kavanagh et al. (2020) as a fundamental motor skill (FMS) and recognized as a physical activity in its own right, is consistent with locomotor, manipulative and stability movements within the FMS (Goodway et al., 2021). These fundamental skills, which are critical for sport-specific skills, develop during the preschool years as children actively explore their bodies and environments (Altunsoez, 2015). Therefore, the systematic development of FMS, including cycling, is a worthwhile endeavor. Kavanagh et al. (2020) argue that FMS assessment tests

should be integrated into curriculum design and teaching materials and justify the inclusion of cycling in these assessments.

In answering the first research question, our results show a discrepancy between professional and parental assessments of children's cycling skills. Professionals (preschool teachers) tend to be more critical in their assessments, while parents are often more satisfied with their children's level of learning. This is consistent with the observations of other researchers (Scott et al., 2012), who also found that parents may not be realistic in their assessment of their children's skills and knowledge. This underscores the importance of integrating cycling into early childhood education curricula and educator training at the college level.

Regarding the second research question, our study confirms the importance of infrastructure for cycling competence. In contrast to some studies (Zajec et al., 2010), which found that material conditions are not related to the frequency of physical activity and motor learning levels, our study emphasizes the specificity of cycling. It is directly related to suitable material conditions, which include both bicycles and suitable infrastructure.

The third research question investigated the relationship between children's cycling skills and their parents' cycling frequency. In contrast to the findings of previous studies (Strniša and Planinšec, 2014), which suggest that more physically active parents have similarly active children, and (Schoeppe et al, 2014), which emphasize the inadequacy of free play for achieving moderate physical activity, no statistically significant relationship (Table 3) was found in our study between children's competence scores and parents' cycling frequency (Spearman's rho coef = -.163 (74), $p < 0.164$). Therefore, we believe that it makes more sense to integrate cycling into the curriculum rather than relying on parents to increase their cycling frequency.

To summarize, our study provides convincing arguments for the integration of cycling into early childhood education. Future research should address the specific material requirements, especially infrastructure, needed for successful implementation of cycling in educational settings. In addition, research into optimal organizational forms for cycling in the general education system would further increase the effectiveness of integration.

References

Altunsöz, I. H. (2015). Motor skill interventions for young children. Beden Eğitimi Ve Spor Bilimleri Dergisi, 9(1), 133-148.

Bull, F. C., Al-Ansari, S. S., Biddle, S., et al. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine, 54*, 1451-1462.

Chaput, J. P., Willumsen, J., Bull, F., Chou, R., Ekelund, U., Firth, J., Jago, R., Ortega, F. B., & Katzmarzyk, P. T. (2020). 2020 WHO guidelines on physical activity and sedentary behaviour for children and adolescents aged 5-17 years: summary of the evidence. *The International Journal of Behavioral Nutrition and Physical Activity, 17*(1), 141. https://doi.org/10.1186/s12966-020-01037-z

Goodway J.D., Ozmun J.C., Gallahue D.L. (2021). *Understanding Motor Development: Infants, Children, Adolescents, Adults*. 8th ed. Jones & Bartlett Learning; Burlington, MA, USA.

Guthold, R., Stevens, G. A., Riley, L. M., et al. (2018). Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. *Lancet Global Health, 6*, e1077–86. https://doi.org/10.1016/S2214-109X(18)30357-7

Guthold, R., Stevens, G. A., Riley, L. M., et al. (2020). Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1·6 million participants. *Lancet Child Adolesc Health, 4*, 23–35. https://doi.org/10.1016/S2352-4642(19)30323-2

Hammond-Haley, M., Allen, C., Han, J., Patterson, T., Marber, M., & Redwood, S. (2021). Utility of wearable physical activity monitors in cardiovascular disease: a systematic review of 11,464 patients and recommendations for optimal use. *European Heart Journal Digital Health, 2*(2), 231–243. https://doi.org/10.1093/ehjdh/ztab035

Jakicic, J. M., Powell, K. E., Campbell, W. W., Dipietro, L., Pate, R. R., Pescatello, L. S., Collins, K. A., Bloodgood, B., Piercy, K. L., & 2018 PHYSICAL ACTIVITY GUIDELINES ADVISORY COMMITTEE* (2019). Physical Activity and the Prevention of Weight Gain in Adults: A Systematic Review. *Medicine and Science in Sports and Exercise, 51*(6), 1262–1269. https://doi.org/10.1249/MSS.0000000000001938

Kavanagh, J. A., Issartel, J., & Moran, K. (2020). Quantifying cycling as a foundational movement skill in early childhood. *Journal of Science and Medicine in Sport, 23*, 171–175. https://doi.org/10.1016/j.jsams.2019.08.020

Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., & Katzmarzyk, P. T. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *The Lancet, 380*(9838), 219–229.

Lubans, D., Richards, J., Hillman, C., Faulkner, G., Beauchamp, M., Nilsson, M., Kelly, P., Smith, J., Raine, L., Biddle, S., & Biddle, S. (2016). Physical activity for cognitive and mental health in youth: A systematic review of mechanisms. *Pediatrics, 138*(3), e20161642.

Marquez, D. X., Aguiñaga, S., Vásquez, P. M., Conroy, D. E., Erickson, K. I., Hillman, C., Stillman, C. M., Ballard, R. M., Sheppard, B. B., Petruzzello, S. J., King, A. C., & Powell, K. E. (2020). A systematic review of physical activity and quality of life and well-being. *Translational Behavioral Medicine, 10*(5), 1098–1109. https://doi.org/10.1093/tbm/ibz198

Schuch, F. B., Vancampfort, D., Richards, J., Rosenbaum, S., Ward, P. B., & Stubbs, B. (2016). Exercise as a treatment for depression: A meta-analysis adjusting for publication bias. *Journal of Psychiatric Research, 77*, 42-51.

Scott Jr, S., Blake, J., & Kim, E. (2012). Differences in Parent and Teacher Ratings of Preschool Problem Behavior in a National Sample: The Significance of Gender and SES. *Journal of Early Intervention, 34*, 151-165. https://doi.org/10.1177/1053815112461833

Schoeppe, S., Duncan, M. J., Badland, H. M., et al. (2014). Associations between children's independent mobility and physical activity. *BMC Public Health, 14,* 91. https://doi.org/10.1186/1471-2458-14-91

Strniša K., & Planinšec J. (2014). Gibalna dejavnost otrok z vidika socialnoekonomskih razsežnosti. *Journal of Elementary Education*, *7*(1), 99-108. Retrieved from https://journals.um.si/index.php/education/article/view/451

Ubago-Guisado, E., Jürimäe, J., & Gracia-Marco, L. (2023). Editorial: Physical activity and fitness for the prevention and management of bone diseases. *Frontiers in Physiology, 14*, 1185201. https://doi.org/10.3389/fphys.2023.1185201

Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: The evidence. *CMAJ: Canadian Medical Association Journal = Journal de l'Association medicale canadienne, 174*(6), 801–809. https://doi.org/10.1503/cmaj.051351

Zajec, J., Videmšek, M., Štihec, J., Pišot, R. in Šimunič, B. (2010). *Otrok v gibanju doma in v vrtcu.* Koper: Univerza na Primorskem, Znanstveno-raziskovalno središče Koper – Inštitut za kineziološke raziskave, Univerzitetna založba Annales.