



Physical Activity and Nutritional Status of Preschool-Aged Children and Their Parents

Iva Blazevic¹, Mirela Sunda², Tamara Brussich³

Affiliations: ¹Juraj Dobrila University of Pula, Faculty of Educational Sciences, Pula, Croatia, ²Josip Juraj Strossmayer University of Osijek, Faculty of Kinesiology Osijek, Osijek, Croatia, ³Teaching Institute of Public Health of the Istria County, Pula, Croatia

Correspondence: I. Blazevic. Juraj Dobrila University of Pula, Faculty of Educational Sciences, Ulica Alda Negrija 6, 52100 Pula, Croatia. E-mail: iva.blazevic@unipu.hr

Abstract

The period of early and preschool age is very important in shaping children's health habits. The parents' approach to physical activity and nutritional habits is important for long-term behavior patterns in children. The aim of this study is to determine the relationships between preschool-aged children and their parents' physical activity and nutritional status, and their nutritional habits. As many as 234 parents completed a questionnaire on their preschool-aged children's nutritional habits and another on children's and parents' physical activity. The children's and parents' level of nutrition was determined by body mass index (BMI). The results show that parents decide on the size of meals and the choice of foods included in the daily nutrition of children and are satisfied with the quality and size of meals that children consume during their stay in kindergartens. A significant correlation was found between the physical activity of children and their parents, as well as the level of nutrition. No statistically significant differences were found between preschool-aged girls and boys. The results obtained show that parents play a key role in creating healthy lifestyle habits and encouraging physical activity of preschool children.

Keywords: *physical activity, nutritional status, healthy habits, children, parents*

Introduction

Insufficient physical activity and inadequate nutrition in children represent a complex problem of modern lifestyle, which is manifested through the increase in excess body weight and the occurrence of obesity from early and preschool age. Movement is a primary biological need and is extremely important for the entire process of a child's growth and development, so physical activity is one of the key factors in the development of all dimensions of the anthropological status of children.

There are different definitions of physical activity. Caspersen et al. (1985) define physical activity as "any bodily movement that increases energy expenditure over resting energy expenditure". The World Health Organization (2018) defines physical activity as "any bodily movement produced by skeletal muscle that requires energy expenditure". Physical activity in children is not limited to sports, but includes all forms of movement such as walking, cycling, active play and

recreation, sports activities, household chores, structured family exercises, as well as preschool and social activities, etc. (Tomic et al., 2015).

Numerous authors highlight physical activity as a major factor in promoting and maintaining good health throughout life, as physical inactivity has been identified as one of the leading risk factors for global mortality and a contributor to the increase in overweight and obesity (WHO, 2019). In the early days of physical activity research not much attention was paid to physical activity in early and preschool children, as it was believed that young children were naturally physically active enough. The sedentary lifestyle in modern society, where reduced physical activity and the availability of modern technologies dominate, has prompted numerous studies on children's physical activity. Studies related with physical activity and various health indicators in children show that insufficient physical activity is one of the main factors in the increase in obesity, given that young children

Received: 29 October 2025 | Accepted after revision: 09 December 2025 | Early access publication date: 15 December 2025 | Final publication date: 15 December 2025

© 2025 by the author(s). License PASTECHL, Podgorica, Montenegro. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY).

Conflict of interest: None declared.

spend more than 75% of their waking hours in a sedentary position (Carson et al., 2016).

Along with adequate physical activity, proper nutrition is an important part of children's healthy growth and development, and balanced nutrition is a key factor in the growth and development of early and preschool-age children. Early childhood development is associated with a greater demand for nutrients and energy to meet the body's physical needs, which is why early and preschool children are particularly sensitive to the lack of proper nutrition (Taylor et al., 2004).

In creating healthy eating habits, it is important for parents to understand what proper nutrition is and what effect nutrition has on a child's growth and development. Children most often observe and imitate the behavior of their parents. Research conducted by Brown and Ogden (2004) has shown that children's eating behavior is very similar to that of their parents and that a positive parental role model can be a better method of improving a child's diet than trying to control their diet.

Children spend seven to eight hours a day in kindergarten, so the food served there should be properly balanced to provide energy and nutrients in the right amounts and proportions in relation to children's needs. In addition, kindergartens provide an excellent environment to promote positive habits and attitudes towards healthy eating and physical activity as an integral part of a healthy lifestyle.

According to the social cognitive theory, children learn by observing the behavior of others (Klarin, 2017). Observational learning is particularly effective when the child respects or is similar to the person they are observing. Parents' physical activity can directly influence the physical activity of their children, while educators have a great influence on children's attitudes towards preschool activities. Su et al. (2022) point to the multidimensionality of the mechanisms of these influences, which include "parental attitudes, beliefs and values towards physical activity and social support". Parents influence children's physical activity patterns through encouragement, logistical support, behavioral modelling, parent-child play, family communication and general social support (Chiarlitti & Kolen, 2017). Children at an early age are still not independent and need help in meeting their basic need for movement from their family and educators. Children whose parents regularly engage in physical activity are more likely to practice some form of physical activity themselves (Blažević et al., 2021).

Mechanisms used to determine the relationship between parent and child activity levels included parents as role models, sharing activities with family members, active parents' enhancement and support of the child's participation in physical activity, and genetically transmitted factors that predispose the child to increased levels of physical activity.

Sedentary lifestyles lead to reduced levels of physical activity in children, while fast-paced life and the availability of industrially processed foods are potential risks of unbalanced nutrition in children. Sedentary behavior and unbalanced nutrition can lead to various non-communicable diseases and psychological disorders, lack of self-esteem, discrimination and stigmatization of overweight children. Negative effects can be prevented through the acceptance and promotion of physical activity and proper nutrition (Pedišić et al., 2025; Sunda, Brkic & Blazević, 2025).

The aim of this study is to determine the relationships between preschool-aged children and their parents' physical

activity and nutritional status, and the parents' attitudes about children's eating habits.

The partial objectives of this study are (1) to determine whether there are differences in the nutritional status and physical activity levels between girls and boys, (2) to determine whether there is a significant correlation between physical activity and indicators of nutritional status in children and parents, and (3) to analyze parental practices in influencing and monitoring children's eating habits.

Methods

Research design

This research used a cross-sectional study design. Before conducting the research, a positive opinion was obtained from the Research Ethics Committee of the Juraj Dobrila University of Pula (Croatia).

Participants

The sample of participants in this study consisted of 234 parents and children aged 6 attending kindergartens in Croatia (Istria county, Croatia). The survey questionnaires were completed by the parents, and of the total number of parents included who completed the questionnaire, there were 92.74% of mothers. The average age of parents who completed the questionnaire was 30 to 39 years (54.7%), 40.17% of parents were aged 40 to 49, and 4.7% were aged 20 to 29. The study included 53.42% of girls and 46.58% of boys aged 6.

Research Instruments

Based on the information obtained from parents on body height and body weight, the body mass index (BMI) of the children and parents included in the study was calculated.

The level of physical activity of preschool children was assessed using the Netherlands Physical Activity Questionnaire (NPAQ). The NPAQ is a questionnaire completed by parents and provides a general insight into the child's daily activities.

Parents completed a short version of The International Physical Activity Questionnaire (IPAQ), a questionnaire that uses standardized questions to monitor physical activity in young people and adults (aged 15-69) and as a result provides internationally comparable data for monitoring activity or inactivity.

Parents completed the Child Feeding Questionnaire (Buratta et al., 2020) to assess parental awareness of the importance of dietary habits, monitoring of children's dietary habits, and parental practices that may influence children's dietary patterns. Author consent was obtained for the use of the questionnaire.

Data Analysis

The data analysis is divided into four parts. In the first part, the BMI of children and parents was calculated according to the following formula: $BMI = \text{weight (kg)} / \text{height (m)}^2$. Parental and children BMI was calculated based on self-reported height and body weight. The obtained values of the nutritional status were calculated according to the BMI - to-age z-score values. The normality of the distribution was tested by the Kolmogorov-Smirnov test.

The second part of the data analysis refers to determining differences in nutritional status according to gender in girls and boys, and differences by gender were determined using the Mann-Whitney U test.

In the third part of the data analysis, correlation analysis was used to (1) determine the association between physical activity and inactivity with BMI in girls and boys, (2) for the relationships between variables that assess the nutritional status and physical activity of parents, and (3) for the relationships between variables that assess the nutritional status of children and parents and the variables of physical activity and inactivity in girls and boys and the physical activity of parents.

The fourth part of the data analysis refers to all qualitative

variables about children's eating habits for which frequency analysis was used.

Results and Discussion

According to the BMI-to-age z-score values, 53.6% of boys and 59.63% of girls have a normal level of nutrition. The results in Figure 1 show that there is a higher percentage of boys with excess body weight (13.6%) and obesity (8.8%) compared to girls.

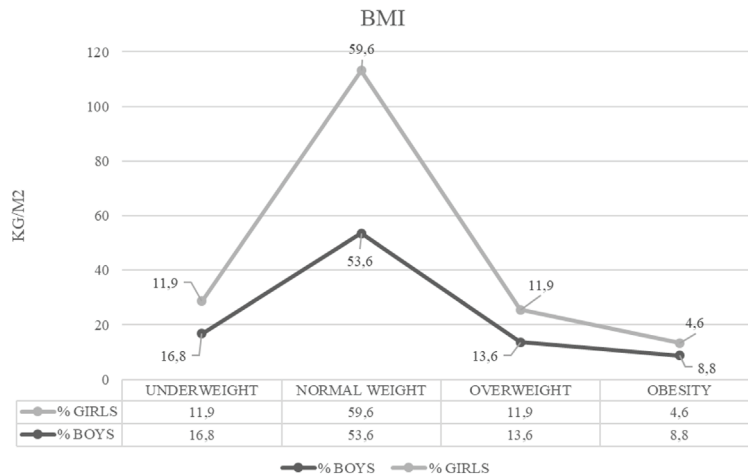


FIGURE 1. BMI in girls and boys

Statistically significant differences in the level of nutrition according to gender were analyzed with the Mann-Whitney U test, since the results of the Kolmogorov-Smirnov test had confirmed that the distributions of the mentioned variables

significantly deviated from normal. The results show that there is no statistically significant difference between girls and boys in the level of nutrition according to the BMI results.

Table 1. Differences in BMI index between girls and boys (Man-Whitney U test)

	MED-QR Girls	MED-QR Boys	Z	p-level
BMI	15.23 (2.22)	15.47 (2.29)	-0.95	0.34

Note. MED- QR - median-quartile rank; Z - z value; p - statistical significance

Of the total number of children included in the study, 22.4% of boys and 16.5% of girls aged 6 years were found to be overweight and obese. These results confirm previously obtained findings from the fifth round of the Childhood Obesity Surveillance Initiative (WHO, 2022) and the results obtained in the population of Croatian preschoolers, according to which 21.5% of children were found to be overweight and obese, with no significant differences in age or gender. This indicates a trend of increasing overweight and obesity in Croatia (Bučan Nenadić et al., 2025; Farkaš et al., 2015; Musić Milanović et al., 2020). Childhood overweight and obesity is associated with an

increased risk of type 2 diabetes mellitus, metabolic syndrome and cardiovascular risk factors, and children are also exposed to other psychosocial consequences such as low self-esteem, body image disorders, depression, stigmatization, marginalization, etc. (Garrido-Miguel et al., 2019; Xu and Xue, 2016).

The level of physical activity of preschool children was assessed using the NPAQ, and correlation analysis was used to determine the correlation of physical activity and inactivity with BMI. The results of the correlation analysis for the variables physical activity (PA) and inactivity (SA) with BMI are shown in Table 2.

Table 2. Spearman's correlation coefficient between variables assessing nutritional status and physical activity and inactivity variables in girls and boys

Variables	PA	PI
BMI	-0.14*	0.16*

Note. PA - physical activity, PI - physical inactivity. * - $p < 0,05$

Spearman's correlation coefficient between variables assessing nutritional status, PA and PI in girls and boys shows statistical significance, although the level of their correlation is low. PA is statistically significantly correlated with BMI ($r =$

0.14), indicating that BMI is lower in children who achieved higher physical activity values, i.e., in children who were more physically active. PI has a statistically significant correlation with BMI ($r = 0.16$), indicating that children who spent more

time in sedentary activities have a higher nutritional status, i.e., higher BMI. Published research on the level of physical activity and sedentary behavior in preschool children shows that physical activity is generally lower and that sedentary behavior is generally higher than the recommended time values (Vukelja, Milanović & Šalaj, 2022). While some studies report impaired fitness and motor skills among overweight/obese preschoolers compared to normal-weight peers, others found no differences based on the weight status or BMI (Rico-González et al., 2024; Ma & Luo, 2023). The majority of

studies prove that physical activity is associated with better fitness performances in preschool children (Serrano-Gallén et al., 2022), but previous research was mostly conducted on a sample of 3-to 6-year-old children. The correlations were stronger in older than in younger children, therefore the statistically significant correlation between BMI, PA and PI in this study can be explained by the fact that only children aged 6 were included in this study, which is why a low, but still statistically significant correlation of physical activity with the BMI was confirmed.

Table 3. Parents' BMI

BMI	N	Mean	Minimum	Maximum	Std.Dev.
PARENTS	234	23.73	15.79	39.65	3.72

Note. N – number of participants; Mean – average result; Minimum – lowest result; Maximum – highest result; Std.Dev. – standard deviation of the result from the arithmetic mean

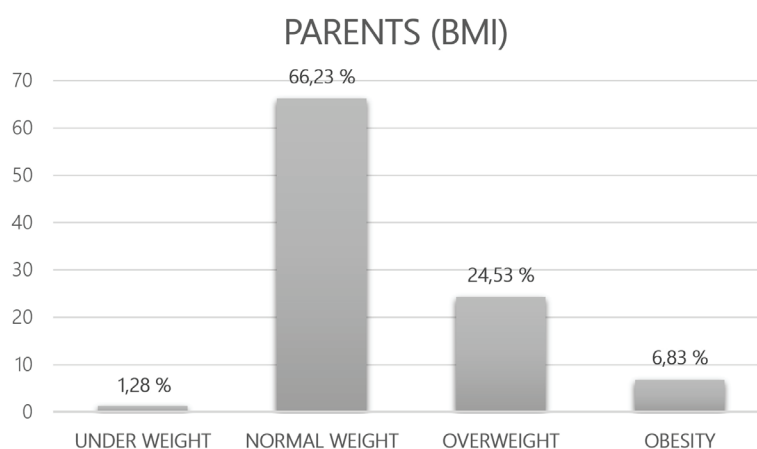


FIGURE 2. Parents BMIs

According to the parents' BMI values, it can be concluded that 66.23% of parents have a normal level of nutrition, 1.28% of parents are underweight, 24.53% have excessive body mass, and 6.83% of parents are obese. Previous research on the adult population in Croatia has shown that only 33.9% of

adults have a normal BMI, while almost two-thirds (64.8%) are classified as overweight or obese (Maltarić, 2025). The data obtained in this study indicate a higher percentage of normal levels of nutrition and a lower percentage of overweight and obese compared to the same population.

Table 4. Spearman correlation coefficient between variables assessing the nutritional status and physical activity of parents

Variables	PA parents
BMI parents	-0.02

Note. PA parents - physical activity of parents

Spearman's correlation coefficient between variables assessing the nutritional status and physical activity of parents shows that there is no statistically significant correlation between these variables. A large number of studies show that there is a negative correlation between the level of physical activity and BMI in

adults, i.e., a higher level of physical activity is associated with a lower BMI (Cleven, 2023; Muti et al., 2023; Tiisanen, 2023). A sedentary lifestyle and demographic factors significantly influence the aforementioned relationship, and the intensity of activity (moderate to vigorous physical activity) is a significant factor.

Table 5. Spearman correlation coefficient between variables assessing the nutritional status of children and parents, PA and PI in girls and boys and the physical activity of parents (MET)

Variables	BMI kids	PA kids	PI kids
PA parents	0.21*	-0.11	0.08
BMI parents	0.22*	-0.16*	0.17*

Note. PA parents - physical activity of parents, PA kids – children's physical activity, PI - children's physical inactivity. * - $p < 0,05$

Correlation analysis between variables assessing the nutritional status of children and parents, PA and PI in girls and boys and the MET shows that there is a statistically significant correlation (Table 5), but the level of their correlation is low. This confirms the results of previous research according to which high adult activity increased odds of children being active (Grant et al., 2018). The obtained results show that there is a statistically significant correlation between the BMI of children and parents, as well as the children's BMI and the level of parents' physical activity. The BMI of parents is statistically significantly correlated with the PA and PI in girls and boys, which confirms previous findings that children of active parents were less likely to be overweight and obese (Erkelenz et al., 2014). The level of physical activity in preschool age is influenced by numerous factors, but one of the most important is the BMI of the father, i.e., fathers who have a lower BMI also have the most active children (Finn et al., 2002).

The frequency analysis of children's eating habits (Child Feeding Questionnaire) shows that 62.2% of parents believe that they are always responsible for their children's nutrition, while 30.2% of parents are often responsible for their children's nutrition. There are 42.7% of parents who always decide on the size of their child's meals. As many as 43.9% of parents always decide on the mandatory consumption of certain foods, and 29% of parents often do so. The results confirm previous findings that parents have a crucial role in children's eating habits and health, and parental feeding practices in the early years contribute to the development of children's eating in terms of quantity and quality of daily energy intake, especially during mealtime (Power et al., 2019; de Souza Rezende et al., 2019). The assessment of the children's nutritional status shows that most parents consider their children to be normally nourished, i.e., 94.6% of parents consider their child to be of normal body weight, 2.1% consider their child to be underweight, and 1.7% to be overweight. Parents' concern about obesity is very low. Namely, 70.1% of parents do not express concern, and only 4.2% are concerned about the possible development of obesity. There are 59.2% of parents who monitor their children's intake of the so-called unhealthy foods, i.e., 59.2% of parents very often control their children's intake of sweets, 27.1% do so often, and 31.3% of parents always control their children's intake of snacks. Fatty food intake is often monitored by 53.4% of parents, and always by 31.7%.

The percentage of parents who do not use food as a reward is 47.3%, while 50.6% of parents do not use their child's favorite food as a reward for appropriate behavior. As many as 61.1% of parents do not insist that the child always eat all the food offered, and 62.6% of parents respect the child's appetite, i.e., do not force the child to eat the entire meal if they say they are not hungry. Early and preschool children who attend kindergarten spend a large part of their waking hours in kindergarten, and 81% of parents state that they are not concerned about the fact that their children eat too much when their parents are not with them. The above indicates that parents are familiar with the menus and nutrition in kindergartens, which is organized in such a way that menu creation and food control are carried out by authorized experts. Parents have a high level of control over their children's diet, which can be useful for creating healthy habits and a proper, balanced diet for early and preschool children.

Conclusion

Based on the findings of the results of this research, it can be concluded that parents play a key role in creating healthy lifestyle habits and encouraging physical activity of preschool children. There was no statistically significant difference between girls and boys in the level of nutrition according to BMI results, but it was confirmed that more physically active children had lower BMI, while children who spent more time in sedentary activities had higher BMI. A significant correlation was found between children and parents' BMI, and children's BMI and the level of physical activity of parents. Parents' BMI is statistically significantly correlated with the PA and PI in girls and boys, which confirms previous findings that children of active parents were less likely to be overweight and obese. The results show that parents decide on the size of meals and the choice of foods included in the daily nutrition of children and are satisfied with the quality and size of meals that children consume during their stay in kindergartens.

The main limitation of this study is that physical activity and sedentary behavior were estimated using questionnaires filled out by the parents of preschool children. Children spend part of weekdays in kindergarten and parents are not present during that time in daycare, so there is a possibility of under- or overestimation of physical activity assessment by parents.

References

- Benassi, L., Blažević, I., & Janković, D. (2021). Physical activity and nutrition of children in primary education. *Economic Research*, 34 (1), 1–14. <https://doi.org/10.1080/1331677X.2021.1962384>
- Brown, R., & Ogden, J. (2004). Children's eating attitudes and behavior: A study of the modeling and control theories of parental influence. *Health Education Research*, 19 (3), 261–271. <https://doi.org/10.1093/her/cyg040>
- Bučan Nenadić, D., Štrkalj, L., Zloić, K., Matana, A., Selak, M., Smoljo, M., Vlašić, A., Peričić, VI, & Kolak Gaurina, E. (2025). Laying the groundwork for health: Eating behavior and physical activity in preschoolers in Split-Dalmatia County, Croatia. *Children*, 12 (6), 699. <https://doi.org/10.3390/children12060699>
- Buratta, L., Delvecchio, E., Germani, A., & Mazzeschi, C. (2021). Parental feeding practices across child's weight status: Evidence of the Italian validation of the Child Feeding Questionnaire. *Public Health Nutrition*, 24 (6), 1256–1264. <https://doi.org/10.1017/S136898002000381X>
- Carson, V., Hunter, S., Kuzik, N., Wiebe, SA, Spence, JC, Friedman, A., Tremblay, MS, Slater, L., & Hinkley, T. (2016). Systematic review of physical activity and cognitive development in early childhood. *Journal of Science and Medicine in Sport*, 19 (7), 573–580. <https://doi.org/10.1016/j.jpms.2015.07.011>
- Caspersen, CJ, Powell, KE, & Christenson, GM (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports*, 100 (2), 126–131. PMID: 3920711; PMCID: PMC1424733.
- Cleven, L., Syrjanen, JA, Geda, YE, ... & Kremers, S. (2023). Association between physical activity and longitudinal change in body mass index in middle-aged and older adults. *BMC Public Health*, 23 , 202. <https://doi.org/10.1186/s12889-023-15119-7>
- Erkelenz, N., Kobel, S., Kettner, S., Drenowatz, C., & Steinacker,

- JM (2014). Parental activity as influence on children's BMI percentiles and physical activity. *Journal of Sports Science and Medicine*, 13 (3), 645–650. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4126304/>
- Farkaš, K., Tomac, A., Petrić, V., & Novak, A. (2015). Anthropometric characteristics and obesity indicators among preschool children in an urban area in Croatia. *Collegium Antropologicum*, 39 (2), 419–424.
- Finn, K., Johannsen, N., & Specker, B. (2002). Factors associated with physical activity in preschool children. *Journal of Pediatrics*, 140 (1), 81–85. <https://doi.org/10.1067/mpd.2002.120693>
- Garrido-Miguel, M., Oliveira, A., Caverro-Redondo, I., Alvarez-Bueno, C., Pozuelo-Carrascosa, DP, Soriano-Cano, A., & Martinez-Vizcaino, V. (2019). Prevalence of overweight and obesity among European preschool children: A systematic review and meta-regression by food group consumption. *Nutrients*, 11 (7), 1698. <https://doi.org/10.3390/nu11071698>
- Grant, VM, Tomayko, EJ, Prince, RJ, Cronin, K., & Adams, A. (2018). Understanding correlates of physical activity in American Indian families: The Healthy Children Strong Families-2 study. *Journal of Physical Activity & Health*, 15 (11), 866–873. <https://doi.org/10.1123/jpah.2017-0584>
- Klarin, M. (2017). *Psychology of Children's Play*. Zadar: University of Zadar.
- Ma, FF, & Luo, DM (2023). Relationships between physical activity, fundamental motor skills, and body mass index in preschool children. *Frontiers in Public Health*, 11 , 1094168. <https://doi.org/10.3389/fpubh.2023.1094168>
- Maltarić, M., Kolak, M., Kolarić, B., Vranešić Bender, D., & Gajdoš Kljusurić, J. (2025). Cross-European patterns of obesity: Where does Croatia stand? Descriptive analysis of waves 2015–2022 of the Survey of Health, Aging and Retirement in Europe (SHARE) including adults aged over 50. *Obesity*, 5 (3), 66. <https://doi.org/10.3390/obesity5030066>
- Milanović, SM, Morović, ML, Bukal, D., Križan, H., Buoncristiano, M., & Breda, J. (2020). Regional and sociodemographic determinants of the prevalence of overweight and obesity in children aged 7–9 years in Croatia. *Acta Clinica Croatica*, 59 (3), 303–311.
- Muti, M., Ware, LJ, Micklesfield, LK, Ramsay, M., Agongo, G., Boua, PR, Kisiangani, I., Cook, I., Gómez-Olivé, FX, Crowther, NJ, Kabudula, C., Norris, SA, & Chikowore, T. (2023). Physical activity and its association with body mass index: A cross-sectional analysis in middle-aged adults from 4 Sub-Saharan African countries. *Journal of Physical Activity & Health*, 20 (3), 217–225. <https://doi.org/10.1123/jpah.2022-0539>
- Pedišić, Ž., Strika, M., Matolić, T., ... & Jurakić, D. (2023). Physical Activity of Children and Adolescents in Croatia: A Global Matrix 4.0 Systematic Review of Its Prevalence and Associated Personal, Social, Environmental, and Policy Factors. *Journal of Physical Activity and Health*, 20(6), 487–499. <https://journals.humankinetics.com/view/journals/jpah/20/6/article-p487.xml>
- Power, TG, Johnson, SL, Beck, AD, ... & Hughes, SO (2019). The Food Parenting Inventory: Factor structure, reliability, and validity in a low-income, Latina sample. *Appetite*, 134 , 111–119. <https://doi.org/10.1016/j.appet.2018.12.032>
- Rico-González, M., Ardigò, LP, Ramírez-Arroyo, AP, & Gómez-Carmona, CD (2024). Anthropometric influence on preschool children's physical fitness and motor skills: A systematic review. *Journal of Functional Morphology and Kinesiology*, 9 (2), 95. <https://doi.org/10.3390/jfmk9020095>
- Serrano-Gallén, G., Arias-Palencia, NM, González-Villora, S., Gil-López, V., & Solera-Martínez, M. (2022). The relationship between physical activity, physical fitness and fatness in 3–6 year old boys and girls: A cross-sectional study. *Translational Pediatrics*, 11 (7), 1095–1104. <https://doi.org/10.21037/tp-22-30>
- Sunda, M., Brkic, M., & Blazevic, I. (2025). Association Between Body Morphology and Motor and Functional Abilities in Preschool Children. *Sport Mont*, 23(3), Ahead of Print. doi: 10.26773/smj.251003
- Taylor, LJ, Gallagher, M., & McCullough, FSW (2004). The role of parental influence and additional factors in the determination of food choices for pre-school children. *International Journal of Consumer Studies*, 28 (4), 337–346. <https://doi.org/10.1111/j.1470-6431.2004.00391.x>
- Tiusanen, R., Saltychev, M., Ervasti, J., Kivimäki, M., Pentti, J., Stenholm, S., & Vahtera, J. (2022). Concurrent changes in physical activity and body mass index among 66,852 public sector employees over a 16-year follow-up: Multitrait analysis of a cohort study in Finland. *BMJ Open*, 12 (2), e057692. <https://doi.org/10.1136/bmjopen-2021-057692>
- Tomac, Z., Vidranski, T., & Ciglar, J. (2015). Physical activity of children during regular stay in preschool institution. *Medical Jadertina*, 45 (3–4), 97–104. <https://hrcak.srce.hr/clanak/393265>
- Vukelja, M., Milanović, D., & Salaj, S. (2022). Physical activity and sedentary behavior in Croatian preschool children: A population-based study. *Montenegrin Journal of Sports Science and Medicine*, 11 (1), 37–42. <https://doi.org/10.26773/mjssm.220304>
- World Health Organization. (2018). *Global action plan on physical activity 2018–2030: More active people for a healthier world*. Geneva: World Health Organization.
- World Health Organization. (2019). *Guidelines on physical activity, sedentary behavior and sleep for children under 5 years of age*. Geneva: World Health Organization.
- WHO Regional Office for Europe. (2022). *Report on the fifth round of data collection, 2018–2020: WHO European Childhood Obesity Surveillance Initiative (COSI)*. Copenhagen, Denmark: WHO Regional Office for Europe.
- Xu, S., & Xue, Y. (2016). Pediatric obesity: Causes, symptoms, prevention and treatment. *Experimental and Therapeutic Medicine*, 11 (1), 15–20. <https://doi.org/10.3892/etm.2015.2853>