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ACADEMIC ACHIEVEMENT OF PUPILS IN SPORT CLASSES: PUPILS ATTENDING SPORT CLASSES HAVE HIGHER FINAL GRADES, BUT…

UČNI USPEH UČENCEV V ŠPORTNIH ODDELKIH: UČENCI IZ ŠPORTNIH ODDELKOV IMAJO VIŠJE KONČNE OCENE, VENDAR…

ABSTRACT

The main goal of the study was to establish whether there are any differences between groups of pupils attending a *sport class* for eight years and those attending a *regular class* in terms of their final grade. The experiment was based on three school years of pupils (N=134) from the Miroslav Vilhar Primary School in Postojna, Slovenia, who were monitored throughout the period they attended primary school. A total of 68 pupils attended the *sport class* (experimental group) and 66 were in the regular school programme (control group). The sample of variables consisted of all standard primary school subjects. The progressive (regressive) changes were monitored on the basis of final grades in individual subjects. The t-test for independent samples and the Chi-square test confirmed the statistical significance of the differences between the pupils attending the regular school programme and those attending a sport class in those subjects that they attended throughout the eight years; specifically, Slovenian language (16%) and mathematics (14%) ($p<0.01$) and their final grade calculated as the average of all grades, (7%) ($p<0.05$), in favour of those pupils attending the sport class. The analysis of covariance showed that the differences in the final grade mainly stemmed from the differences in the overall achievement at the beginning of schooling and the influence of the family environment, especially the parents' education. This means that the observed differences in the overall achievement of pupils attending sport and regular classes are mainly a consequence of the initial formation of individual classes. In a family environment where high levels of knowledge and education are perceived as valuable, parents show greater interest in and care for both the education of their children and that they develop a healthy lifestyle.

Key words: physical education, sport class, final grade, primary school

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POVZETEK

Osnovni namen predstavljene študije je bil ugotoviti ali obstajajo razlike v učnem uspehu med skupinama učencev , ki so bili 8 let vključeni v *športni oddelek* in tistimi, ki so bili v *običajnem oddelku*. V eksperiment so bile vključene tri generacije učencev (N =134) OŠ M. Vilharja iz Postojne, ki so bili spremljani skozi celotno osnovnošolsko obdobje. 68 učencev je bilo vključenih v *športni oddelek* (eksperimentalna skupina), 66 pa v običajen šolski program (kontrolna skupina). Vzorec spremenljivk so predstavljali vsi zakonsko predpisani učni predmeti za osnovno šolo. Progresivne (regresivne) spremembe smo spremljali na osnovi zaključnih ocen pri posameznih učnih predmetih. T- test za neodvisne vzorce je potrdil statistično pomembnost razlik med skupinama učencev s športnim in običajnim šolskim programom pri predmetih, ki so jih imeli vseh osem let šolanja v slovenščini (16 %) in matematiki (14 %); ($p<0,01$) ter učnim uspehom – izračunanim iz povprečja vseh ocen) (7 %); ($p<0,05$) v prid učencev z dodatnim športnim programom. Analiza kovariance je pokazala, da so razlike v učnem uspehu predvsem posledica razlik v učnem uspehu v začetku šolanja in vpliva domačega okolja, zlasti izobrazbe staršev. To pomeni, da so opažene razlike v učnem uspehu med učenci športnih in običajnih oddelkov predvsem posledica začetnega oblikovanja posameznih oddelkov. Družinsko okolje, kjer sta znanje in izobraženost višja in prepoznavna kot vrednota, obstaja večji interes in skrb staršev za šolanje in vzgojo njihovih otrok za zdrav način življenja.

Ključne besede: športna vzgoja, športni oddelek, učni uspeh, osnovna šola

INTRODUCTION

The mission of school is to successfully transfer social norms, values and knowledge to young children (Peček & Lukšič-Hacin, 2003). In our aspiration to facilitate the fulfilment of the school's mission, we expect it to encourage and activate all available factors that indirectly affect the educational process (Kroflič, 2000). The school's management and teachers, and sometimes even the parents, are allowed to employ different educational content and forms in their pursuit of the school's goals and mission. The school's performance can be assessed by the level of knowledge of its pupils (reflected in their final grades) and their achievements in extra-curricular activities associated with sport, culture etc. Therefore, knowledge is not the only criterion. Performance depends on many different factors (Marentič, Požarnik, 1988), including: a) physiological and psychological factors showing a child's psychophysical condition, state of health, general well-being, intellectual and emotional condition, self-image, previous knowledge etc., b) social factors of the school environment (teacher's competence, internal school organisation etc.), and c) external circumstances (support from the environment, infrastructure, family environment etc.).

A number of studies show that pupils' final grades depend on their family environment. A major effect on the final grade is exerted by a family's socio-economic status (Mariaribanks, 2001; Pungelo, Kupersmidt, Burchinal, & Petterson, 1996) and cultural level (Bacete & Ramirez, 2001).

Sport programmes can contribute a great deal to the school's performance. Physical education with its specific tasks (development of motor abilities and sport knowledge, promotion of a positive self-image and socialisation as well as care for the young people's psychophysical state and health) (Auweele, Bakker, Biddle, Durand, & Seiler, 1999; Kovač & Novak, 1998) is an important element of the educational system at school.

This is particularly true when the school's organisation allows a choice from variety of subjects and a more personal approach in different types of individualised and differentiated classes and when it plays a compensatory role with respect to the development shortcomings of children from families with a low socio-economic status.

One of the possibilities for organising and implementing these work methods is a sport class. In the 1985/86 school year, Slovenia introduced a school programme with additional sport subjects (Cankar & Kovač, 1995). Today, school programmes with sport content are being implemented in about 30 schools so as to contribute to the quality of the school's educational work in different periods of compulsory schooling. There is not much data available on how efficiently these sport classes attain the school's objectives. Some studies by Černohorski (2002), Jurak et al. (2004) and Novak et al. (1990) demonstrate the influence of a complementary sport programme on a pupil's individual abilities. A comprehensive and longitudinal evaluation of the efficiency of an eight-year programme with additional sport contents, which would also analyse the pupils' overall achievement, has not yet been produced in Slovenia.

Therefore, the objective of this study was to establish whether programmes with additional sport content contribute to the school's performance measured in the pupils' final grade. Domestic and foreign studies (Zurc, 2006; Petrovič, Strel, & Ambrožič, 1982; Yu, Chan, Cheng, Sung, & Hua, 2006; Linder, 2002) have reported that pupils who are physically more active and more efficient in motor terms have a better self-image.

The study aimed to identify differences between the groups of pupils attending a sport class for eight years and those attending a regular class, in terms of their final grade. Using a sample of pupils, the study aimed to establish the extent to which the differences in grades at the beginning of schooling and the socio-economic status of pupils or their family influence on the differences (if any) on the pupils' overall achievement at the end of their schooling.

WORK METHODS

Sample of subjects

The sample was monitored longitudinally for eight years, from the age of 7 (1st year of school) to 15 (8th year of school). The sample included three years of pupils who enrolled in the 1st year of school of the Miroslav Vilhar Primary School in Postojna, Slovenia, in the 1995/96, 1996/97 and 1997/98 school years and completed their schooling in the 2002/03 to 2004/05 school years. The sample consisted of 134 male and female pupils. The experimental group included 68 subjects attending the programme with additional sport contents. The control group consisted of 66 subjects attending regular classes.

Programme of classes with additional sport contents

The sport class programme, compared to the regular class programme, included more hours of regular physical education (Table 1) and more extra-curricular sport activities. In the sport classes, the physical education lessons were delivered by two teachers throughout the schooling. In terms of all other educational contents, the sport and regular class programmes were identical.

In the period from the 1st to the 4th year of schooling, pupils in the experimental group (EG) had five lessons of physical education a week, which were delivered concurrently by two teachers (a sport teacher and a classroom teacher). The control group (CG) had three lessons of physical education a week, which were delivered by their class teacher alone. In the 5th and 6th years of schooling, the EG pupils had five lessons of physical education a week and, in the 7th and 8th years of schooling, three lessons a week. The CG pupils had three lessons a week in the 5th and 6th years of schooling and two lessons a week in the 7th and 8th years of schooling. In the period from the 5th to the 8th years of schooling, lessons were delivered concurrently by two sport teachers, in both experimental and control groups.

Table 1: Differences between the experimental and control groups in terms of the number of physical education lessons in the eight-year schooling period

Group[1]	1st-4th yr.	Index in %	5th & 6th yr.	Index in %	7th & 8th yr.	Index in %	1st-8th yr.	Index in %
CG	420*	100	210**	100	150**	100	780**	100**
EG	700**	167	350**	167	210**	140	1260**	162**

[1]The baseline (100%) is the number of lessons in the CG (regular classes)
*classroom teacher delivers the lesson
**classroom teacher and sport teacher deliver the lesson together

Pupils of the sport classes (EG) also took part in additional sport activities of several hours' to several days' duration (hiking, cycling, bivouacking, cross-country skiing, dance courses,

archery, bowling, boules etc.) and one open-air school a year. Pupils of the regular classes (CG) only had one summer (swimming course) and one winter (skiing course) outdoor activity along with a prescribed number of sports days a year, which is the same as their schoolmates attending the sport programme.

MEASUREMENT INSTRUMENTS

Final grade

To evaluate the final grade in all standard primary school subjects a five-degree scale was used, ranging from 1 (the lowest score) to 5 (the highest score). The average final grade was calculated on the basis of the average of all grades. Grades in art, music, technical and physical education (hereinafter: the education subjects) were evaluated using the following scale: those who were less successful received 2, those successful received 3.5 and those very successful received 5.

Socio-economic status

A survey questionnaire with 17 questions was used as an instrument for measuring the pupils' socio-economic status. These questions were divided into three sub-systems: (i) general description (parents' age, nationality, size of family, parents' education etc.); (ii) consequential (car ownership, housing situation, subjective classification on a social ladder, assessment of the parents' state of health, time and way of spending annual holidays, practicing of sport and percentage of family's monthly budget spent on sport and recreation); and (iii) sub-system of viewpoints (quantity of sport-recreational areas and the range of organised types of sport-recreational activities).

Motor abilities – XT variable

To measure motor abilities tests drawn from the Sport Educational Chart (Strel et al., 1996) were used. The selected tests included: 20-second arm plate tapping, standing broad jump, polygon backwards, forward bench fold, 60 seconds of sit-ups, bent arm hang, 60-m run and 600-m run. The average of standardised values of all eight tests is represented by the variable XT.

STATISTICAL METHODS

Basic statistical parameters for all the variables used were calculated. Correlations between individual variables (Pearson's r) were also calculated. The calculation of the statistical significance of differences between the variables of the experimental and control group pupils at the end of schooling was made using a t-test for independent samples and Chi-square tests (for grades). To identify the effects of the family environment (socio-economic status of the family, parents' education) and the initial differences in the overall achievement on the final grade at the end of the eight-year period of schooling, a multivariate analysis of covariance (MANCOVA) and an analysis of covariance (ANCOVA) were employed.

RESULTS

Differences between the experimental and control groups in terms of final grades

Using the t-test for independent samples and the Chi-square test, we established the differences between the experimental and control groups at the end of schooling. The differences between the experimental and control groups in individual subjects in terms of overall achievement are shown in Table 2.

Table 2: Differences between the experimental and control groups in terms of the final grade at the end of eight years of schooling (calculated by a t-test and Chi-square test and expressed as an EG/CG index)

Final grade	M (SD)	M (SD)	t-value	df	p t-test	p Chi-square	%
Subject[1]	EG (N=68)	CG (N=66)					EG : CG
SL	3.94 (0.94)	3.41 (1.14)	2.93	132	**0.004****	**0.012***	116
MAT	3.75 (1.04)	3.30 (1.15)	2.36	132	**0.020***	**0.047***	114
EN	3.90 (0.95)	3.42 (1.19)	2.54	132	**0.012***	**0.033***	114
GEO	4.04 (0.80)	3.60 (1.05)	2.72	132	**0.007****	**0.014***	112
HIS	3.83 (0.95)	3.68 (1.14)	1.35	132	0.179	0.191	104
BIO	4.18 (0.84)	3.86 (0.97)	1.99	132	**0.050***	0.075	108
CHEM	3.78 (1.02)	3.35 (1.08)	2.36	132	**0.020***	0.074	113
PHYS	3.76 (1.05)	3.26 (1.18)	2.64	132	**0.009****	0.111	115
AE	4.29 (0.75)	4.36 (0.75)	-0.54	132	0.593	0.607	98
ME	4.32 (0.75)	4.32 (0.75)	-0.02	132	0.988	0.936	100
TE	4.76 (0.55)	4.43 (0.73)	2.90	132	**0.005****	**0.006****	107
HE	4.74 (0.58)	4.81 (0.49)	-0.89	132	0.372	0.469	98
PE	4.630 (0.700)	4.450 (0.730)	1.38	132	0.170	0.128	104
FINAL GRADE	4.150 (0.640)	3.870 (0.760)	2.38	132	**0.019***		107

[1]SL=Slovenian language; MAT=mathematics; EN=English language; GEO=geography; HIS=history; BIO=biology; CHEM=chemistry; PHYS=physics; AE=art education; ME=music education; TE=technical education; HE=home economics; PE=physical education; M=arithmetic mean; SD=standard deviation;

*$p<0.05$

**$p<0.01$

The male and female pupils who had eight years of schooling (Table 2) with an additional sport programme achieved statistically significantly higher grades in all subjects included in the programme. The largest differences ($p<0.01$) were identified in Slovenian language and physics (by 16% or 0.53 or 0.5 of a grade), English language and mathematics ($p<0.05$) (by 14%) and chemistry ($p<0.05$) (by 13%). There were no statistically significant differences between the groups in *education subjects*, except for technical education. The average final grade (the average of the grades for all subjects) of the pupils in the experimental group was by 0.29 (7%) of one grade higher ($p<0.05$) than in the control group.

Correlation between the final grade, motor efficiency and some parameters of the socio-economic status of the family of pupils in the experimental and control groups

Pupils' overall achievement depends on many factors which were already described in the introduction. Table 3 presents the correlations between the overall final grade and grades in individual subjects, motor efficiency and some parameters of the socio-economic status of families of the pupils involved in the study. Motor efficiency is defined as an average performance in the individual motor tests that the pupils performed according to the Sport-education Record.

Table 3: Correlations (Pearson's r) between the overall final grade and the grades in individual subjects, motor efficiency and some parameters of the socio-economic status of families of the pupils involved in the study

GRADES[1]	FINAL GRADE – EG	FINAL GRADE – CG
MOTOR EFFICIENCY	0.51**	0.29*
EN	0.79**	0.88**
MAT	0.89**	0.91**
SL	0.86**	0.89**
SOC-F	0.42**	-0.09
SOC-M	0.42**	-0.09
SOC-FM	0.46**	-0.11
EDU-F	0.31*	0.36**
EDU-M	0.44**	0.38**
EDU-FM	0.44**	0.41**

[1]SL=Slovenian language; MAT=mathematics; EN=English language; SOC-F=average score of social status of the father; SOC-M=average score of social status of the mother; SOC-FM=average score of social status of the father and mother; EDU-F=average education of the father; EDU-M=average education of the mother; EDU-FM=average education of the father and mother

*$p<0.05$

**$p<0.01$

The results show a medium-high correlation between the final grade of the pupils attending sport classes, the socio-economic status of the family ($r=0.46$; $p<0.01$) and the parents' education level ($r=0.44$; $p<0.01$). In contrast, the final grade of pupils in the control group correlates only with their parents' education level ($r=0.41$; $p<0.01$), but not with their family's socio-economic status.

Higher final grades were achieved by pupils who were more efficient in terms of their motor abilities, in both the experimental and control groups. The correlations between the basic subjects (mathematics, Slovenian language and English language) and the pupils' overall final grades are as high as were expected.

Investigation of the effect of the overall achievement at the beginning of schooling and of the family's socio-economic status on the pupils' final grade at the end of the eight years of schooling

Effect of overall achievement at the beginning of schooling

The results of the analysis of covariance show that the differences between the eight-year pupils of the experimental and control groups in terms of their final grade in all subjects become statistically insignificant after eliminating the effect of covariates (performance in an individual subject at the beginning of schooling, i.e. in the 1st year of school).

In Slovenian language, the F value decreases to 2.22 ($p=0.139$) and, after eliminating the differences in the grades, the F value in mathematics in the 1st year of school decreases to 0.354 ($p=0.553$). The same trend was observed in "education subjects." When the differences in the

pupils' performance in physical education in the 1st year of school were eliminated in both groups, the same differences became insignificant (F=0.047; p=0.828) in the 8th year of school. In music education, the F value decreases to 0.957 (p=0.330), whereas in art education it drops to 0.632 (p=0.428).

The pupils from the experimental group (Figure 1) had higher overall final grades (the average of grades in all subjects) by about 0.3 of a grade already in the 1st year of schooling. This difference increased until the 5th year of school (more than 0.4 of a grade), it then decreased again until the 8th year of school achieving a value roughly equal to that in the 1st the year of school. Taking into account the initial differences in the overall final grade, the differences after the eight-year schooling period are statistically insignificant (F=0.298; p=0.586). The influence of all covariates (SL1, MA1, ME1, AE1, PE1 and OFG1) is statistically significant (p>0.001).

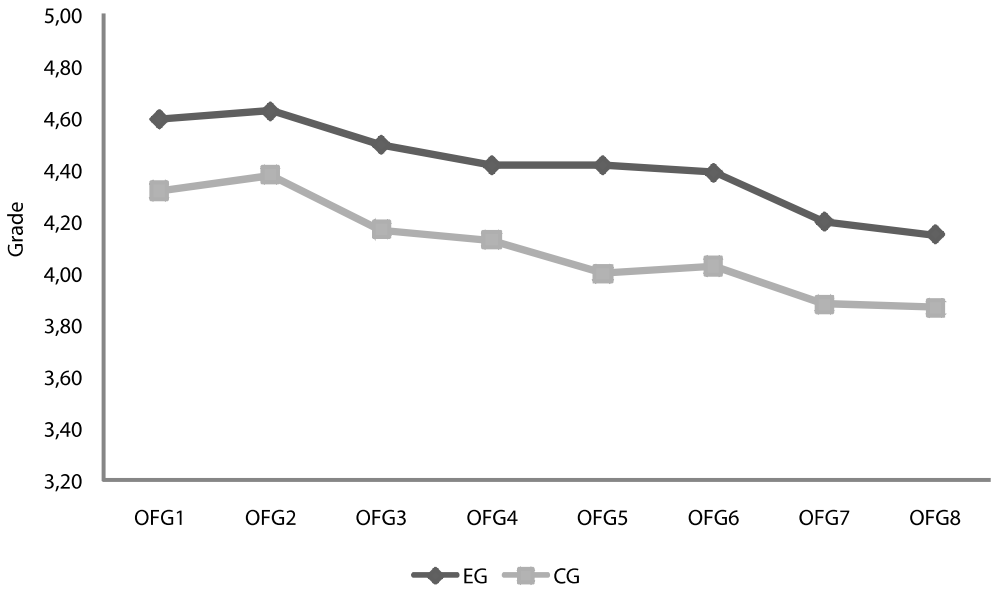

Figure 1: Overall final grade (arithmetic mean) from the 1st to the 8th years of schooling

Legend: EG=experimental group; CG=control group; OFG1 to OFG8=overall final grade from the 1st to the 8th grades

Effect of the family's socio-economic status

In view of the previous findings, we were also interested in whether the visible effects of the programme would still be present after eliminating the effect of individual variables from the SES (socio-economic status) area (Table 4).

Table 4: Effect of the programme on the final grade (p values) in individual subjects in the 8th year of schooling along with covariates of some SES variables

Covariates	SOC-FM	EDU-FM	PaSA-FM	PreSA-FM	FBR	SH-FM
SL	0.007**	0.292	0.010*	0.023*	0.021*	0.005**
EN	0.022*	0.396	0.029*	0.049*	0.031*	0.010*
MA	0.037*	0.528	0.046*	0.134	0.096	0.021*
GEO	0.009**	0.348	0.023*	0.03*	0.024*	0.009**
HIS	0.205	0.604	0.201	0.332	0.382	0.156
BIO	0.080	0.781	0.122	0.210	0.145	0.049*
CHEM	0.024*	0.378	0.026*	0.058*	0.063	0.020*
PHYS	0.015*	0.347	0.019*	0.061	0.041*	0.010*
AE	0.419	0.155	0.422	0.431	0.269	0.633
ME	0.921	0.465	0.905	0.771	0.673	0.842
TE	0.012*	0.060	0.017*	0.021*	0.020*	0.004**
HE	0.338	0.186	0.133	0.145	0.301	0.287
PE	0.300	0.699	0.460	0.665	0.261	0.222
OFG8	0.031*	0.621	0.049*	0.105	0.081	0.019*

Legend: SOC-FM=average assessment of social status of the father and the mother; EDU-FM=average education level of the father and the mother; PaSA-FM=past sport activity of the father and the mother; PreSA-FM=present sport activity of the father and the mother; FBR=family budget spent on recreation; SH-FM=average assessment of the state of health of the father and the mother

*$p<0.05$

**$p<0.01$

The results in Table 4 show that among the selected variables of the family's socio-economic status (covariates), only the parents' education impacts the overall final grade and the grade in all subjects more statistically significantly than the programme. After the effect of the parents' education is eliminated, the differences in the overall final grade between the pupils from the experimental and control groups are no longer statistically significant. The effect of all other SES variables as covariates on the final grade is not strong.

DISCUSSION AND CONCLUSIONS

Pupils who attend sport classes achieve higher final grades than those in regular programmes. Statistically significantly higher grades are achieved mainly in the subjects of Slovenian language, mathematics and foreign languages, while differences between the other groups of subjects (music education, art education, sport education) in terms of performance are minimal and statistically insignificant. The differences between pupils attending different programmes in terms of their final grade are not only seen at the end of schooling but are clearly evident at the beginning of schooling, i.e. in the 1st year. The correlation between the final grade in the 1st and the 8th years of schooling equals 0.65 ($p<0.01$). The results of the study clearly demonstrate that the differences in the final grade between pupils attending sport classes and those attending a regular programme

stem from the initial selection of pupils in individual programmes rather than from the school's educational endeavours and teachers' influence. The final grade depends on a number of factors. Among the factors that were included in this study, the family environment (education of the father and the mother as well as the family's socio-economic status) had a direct and very strong impact.

School programmes with additional sport contents (sport classes) are open to all pupils. Those parents who wish to ensure their children receive a quality regular and expanded programme with physical education on a daily schedule and additional sport-education contents have to pay extra (part of personnel costs, organisational costs etc.). Therefore, parents play the key role in the formation of sport classes. The results of this and other studies (Peternelj, Škof, & Strel, 2007) along with everyday practice show that the parents' higher level of education and, consequently, higher awareness are the key factors at the moment they decide on their child's schooling as well as the content of the school and extracurricular activities. It is evident that in a family environment where high levels of knowledge and education are perceived as valuable, parents show a greater interest in and care for education (they also have better possibilities for this) as well as for their children to develop a healthy lifestyle. The correlation between the final score of a child and their parents' education is statistically significant throughout their schooling and is medium-high (about 0.45). Similar findings were also reported by Toličič and Zorman (1977) who established that, particularly in mathematics, the children of parents with a higher education and socio-economic status performed better. The positive relationship between the parents' education and performance in mathematics and reading skills was also corroborated by Pungello et al. (1996). Debeljak (1999) established, among other things, that it is particularly the mother's education that influences a child's (mainly boy's) intellectual achievements. The results of this study also confirm that the mother's education has a stronger influence on her children's final grade.

Moreover, the study showed that the parents' education was a more important factor in a child's overall achievement than the family's socio-economic status. This was even more the case for pupils of regular classes where there was no correlation between the social status and final grade.

The parents' influence on the formation of both sport classes and regular classes reveals another dimension with regards to the children's final grades. It is not only the environment but also the child's genetic blueprint that impacts on the final grade. It is true that children inherit, for example, artistic or other talents; likewise, some studies (Toličič & Zorman, 1977; Pungello et al., 1996; Debeljak, 1999) showed that parents with a higher education have children with better final grades.

A child's abilities and some behavioural patterns are highly correlated with their parents' education i.e. the family in which children are developing (Zupančič, 1999). Among children aged 5.5 to 7.5 years (Cecić Erpič, 1999), regardless of their chronological age, the best results are achieved by children whose parents have a college or university education and the lowest by children of parents with a primary or vocational school. That study also established that children from highly-educated families are better prepared when entering school, mainly in terms of their verbal cognition, inference skills, apprehension of quantities and graphomotor abilities. Based on empirical results, Zupančič & Justin (1996) reported that the difference between children with highly-educated parents and those whose parents have a low education equals about one year of mental age.

By enrolling in a school, a child is required to adjust to the school's work organisation and their teacher and to "practice new types of co-operation with their peers in the classroom and during leisure time activities" (Puklek & Gril, 1999). Moreover, the same authors established that a child's co-operation with his peers in common activities promotes his cognitive development and mastery of social skills as well as increases satisfaction and the volume of knowledge acquired through a specific task. In this way, children develop their self-esteem, assess their achievements more realistically, are willing to carry on with more demanding tasks and thus achieve better results in school work. In this aspect of a child's development before starting school, those children with more educated parents or a higher family socio-economic status again have an advantage.

The key conclusions of the study are that: a) the pupils attending sport classes achieve higher final grades than pupils attending regular programmes, b) that the final grade of the pupils in sport classes correlates with their family's socio-economic status and their parents' education, and c) that the final grade of the pupils in sport classes at the end of the eight-year schooling is largely defined by their overall achievement at the beginning of schooling and their parents' education.

The purpose of programmes offering additional sport subjects is not only to diversify the school curriculum, but also to exploit the possibility of making organised education in the public school a way to compensate for certain drawbacks of a non-stimulating family environment. However, the fact that school programmes with additional sport subjects are attended by pupils from families with a higher socio-economic status shows that the public school is failing to fully exploit the potential of the successful compensation of school socialisation. This finding underscores the need for a further consideration of the quality development of classes offering additional sport contents.

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