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THE EFFECT OF 8 WEEKS OF BASIC GYMNASTICS TRAINING ON THE PHYSICAL FITNESS OF CHILDREN AGED 6-8 YEARS

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Abstract:
The aim of this study is to examine the effects of 8-week basic gymnastics training on the physical fitness of children aged 6-8 in terms of various biomotor characteristics. A total of 20 children (10 girls, 10 boys) voluntarily participated in the study. The children were randomly assigned to either the experimental (n=10) or control (n=10) groups. The experimental group received basic gymnastics training three days a week, while no training was provided to the control group. Before and after the study, the children's balance, flexibility, strength, endurance, and speed were assessed using the Eurofit test battery. The tests applied included the flamingo balance test, sit-and-reach flexibility test, handgrip strength test, 30-second sit-up test, vertical jump test, standing long jump test, medicine ball throw, and 20-meter sprint. The findings of the study revealed that children in the experimental group showed significant improvements in all biomotor tests ($p<0.05$). In the control group, significant improvements were observed only in the flamingo balance test, sit-and-reach flexibility test, and 30-second sit-up test ($p<0.05$). Comparisons between the groups indicated significant differences in favor of the experimental group in all parameters except the standing long jump. In conclusion, it was found that basic gymnastics training positively affects the physical fitness of children aged 6-8 and leads to significant improvements in their biomotor skills.

Keywords: basic gymnastics, biomotor skills, children, Eurofit test battery, physical fitness

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1. Introduction

Physical fitness is a comprehensive concept that typically includes various attributes such as endurance, muscular endurance, muscular strength, cardiovascular endurance, flexibility, speed, balance, agility, body composition, and reaction time. These attributes are of great importance both in terms of sports performance and overall health. It is widely accepted that physical fitness plays a critical role in maintaining an individual's overall performance level and health (Graham, 2001). Health-related fitness encompasses muscular strength and endurance, cardiovascular fitness, flexibility, and body composition, while performance-oriented physical fitness includes elements such as coordination, agility, speed, and explosive power. These two types of fitness complement each other in supporting overall health and enhancing sports performance. While health-related fitness aims to improve overall quality of life, performance-focused fitness specifically seeks to achieve high performance in sporting activities. Therefore, addressing both general fitness and performance-oriented fitness in a balanced manner enables the successful implementation of a comprehensive health and sports program for a healthy individual (Graham, 2001 - Okudur and Sanioğlu, 2012). The healthy growth and development of future generations is a situation desired by all societies. Healthy development is closely related not only to genetic factors but also to the adequacy of environmental and living conditions (Yıldırım, 2011).

Gymnastics is a discipline that forms the foundation of sports. Through its fundamental movement patterns (walking, running, jumping, turning, etc.), it engages all joints and muscles in the body, contributing to the development of various motor skills. This discipline not only enhances locomotor and balance skills but also aims to cultivate spatial awareness (Kanat and Dalaman, 2000). In this regard, gymnastics provides significant contributions in preparing children both for other sports and for life itself (Serin, 2019).

Gymnastics training is considered to play an important role in physical development, especially for preschool children. It is widely accepted that engaging in physical activities and implementing age-appropriate programs for younger age groups positively impacts children's natural development. Gymnastics can be defined as a sport discipline that requires constant effort, perseverance, skill, and discipline, encompassing not only physical strength but also mental resilience. Through basic gymnastics training, young children can develop balance, body awareness, coordination, and flexibility, laying a solid foundation for pursuing an authentic sport discipline in the future. Additionally, it is emphasized that basic gymnastics training plays a significant role in children's motor development. The starting age for gymnastics is generally considered to be around 3-4 years old, and it is noted that providing structured and disciplined basic gymnastics training can positively influence a child's physical development. To acquire the motor movements required by the human body, motor skills such as strength, endurance, speed, and skill must be activated (Zeybek, 2007). While fundamental motor

skills like strength, endurance, speed, mobility, and coordination can be innate from birth, they can also develop as a person ages (Çakıroğlu, 1997).

Skills such as running, jumping, and hopping are fundamental movement elements in children's daily lives. The development of fundamental movement skills largely depends on experience and requires multiple, structured or unstructured opportunities for the advancement of these skills. However, the lack or restriction of movement and experimentation opportunities can negatively affect motor skill performance at an early age (Gallahue and Ozmun, 2002).

According to the literature**,** physical activity exercises included in gymnastics training have positive effects on the development of motor skills in children. These exercises contribute to the development of muscles and bones, increase muscle flexibility, joint angles, and muscle strength, while also aiding the physical structure of the body. Additionally, activities such as running, jumping, leaping, and hopping performed during gymnastics training benefit the development of athletes' coordination and balance skills (Şişli, 2018).

This study was conducted to investigate the benefits of an 8-week basic gymnastics training program on the physical fitness of children aged 6-8.

2. Materials and Methods

2.1. Research Model

This study was conducted using an experimental design, one of the quantitative research methods. Twenty children (10 girls, 10 boys) aged 6-8 years were voluntarily included in the study with parental consent. A randomized controlled method was used to form the control group (n=10, 5 girls, 5 boys) and the experimental group (n=10, 5 girls, 5 boys). The experimental group underwent an 8-week basic gymnastics training program, 3 days a week (Monday, Wednesday, Friday), while no training program was applied to the control group. To assess the children's biomotor abilities, tests such as the stork balance test, sit-and-reach flexibility test, handgrip strength test, vertical jump test, standing long jump test, medicine ball throw, 30-second sit-up, and 20-meter sprint were administered. Additionally, body weight and height measurements were taken to determine anthropometric characteristics. A biomotor test battery was applied as a pre-test one day before the study and as a post-test at the end of the 8-week period. The necessary approvals for the study were obtained from the Ethics Committee of Gaziantep University, Faculty of Health and Sports Sciences.

The experimental group participated in a training program designed for children who are learning basic skills, structured to occur 3 days a week over a period of 8 weeks. Each training session lasted a total of 60 minutes, with a 10-minute warm-up and a final 10 minutes dedicated to flexibility exercises. The remaining 40 minutes focused on basic gymnastics movements. These activities included skills such as balance exercises, body positions, jumps, hops, rolls, circles, bridges, and handstands. In accordance with the

principle of progressive overload, the number of repetitions and durations were gradually increased each week.

2.2. Data Collection Tools

2.2.1 Stork Balance Test

In the stork balance test, participants are barefoot and positioned on a wooden floor while keeping their hands on their hips. The non-testing leg is placed against the inner side of the knee joint of the other leg. Participants are instructed to focus on a point located 5 meters away. They rise onto the toes of their supporting foot, and the timer starts with the command "rise." The participant is asked to maintain this position for 1 minute. If the foot position fixed at the medial side of the knee is disrupted, if the hands are removed from the hips, or if the heel of the supporting foot touches the ground, the timer is stopped, and the elapsed seconds are recorded. The test is repeated three times, and the best result is recorded. Scores are classified as follows: 50 seconds and above is rated 5 (excellent), 40-50 seconds is rated 4 (good), 25-39 seconds is rated 3 (average), 10-24 seconds is rated 2 (poor), and below 10 seconds is rated 1 (very poor) (Johnson and Nelson, 1979).

2.2.2 Sit-and-reach Test

This flexibility test aims to measure how far the participant can reach while seated. During the test, a measuring box that is 35 cm long, 45 cm wide, and 32 cm high is used. On top of the box, there is a plate measuring 55 cm long and 45 cm wide, marked with one-centimeter lines extending 15 cm beyond the foot support. The participant sits with their feet against the box and stretches their body forward without bending their knees, extending their arms ahead. When they reach the furthest point they can stretch, they try to remain in that position. The test is repeated twice, and the best measurement result is recorded. The researcher sits next to the participant to ensure that the knees remain straight (extended). As a result, the furthest point reached by the participant's fingertips is recorded. If the participant cannot bring the fingertips of both hands to the same point, the distances reached by each hand are measured, and the average of these two values is taken to determine the test result. Two trials were conducted for this test, and the best result was recorded in centimeters. For example, if the participant reaches their toes, they score 15 cm, and if they reach 7 cm beyond their toes, they score 22 points (Kamar, 2008).

2.2.3 Handgrip Strength Test

This test aims to measure isometric (static) strength using a hand dynamometer with an adjustable grip, performed with one hand. During the test, the pinching force applied by the hand is recorded using a hand dynamometer capable of measuring with a precision of 0.1 kg. The participant takes the dynamometer with their preferred hand and squeezes it with the highest possible force while holding the device at a specific distance from their body. Throughout the test, the participant must squeeze the dynamometer for at least 2 seconds to ensure that the device does not make contact with the body. The researcher

administering the test should reset the dynamometer before each measurement, and after determining which hand the participant will use (right or left), adjust the measurement line appropriately between the participant's thumb and middle finger. During the measurement, care should be taken to ensure that the dynamometer does not touch the body and remains positioned straight along the participant's side. The participant performs two trials in this test, and the best result is recorded in kilograms. The participant is allowed a rest period between trials. For example, a participant who applies a squeezing force of 24 kg receives a score of 24 points (Kamar, 2008).

2.2.4 30-Second Sit-up Test

This test is conducted to assess core strength and measures the maximum number of sit-ups that can be performed within 30 seconds. The test requires two mats, a stopwatch, and an assistant. Before starting the test, the participant lies on their back, interlocks their hands behind their neck, and pulls their knees toward their chest at a 90-degree angle. The soles of the feet must be completely on the mat. The participant must ensure that their elbows come forward and touch their knees as they rise. Additionally, both shoulders must make contact with the mat to complete the movement.

The test begins with the command "Ready… Go," and the participant continues performing sit-ups for 30 seconds until they hear the command "Stop." The test is conducted once, and the researcher confirms that the participant is in the correct position. To ensure that the participant's feet maintain contact with the mat, their ankles are held by an assistant. The stopwatch is started with the command "Ready… Go" and stopped when the 30 seconds are up. During this time, each correct sit-up is counted aloud; movements that are not counted are considered invalid. A sit-up is deemed appropriate when the torso reaches a seated position, the elbows touch the knees, and both shoulders are fully in contact with the mat. The researcher verbally corrects any errors made by the participant. The number of correct sit-ups performed during the 30 seconds is recorded. For example, 15 valid sit-ups are counted as 15 points (Kamar, 2008).

2.2.5 Vertical Jump Test

The vertical jump height of the participants was measured against a wall. The children were asked to take the starting position on the mat with bare feet, placing their hands on their hips, while keeping their torso and knees in a 90-degree flexion position. This position was to be maintained for 4 seconds before jumping to the maximum height. It was emphasized that the children should not move forward, backward, or sideways during the jump, should keep their hands on their hips, and should not bend their knees in the air. The measurement was repeated twice at 30-second intervals, and the highest jump height was recorded (Kamar, 2008).

2.2.6 Standing Long Jump

To determine the explosive leg strength of the participants, a standing long jump test was conducted on a non-slip surface. A starting line was established before the test, and participants were instructed to stay behind this line and not to step on it. Then, the participants were asked to bend their knees and jump as far as possible, landing on both feet without falling backward. After the jump was completed, the distance from the nearest heel to the starting line was measured and recorded in centimeters. The standing long jump test was administered twice, allowing sufficient rest time between attempts, and the highest result was recorded for analysis (Kamar, 2008).

2.2.7 Medicine Ball Throw

The participant positions themselves with their back straight and their head at a 90-degree angle, with their legs parallel to the ground. The participant is instructed to throw the medicine ball as far as possible in a horizontal manner using both hands over their head. The distance between the point of release and the first point of contact with the ground is measured in meters. A 1 kg medicine ball was used for the test. Participants perform the test twice, and the longest distance is recorded as the result (Kamar, 2008).

2.2.8 20-Meter Sprint Test

The 20-meter sprint test was conducted to assess the starting speed. Prior to the test, a warm-up session lasting 20 minutes was conducted. On the running track, participants took turns running the 20-meter distance. They were instructed to run the specified distance at maximum speed and were asked to wait at the starting point of the track. When the start signal was given, participants ran the 20-meter track at maximum speed twice, with sufficient rest periods provided between trials. The best running time was evaluated in seconds (Kamar, 2008).

2.3 Analysis of Data

Statistical analyses were conducted using the SPSS 20.0 program. The values were presented as mean and standard deviation, and analyzed at a significance level of 0.05. The Shapiro-Wilk test was performed to assess normality. A dependent samples t-test was used to evaluate differences within groups, while an independent samples t-test was used to analyze differences between groups.

3. Results

The statistical analysis results of the obtained data are presented in this section. The data are provided as mean and standard deviation.

Table 4.1: Comparison of pre- and post-test data of the experimental group

		Ort.	**SS**	**t**	**p**
Stork balance test (sn)	Pre test	2.76	1.34	**-3.060**	**.014**
	Post test	4.84	3.15		
Sit-and-reach test (cm)	Pre test	22.40	2.32	**-7.619**	**.001**
	Post test	31.70	3.23		
Handgrip strength test (kg)	Pre test	9.25	1.20	**-6.128**	**.001**
	Post test	9.80	1.08		
30-second sit-up test (adet)	Pre test	7.20	3.85	**-6.029**	**.001**
	Post test	11.80	4.59		
Vertical jump test (cm)	Pre test	169.80	8.07	**-4.984**	**.001**
	Post test	173.90	8.57		
Standing long jump (cm)	Pre test	74.60	33.64	**-2.360**	**.043**
	Post test	98.40	24.62		
Medicine ball throw (cm)	Pre test	107.10	50.70	**-3.088**	**.013**
	Post test	158.50	26.79		
20-meter sprint test (sn)	Pre test	5.38	.55	**2.615**	**.028**
	Post test	5.19	.52		

Table 4.1 shows the comparison of the pre-test and post-test data of the experimental group. According to the results of the dependent groups t-test, significant differences were observed between the pre-test and post-test scores in all parameters of the experimental group ($p<0.05$).

Table 4.2: Comparison of pre- and post-test data of the control group

		Ort.	**SS**	**t**	**p**
Stork balance test (sn)	Pre test	1.21	.61	**-2.492**	**.034**
	Post test	1.36	.59		
Sit-and-reach test (cm)	Pre test	16.10	3.63	**-3.250**	**.010**
	Post test	17.00	3.65		
Handgrip strength test(kg)	Pre test	7.16	1.38	.287	.780
	Post test	7.14	1.31		
30-second sit-up test (piece)	Pre test	7.40	4.43	**-3.250**	**.010**
	Post test	8.30	4.40		
Vertical jump test (cm)	Pre test	157.10	7.45	1.413	.191
	Post test	156.40	6.53		
Standing long jump (cm)	Pre test	61.40	24.25	-.977	.354
	Post test	71.30	15.30		
Medicine ball throw (cm)	Pre test	127.90	20.01	1.220	.254
	Post test	121.00	22.85		
20-meter sprint test (sn)	Pre test	6.29	1.05	-1.789	.107
	Post test	6.61	.99		

Table 4.2 presents the comparison of the pre-test and post-test data of the control group. According to the results of the dependent groups t-test conducted, significant differences were observed in the control group for the flamingo test, sit-and-reach test, and the 30-

second sit-up test ($p < 0.05$). No significant differences were found between the pre-test and post-test results for the other parameters of the control group ($p > 0.05$).

Table 4.3: Comparison of pre- and post-test differences in data between groups

		Ort.	**SS**	**t**	**p**
Stork balance test (sec)	Experimental group	2.07	2.14	**2.821**	**.020**
	Control group	.15	.20		
Sit-and-reach test (cm)	Experimental group	9.30	3.86	**6.711**	**.001**
	Control group	.90	.88		
Handgrip strength test (kg)	Experimental group	.55	.28	**5.019**	**.001**
	Control group	-.02	.22		
30-second sit-up test (piece)	Experimental group	4.60	2.41	**4.558**	**.001**
	Control group	.90	.88		
Vertical jump test (cm)	Experimental group	4.10	2.60	**4.998**	**.001**
	Control group	-.70	1.57		
Standing long jump (cm)	Experimental group	23.80	31.89	.972	.344
	Control group	9.90	32.05		
Medicine ball throw (cm)	Experimental group	51.40	52.63	**3.316**	**.007**
	Control group	-6.90	17.89		
0-meter sprint test (sec)	Experimental group	-.19	.22	**-2.618**	**.023**
	Control group	.32	.57		

Table 4.3 presents the comparison of the pre-test and post-test differences between the groups. According to the results of the independent groups t-test conducted to analyze the differences between the groups, significant differences were observed in favor of the experimental group for all parameters except for the standing long jump ($p < 0.05$).

4. Discussion and Conclusion

Significant differences were found between the pre-test and post-test results for all parameters in the experimental group. In the control group, significant differences were observed for the stork test, sit-and-reach test, and the 30-second sit-up test, while no significant differences were found between the pre-test and post-test results for the other parameters. According to the results of the independent groups tests conducted to evaluate the differences between the groups, significant differences were observed in favor of the experimental group for all parameters except for the standing long jump.

In the study titled 'Investigation of the Effects of Basic Gymnastics Training on Some Motor Skills and Motor Characteristics in Children Aged 7-9' conducted by Karakaya, B. A. (2023), the effects of basic gymnastics training given to children aged 7-9 on motor characteristics such as flexibility, balance, and agility were investigated, as well as its impact on motor skills, including locomotor skills (running, galloping, hopping on one foot, jumping with two feet, and lateral stepping) and object control skills (striking a stationary ball with a stick, throwing and bouncing a ball, catching a ball thrown in the air, striking a stationary ball, and overhand and underhand throwing of a tennis ball).

The study also aimed to determine the extent of the training's effectiveness if it were implemented. According to the results of the study, no statistically significant difference was observed between the pre-test and post-test results for locomotor skills, but significant differences were observed in all other parameters (Karakaya, 2023).

In the study titled 'Effects of a 12-Week Basic Gymnastics Training on Anthropometric Characteristics and Biomotor Abilities in Girls' conducted by Temürçi, İ. (2022), the anthropometric characteristics and biomotor abilities of girls in both groups were assessed using the Eurofit test battery (20m Shuttle Run Test, Touching Discs Test, Flamingo Balance Test, Standing Long Jump Test, Sit-and-Reach Flexibility Test, Hand Grip Strength Test, Bent Arm Hang Test, Sit-Up Test, 10 x 5m Shuttle Run Test) and anthropometric measurements (Height, Body Mass Index, Skinfold Thickness, Body Weight) were applied as pre-tests and post-tests to investigate developmental differences (Temürci, 2022).

According to the results, the children in the training group showed significant and positive improvements in the flamingo balance test, touching discs test, sit-and-reach flexibility test, standing long jump test, hand grip strength test, trunk sit-up test, bent arm hang test, 10 x 5 m shuttle run test, and 20 m shuttle run test. However, no significant change was observed in the body fat percentage. In the control group, significant but negative differences were found in the flamingo balance test, touching discs test, bent arm hang test, 10 x 5 m shuttle run test, and 20 m shuttle run test. Significant changes were identified in the control group's body fat percentage test. No significant change was observed in the sit-and-reach flexibility test, standing long jump test, hand grip strength test, and trunk sit-up test results in the control group. The findings of the study indicate that the 12-week basic gymnastics training provided to girls aged 6-8 had positive effects on anthropometric characteristics and biomotor skills (Temürci, 2022).

In the study titled "Effects of an 8-Week Rhythmic Gymnastics-Based Training on Some Strength and Balance Parameters in Children Aged 4-6" conducted by Balıkçı, Ş. (2022), a total of 28 students, consisting of a 14-member experimental group and a 14-member control group, were randomly selected from a larger pool of participants within the age range of 4-6 years. The participants underwent an 8-week rhythmic gymnastics basic training program, and a pre-test and post-test comparison method was used during the data collection phase. In this context, participants first completed a vertical jump test, followed by static balance tests, dynamic balance tests, and measurements related to body composition. According to the findings of the study, statistically significant differences were found between the experimental and control groups in the following tests: hands-on-hips vertical jump test, hands-free vertical jump test (CMJ), star balance test on the left foot, star balance test on the right foot, SİGMA XL easiest 60-second test, and SİGMA L easy 30-second test, based on pre-test and post-test values (Balıkçı, 2022).

In the study titled "Effects of 12 Weeks of Basic Gymnastics Training on Physical Fitness in 6-7-Year-Old Male Children" conducted by Savucu, Y., Karataş, M., Eskiyecek, C. G., Yücel, A. S., & Karadağ, M. (2018), the physical parameters of gymnastics athletes (age, duration of sport participation, body mass index (BMI), height, and weight),

performance characteristics, and significant differences recorded between groups were analyzed. The results indicated statistically significant changes between the pre-test and post-test measurements of the experimental group. It was found that, particularly in gymnastics, the duration of training, the high number of exercises performed, and the implementation of discipline-specific warm-up phases in each training session positively impacted the athletes' performance (Savucu, 2018).

The study titled "Effects of Gymnastics and Taekwondo Training on Balance, Flexibility, and Jumping Parameters in Primary School Students," conducted by Çiçek, İ., & Türkeri, C. (2023), aimed to examine the effects of gymnastics and taekwondo training applied to primary school students aged 8-10 years over 8 weeks on balance, flexibility, and jumping parameters. A total of 30 students participated in the research and were randomly divided into three groups: gymnastics group (GG), taekwondo group (TG), and control group (CG). The GG and TG underwent training specific to their disciplines twice a week for a total of 8 weeks with 48 hours in between sessions, while the CG did not participate in any physical activity during this period. Performance measurements included vertical jump tests, flexibility tests, and Y dynamic balance tests, administered both before and after the training. The findings revealed significant differences within the GG and TG groups in flexibility and jumping tests, whereas no significant changes were observed in the CG. When comparing lower and upper extremity dynamic balance performances, significant differences were found in favor of the GG, while only the anterior value of the right leg in the TG showed a significant difference. No significant changes were detected in the CG. Intergroup comparisons indicated a significant difference in favor of the GG for the lower extremity left leg composite variable, while no statistically significant differences were observed in other variables. As a result, gymnastics training was found to have more positive effects on balance, flexibility, and vertical jump parameters compared to taekwondo training (Çiçek and Türkeri, 2023).

The findings of this research indicate that the eight-week basic gymnastics training significantly improved the physical fitness of the children in the experimental group. When comparing the pre-test and post-test data for the experimental group across the Eurofit test battery, which included the Flamingo Balance Test, Sit-and-Reach Flexibility Test, Hand Grip Strength Test, 30-Second Sit-Up Test, Vertical Jump Test, Standing Long Jump Test, Medicine Ball Throw, and 20-Meter Sprint Test, significant improvements were recorded in all parameters ($p<0.05$). Notably, the results of the Sit-and-Reach Test and Hand Grip Test clearly demonstrate the contribution of gymnastics training to the development of flexibility and strength.

Looking at the results of the experimental group's Flamingo Balance Test, the pre-test average was 2.76 seconds, which increased to a post-test average of 4.84 seconds, and this difference was found to be significant ($p = .014$). The Sit-and-Reach Flexibility Test results showed that the experimental group's pre-test average increased from 22.40 cm to 31.70 cm, which was also statistically significant ($p = .000$). Similar significant improvements were observed in other parameters, highlighting the positive effects of

basic gymnastics training on children's biomotor skills, including balance, flexibility, strength, and speed.

In the control group, significant differences were observed in only a limited number of parameters, including the Flamingo Balance Test ($p = .034$), Sit-and-Reach Test ($p = .010$), and 30-Second Sit-Up Test ($p = .010$), while no notable improvements were recorded in other biomotor characteristics. Notably, no significant differences were found between pre-test and post-test data for hand grip strength, vertical jump, standing long jump, medicine ball throw, and 20-meter sprint tests in the control group ($p > 0.05$).

Comparing the groups, significant differences were found in favor of the experimental group in all parameters except for the standing long jump. Notably, the experimental group demonstrated significantly better performance compared to the control group in parameters such as Sit-and-Reach Test ($p = .000$), hand grip strength ($p = .000$), vertical jump ($p = .000$), 30-second sit-up test ($p = .001$), and medicine ball throw test ($p = .007$).

When comparing the findings from the literature with the results obtained in this study, the results are also supported by existing literature. It has been clearly stated in the literature that basic gymnastics training can lead to positive developments in parameters such as mobility, strength, and endurance in children during the developmental phase (Durukan, H., Koyuncuoğlu, K., & Şentürk, U., 2016).

In conclusion, this study demonstrates that basic gymnastics training is an effective method for improving the overall physical fitness of children aged 6-8 and confirms that physical activities performed at an early age significantly contribute to the development of children's biomotor skills.

It is believed and recommended that basic gymnastics training should start in early childhood for both girls and boys, and that this training should continue gradually throughout their school years for optimal benefits.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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