POSTURE CORRECTION AS PART OF HOLISTIC HEALTH PROMOTION IN HUNGARIAN SCHOOLS

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The primary prevention program of the Hungarian Spine Society was launched in 1995 with two goals: 1. to achieve that all school-children take part regularly in effective posture correcting exercises as part of physical education; and 2. to achieve daily physical education for all school-children. With appropriate governmental legislation and parliamentary decision both goals were integrated into the National Public Health Program in 2001 and 2003 and later in the national educational laws and documents. From 2011 and 2012 holistic health promotion in schools with the goal to reach all children became also prescription for all schools in Hungary. Public health institutions and actors still have to do much: they have to give continuous professional help to the physical education teachers in their posture correcting work and to all teachers in their daily health promoting tasks.
The article presents the details of the special posture correcting exercises, their distribution and prospective controlled studies, their place in the national education, the present situation and the further tasks. The article is supplemented by a short report about daily physical education and holistic health promotion in schools: how the prescription was achieved, the essence and the follow up of it, and what are the tasks for the helping public health actors.

Keywords: *biomechanically correct posture, sagittal balance, posture correction, daily physical education, holistic health promotion in schools*

TARTÁSKORREKCIÓ A TELJES KÖRŰ ISKOLAI EGÉSZSÉGFEJLESZTÉS RÉSZEKÉNT

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A Magyar Gerincgyógyászati Társaság prevenciós programja 1995-ben indult két célkitűzéssel: minden iskolás tanuló vegyen részt rendszeresen a hatékony tartásjavításban a testnevelési óra keretében; a mindennapos testnevelés váljon jogszabályi előírássá és ezáltal váljon minden tanuló hasznára. Kormányzati és országgyűlési jogi szabályozás útján mindkét cél része lett a 2001-ben indított Egészséges Nemzetért Népegészségügyi Programnak, majd később a köznevelési jogszabályoknak. 2011, illetve 2012 óta a teljes körű iskolai egészségfejlesztés is előírás minden iskola részére. A népegészségügyi szereplőknek most szakmai segítséget kell nyújtaniuk a testnevelők részére a tartáskorrekció helyes végzésében, illetve minden pedagógusnak az egészségfejlesztési tennivalókban. A közlemény a speciális tartáskorrekció részleteit, terjesztését, kontrollált vizsgálatát, a köznevelésben elfoglalt jelen helyzetét és a további tennivalókat ismerteti. A közlemény kiegészítő része a mindennapos testnevelésről, valamint a teljes körű iskolai egészségfejlesztésről ad rövid tájékoztatást: hogyan sikerült elérni a kötelező előírást, mi a lényege, hogyan történik a nyomon követése és mik a további népegészségügyi tennivalók.

Kulcsszavak: *biomechanikailag helyes testtartás, nyílirányú egyensúly, tartáskorrekció, mindennapos testnevelés, teljeskörű iskolai egészségfejlesztés*

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The importance of the biomechanically correct posture can not be overstated. Physical inactivity and the sedentary lifestyle that is unfortunately common among children and adolescents results in weakened and shortened postural muscles due to little or incorrect use. Thus, the proper balance among posture muscles is not achieved, and the gravitational load affects the small structural components of spine, which are not able to endure the strain. (Proper muscle balance ensures that the load

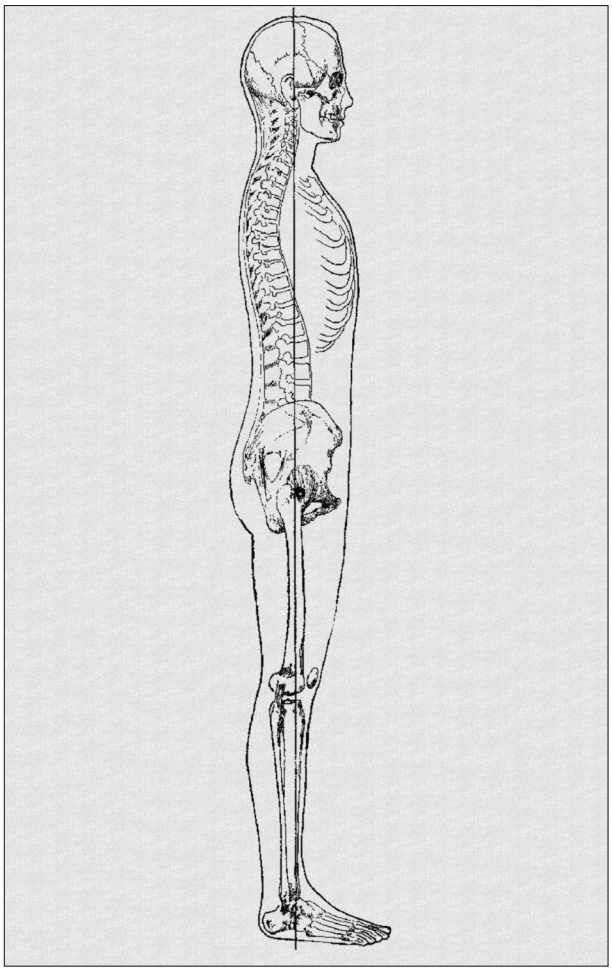

Figure 1. *The biomechanically correct posture is based on a correct middle position of the pelvis and the physiological sagittal curves above it. From the side view, the imaginary weight median of the body crosses the 2nd to 5th cervical and the 2nd to 5th lumbar vertebral bodies, which are relatively large bony components adapted for this, while the thoracic kyphosis assists flexibility*

falls upon components of spine which are capable of enduring the strain.) Muscle imbalance and overloading certain elements of spine can cause degenerative spinal disorders. Degenerative changes in the overloaded intervertebral discs cause pathological hypermobility in facet joints, and then these two processes accelerate each other. Later spinal stenosis can occur because of the above mentioned degenerative changes of the discus and the facet joints.

Dynamic balanced posture – i.e., alignment of body parts – is maintained by invisible, multidirectional functions of postural muscles[1, 2]. Biomechanically correct posture[1, 3, 4] occurs when there is physiological tension on joint capsules and ligaments with a minimum amount of muscular effort because of the balanced interaction of the postural muscles. Thus, the pressure on the articular surface of joints is evenly distributed. The biomechanically correct posture is based on a correct middle position of the pelvis and the physiological sagittal curves above it **(Figure 1)**. There are several types of incorrect posture where the lumbopelvic sagittal balance is impaired **(Figure 2)**.

Posture being an automatism, developing and maintaining the automatism of biomechanically correct posture gives the basis for primary prevention of discopathy. The aim of application of special exercises in physical education is to develop, automatize, and maintain biomechanically correct posture.

Some data of physical evaluations among preschool children and students

The physically inactive, sedentary lifestyle of today's children and adolescents has become remarkably prevalent: according to *Pellet,* 62% of preschoolers have bad posture, and this figure increases over the school years. According to *Fejérdy,* the rate of poor posture or other orthopedic disorders was 66% in 1991, 73% in 1992, and 78% in 1996 among high school students, and 88% among primary and secondary school students in 1999[5]. According to *Simóné Rőth* et al. in 2010, 70% of the 900 student evaluated had various physical spine deviations which required regular spine-exercises[6]. *Boja* et al. reported some results of the Genodisc Project (see later) also in 2010, according to which there were numerous students with poor posture (64.5% of evaluated students with bad posture in the premeasurement)[6]. 60% of pre-schoolers in Germany have sceletal muscle weakness according to *Weiss*[7], and *Kapo*[8] – based on his

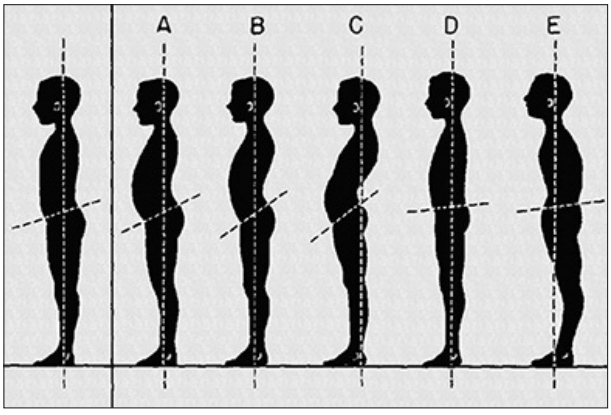

Figure 2. *Correct and several poor (A-E) postures*

objective measurements –, showed the correlation between the deformities of several parts of the body.

The Essence of the Hungarian Spine Society's Prevention Program

To compensate sedentary lifestyle and it's harm on the spine, daily regular physical activity, as well as automatizing and maintaining correct posture from childhood on, may prevent degenerative spinal disorders or delay their onset. Automatizing and maintaining correct posture may work best if special physical exercises are regularly applied since childhood. This is why daily physical education (DPE) and, within that, regularly performed special posture correction exercises for all schoolchildren are needed.

To improve the children's chance for a healthy life, the Hungarian Spine Society (HSS) launched its Prevention Program in 1995 with two goals: that schools offer DPE classes and teach special posture correction exercises to every student in DPE. The Prevention Program was based on the international and national medical literature and started in full agreement with all associate professions[9].

The essence of the HSS's Prevention Program is to show physical education teachers the special posture correction exercises that are to be taught to all schoolchildren (preferably also to kindergartners) as part of their daily physical education throughout the school years in order to develop and automatize the biomechanically correct posture, thereby contributing to the prevention of degenerative spinal disorders in adulthood. The special exercises were created by leading physiotherapists. The theoretical background and literature of this special posture correction exercises was reported in 2005[10]. The exercises were designed to develop and maintain the muscle balance (i.e. appropriate flexibility and strength of the muscles responsible for posture) and the correct mid-position of the pelvis. Thus, the exercise program targets all the postural muscles (stretch and strengthen), not only the well-known weak abdominal and back muscles. In order to develop and maintain the correct posture, exercises must be necessarily complex to impact several muscles and to improve global muscle balance. The special exercise program is based on 12 goal-exercises that may function as test-exercises as well **(Figure 3)**. These 12 semi-objective muscle tests evaluate whether the subject is able to perform the exercises in the correct way. If one is able to per-

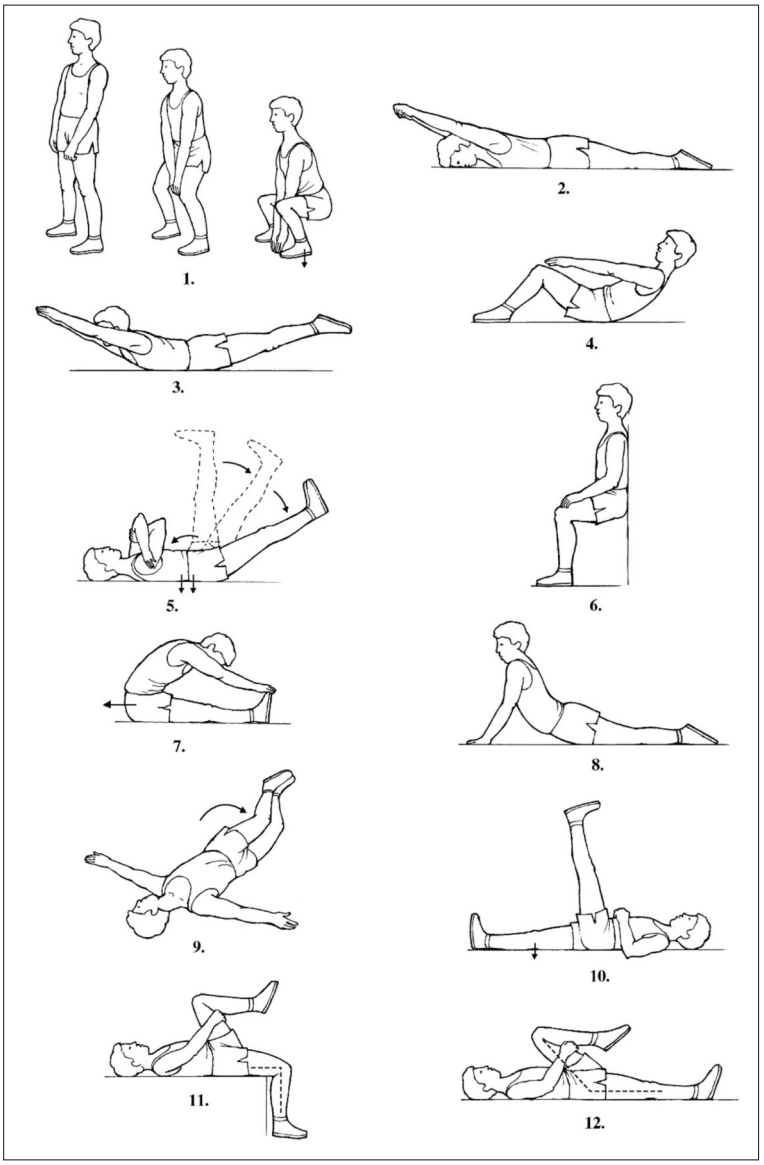

Figure 3. *The special posture correcting exercise program of HSS is based on 12 goal - or test-exercises, as these show the strength and flexibility of postural muscles. There are 3-5 developing exercises belonging to all goal - or test - exercises. Physical education teachers have to apply the exercise-blocks one after another, continuously in the whole school year – so it does not take too long time but the regular and repetitive performance will develop the muscle balance. Performance must be precise*

form all these 12 test-exercises perfectly, he or she has postural muscle balance: all postural muscles are appropriately flexible and strong.

The whole exercise program consists of 52 exercises, which are to develop all muscle groups responsible for posture. The exercises are placed in 11 blocks, in which after several developing exercises, the goal/test exercises are also located:

1. conscious sensation of the correct posture in standing position;
2. strengthening (and stretching) certain parts of neck and shoulder girdle (with the goal/test exercise No.2);
3. common strengthening of deep back muscles and hip extensors (with the goal/test exercise No.3);
4. strengthening certain parts of abdominal muscles (with the goal/test exercises No.4 and 5);
5. strengthening antigravity muscles of the lower limb (with the goal/test exercises No.1 and 6);
6. stretching deep back muscles (with the goal/test exercise No.7);
7. stretching abdominal muscles and hip flexors (with the goal/test exercise No. 8);
8. increasing the rotation of the lower thoracic and lumbar spine: stretching pectoral muscles, m. adductores, and m. tensor fasciae latae, strengthening and stretching the oblique abdominal muscle (with the goal/test exercise No.9);
9. stretching the hamstring muscles (with the goal/test exercise No.10);
10. increasing the mobility of hip joint and stretching the hip-flexores (with the goal/test exercises No.11 and 12);
11. practicing the awareness of the correct posture.

Teachers of physical education have to use the 1st block in every physical education (PE) class and then one of the following blocks, so after 11 PE classes the blocks will be repeated. With this repetitive and regular method the exercises will develop, automatize and maintain the muscle balance and this can be detected e.g. in improving muscle tests of muscle balance.

As a result of continued government support between 1995 and 2004, the physical education teachers could take part in trainings of the posture correction exercises throughout the whole country and were given the introductory exercise booklet and DVD 1, 2 and 3 – all free of charge[11, 12]. DVD1 is an educational film: after the 12 muscle test-exercises the whole exercises are presented, showing the correct and incorrect ways to perform and explaining the details. One is not supposed to do the exercise simultaneously with this training film, because there is not enough time to assume the initial stance and exercises are shown only once (not repeated as it would be appropriate). As physical education teachers required a film suited to performing the exercise along with the instruction, so we introduced DVD2. Finally, we presented DVD3 for preschool and kindergarten teachers who had attended our course and wanted to see the adapted exercise program for younger children.

After a 9 year long continuous government support by January 2004, a total of 7772 physical education teachers teaching in 3715 schools had become familiar with the special posture correcting exercises. A total of 51475 functional muscle tests were conducted by the physical education teachers on 32831 students and revealed that only 11% of the children had the muscle balance necessary for supporting correct posture. In the remainder of the children, some or more posture supporting muscles were weakened and/or shortened[6].

The exercise program was included in the National Core Curriculum since 2003 within the physical education curriculum framework and made part of the qualification requirements for physical education teachers, as well as part of the objectives and actions of the National Public Health Program in 2001 and 2003. The National Core Curriculum, newly drafted in 2012, emphasizes to a much greater extent the necessity for posture correction (in addition to several other health promotion criteria). Though professional review (subject monitoring and supervision of subject matter), terminated in 1985, it has been reintroduced since 2012, in our experience physical education supervision has not paid adequate attention yet to the effective application of special posture correcting exercises. That is why health sector must take further steps.

The other objective of this preventive program was to achieve compulsory DPE – as this is the only way to reach all children.

Short-term and medium-term efficacy studies of the special posture correction exercises

The effectiveness of applying the special posture correction program integrated into formal physical education was tested several times.

A prospective controlled study was performed in the 2001/2002 school year on 6-14 years old students in Békéscsaba[13]. There were 200 students in the intervention group, and 213 in the control group. The postural muscles of the students were examined with the 12 test exercises from the postu-

Table 1. *Test Results of the Intervention (i=200) and Control (c=213) Groups*

Exercise number	1	2	3	4	5	6	7	8	9	10	11	12	Total
Fall-Interv.Grp.	1.62	1.52	1.68	1.32	1.59	1.32	1.52	1.43	1.29	1.59	1.4	1.45	17.76
Spring-Interv.Grp	1.49	1.03	1.19	1.04	1.28	1.13	1.36	1.29	1.1	1.42	1.24	1.33	14.93
Fall-Control Grp.	1.53	1.31	1.46	1.32	1.43	1.16	1.45	1.33	1.23	1.71	1.38	1.43	16.79
Spring-Control Grp.	1.7	1.21	1.44	1.35	1.32	1.12	1.53	1.29	1.27	1.83	1.39	1.54	17.03

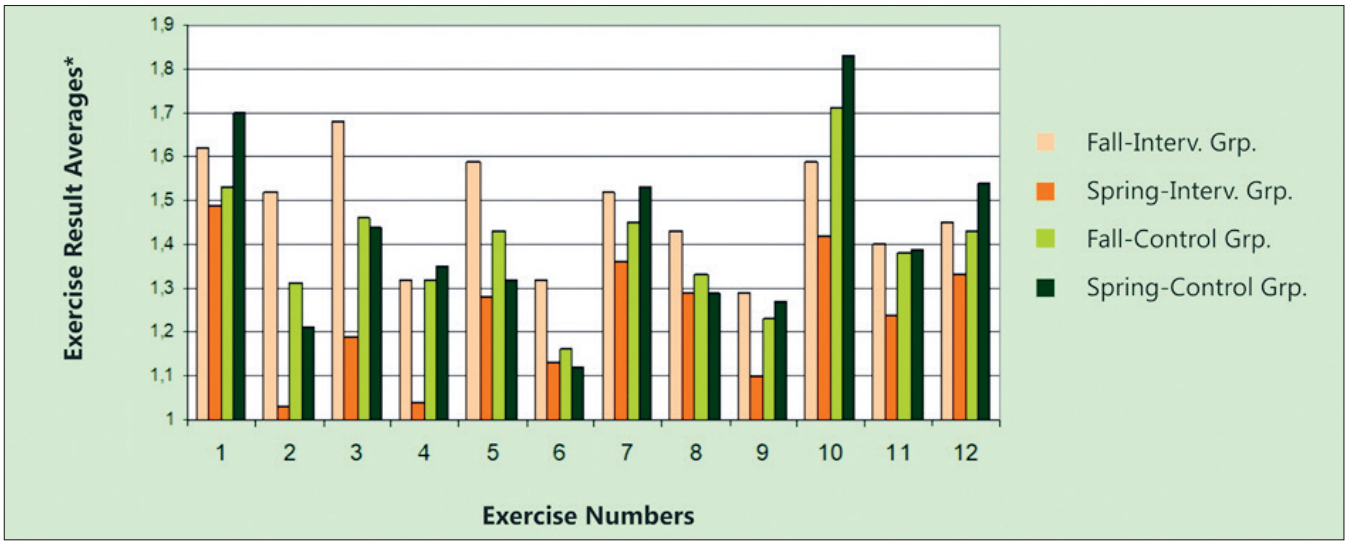

Figure 4. *Diagram of the Test Results of the Intervention (i=200) and Control (c=213) Groups*

*Correctly executed exercise = 1 point
Incorrectly executed exercise = 2 points

re correction program at the beginning and the end of the school year by an independent examiner (a well-practiced physiotherapist). The intervention group performed the posture-correcting exercises integrated into the regularly scheduled physical education classes under the direction of the teacher, while the control group had not performed these exercises. The controlled trial validated the efficacy of posture-correcting exercises integrated into physical education classes **(Table 1–3)**. **Table 1** and **Figure 4.** show the average results of the test exercises of both the Intervention and the Control Group. The one- and two-sample t-test results are summarized in **Table 2.** The one-sample t-tests of the Intervention Group show significant improvement ($p<0.01$) in each and every muscle test exercises while those in the Control Group showed significant deterioration ($p<0.01$) in 4 muscle test exercises by the end of the school years with 6 remaining unchanged and 2 (Nos. 2 and 5) showing significant improvement ($p<0.01$). The average total point of the 12 muscle test exercises showed significant improvement ($p<0.01$) in the Intervention Group and significant deterioration ($p<0.05$) in the Control Group. The two-sample t-tests showed a significant difference ($p< 0.01$) in the end of the year results between the Intervention Group and the Control Group (this applied also to all individual muscle tests and for their average total point). To understand the significant improvement shown by one-sample t-test of the No. 2 and 5 tests in the Control Group one has to look at the two-sample t-tests. These show that the improvement of the No. 2 and 5 tests in the Intervention Group was very significantly greater than that of the Control Group.

Chi-square distribution **(Table 3)** supports t-test results by showing that deterioration was seldom noted in those who regularly did the posture corrective exercises and significant improvement was much more likely, while among those who did not do the exercises, deterioration was much more likely, while improvement was seldom ($p< 0.01$).

A prospective study was performed to evaluate the effectiveness of applying special posture correcting exercises in Pásztó and in Szentgotthárd over

Table 2. *Controlled testing of the Hungarian Spine Society's Exercise Material: Summary table of t-test values*

Test Exercise Numbers	Intervention Group Results i=200 (one-sample t-tests)	Control Group Results c=213 (one-sample t-tests)	Changes in the Intervention Groups as compared to the Control Group (two-sample t-tests)
2, 5	Improved $p<0.01$	Improved $p<0.01$	Improved **$p<0.01$
1, 7, 10, 12	Improved $p<0.01$	Deteriorated $p<0.01$	Improved $p<0.01$
3, 4, 6, 8, 9, 11	Improved $p<0.01$	Unchanged	Improved $p<0.01$
Changes in average total point values *	Improved 17.76 → 14.93 $p<0.01$	Deteriorated 16.79 → 17.03 $p<0.05$	Improved 14.93 →← 17.03 $p<0.01$

*Best total point value = 12. Worst total point value = 24
**The degree of improvement noted in the Intervention Group is very significantly greater than that of the Control Group.

Table 3. *Controlled Testing of the Hungarian Spine Society's Exercise Material: Analysis of Chi-square distribution*

	Muscle Test showed improvement	Muscle Test showed no improvement	Total
No. of students who took part in the exercises	186	14	i = 200
No. of students who did not take part in the exercises	80	133	c = 213
Total	266	147	n = 413

$p < 0.01$
i = Number of students in Intervention Group
c = Number of students in Control Group
n = Total number of students tested

the 2009/2010 school year, involving 530 student, 7-12 years old, who performed the posture correction exercise program for 6 months integrated in physical education class, conducted by the teachers. Meanwhile, the condition of their postural muscles – evaluated with the 12 muscle tests – significantly improved ($p<0.01$ and $p<0.01$).

The Spinal Mouse is a small skin-surface device, exactly the size of a computer mouse (hence the name), connected to a computer. It is guided by hand along the spinal column along the spinosus processes, and the spinal curvature is analysed and presented graphically by the computer. According to this non-invasive spinal mouse computer-analysed examination, the rate of bad posture among participating student decreased from 64% (initial value) to 38.3% among students from Pásztó and from Szentgotthárd (Chi-square=16.6; degrees of freedom=3; $p=0.0009$). There was an inverse correlation between the students' muscle balance and body mass – that is, there was lower ratio for good postural balance among overweight students ($p<0.01$). Considering that obesity occurs more and more frequently among children and youth in our country, this is highly relevant. Trials in Pásztó and Szentgotthárd were part of the prevention arm of the Genodisc Research of the National Center for Spinal Disorders[6].

Tóthné Steinhausz et al. applied HSS's special posture-correcting exercises in kindergartens, they evaluated children with the 12 muscle test and a pressure sensor (pedograph) to measure and analyse pressure distribution on the feet. The condition of their postural muscles ($p=0.0001$) and the distribution's projection of the center of gravity ($p=0.002$) significantly improved[14].

Several physiotherapist students have written studies on the short-term efficacy of the HSS's program of special posture-correction exercises, though usually studying a small sample size. As every thesis supported the effectiveness, we have to aggregate results and analyze these in the future.

Evaluation of HHS's preventive program considering recently published international literature

Genodisc Research had presented not simply another scientific evidence of the high prevalence of incorrect posture and the effectiveness of special correcting exercises integrated in daily physical

education classes, but its objective evaluations of the spine before and after the exercise program – added to the semiobjective physical examination – was a novelty compared to our previous research[6].

The goal of the preventive program by HSS is supported also by recently published articles in leading journals. These authors highlighted again the tight biomechanical connection between the pelvis and the spinal column (sagittal balance) and emphasized the importance of biomechanically correct posture which would not overload the spinal structures[15–21]. The Prevention Program by the HSS is based on this evidence and helps to develop the correct posture.

The "European Guidelines for Prevention in Low Back Pain"[22] published in 2004 summarized recent reviews about the prevention of degenerative spinal disorders. Both the controlled trial in Békéscsaba and the prevention arm of the Genodisc study met the recommended main research focus: they were prospective, controlled trials with large sample sizes, intended to reduce the risks of low back pain in adulthood. It was only the requirement for long-term studies that our researches did not comply with, since the trials were not designed for long-term intervention follow-up. We have fulfilled the Guideline's requirement to appropriately influence decision makers as it is shown above.

In accordance with the Guideline's recommendations, the HSS's prevention program has influenced bio-psychosocial factors of low back pain in adults, because physical education teachers have several opportunities to influence not only the physical, but also the mental health of their pupils, thus their bio-psychosocial wellbeing.

The Guideline emphasizes the importance of researches lasting for several decades to support scientific evidence of the long-term effectiveness of preventive interventions in the reduction of bio-psychosocial risk factors. This would be a large-scale project, requiring financial resources and organization, so its realization is unlikely. Nonetheless, this is no excuse to ignore the application of already existing scientific evidences – as also the Guideline highlights.

We presented in 2013 a literature review on the primary prevention of symptoms of discopathy in the European Spine Journal[23]. The literature review shows that the HSS's preventive program is unique. Other preventive programs evaluated the short-term effect of interventions focused upon giving theoretical knowledge or upon a limited exercise routine to be performed during classes. In accordance with this experience, an analysis of physical education in the European countries provides an overview, in which it refers specifically to Hungary, where special posture correcting exercises are integrated in daily physical education classes[24].

Enhancing performance of posture correcting exercises in public education (2003-2021)

The subject of developing biomechanically correct posture has been part of National Core Curriculum and the physical education curriculum since 2003, and upon being reintroduced in 2012 then in 2019 it became more detailed. The training requirements for physical education teachers have included spine-specific joint protection since 2002. Since the start of the 2000s, the Institutes of Physical Education has taught the special posture correcting exercises based on cooperation with the HSS, but this subject was only optional – despite the training requirements. In December 2021 in the new regulation of training requirements efficient posture correction is written very directly.

The professional review terminated in 1985 and reintroduced in 2012, but is still not enough effective: it does not emphasize to a proper extent the necessity for posture correction (in addition to several other health promotion criteria). Apparently, the topic of the posture correction program has no place within the state-funded further training for teachers of physical education because of many other mandatory trainings in public education. Therefore the National Center for Spinal Disorders together with HSS shared the instruction book on the posture correcting exercises and three videos on its websites in 2014[11, 12], so these are now accessible for physical education teachers without taking part in special training course, and the website encourages physical education teachers themselves to practice precisely on their own bodies the posture correcting exercises before teaching them.

In 2014 – according to the wish of leading physical education teachers and with their contribution –, HSS created a table-form of the exercises to be applied in each physical education class. In every page the physical education teacher can see that special exercise which he has to apply in that special physical education class. So he can use this table-form easier than the booklet-form. As there are also graphs in it, one may understand the rough content of a page without knowing Hungarian. In 2021 this table was published also on the English version of the homepage of HSS[12].

The Hungarian School Sport Federation (HSSF)

contributed to curricula developments in the field of physical education, where a new focus was given in physical education on the criteria of health promotion, e.g. instead of the previously used fitness tests that often generated shear force in the lumbar spine, they developed a new fitness test battery (NETFIT[25]) which does not operate on shear force or do not harm the joints and the spine. Some of the HSS's muscle tests are also included in a measurable form. (About NETFIT see more in the supplementive part).

Conclusion

Posture-correction exercises that develop, automatize, and maintain biomechanically correct posture were started by the HSS to integrate into daily physical education in 1995, and there were remarkable results. Yet, there are further activities to be performed.

First, it has to reach that special posture correcting exercises be a mandatory topic in the gradual training for all physical education teachers - but in the reality and not only in documentations.

Second, posture-correction programs has to be part of the official post-gradual training for physical education teachers.

Third, it has to be reached that posture correction program's comprehensive inclusion be part of the training for subject monitoring and supervision specialists in relation to physical education.

Fourth, according to Government Decree No. 1722/2018 (XII.18), the National Musculoskeletal Program (author: Gyula Poór M.D., D.Sc.) including the National Preventive Center of Musculoskeletal Disorders and its national network has to be implemented. This means that, as part of the enhancing primary care, physiotherapists would work in outpatient settings and they would help and oversee the work for prevention in schools, too: they would teach posture correcting to physical education teachers, as well as assist them with the student examinations and follow-up work.

Fifth, school health services could help to better perform posture-correction exercises in DPE. Posture correction could be monitored by the school health servise using the Matthiass test[26], which is a semi-objective clinical test to detect postural muscle weakness. Based on the József Fodor School Health Society's three year pilot project examining the feasibility of the Matthiass test in practice[27], the Matthiass test is now planned to be integrated into the regular school health screenings as a recommended method.

Supplementum

DAILY PHYSICAL EDUCATION (DPE) AS PART OF HOLISTIC HEALTH PROMOTION (HHS) IN HUNGARIAN SCHOOLS

Because physical inactivity is one of the leading risk factors for noncommunicable diseases, the Global Strategy on Diet, Physical Activity and Health[28] states in 49.§: „Schools are encouraged to provide students with daily physical education." After several newer documents[29–34] the Physical Activity Strategy for the WHO European Region 2016-2025[35] highlights the need of at least 60 minutes physical activity daily for children and young people and recommends that schools should provide "an appropriate number of regular physical education lessons, in line with the available scientific evidence". Nationwide implementation of quality physical education classes and legislation are also recommended. Several facilitating factors were given from the international professional sites for holistic health promotion in schools, too: the lessons learnt from the European Network for Health Promoting Schools, now Schools for Health in Europe[36–38] and the supporting works of WHO European Region[39].

In Hungary - accordingly to the initiation of the HSS and with wide consensus of several medical societies - *DPE* was made an important goal of the National Public Health Program in 2001. As the education sector was not convinced if schools were able to organize DPE, an intersectorial application for schools was organized in 2001 (Ministry of Health, Ministry of Education, Ministry of Sports). More than 700 schools applicated and this convinced the Ministry of Education that schools may organize DPE if they are given the missing financies. Thereafter DPE was included in the national education plan (2006), but DPE became part of the Government's Program only in 2010. The new *National Education Act Nr. 190 of 2011 prescribed DPE for all schools*, and after a 4 year long gradual implementation now all students take part in DPE since September 2015.

To achieve the expected health gains of DPE it must fulfill some special health-promoting criteria which were laid down together with several medical societies in 2012[6, 40–43] and these criteria of DPE became part of the basic ruling documents of public education in 2012. There were several big projects to enhance methodology of the PE teachers and the government is building gyms and swimming pools throughout the whole country to enhance quality of DPE, nevertheless physical education teacher's creativity is also needed for DPE classes

outside the gymnasium – as not the gym, but the physical activity is needed for all child every day.

The plan of HHP in schools was born in 2003, corresponding to the Parliamentary decision No. 46/2003. (IV.16.), and to the Public Health Interministerial Board's decisions the Ministry of Health in consensus with other competent departments (Ministry of Education, Ministry of Children, Youth and Sport, Ministry of Finance) created the plan of holistic health promotion (HHP) in schools, which – mainly because of lacking political commitment from the side of education – was not implemented until 2010.

In 2010 the Program of Government, in 2011 the Act Nr. 190 on National Education, and *in 2012 the Decree No. 20/2012 of the Minister for Education prescribed the institutionalized implementation of HHP* in all educational institutions. Since 2013 more projects from the health, the education and the sports sector gave significant professional assistance and motivation to schools to further their daily work in health promotion. An efficient intersectoral cooperation started and is still working on the basis of the Ministry of Human Capacities.

ESSENCE OF HHP

Holistic health promotion means a holistic, whole school approach where health promotion has to be part of the every day life of the school. There are four main health promoting tasks for schools to do in their daily work - with participation of the whole school, of parents and the public environment[43–45]:

I.) Healthy eating – potentially based on local food products;

II.) Daily physical education fulfilling health promotion criteria, and other forms of physical activity;

III.) Appropriate pedagogic methods (including also the use of arts) to enhance mental health;

IV.) Improving health literacy and health competencies of the children – topics see listed on the official website[44].

Effective implementation of HHP having so many beneficial consequences is considered a „whole society" target by the public health and the education administration as well. Therefore, in a joint effort the Secretariat of State for Education and the Secretariat of State for Health (Ministry of Human Capacities) issued in March 2016 the „Recommendation for every-day HHP activities of the pedagogues", listing all those websites where help would be available for them. The HHP Recommendation was mailed to all school leaders and was put on official websites. The Recommendation and legal tools to facilitate implementation of HHP in schools are available on the official website[44]. In February 2020 an online questionnaire was created and sent to all schools to ask them on how they can use the HHP Recommendation in their daily work. The results show that teachers and schools use many practical parts but they need further help from the health sector.

MONITORING OF DPE

Of the 4 basic health promoting tasks of HHP we have the best organized monitoring for the 2nd task: for DPE. HSSF in cooperation with the Cooper Institute (USA) created a new national measurement tool (NETFIT) for physical education teachers to monitor physical fitness of schoolchildren from 10 to 18 years old[40]. Online input of data and online analysis of results was made available for the public[25]. The devices for NETFIT were given to all Hungarian schools (more than 3800 schools). Since 2015 NETFIT is a yearly compulsory measurement for physical education teachers, for all 10-18 years old school-children, according to the Decree No. 20/2012 of the Ministry for Human Capacities. NETFIT has four profiles: body composition, aerob fitness, musculosceletal fitness and flexibility.

In May 2015 NETFIT was measured at the first time (623.026 schoolchildren took part with 13.543 teachers); in May 2016 it was measured on 651 431 school-children by 14.685 teachers and similarly it went on in the coming years. Main statements of the analysis after the first and second measurement are[25, 45]: 25,8% of children were overweight and obese, and this was worse than in 2015; worst results were seen in progressive aerobic capacity endurance test (PACER-test, only 61 % of the children were in health zone) and in trunk lift test (only 51 % of the children were in health zone); developement of PACER-test was detected first in 2016: girls developed in PACER-test by 10%, especially those who already have taken part in DPE.

According to the last measurements from May 2019 (in 2020 measurements were ceased because of COVID) it is seen that the PACER tests show further improvement even though physical education teachers have to work better: the results of PACER test are worsening with the age, obesity is slightly growing and trunk lift test is in every year the worst test among all tests of NETFIT[25].

NEEDED PROFESSIONAL HELP FROM THE PUBLIC HEALTH ACTORS FOR SCHOOLS IN THE FOUR TASKS OF HHP

As teachers are quite overloaded and their health literacy might be uncertain (as this is the case in the

Hungarian population), they cannot be left with their health promoting tasks alone. Many actors of the health system and of public health could and should give professional help to the schools in the following topics[45]:

I.) Healthy eating – potentially based on local food products. Dieticians should go to schools and help them to reach children, parents and teachers working together so that children would like healthy diet.

II.) Daily physical education fulfilling health promotion criteria and other forms of physical activity. Physiotherapists should go to schools and help to the teachers of physical education so that they would learn and use posture correcting exercises more effectively.

III.) Appropriate pedagogic methods (including also the use of arts) to enhance mental health - in this task health sector may help to find a good motivating tool for teachers so that they would change their old fashioned pedagogic methods to better ones and so they would enhance the mental health and well-being of their students and for themselves, also. Teachers should give more time for the use of arts in developing mental health, too.

IV.) Improving health literacy and health competencies of the children. In Hungary it is planned to develop an appropriate method for measuring health literacy of Hungarian school-children and adolescents for yearly countrywide use; this would be a big set (up to ca. 1000) of interesting online questions in all the important health themes, they would be entertaining and teaching in the same time.

The new quality management in education and the ongoing whole renewal of the national education are important helping structures and factors for HHP, e.g. all projects of the education sector are spreading the use of appropriate pedagogic methods to enhance mental health and wellbeing.

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