

Original empirical article

**DIFFERENCES BETWEEN BOYS AND GIRLS
IN TERMS OF PHYSICAL ACTIVITY**

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Abstract. *The physical activity of schoolchildren is an important factor of their regular development. The aim of this study was to examine the occurrence of the differences between boys and girls in the level of the physical activity. A total of 98 schoolchildren (48 boys and 50 girls) average age 11.4±0.58 were tested by means of a Physical activity score that included data about the level of physical activity (9 variables) as well as back pain and estimates of general health. A binary logistic regression analysis of the data was carried out. The dependent variable was gender. The results of our investigation show that a significant predictor of the differences between boys and girls in the level of physical activity was playing games (time spent outside) (OR=0.398, p<0.05), when these variable were controlled by other independent variables. Our investigation showed that games are a significant predictor of differences in physical activity between boys and girls.*

Key words: *children, physical activity, games.*

INTRODUCTION

Physical activity is critical for children's normal growth and development. A lack of physical activity is directly related to other health problems during childhood, including childhood obesity (Butland, 2007; Lobstein, Baur & Uauy, 2004: 4-104; Krebs & Jacobson, 2003: 424-30), metabolic impairments (Ekelund et al., 2007: 1832-40; Imperatore, Cheng, Williams, Fulton & Gregg, 2006: 1567-72; Andersen et al., 2006: 299-304; Garmo, Palsdottir & Strandvik, 2006: 1021-26; Williams & Strobino, 2008: 11-20) and poor skeletal health (Hind & Burrows, 2007: 14-27; Prentice et al., 2006: 348-60).

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Research studies confirm the health benefits of regular physical activity. Increasing physical activity and improving dietary habits in childhood have therefore been identified as targets for future public health policies (Butland, 2007; Department of Health, 2004). This will help the identification of populations at risk and the development of interventions to promote change in these health behaviours. Previous studies have reported mixed results, with the proportion of children achieving the recommended guideline of at least one hour of moderate-to vigorous intensity physical activity (MVPA) each day (11) varying from 2,5 to 97% (Department of Health, 2004; Riddoch et al., 2004: 86-92; Riddoch et al., 2007: 963-69; Pate et al., 2002: 303-8; Spinks, Macpherson, Bain & McClure, 2007: 156-63).

This large variation mainly depends on the population studied and the variation in the applied data processing methods. However, most studies indicate that physical activity levels decline with age, especially during late primary school years (Sallis, Prochaska & Taylor, 2000: 963-75; Sherar, Esliger, Baxter-Jones & Tremblay, 2007: 830-35; Kimm et al., 2002: 709-15), making this a potentially important period for health promotion interventions. Previous studies are focused on physical activity and dietary behavior of 9-10-year old British children (Van Sluijs, Skidmore, Mwanza, Jones, Callaghan, 2008: 388), ethnic and gender differences in physical activity levels among 9–10-year-old children (Van Sluijs, 2008: 388), overweight children (Binns et al., 2009: 591-1598; Maddison, 2009: 146), physical activity and good health (Blair, Kohl, Gordon & Paffenbarger, 1992: 99-126), association of blood pressure with BMI, physical activity and cardio respiratory fitness in youth (Gaya et al., 2009: 1-9). The SPEEDY study (Sport, Physical activity and Eating behavior: Environmental Determinants in Young people) was established to examine physical activity levels and dietary behavior in a large population-based sample of British 9–10 year old children, and to investigate the individual and collective factors associated with these behaviors.

Although there is some information available on the physical activity of school aged children (Kimm et al., 2002: 709-15; Van Sluijs, Skidmore, Mwanza, Jones, Callaghan, 2008: 388), little is known about the differences between boys and girls in terms of physical activity. The aim of this investigation was to examine the occurrence of the differences between boys and girls in the level of the physical activity among schoolchildren aged 11-12 years.

METHODS

Ninety-eight schoolchildren (48 boys and 50 girls) were included in this study. The average age of the children was 11, 4±0, 58 (Table 1).

Table 1. Characteristics of the study sample (n=98)

Parameter	Boys		Girls		Total	
	N ⁰	%	N ⁰	%	N ⁰	%
	48	49	50	51	98	100
Average age (years)	11.41		11.48		11.4	
SD	0.67		0.57		0.58	

All the children were tested by a Physical activity score that included data regarding the level of time spent studying, sedentary screen-based activities (video gaming, computer science), physical education classes, corrective exercises, playing games (time spent outside),

sports activities, training, warming up before training and walking. The physical activity score included free time and organized physical activity, sedentary activities as well as variables that are potentially related to children's physical activities. (The presence and level of back pain and estimates of general health were also included in the test). The physical activity score was based on individually reported data with an estimate of intensity and lasting of any of the 9 chosen activities and 2 conditions. The minimum score was "0", the maximum score was "4" (a score from 0 to 4, from best to worst). Responses were scored as follows: the best (normal) scoring by "0", satisfactory "1", moderate "2", poor "3", the worst (extreme) "4". Learning and sedentary screen-based activities (video gaming, computer science) were assigned the value 4 if those activities last 4 hours or longer.

The student-t test was used to estimate the statistical significance of the age difference between boys and girls. A binary logistic regression was used in order to investigate the predictors of differences between boys and girls in their activities, back pain and general health. The dependent variable was gender and the independent variables were time spent studying, sedentary screen-based activities (video gaming, computer science), physical education classes, games (time spent outside), sports activities, training, warming up before training, walking, back pain and estimates of general health.

The statistical significance of the differences was at the $p < 0,05$ level.

RESULTS

The average age of the participants in our study was 11.4 ± 0.6 (11.5 ± 0.6 for the girls and 11.4 ± 0.7 for the boys). This difference was not statistically significant ($t = 0.42$, $p > 0.05$).

The average values of the independent variables of the participants (score from 0 to 4, from best to worst) were presented in Table 2. We can see that the children evaluated the time spent studying with a 3.24. The children in our study spent a little time in sport activities and these activities were evaluated with a 3.08 scores. Warming up before training is insufficient (2.84). Back pain is unusual and estimates of general health are good (0.49 and 0.63 scores).

Table 2. Average value of the independent variables (score from 0 to 4, from best to worst)

Variable	N	Minimum	Maximum	Mean	SD
Time spent studying	98	0.00	4.00	3.24	0.99
Sedentary screen-based activities (video gaming, computer science)	98	0.00	4.00	1.33	1.66
Physical education classes	98	0.00	4.00	1.35	1.68
Corrective exercises	98	0.00	4.00	2.37	1.88
Games (time spent outside)	98	0.00	4.00	2.12	1.58
Sports activity	98	0.00	4.00	3.08	1.55
Training	98	0.00	4.00	2.82	1.82
Warming up before training	98	0.00	4.00	2.84	1.69
Walking	98	0.00	4.00	1.24	1.51
Back pain	98	0.00	4.00	0.49	1.00
Estimates of general health	98	0.00	4.00	0.63	1.27

Boys had smaller scores than girls in all activities except time spent studying. Estimates of general health were worse in the case of the girls than the boys (1.04 and 0.45), as well as of back pain (2.78 and 0.14).

The results of our investigation show that a significant predictor of the differences between boys and girls in terms of the level of physical activity was playing games (OR=0.398, $p<0.05$), when this variable was controlled by other independent variables (Table 3).

Table 3. Confounders related to gender (boys and girls) based on the multivariate logistic regression analysis (sex was the dependent variable), $n=98$

Variable	Boys		Girls		Logistic regression analysis	
	Mean	SD	Mean	SD	p-value	Odds ratio (95 CI)
Time spent studying	4	1.02	3.96	1.02	>0.05	0.477
Sedentary screen-based activities (video gaming, computer science)	1.18	1.65	1.44	1.69	>0.05	1.043
Physical education classes	1.14	1.64	1.51	1.72	>0.05	1.278
Corrective exercises	1.77	1.92	2.85	1.72	>0.05	0.482
Games (time spent outside)	1.64	1.46	2.52	1.58	<0.05	0.398
Sports activity	2.54	1.76	3.52	1.22	>0.05	33.663
Training	2.00	2.05	3.48	1.31	>0.05	0.025
Warming up before training	2.23	1.8	3.33	1.44	>0.05	0.811
Walking	1.04	1.49	1.41	1.52	>0.05	1.103
Back pain	0.14	0.47	2.78	1.62	>0.05	0.125
Estimates of general health	0.45	1.22	1.04	1.79	>0.05	0.693

There was a change in the odds for a unit increase in some of the variables: playing games (time spent outside) and an increase in the probability of the participant being a boy (the odds ratio tends to be less than 1). Playing games was a significant predictor of gender differences in school children aged 11-12, but time spent studying, sedentary screen-based activities (video gaming, computer science), physical education classes, corrective exercises, sports activities, training, warming up before training, walking, back pain and estimates of general health were not.

DISCUSSION

The aim of the current paper was to present data on the physical activities of boys and girls and their behavior based on a sample of one school from Banjaluka, which included 11-12 year-old children. Previous reviews of the correlation in youth physical activity have given conflicting results. Differences in various investigations may occur because of different methods of measurement, different instruments and variables that were included. These differences could be a result of differences among countries and different socioeconomic and cultural conditions, as well.

The results of our study showed that playing games was a significant predictor of gender differences in school children aged 11-12, but time spent studying, sedentary screen-based activities (video gaming, computer science), physical education classes, corrective exercises, games (time spent outside), sports activities, training, warming up before training and walking were not.

Boys were more likely to be physically active than girls. The girls recorded significantly fewer activities involving games (time spent outside) than the boys did. This is in accordance with other reports (Spinks, Macpherson, Bain & McClure, 2007: 156-63; Sallis, Prochaska & Taylor, 2000: 963-75; Van Sluijs, Skidmore, Mwanza, Jones, Callaghan, 2008: 388; Maddison, 2009: 146; Hinkley, Crawford, Salmon, Okely & Hesketh, 2008: 435-41).

Girls recorded more time spent in sedentary activities and less time in light, moderate and vigorous activity. In all ethnic groups combined, girls recorded fewer activities than boys (Maddison, 2009) did.

Hinkley et al. reported that preschool children who spent more time outdoors were more active than children who spent less time outdoors, also (Hinkley, Crawford, Salmon, Okely & Hesketh, 2008: 435-41). Our results show that the Physical activity score based on self-reported data can monitor differences in the levels of activities. Self-report methods are still likely to be a principal source of information for many studies. However, there is a report (Sproston & Mindell, 2006) that gender differences in self-reported levels of activity (with 69% of the boys and 61% of the girls reporting the recommended levels) were less marked than those measured objectively (76 vs. 53%, respectively).

Strengths and weaknesses

The study was designed to allow schoolchildren (boys and girls) comparisons while limiting the influence of confounders. We have included all the available data and have adjusted for all factors related to gender differences (boys and girls) in relation to physical activity. These may be the strengths of this study. The primary limitation of the study was that we could not include as confounders emotional health domains, BMI, and previous physical activity. Due to potential gender biases in reporting on physical activity, objective measures offer a more reliable form of assessment. Therefore, further investigation is needed.

CONCLUSION

Our investigation showed that playing games is a significant predictor of differences in physical activities between boys and girls and that boys spend more time playing games than girls do. This study provides an understanding of the factors that influence physical activity. It can aid design of more effective interventions for school aged girls and boys. These results may promote more active lifestyles among children, especially girls.

REFERENCES

- Andersen, L.B., Harro M., Sardinha L.B., Froberg K., Ekelund U., Brage S., & Anderssen S.A. (2006). Physical activity and clustered cardiovascular risk in children: a cross-sectional study (The European Youth Heart Study). *Lancet*, 368(9532), 299-304.
- Blair, S.N., Kohl H.W., Gordon N.F., & Paffenbarger R.S. Jr. (1992). How much physical activity is good for health? *Annual review of public health*, 13:99-126.
- Butland, B., Jebb S., Kopelman P., McPherson K., Thomas S., et al. (2007). Tackling obesities: Future choices—Project report. London, UK: Government Office for Science
- Committee on Environmental Health, Tester JM. Collaborators (17) Binns H.J., Forman J.A., Karr C.J., Osterhoudt K., Paulson J.A., Roberts J.R., Sandel M.T., Seltzer J.M., Wright R.O., Kim J.J., Blackburn E., Anderson M., Savage S., Rogan W.J., Jackson R.J., Tester J.M., & Spire P. (2009). The built environment: designing communities to promote physical activity in children. *Pediatrics*, 123(6), 591-1598.
- Department of Health. (2004). At least five a week. Evidence on the impact of physical activity and its relationship to health. A report from the Chief Medical Officer. London: Department of Health.
- Ekelund, U., Anderssen S.A., Froberg K., Sardinha L.B., Andersen L.B., & Brage S. (2007). Independent associations of physical activity and cardio respiratory fitness with metabolic risk factors in children: the European youth heart study. *Diabetologia*, 50(9),1832-40.
- Garemo, M, Palsdottir V, & Strandvik B. (2006). Metabolic markers in relation to nutrition and growth in healthy 4-y-old children in Sweden. *The American journal of clinical nutrition*, 84(5),1021-26.
- Gaya, A.R., Alves A., Aires L., Martins C.L., Ribeiro J.C., & Mota J. (2009). Association between times spent in sedentary, moderate to vigorous physical activity, body mass index, cardio respiratory fitness and blood pressure. *Annals of human biology* 13,1-9.
- Hind, K., & Burrows M. (2007). Weight-bearing exercise and bone mineral accrual in children and adolescents: a review of controlled trials. *Bone*, 40(1),14-27.
- Hinkley, T., Crawford D., Salmon J., Okely A.D., & Hesketh K. (2008). Preschool children and physical activity: a review of correlates. *American journal of preventive medicine*, 34(5),435-41.
- Imperatore, G., Cheng Y.J., Williams D.E., Fulton J., & Gregg E.W. (2006). Physical activity, cardiovascular fitness, and insulin sensitivity among U.S. adolescents: the National Health and Nutrition Examination Survey, 1999–2002. *Diabetes Care*, 29(7),1567-72.
- Kimm, S.Y., Glynn N.W., Kriska A.M., Barton B.A., Kronsberg S.S., Daniels S.R., Crawford P.B., Sabry Z.I., & Liu K. (2002). Decline in physical activity in black girls and white girls during adolescence. *The New England journal of medicine*, 347(10),709-15.
- Krebs, N.F., & Jacobson M.S.(2003). Prevention of pediatric overweight and obesity. *Pediatrics*, 112(2),424-30.
- Lobstein, T., Baur L, & Uauy R. (2004). Obesity in children and young people: a crisis in public health. *Obesity reviews: an official journal of the International Association for the Study of Obesity*, 5(Suppl1), 4-104.
- Maddison, R., Foley L., Ni Mhurchu C., Jull A., Jiang Y., Prapavessis H., Rodgers A., Vander Hoon S., Hohepa M., & Schaaf D. (2009). Feasibility, design and conduct of a pragmatic randomized controlled trial to reduce overweight and obesity in children: The electronic games to aid motivation to exercise (eGAME) study. *BMC public health*, 9(1),146.
- Pate, R.R., Freedson P.S., Sallis J.F., Taylor W.C., Sirard J., Trost S.G., & Dowda M. (2002). Compliance with physical activity guidelines: prevalence in a population of children and youth. *Annals of epidemiology*, 12(5), 303-8.
- Prentice, A., Schoenmakers I., Laskey M.A., de Bono S., Ginty F., & Goldberg G.R. (2006). Nutrition and bone growth and development. *The Proceedings of the Nutrition Society*, 65(4), 348-60.
- Riddoch, C.J., Bo Andersen L., Wedderkopp N., Harro M., Klasson-Heggebo L., Sardinha L.B., Cooper A.R., & Ekelund U. (2004). Physical activity levels and patterns of 9- and 15-yr-old European children. *Medicine and science in sports and exercise*, 36(1), 86-92.
- Riddoch, C.J., Mattocks C., Deere K., Saunders J., Kirkby J., Tilling K., Leary S.D., Blair S., & Ness A. (2007). Objective measurement of levels and patterns of physical activity. *Archives of disease in childhood*, 92, 963-9.
- Sallis, J.F., Prochaska J.J., & Taylor W.C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine and science in sports and exercise*. 32(5), 963-75.
- Sherar, L.B., Esliger D.W., Baxter-Jones A.D., & Tremblay M.S. (2007). Age and gender differences in youth physical activity: does physical maturity matter? *Medicine and science in sports and exercise*, 39(5), 830-5.
- Spinks, A.B., Macpherson A.K., Bain C., & McClure R.J. (2007). Compliance with the Australian national physical activity guidelines for children: Relationship to overweight status. *Australian journal of science and medicine in sport*, 10(3),156-63.

- Sproston, K., & Mindell J. (2006). Health Survey for England 2004: Volume 1 The Health of Minority Ethnic Groups. London: Stationery Office.
- Van Sluijs, E.M.F., Skidmore P.M.L., Mwanza K., Jones A.P., Callaghan A.M., (2008). Ekelund U., Harrison F., Harvey I., Panter J., Wareham N.J., Cassidy A.A, & Griffin S.J. Physical activity and dietary behaviour in a population-based sample of British 10-year old children: the SPEEDY study (Sport, Physical activity and Eating behaviour: Environmental Determinants in Young people). *BMC public health*, 8, 388.
- Williams, C.L., & Strobino B.A. (2008). Childhood diet, overweight, and CVD risk factors: the Healthy Start project. *Preventive cardiology*, 11(1), 11-20.

RAZLIKE IZMEĐU DJEČAKA I DJEVOJČICA U FIZIČKOJ AKTIVNOSTI

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Fizička aktivnost djece školskog uzrasta je veoma važan faktor pravilnog razvoja. Cilj ovog istraživanja je bio da se ispita postojanje razlika između dječaka i djevojčica u nivou fizičke aktivnosti. 98-oro djece školskog uzrasta (48 dječaka i 50 djevojčica) prosječne starosti 11, 4±0,58 godina su testirani Testom fizičke aktivnosti (Physical activity score) koji uključuje podatke o nivou fizičke aktivnosti (9 varijabli), kao i bol u leđima i ocjene opšteg zdravlja. Za sttističku analizu podataka koristili smo Binarnu logističku regresiju. Zavisna varijabla je bila pol. Rezultati našeg istraživanja pokazuju da je igra (vrijeme provedeno vani) značajan prediktor razlika između dječaka i djevojčica u nivou fizičke aktivnosti (OR=0,398, p<0,05), kada su varijable kontrolisane sa drugim nezavisnim varijablama. Naše istraživanje pokazuje da postoji razlika u fizičkoj aktivnosti između dječaka i djevojčica i da dječaci provode više vremena u igri vani od djevojčica.

Ključne reči: djeca, fizička aktivnost, igra