The Use of Homework Assignments in Physical Education among High School Students

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Abstract

Only a few studies have examined how students and their parents perceive the contribution of homework (HW) assignments given in physical education (PE) classes to the students' development. The main objective of our study was to explore the attitude and compliance towards HW assignments in PE among Israeli high school students and their parents. The students and their parents completed questionnaires at the beginning and at the end of a 12-week PE program in which physical activity (PA), academic, and combined (PA and academic) HW assignments were given after each PE class (24 classes, 24 HW assignments). In addition, the students underwent anthropometric measurements and physical fitness assessments. Among the main findings that emerged from our study were that (a) more than half of the students supported being given HW assignments in PE, (b) the majority of the parents supported the idea of assigning HW assignments in PE, and (c) very few of the students complied with all the homework assignments (4%), and less than half completed some of the given assignments. A number of instructional strategies are discussed in order to help the PE teacher in monitoring the preparation of HW assignments given in PE classes.

Key words: Physical activity, knowledge, instruction

Physical activity (PA) plays an important role in children's normal development and health (Strong et al., 2005), especially during periods of accelerated growth such as adolescence (Nemet, Berger-Shemesh, Wolach, & Eliakim, 2006; Shi et al., 2006). PA also improves fitness and body composition (increase in muscle mass and bone mineralization and decrease in fat mass) (Strong et al., 2005). Despite the positive contribution of PA to a healthy lifestyle, studies have shown that the level of PA decreases steadily as children grow older towards adolescence (e.g., Tomkinson, Leger, Olds, & Cazorla, 2003). This decline in PA in children has been suggested as one of the major contributing factors to the current epidemic of childhood obesity in Westernized societies (Nemet & Cooper, 2002), including Israel (Lissau et al., 2004). Moreover, a decline in PA among high school students has also been reported (e.g., Kimm et al., 2002).

One way to enhance PA is to encourage students in school to be active and to increase their awareness of PA's advantages and its contribution to a healthy lifestyle. Schools provide a unique opportunity for implementing PA, since they can reach a large number of participants all year long due to the availability of facilities and equipment, as well as having well-trained physical education (PE) teachers who can provide relevant information about an active lifestyle (Sallis & McKenzie, 1991).

In Israel, children are involved in organized PE classes starting with Grade 1 (Ministry of Education, 2007a; Ministry of Education, Culture, and Sport, 2006). Two mandatory PE classes per week are given to the children in every year of their studies in both elementary and high school. The Ministry of Education has developed a mandatory core program for elementary schools composed of eight academic disciplines, including mathematics, literature, and biology, as well as a ninth discipline – namely, PE (Lidor, 2005). This means that PE must be offered in each academic year, and no other subject can replace it. Recently the core program was expanded to high schools. PE activities are also offered to children in kindergarten (Ministry of Education, 2007b), however these activities are optional and not mandatory.

At the elementary school level (up to Grade 6) girls and boys participate together in PE classes, while in Grades 7 and 8 PE activities are planned separately for boys and girls. The main objectives of the PE program for Grades 1 through 5 are (a) to develop basic motor abilities such as balance, coordination, and kinesthesis, (b) to develop basic motor skills such as running, jumping, throwing, catching, and kicking, (c) to create opportunities for interaction and cooperation in small groups, and (d) to develop character and moral values through cooperation as well as competitiveness. In Grades 6, 7, and 8 some of the children begin their involvement in sport competitions, mainly in sports such as basic gymnastics, ball games (e.g., basketball and soccer), and track and field which are organized by the Ministry of Education and take place after school (Ministry of Education, 2007a).

In high schools, the emphases of the PE program are gradually changed from those set for the elementary school (Ministry of Education, Culture, and Sport, 2006). Among the objectives of the PE curriculum for high school students are (a) to gradually improve fitness components of dynamic balance, endurance, flexibility, speed, and strength, (b) to develop ball-game skills, (c) to introduce the concept of physical activity and leisure, and (d) to teach basic and advanced concepts in PE and sport sciences, such as anatomy, exercise physiology, nutrition, sport psychology and sociology, and sports medicine.

In most subjects that are studied in schools the learning time is expanded by the provision of homework (HW) assignments. A number of benefits are associated with HW assignments, among them (a) developing the ability of self-study in students, (b) developing self-discipline, (c) enhancing the ability to manage time, (d) improving attitudes towards school, and (e) improving academic achievements (Cooper, Robinson, & Patall, 2006).

Although a number of educational organizations have recommended providing students with HW assignments in PE, there is no tradition for the use of HW assignments in this

discipline. For example, the United States Center for Disease Control and Prevention (CDCP) has recommended giving students PA assignments (e.g., jogging, running, walking) that can be performed after school by the students and their family members (Smith & Claxton, 2003). It was assumed that HW assignments focusing on PA given by the PE teacher would (a) increase learning time, (b) improve motor and physical performance, and (c) encourage a healthy lifestyle.

Only a small number of studies have examined the use of HW assignments in PE. In one study (Jorgenson, George, Blakemore, & Chamberlain, 2001), the effectiveness of academic assignments (reading materials on topics related to PA and health) on achievements was examined. It was found that those who received HW assignments exhibited a significant improvement in knowledge on topics related to PA (e.g., fitness and nutrition) compared with those who were not asked to complete such assignments. The increased knowledge of the students who completed the academic assignments was associated with an increase in PA during leisure time. In addition, most of the students were in favor of self-study for academic assignments given in PE classes.

Other studies examined the effectiveness of PA assignments on achievement in PE (e.g., Smith & Claxton, 2003; Smith, Cluphf, & O'Connor, 2001; Smith et al., 2007). While these studies did not report a significant increase in overall daily PA, both parents and students who participated in these studies reported that the PA assignments were positive and enjoyable experiences. In contrast, research examining the attitude of high school students' parents towards PE (Tannehill, Romar, & O'Sullivan, 1994) found that the majority of the parents who participated in this study categorized PE lower than other school subjects in terms of their importance and their contribution to the development of their children. More specifically, more than 70% of the parents did not support incorporating HW assignments in PE. They argued that working on HW assignments in other subjects such as biology, mathematics, and science would benefit their children much more than devoting time to assignments in PE. Altogether, the support for the effectiveness of HW assignments in PE is not clear cut.

Since most school subject courses make use of HW assignments as an instructional tool, and evidence has been given of its contribution to learning and achievement, the main objective of our study was to examine the attitude and compliance towards HW assignments in PE among high school students in Israel. We assumed that if high school students understood the importance of the provision of HW assignments in PE, their compliance with the completion of such assignments would increase.

Method

Participants

Ninety-five students in Grades 11 and 12 from a regional high school located in the south of Israel participated in the study. Informed consent was obtained from all participants and their parents or guardians. The participants were divided randomly into four groups: (a) PA HW assignments group (n = 23); (b) academic HW assignments group (n = 25); (c) a combined PA and academic HW assignments group (n = 24); and (d) a control group (no HW assignments were given; n = 23). The research hypothesis and objectives of the study were not revealed to the students. The study was approved by the Israeli Ministry of Education and by the institutional review board of the Meir Medical Centre, Tel-Aviv University.

Procedure

The study was conducted over a 12-week period of time. The students in each group took part in two weekly PE classes (total = 24 PE classes). HW assignments were given to the three HW assignments groups at the end of each PE class (total HW assignments = 24). All HW assignments were given to the students in the form of assignment papers, which were also available to them on the school website. A few minutes before the end of the class, the PE teacher gave each of the students an assignment paper. Then, the instructions included in the assignment paper on how to do the assignment were read out loud by the PE teacher, who explained what was expected from them for each assignment. The students had one week to complete each assignment. The teacher provided written feedback on the completed assignment papers. The students were encouraged to meet with the PE teacher to discuss their assignments. The given assignments were aligned with the topics studied in the PE classes.

The PA HW assignments included PAs that are usually performed in PE classes in Israeli high schools, focusing on long distance running, short distance interval sessions, strength exercises (for upper/lower extremities and abdominal muscles), rope skipping, and ball games, mainly basketball and volleyball. It took the students about 20-45 minutes to complete each PA HW assignment.

The academic HW assignments included reading materials and writing brief reports on the beneficial health effects of the different types of PAs that were typically performed in their PE classes. Other assignments included brief self-selected written reports on important or significant historical sporting events (such the participation of Israeli athletes in the Olympics/world championships or the history of world records in track and field).

The combined PA and academic HW assignments included both the PA HW assignments given to the PA HW assignments group and the academic HW assignments given to the academic assignments group. The control group was not given any HW assignments during the 12-week period of time.

Questionnaires and Testing

Questionnaires were given to the students and their parents; the students were asked about their PA habits, and both the students and the parents were asked how they perceived the provision of HW assignments in PE. In addition, the students underwent anthropometric measurements and physical fitness tests.

Questionnaires. All participants completed a habitual PA questionnaire to determine the intensity of their after-school participation in PA (i.e., light level of participation, moderate, or intense). The questionnaire was composed of five questions (see Appendix). The student was asked to select the most appropriate answer for each question and to circle it. For Questions 3 and 4, the students could add their own answers to the ones listed in the questionnaires. The questionnaire was administered twice: prior to the beginning of the study and at the end of the study. In addition, participants were asked to express their opinions about the PE

HW assignments given to them, and to report compliance and completion of these assignments. The parents of the participants were also asked to express their opinion on the importance of the PE HW assignments, as well as their own involvement in helping their children complete the given assignments.

Anthropometric measurements. Standard calibrated scales and stadiometers were used to determine the height, weight, and BMI of the participants at the beginning of the study. Since BMI changes with age, we calculated the BMI percentile for each child using the recommendations of the Centers for Disease Control, United States National Center for Health Statistics (see Eliakim, Raisz, Brasel, & Cooper, 1997). Measurements of the sum of skin folds at two sites (triceps and sub-scapula) were used as a measure of body fat. Anthropometric measurements were carried out at the beginning and at the end of the study,

Assessment of physical fitness. Assessment of physical fitness was made at the beginning and at the end of the study, and included a 2-km run for boys and 1.5 km run for girls, and two minutes of rope skipping (counting the number of skips). Other tests were the maximal number of continuous sit-ups to assess abdominal strength (participants were not allowed to stop for more than 5 seconds), and the number of pull-ups for boys and seconds of static pull-ups for girls to assess arm strength. There were three reasons for the selection of these tests: (a) they reflect basic physical fitness components, (b) they are administered regularly in PE classes in Israel, and (c) they are used by the Israeli Ministry of Education as the national fitness assessment battery test.

Data and Statistical Analyses

A content analysis was used to analyze the data that emerged from the questionnaires given to the students and their parents. A 2 x 2 (Group x Time) analysis of variance (ANOVA) with repeated measures on the second factor was performed on the anthropometric and fitness data for the participants who complied with the homework assignments and for those who did not. Data were presented as mean ± SD. Alpha level was set at .05 for all statistical analyses.

Results

The responses of the students and their parents on the need for HW assignments in PE, and the responses of the students on the actual HW assignment completion, are presented in Table 1. It was found that more than half of the students supported being provided with HW assignments in PE. The students justified being given the HW assignments by a number of reasons, among them (a) to increase their knowledge on relevant topics in PE and PA, (b) to achieve a healthy lifestyle, (c) to develop their level of fitness, and (d) to have fun. Approximately one-third of the students did not support being given HW assignments in PE. The reasons for this included (a) lack of time to complete the given assignments, (b) large homework load in other classes taught in school, and (c) the feeling that preparing the HW assignments could affect their perception of the unique status of PE classes as a fun activity. Some of the students felt that there is a place for HW assignments in PE only in elementary schools.

Table 1. ***Attitude of Students and their Parents toward HW Assignments in PE, and Self-report of the Students on Actual Assignment Complietion***

	PA	Academic	Combined	Control	Average
Need for HW assignments in PE					
Students	47.8	60.0	60.0	47.8	53.9
Parents	100	80	100	100	95
Completion of HW assignments in PE					
All	4.3	4.0	4.2		4.2
Some	47.8	44.0	29.2		40.3
All + some	52.1	48.0	33.3		44.5
Not done	47.8	52.0	58.3		52.7

The majority of the parents supported the idea of assigning HW assignments in PE. They perceived these assignments as an opportunity for their children to (a) acquire a healthier lifestyle, (b) develop PA as a habit, and (c) increase their general knowledge of the contribution of PA to a healthy lifestyle.

From the students' responses on the actual preparation of the given assignments, it was revealed that only a few of them did all the HW assignments (4%), and about 40% of the students reported that they carried out fewer than half of the assignments given to them. The percentage of students who did the assignments in the groups assigned for either PA or academic HW assignments was higher than the combined PA and academic HW assignments group (about 50% and 33%, respectively). Due to the relatively small number of students who completed the given assignments, we

Table 2. ***Self-report of the Students on Motivation, Type, and Intensity of Habitual PA. Results Reported as Percentage of Pupils***

	HW Group (n = 32)		No-HW Group (n = 63)	
	Pre	Post	Pre	Post
Habitual PA	87.5	87.5	74.6	65.1
1-2 / week	50	46.4	55.3	34.1
3-4 / week	39.3	21.4	31.9	39.0
5+ / week	10.7	32.1	12.8	17.1
Motivation for PA 1	Fun 64.3	Fun 57.1	Fun 31.9	Fun 58.5
Motivation for PA 2	Wt loss 35.7	Health 42.8	Wt loss 31.9	Health 34.1
Type of PA 1	Run/walk 60.7	Run/Walk 50.0	Run/Walk 59.6	Run/Walk 63.4
Type of PA 2	Gym 46.4	Ballgames & Gym 35.7	Ballgames 40.4	Ballgames 43.9
Intensity of PA				
Light (L)	L: 7.1	L: 17.8	L: 10.6	L: 14.6
Moderate (M)	M: 64.3	M: 57.1	M: 57.4	M: 41.5
Intense (I)	I: 28.6	I: 25.0	I: 29.8	I: 46.3

Wt loss – weight loss
Gym – exercising in the gym

combined students from all groups who prepared the assignments (HW group) and those who did not do these assignments for another group (no-HW group).

The responses of the students on their motivation to participate in PA, the types of PA they selected to perform, and the intensity of their selected PA are presented in Table 2. The percentage of the students who performed some form of habitual PA was high (70-78%), most of them once or twice a week. The main reason given for doing exercise was having fun. Other reasons given were the desire to lose weight and to be involved in competitive sports. The favorite activity was running and/or walking, followed by ball games and exercising in a gym.

The anthropometric measures and fitness achievements of the students in the HW and no-HW groups are presented in Table 3. There were no differences in baseline anthropometric measures and fitness characteristics between the HW and no-HW groups.

Table 3. ***Anthropometric Measurements and Fitness Characteristics of the Students in the HW Group and the No-HW Group: Means, Standard Deviations, and F-Values***

	HW Group		No-HW Group				
	Pre	Post	Pre	Post	F		
					T	G	Int.
Height (m)							
boys	1.72±.07	1.73±.07	1.75±.07	1.76±.07	24.38	1.43	.27
girls	1.62±.07	1.62±.07	1.59±.06	1.59±.06	9.22	2.13	.26
Weight (kg)							
boys	67.6±19.0	68.1±18.2	68.4±8.5	69.13±9.0	1.78	.05	.05
girls	58.3±10.4	58.6±10.0	55.3±10.6	55.8±10.7	3.68	.83	.15
BMI (%)							
boys	45.3±31.4	46.0±30.4	52.0±26.5	51.7±25.7	.01	.51	.09
girls	56.3±23.8	54.8±25.9	48.3±28.0	48.0±28.7	1.16	.73	.46
SSF (mm)							
boys	20.4±8.7	19.9±13.2	21.0±6.3	19.9±5.9	1.14	.01	.00
girls	25.4±7.3	25.7±6.7	26.4±7.5	24.6±8.1	2.31	.00	4.08
% Bone strength							
Boys	77.7±31.9	90.8±15.9	78.5±31.6	75.9±34.2	1.94	.59	4.36
Girls	50.9±34.5	58.9±24.7	71.9±30.2	74.6±25.3	9.34	2.68	.48
Distance run (sec)							
boys	520.1±64.0	508.3±59.4	537.0±94.1	538.7±91.0	1.27	.79	2.25
girls	567.2±115.7	560.6±112.3	532.4±89.7	528.9±102.1	1.79	1.2	.17
Abdominal strength							
boys	67.7±13.9	73.3±12.9	59.6±12.6	61.9±13.2	5.47	6.3	.94
girls	50.6±11.5	50.5±12.9	51.2±13.5	50.0±15.0	.24	.00	.2
Arm strength							
boys	10.7±7.7	12.0±7.7	8.4±5.9	9.0±5.9	7.93	1.6	1.07
girls	29.4±28.1	30.81±28.6	33.3±23.2	35.5±24.6	9.31	.32	.45
Rope skipping							
boys	192.9±48.9	21.9±41.8	195.8±82.2	204.6±76.8	15.46	.06	3.84
girls	144.1±68.4	146.2±67.8	122.9±44.4	129.6±44.7	9.51	1.43	2.4
Knowledge test							
boys	44.3±9.7	47.5±19.9	46.5±12.6	50.1±14.7	2.43	.35	.00
girls	43.3±11.4	52.2±13.6	46.3±10.8	54.2±18.1	13.94	.48	.06

T – time effect
G – group effect
Int. – interaction (Group x Time)

Discussion

HW assignments are commonly used in most school courses to develop the abilities of self-study and self-discipline among students, as well as to improve their academic achievements (Cooper et al., 2006). However, the use of HW assignments in PE classes is very rare. In this study we explored the attitude and compliance of Israeli high school students towards HW assignments in PE. The main finding from our study, as opposed to the findings that emerged from previous studies (e.g., Tannehill et al., 1994), was that the majority of the parents (>90%) and more than half of the students supported the provision of HW assignments in PE. This support is encouraging, and indicates a growing awareness among Israeli high school students and their parents of the importance of PA. Moreover, most of the parents reported that they would like to see their children further increase the amount of PA they engage in. It was assumed that the parents of the high school students perceived PE at school as a contributing element towards achieving this goal, and therefore they would be supportive of the provision of HW assignments in PE. Despite this support, very few of the students complied with *all* homework assignments (4%), and less than half complied with even *some* of the given assignments.

In our attempt to interpret the data from the questionnaires given to the parents, as well as from the data obtained from the other self-report surveys given in our study, we adopted a cautious approach. We wanted to assume that all the students and their parents honestly reported what they actually thought about the use of HW assignments in PE classes. However, since we used self-report surveys, it is possible that some of the responses given by the students and their parents reflected to a greater extent what they thought the examiners wanted to hear.

As also observed in the findings from the questionnaires given to the students and their parents, both students and parents viewed the HW assignments in PE as an opportunity to increase awareness of a healthy lifestyle and to improve components of fitness, such as endurance and strength. Those students who did not do the assignments given in the PE classes reported that they had focused on the preparation of the assignments given in other classes in school. In other words, they did not value the contribution of the assignments given in PE to their development as much as the contribution of other subjects taught in school.

Another possible explanation for the relatively low rate of completion of HW assignments among the high school students was that they were faced with an especially heavy studying load, due to the approaching matriculation examinations. At the time of the current study, the high school students faced preliminary matriculation exams that demanded a high investment of time and effort. It is suggested that during the preparation for the matriculation examinations, high school students should be assigned short, focused, and easy-to-implement PE HW tasks in order to increase the preparation rate.

It is also possible that in order to promote the preparation of HW assignments in PE – both PA and academic – students should become accustomed to this form of assignment at an earlier age, preferably from Grades 1 and 2 in elementary schools. By adopting such an approach, students will be able to practice the material studied in PE classes, intensify their knowledge of relevant academic material, and increase habitual PA during a period of

a reduced academic load. In addition, it is assumed that through early adjustment to HW assignments in PE, any opposition to the idea of the provision of such assignments in high school would be reduced.

It is also possible that a concrete reward is needed for those students who complete the PE HW assignments. It is probably difficult for high school students to assess the contribution of PA and the relevant knowledge associated with it to later stages in life. In senior classes in high school the most tangible benefit can be expressed as a credit added to the course grade. If the HW assignments have significant influence to the course grading, this may prompt the students to prepare them, particularly those students who do not have natural sports skills and do not habitually engage in PA.

In our study the PE teachers did not monitor the preparation of the HW assignments given at the end of each class. In fact, the difficulty of supervising HW assignments exists not only in PE, but also in most courses taught in school. For PE classes, a number of instructional strategies are suggested in order to help the PE teacher to supervise the preparation of the HW assignments. Among the strategies are (a) giving a brief written or oral examination on the material studied, (b) administering a field fitness test, and (c) providing positive verbal feedback to the students who completed the assignments.

As indicated before, due to the relatively small number of students who prepared the HW assignments, we combined students from all groups who prepared the assignments to one group, and compared them to a combined single group of those who did not prepare these assignments. Consistent with the known decline in PA among high school students (see Kimm et al., 2002), there was a decrease in the percentage of students who performed habitual PA in the no-HW group during the 12-week period of our field study. The preparation of HW assignments in the other groups attenuated this decline. The increase in leisure-time PA was observed mainly in the group assigned to PA assignments, but was not observed in the group assigned to the combined PA and academic assignments. This observation suggests that an increase in HW load (complexity and/or length of time needed for preparation) above a certain threshold can result in not doing the PA HW at all, pointing out, once again, the need for brief, short, and "doable" HW assignments in PE.

Finally, we were not able to characterize those students who complied with the HW assignments in PE. There was a trend towards leaner and fitter boys, and fatter and less fit girls in the HW group compared to the no-HW group (see Table 3). However, these differences were not statistically significant.

In summary, HW assignments in PE have the potential for increasing habitual PA, improving fitness, and promoting a healthier lifestyle in high school students. However, despite the support of the majority of both students and parents, very few students completed all the given assignments, and less than half completed even some of the homework assignments. This suggests that introducing the idea of giving HW assignments in PE at earlier stages (e.g., elementary school), as well as assigning short, focused, and easy-to-implement HW tasks, may lead to greater cooperation on behalf of the students.

Appendex. ***A Habitual Physical Activity Questionnaire***

During the coming months, you are going to participate in a study which examines a number of aspects associated with free-time habitual physical activity among students in high schools. Please answer all the following five questions (circle the appropriate answer).

1. Do you do any physical activity in your free time? Yes / No

2. If you do physical activity in your free time, how many times per week are you involved in this activity? 1-2 3-4 5-above

3. I do free-time physical activity for:
   - •Pleasure
   - •Body development / Losing weight
   - •Competitive sports
   - •Social reasons
   - •Other _____

4. What kind of physical activity do you do?
   - •Team ball games
   - •Gym (exercising in the gym)
   - •Swimming
   - •Running / Walking
   - •Other _____

5. What is the intensity of the physical activity that you usually do?
   - •Light
   - •Moderate
   - •Intense

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