

## APPENDIX

### ANALYSIS OF DATA ON RECREATIONAL SPORTS ACTIVITIES (2018) RECORDED DURING THE NATIONAL ASSESSMENT OF BASIC COMPETENCES AND PUBLICATION OF ITS STANDARDS

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#### Abstract

The National Assessment of Basic Competences made year on year test the literacy and mathematics skills and performance of students attending 6th, 8th and 10th grade. The purpose of this study is to demonstrate the results of the National Measurement of Basic Competences linked to sport activities. The Authors describe the frequency of regular sporting habits outside school and at school by age group, gender and type of school. Highlights: (1) Among both sexes, it can be stated that the 6th grade athlete ratio in the subsequent grades shows a downward trend of about 10-10%. (2) From the point of view of the types of schools, the proportion of regular sports students is by far the most favorable among students attending primary school and high school. (3) The advantage of athletes is the most consistent in the girls' mathematical scores with one exception, athletes in all grades and in all types of schools outperform the athletes. (4) Among male students it was found that the superiority of athletes is present only in primary school and high school. Kind of an „athlete's disadvantage” exists among technical college and vocational high school students, more consistently than it was found in the data of 2017. The authors of the study carried out the research on the basis of the National Assessment of Basic Competences Research Group with the topic number 20642B800, funded by the Faculty of Humanities and Social Sciences, Károli Gáspár University of the Reformed Church in Hungary. As an appendix to our study, we also publish our dissertation in English.

**Keywords:** nationwide competency measurement ■ sport ■ exercise ■ mathematics ■ literacy

By covering the entire Hungarian student body, the National Assessment of Basic Competences can provide answers to questions asked at the social level instead of capturing individual-focused processes. Available data on the sports activities of Hungarian students suggest it worthwhile examining through social psychology and the sociology of sports.

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*Society psychology / sport psychology*

„The most important feature of social psychology as an interdisciplinary field of sciences is that it puts the understanding of the psychological state and behavior of individuals into a social matrix.” (Pikó, 2012, 10) It is a kind of interaction: society shapes the behavior of the individual and it has a repercussion on society, as social reality is created and constructed by those involved. The relationship between the individual and society significantly determines social reality, with a strong impact on health on both individual and population-level. The regularities of social processes provide an essential guide to understanding and analyzing factors affecting mental health (Kopp et al., 2010). An important aspect of health psychology and quality of life is thus the extent to which the existence of individuals is in harmony with the given social reality, i.e. how well the adaptation processes between the individual and society work.

Related social phenomena include modernization, individualization, globalization, and the advancement of new technologies. During the modernization, fundamental social changes took place, which led to the fragmentation of the previously unified worldview, system of values and norms, which also significantly affected the changes in the way people's lifestyles were regulated. This process can also be seen as the foundation of individualization. In individualization, the individual becomes more and more isolated from others and thus defines himself (Gurevics, 2003). As a result, the relationship between the individual and the community changes, weakens, and social norms and obligations are relaxed. The resulting vacuum of values, obligations and norms is filled by the members of society with what they want. Along the pleasure principle of Freud, risk behaviors (e.g. addictions) that are good in the short term, enjoyable, but have bio-psycho-social harms in the long run come into question at this point. A deeper understanding of this process is offered, among others, by existential psychology (Lukas, 2009), as well as by the temporal theory of self-regulation (Hall & Fong, 2007).

Despite the blurring of values, loosening of norms and obligations at a trend level, solid values, strong norms and clear obligations continue to prevail in certain areas of social life. Such a „value-oriented area” is, for example, religion (e.g. Bergin, 1991), the army (e.g. Dunivin, 1994) and sport (e.g. Pikó, 2005).

The lack of exercise and physical activity is a cause of increasing social concern in many areas (Garrett, Brasure, Schmitz, Schultz, Huber, 2004) like health (Biddle, 2012; Wilmot et al, 2012) mortality (Kopp and Skrabski, 2004) and economics (Ding et al, 2017). Not only amongst adults but also amongst young people as well (Tremblay et al., 2011). Satisfactory physical activity is available through sport, leisure, and everyday life (Moran, 2011). Certainly, top professional sports only affect the narrow part of society whose members (and their families) lives are dominated by sports. In connection with the physical activities embedded in everyday life we recommend the work of Moran (2012) and Róbert Urbán's (2017) health psychological book in Hungarian. In the remainder of the study, we will look more deeply into recreational sports activities.

*Adolescent leisure sport activity*

In adolescence, joint activities with peers are at the forefront, which also significantly influences their health-related behavior (Pikó, 2006). From a health-psychological point of view, some recreational activities have a risk-increasing effect (prone to smoking, alcohol and drug use), while others have a protective effect. The former include unstructured time spent with peers, consumption oriented activities, and creative activities, sports, religion and intellectual interest (Pikó, 2005).

While regular leisure exercise is an integral part of children's lives (Kulig, Brener & McManus (2003), there is a decreasing trend in late adolescence (Telama & Yang, 2000). So, as with all health behaviors, the practice of recreational sporting activity develops during late childhood and early adolescence (Perkins, Jacobs, Barber & Eccles, 2004). This also explains that childhood sporting activity is a unique and highly prominent predictor of adult sports activity (Moran, 2012). The release of sport as a result of age is particularly evident among girls, which is explained by the learned helplessness and minor engagement resulting from the several negative experience of physical education lessons, and the lower level of interest and involvement in comparison to boys in sports (Coakley & White, 1992; Ennis, 1996). The aptitude of boys to sports is further explained by the relationship between their affection to sports with masculine identity and the resulting competitive spirit and result-centricity (Lantz & Schroeder, 1999; Koivula, 1999). What can bring for girls back their enthusiasm and commitment to sports? Parents, as a good example, only affect boys (Sallis, Alcaraz, McKenzie, Hovell, 1999), but girls can be motivated very much if some girls in their immediate environment are engaged in sports (Coakley & White 1992; Keresztes, Pikó, Pluhár, Page, 2008).

*Leisure activities of adolescents in Hungary*

As a report summary on the 2004 "South Great Plain" Youth Research, Bettina Pikó (2012) reports that in case of a very large national adolescent sample ( $N = 1114$ ), out-of-school sports activities were carried out by about two-thirds of participants (65.6%) at least once a week. Within this, physical activity was related to the social situation in such a way that adolescents with a higher social status were more likely to have out-of-school sports activities. In particular, the mother's low level of education was associated with the child's lack of physical activity.

Keresztes, Pluhár, Pikó and Page (2008) found in a 548 Hungarian adolescent sample that one third (31.9%) of the participants did not participate regularly in recreational sports. The difference between boys (30.4%) and girls (32.9%) has been minimal in this field.

*Psychological aspects of sports activities*

The time spent on regular leisure sports returns by long-term health care (Warburton, Nicol & Bredin, 2006), which is reflected in the avoidance of chronic diseases at a higher

rate, as well as improved health and survival rates (Macintyre & Mutrie, 2004). But beyond physical health, physical exercise significantly contributes to psychological well-being (Fox, 1999), better general state of health, mental health (Ahn & Fedewa, 2011), physical fitness (Perkins, Jacobs, Barber & Eccles, 2004), lower levels of harmful behavior to the health (Pate, Trost, Levin & Dowda, 2000).

Biddle and Asare (2011) reviewed 18 reviews of the impact of physical activity on health psychological variables such as self-esteem, depression, anxiety and cognitive function among children and adolescents. Surprisingly few quality research has been found on the subject. According to their results, physical activity is beneficial to mental health. A weak-sized beneficial effect was found for depression and anxiety. Cognitive function and school performance are only affected by daily exercise, but the results are not consistent. One of the strongest results was the negative relationship between a lifestyle without exercise and mental health.

Physical activity has a beneficial effect on mental health. In Hungary, Kovács and Perényi (2014) examined the relationship between sport and health – among others, mental health – on young people. They concluded that sport contributes to a higher level of each dimension of well-being and protects against certain depressive symptoms. The relationship between physical activity and mental health can be approached from both a negative and a positive perspective. Athletes are protected from depression by their lifestyle due to regular exercise, as well as their self-confidence, support from society and social contacts (Armstrong, Oomen-Early, 2001). The positive impact of sport on mental health was also supported by a research of Vörös (2017), in which he examined the relationship between the inclination to sports and mental health. In estimating mental health, he took into account those who, based on their subjective opinion, mostly or always feel happy. He found that residents of countries with a higher proportion of the athlete population are also more likely to be happier.

From a neuropsychological point of view, regular exercise results in increased cerebral blood flow and metabolism (Blakemore, 2003), which can lead to a more mature nervous system and bodily functions in the long run, which appears in attention and learning abilities (Hillmann, Castelli and Buck, 2005) and in the growth of the cognitive performance Biddle, Asari, 2011, Rasberry et al, 2011).

## METHOD

This study contains analysis of the entire sample of the National Assessment of Basic Competences (NABC). The following two questions were used for grouping:

- What regular extracurricular classes do you attend at school?
  - Tutoring, development work
  - Talent management classes
  - School-organized leisure sports
- Do you attend extracurricular tutorial lessons, private lessons out of the following subjects?
  - Mathematics
  - Foreign language
  - Music
  - Sports
  - Other

The students were grouped into “athletes” and “passives” in such a way that those who marked the answer containing at least one of the above two questions with sports activity were included in the group of athletes. Students who did not nominate a response referring to sports were classified in the “passive” group.

Following that, the analyses were grouped, examined and described by gender, grade, and type of school.

Likewise to the analysis of the 2017 data, the analysis of the current 2018 data, the comparison of the competency scores of athletes and passives was performed with 95% confidence interval analyzes (Kárász, J., 2019a, 2019b).

Due to the size of the tables and data, the exact results and figures of the inquiry can be obtained in an additional source, from the website of the journal: PSYC\_HU<sup>6</sup>

## RESULTS

Those who engage in sports activities at least weekly within the Hungarian student population vs. the proportions of non-pursuers are shown in Table 1, by gender, grade, and type of school.

Table 1 suggest that the current (2018) results are consistent with the 2017 National Assessment of basic Competences in terms of the proportion of athletes. Among the boy members of the current Hungarian student population, the proportion of those who are passive in terms of sport is almost 8% lower (34.66%) than among girls (42.34%). This degree of shift is present between the genders across all grades. Among the representatives of both genders, it can be stated that the proportion of athletes experienced in the 6th grade shows a declining trend of about 10% at each level of later grades, and the proportion of passive ones increases by the same 10% amount. Among boys, the 12% decrease in athlete’s ratio between class 8 and 10 is exceptionally steep.

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<sup>6</sup> <http://www.kre.hu/portal/index.php/kiadvanyok/folyoiratok/psychologia-hungarica-caroliensis.html>

In terms of school types, it is clear that the proportion of students engaged in regular sports activities is by far the most favorable by those attending high school. Comparisons are made between 6th and 8th graders with primary school attendance, and among 10th graders with vocational secondary and technical college students. Technical college sports are roughly halfway between the frequency of vocational high school and high school sports activities, when also taking gender into account.

Missing data may skew the results to a small extent, but the trends identified above are so strong that reality is likely to be illustrated quite accurately, also taking into account the uncertainty associated with missing data. It is unlikely that e.g. a significantly higher proportion of athletes among 10th graders -than younger ones- would leave the question about sport unanswered.

The results related to the mathematics and comprehension performance of students who engage in regular recreational sports activities and are passive in this regard are detailed below.

In grades 6 and 8, the performance of athletic girls both in math and comprehension is superior to that of passive girls, regardless of school type. Compared to the 2017 data, this means a change among 8th grade girls attending 8 grade high school, as this year the athletes already had a superiority in the reading comprehension score compared to the passive ones from the sports point of view.

Among 6th grade boys attending 8 grade high schools, the supremacy of athletes' competence scores did not show up in 2017, but in 2018, the average mathematics and comprehension score of athletes clearly exceeded that of non-athletes.

There was still no difference in the math scores of boys attending 8th grade primary school between athletes and passives, and passivity remained superior in terms of reading comprehension. Among the 8th grade boys attending high school, the athletes showed the superiority of both mathematics and comprehension average scores: while last year this only applied to sixth-graders, this year it also apply to eighth-graders.

Interestingly among 10th grade boys, in some school types, the average math and comprehension scores of athletes are lower than those of passives. This applies to both attending the vocational high school and the technical college. Among high school boys, most comparisons did not differentiate between athletes and passives, with the exception of athlete superiority amongst those boys attending 4 grade high school in math comprehension scores vs. 8 grade high school boys.

Among 10th grader girls, we can state that athletes outperform passives in most cases, with the exception of vocational school girls where passives outperform in comprehension and the even level literacy results of those attending technical college and 8 grade high school, and math results of those attending vocational high school.

## AZ ORSZÁGOS KOMPETENCIAMÉRÉS (2018) A SZABADIDŐS SPORTTÜKRÉBEN

Table 1. Competency scores comparison of students engaged in leisure-time sports activities at least on a weekly basis by class, type of school and gender

		Boys				Girls				N	
		Athlete%	Passive%	Missing data %	Sum%	Athlete%	Passive%	Missing data %	Sum%	Boys	Girls
Class 6	primary school	54,66	26,25	19,10	100	50,21	34,04	15,75	100	42137	41710
	8 grade high school	62,27	20,24	17,48	100	65,18	22,19	12,64	100	1840	1963
	sum	54,98	26	19,03	100	50,88	33,51	15,61	100	43977	43673
Class 8	primary school	45,38	33,09	21,53	100	39,49	43,26	17,24	100	37070	36522
	6 grade high school	57,47	23,52	19,01	100	56,53	28,03	15,45	100	2364	2604
	8 grade high school	53,60	24,29	22,09	100	56,83	26,47	16,72	100	1710	1902
	sum	46,42	32,17	21,41	100	41,38	41,52	17,1	100	41144	41028
Class 10	vocational high school	24,95	55,34	19,72	100	15,19	68,30	16,51	100	9583	5397
	technical college	31,34	52,64	16,02	100	24,38	62,43	13,19	100	15223	12993
	4 grade high school	42,35	36,44	21,22	100	39,43	45,59	14,98	100	12272	17055
	6 grade high school	47,14	29,87	22,98	100	49,13	31,93	18,95	100	2101	2331
	8 grade high school	46,05	34,24	19,70	100	50,77	34,17	15,07	100	1352	1579
	sum	34,47	46,58	18,95	100	32,17	53	14,84	100	40531	39355
	sum	45,56	34,66	19,78	100	41,8	42,34	15,86	100	125652	124056

## SMOHAI MÁTÉ ÉS MTSAI

Table 2. Competency score averages comparison of students in sports activities and passives on all levels of school types, class and gender (based on 2017 and 2018 National Competency Assessments data)

Class	Type of school	Boys								Girls							
		Mathematics				Literacy				Mathematics				Literacy			
		2017		2018		2017		2018		2017		2018		2017		2018	
		ath. (SE)	non-ath. (SE)	ath. (SE)	non-ath. (SE)	ath. (SE)	non-ath. (SE)	ath. (SE)	non-ath. (SE)	ath. (SE)	non-ath. (SE)	ath. (SE)	non-ath. (SE)	ath. (SE)	non-ath. (SE)	ath. (SE)	non-ath. (SE)
6.	primary school	1509,4 (1,23)	1492,6 (1,8)	1516,7 (1,15)	1500,4 (1,76)	1483,7 (1,25)	1470,6 (1,92)	1477,6 (1,19)	1468,7 (1,94)	1510,5 (0,96)	1468,1 (1,39)	1506,3 (1,18)	1464,7 (1,3)	1547 (1,09)	1505,2 (1,62)	1528,3 (1,17)	1491,8 (1,37)
	8 grade high school	1695,3 (4,68)	1669,5 (8,38)	1687,1 (3,7)	1653,9 (7,93)	1662,7 (4,33)	1640,3 (8,73)	1646,8 (4,04)	1623,3 (7,11)	1646 (4,03)	1612,7 (7,41)	1649 (3,48)	1600,2 (7,49)	1692 (4,44)	1682 (8,46)	1676,4 (3,52)	1653,8 (8,12)
8.	primary school	1608,6 (1,5)	1613,9 (1,43)	1613,1 (1,62)	1613,8 (1,6)	1532,2 (1,4)	1542,3 (1,45)	1555 (1,52)	1566,6 (1,69)	1610,9 (1,41)	1577,1 (1,49)	1615,1 (1,35)	1573,8 (1,29)	1592,2 (1,46)	1571,5 (1,5)	1632,3 (1,56)	1604,2 (1,5)
	6 grade high school	1810,8 (3,48)	1772,5 (7,25)	1806,1 (3,5)	1778 (6,26)	1725,8 (3,61)	1699,1 (6,97)	1738,9 (6,67)	1756,9 (3,92)	1745,9 (3,83)	1684,6 (5,61)	1752,6 (3,67)	1701,8 (4,88)	1745,4 (3,79)	1703,5 (5,93)	1799 (3,43)	1752 (4,8)
	8 grade high school	1792,9 (5,8)	1772,8 (7,1)	1805,4 (4,21)	1771,8 (7,1)	1700,6 (4,92)	1689,7 (7,91)	1758,6 (4,06)	1718,4 (7,67)	1746,2 (4,87)	1715,7 (5,47)	1771,6 (4,43)	1715,8 (6,74)	1740,1 (4,59)	1717,5 (6,1)	1803,8 (3,8)	1760,2 (7)
10.	vocational high school	1437,6 (3,46)	1472,6 (2,29)	1447 (3,38)	1476,7 (2,18)	1402,7 (2,24)	1360,5 (3,46)	1388 (3,03)	1421,6 (2,17)	1396,8 (5,81)	1411,2 (2,35)	1411,8 (4,83)	1419,3 (2,24)	1401,2 (6,39)	1420,7 (2,55)	1419,5 (5,47)	1447,6 (2,29)
	technical college	1658,3 (2,52)	1665,5 (1,64)	1654 (2,24)	1664,4 (1,79)	1568,1 (2,31)	1583,1 (1,61)	1591 (2,31)	1607,1 (1,81)	1591,7 (2,49)	1575,2 (1,66)	1593,4 (2,68)	1573,3 (1,54)	1600,4 (2,52)	1595,9 (1,67)	1619,9 (1,71)	1620,6 (2,57)
	4 grade high school	1786,2 (2,56)	1777,1 (2,66)	1782,1 (2,19)	1769 (2,38)	1692,25 (2,11)	1695,7 (2,34)	1722,7 (2,15)	1721,8 (2,11)	1734 (1,92)	1691,5 (1,85)	1734,4 (1,69)	1692,9 (1,85)	1746,1 (1,92)	1719,5 (1,97)	1765,9 (1,73)	1741,1 (1,84)
	6 grade high school	1892,9 (5,11)	1865,9 (5,72)	1871,2 (4,54)	1848,6 (6,68)	1777,2 (4,51)	1758,4 (6,58)	1792,2 (4,59)	1776,1 (5,96)	1808,8 (4,46)	1759,5 (5,89)	1810,2 (4,44)	1758,8 (5,7)	1810,9 (4,24)	1777,3 (5,25)	1832,1 (4,1)	1794,8 (5,4)
	8 grade high school	1897,89 (5,45)	1874,4 (7,48)	1890,1 (5,54)	1867,1 (6,1)	1783,7 (4,6)	1773,3 (6,71)	1821,4 (5)	1796,7 (6,2)	1819,1 (5,28)	1786,9 (6,34)	1817,1 (4,74)	1784,4 (5,99)	1816,2 (4,59)	1808,2 (4,98)	1836 (4,34)	1820,4 (5,81)

Notation:

SE = standard error

**Bold:** Results indicating significant differences between the scores of athletes and passive students (i.e. non-overlapping 95% confidence intervals) results indicating significant differences between the score of athletes and passive students



## DISCUSSION

All in all, our results are organized around two main themes: the proportion of those who engage in sport at least once a week in different grades and school types, and the comparison of athletes and passives in terms of results from competency measurement.

There may be several factors behind the overall positive level of competence in recreational sport activities. Beside the neuropsychological aspect (Blakemore, 2003; Hillmann, Castelli and Buck, 2005; Earth, 2000; Trudeau and Shephard, 2008), it can be assumed from a stress-theoretical approach that regular sporting activities test and develop psychological adaptive skills and endurance, resilience and, at least in the long run, they are certainly an advantage in learning and in a variety of performance situations. Last but not least, the fact that a student goes in for sports in his or her free time structures his or her schedule, which is an important point in a healthy lifestyle. For example, a student who has an important sports competition on a Saturday morning is more likely to avoid a Friday night out and abstain from mood enhancers and drugs. Among both sexes, it can be stated that the 6th grade athlete ratio in the subsequent grades shows a downward trend of about 10-10-10%. From the point of view of the types of schools, the proportion of regular sports students is by far the most favorable among students attending grammar school comparing to vocational school and technical college attendees.

Overall, the comparison of the scores obtained during the National assessment of Basic Competences can be concluded with that at least one leisure sports activity per week is not reflected in a consistent and spectacularly higher level of competence measurement results. However, Hungarian athlete students outperform passives in far more comparisons than vice versa. In 26 of the 40 analyzes, broken down by class, school type and gender, the athletes outperformed passives, which is eight more than found in the 2017 National Assessment of Basic Competences data (18 pieces)! While last year in only five cases the passives had outperformed in math or comprehension scores the athletes, this year that number has risen to six. In the remaining nine comparisons, there was no difference between the two groups, which is eight less than last year.

The advantage of the athletes show most consistently in girls' mathematical competence score: regardless of the type of school, athletes outperformed passives across all three grades, with the sole exception of 10th grade vocational high school students, where there was no significant difference. Girls' comprehension scores also show the superiority of athletes in two comparisons compared to last year (for 6th and 8th graders attending an 8 grade high school)

It is worth mentioning that, regardless of the type of school, among girls in grades 6 and 8, athletes consistently outperformed passives in both math and comprehension competence scores.

Another notable cumulative result is that among boys, the benefits of mathematics and comprehension performance associated with sports activities are consistently seen in the two younger age groups (grades 6 and 8): out of the 10 comparative analyzes

(compared to only four last year), eight show a difference in favor of athletes, one in favor of passives, and one shows no difference.

Thus, the gap in the wide range of performance gaps between athletes and passives appears to have widened compared to the 2017 results: the advantage of athletes attending primary school and high school is manifested in more areas (26 instead of 18), and among those attending vocational high school and high school, athletes lag behind in more areas (six instead of five) than passives. It is as if a kind of “athlete disadvantage” emerges in terms of competency scores for boys attending vocational high school and high school, which covers both lower-level math and comprehension scores. What could be the reason for this? Does the sports culture of high school and primary school have an increasing impact on the lives of students and, within that, on the scores of competence? Would the sports culture present in vocational secondary schools and high schools have an increasingly negative effect?

It is worth mentioning the restrictions on the sports section of the National Assessment of Basic Competences. The undifferentiated sporting habits survey restricts the exact capture of the relationship between sports and cognitive abilities, as all the athletes are grouped together without differentiation, e.g.: a professional water polo player doing 10 trainings a week fall under same category as an amateur football player playing once a week. In addition, we also must beware of the cause-and-effect statement, because even if the overall score of athletes’ competency score is better than that of non-athletes, it is not proven that sport is the single cause of this important difference. For a better understanding, follow-up testing would be ideal, or at least multidirectional analysis with data e.g.: what the student is doing, since when and how often.

It is important to state and emphasize that the National Assessment of Basic Competences carried out year after year provides a unique opportunity for trends in sport activity at the societal level, and even for gender or school types, to be well captured in the future. Among other things, the performance of athletes vs. long-term development of the proportion of passive students becomes measurable in connection with changes in the law, changes in the world of sports, changes in gender roles, amendments to the law on education.

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