

Increase in Elementary Students' Physical Activity Levels: The Use of Activity Breaks

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Abstract:

Background: The obesity epidemic that has affected children in many countries around the world also has affected Cypriot children, calling schools, teachers, parents and researchers to take action. There is evidence that obesity in childhood and adolescence leads to permanent obesity in adulthood. Therefore, the prevention of childhood obesity is considered particularly important, to avoid health problems directly linked to obesity such as lipid disorders, orthopaedic problems, psychological disorders and other. Elementary school may contribute towards that, by increasing students' physical activity levels. Beyond physical education class that is included in the school curriculum and is offered 2-3 times per week, elementary schools in Cyprus may offer activity breaks in the classroom to augment student involvement with physical activity. Therefore, the purpose of the study was to investigate the increase in elementary students' physical activity levels in school, using activity breaks during the lessons.

Materials and Methods: Twenty-two elementary school teachers (6 men and 16 women) who were randomly selected from public urban elementary schools in Nicosia and their students participated in this study. Teachers were asked to participate in 3 mandatory preparation workshops to get ideas of physical activity breaks that could be given in their classes and to receive answers to their questions. Data collection took place in dates that were agreed with the participating teachers and the school principals in a way that would not affect the regular school programme. Five visits per teacher were paid by the investigator to observe the lessons and the activity breaks given and to take notes and write details in regard to the breaks. In addition, informal interviews were conducted. **Results:** Results revealed that students' physical activity levels were increased, due to the activity breaks and it seems that school may contribute to the fight against obesity in that way, beyond physical education class. Despite the fact that kids had increased their physical activity levels in school, the majority of the participating teachers did not seem to be willing to continue using the activity breaks, targeting in increasing kids' physical activity levels. Instead, teachers seem to be rather negative in giving activity breaks in their classes, due to a number of common problems they had to deal with, such as a hard time for class management when movement activities were included, a minimum repertoire of activities, their limited pedagogical knowledge in implementing the activity breaks and the limitation of time, since they had to prepare students for school celebrations, beyond their regular teaching in class. Despite their negative feelings, a positive theme that occurred in this study was that teachers would use activity breaks in their classes if kids were looking tired and they wanted to "wake" them up and if the content of the activity breaks was connected to the content of the lesson.

Conclusion: Elementary children in this study had increased their physical activity levels, indicating that school may play a significant role against childhood obesity. Further studies, however, investigating teachers' perceptions towards giving activity breaks would better help to understand why the majority of teachers seem to carry negative feelings against activity breaks and would allow investigators collaborate with teachers to help them towards that.

Key Word: Physical activity, elementary school, activity breaks.

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I. Introduction

The elementary school years provide a great opportunity to teachers for helping children develop the physical, social, emotional, and cognitive skills necessary to lead a healthy and active lifestyle (Graber, Locke, Lambdin & Solmon, 2008; Kirk, 2005). This can be achieved by school physical education, which is part of the formal curriculum in most schools. According to the Cypriot national curriculum (Ministry of Education, Department of Curriculum Development, 2009), school physical education can play a major role in terms of increasing children's daily physical activity. The benefits of regular physical activity, and the knowledge, skills, as well as attitudes needed to lead to an active lifestyle can be taught to all children (Constantinides, 2011, 2013; Mandigo, 2010). Indeed international organizations such as the World Health Organization (WHO) recommends

at least 60 minutes of moderate to vigorous intensity physical activity daily. Most of the daily physical activity should be aerobic, but vigorous intensity activities should be incorporated, such as those that strengthen muscle and bone, at least three times a week (World Health Organization, 2010).

Despite the favorable endorsement made by WHO (2010) and other organizations in the past (UNESCO, 1978), and the knowledge derived from tons of studies for the health benefits from regular physical activity, an alarm is ringing the past couple of decades for children in Cyprus, calling them to eliminate the time spent in front of television, in front of a computer or any other electronic device, leave the couch and engage in any kind of physical activity. This is critical, considering that Cyprus is ranked among the top European countries in childhood obesity (Joseph, Genakritis, Vezyrides, & Samoutis, 2013; Lazarou, Panagiotakos, & Matalas, 2010). Children, unfortunately, do not exercise in a regular basis and do not follow a balanced diet.

Hardman and Marshall (2000) suggested, that school physical education is in a perilous position worldwide. Using two worldwide surveys conducted in 2000 and 2009 that assessed the state and status of physical education in schools, Hardman and Marshall (2000; 2009) identified four sets of factors that affect the quality of physical education programs: (a) legal requirements for the implementation of physical education; (b) time allocated to physical education as opposed to time spent for other classes, such as math class; (c) the status of the class and attitudes of educational leaders and stakeholders, such as principals, teachers, or parents; and (d) financial and human resources available to physical education.

The factors identified by Hardman and Marshall (2000; 2009) apply readily to physical education in Cypriot schools. As mentioned earlier, physical education is part of the formal curriculum, however, elementary physical education in Cyprus is taught by classroom teachers (common branch teachers) who are not specialists. This occurs in other European countries, in the U.S (Constantinides, Montalvo & Silverman, 2013) and in Canada (Cameron et al., 2007; Dwyer et al., 2008). Having specialists teach physical education does not guarantee a quality program, although research suggests that specialists generally teach better lessons than classroom teachers (Constantinides, Montalvo & Silverman, 2013; Graber et al., 2008; Tsangaridou, 2008). For example, when compared to elementary classroom teachers (common branch teachers), physical education specialists exhibit higher levels of effective teaching behaviors such as having better-planned programs, individualizing instruction whenever needed, providing more opportunities for practice (physical activity and skill development), having more success in enhancing children's fitness levels (Constantinides, Montalvo & Silverman, 2009; DeCorby et al., 2005; McKenzie, Sallis, Faucette, Roby & Kolody, 1993; Sallis, McKenzie, Alcaraz, Kolody, Faucette & Hovell, 1997) and promoting positive student attitudes towards physical activity (Constantinides & Silverman, 2018). Furthermore, specialists tend to feel better prepared to teach this class, considering that they studied the topic for four years and enjoy teaching physical education more, since they have chosen to do so intentionally (Constantinides, Montalvo & Silverman, 2013; Mandigo et al., 2004).

The factors mentioned above concerning the effectiveness in physical education classes of elementary classroom teachers in Cyprus, leads to a number of problems: (a) the class is many times neglected in favour of other classes (Constantinides & Silverman, 2018) or is partially implemented, which affects the amount of time students spend in school physical activity; (b) classroom teachers do not possess the content knowledge (CK) and the pedagogical content knowledge (PCK) as specialists do, to teach the lesson effectively (Constantinides, Montalvo, & Silverman, 2013; Constantinides, Montalvo & Silverman, 2013; Rovegno, 1995, 1998, 2003, Rovegno, Chen, & Todorovich, 2003), which affects the quality of the lesson and the development of positive student attitudes; (c) guidelines of the curriculum reform, which took place in 2009, for more student-oriented teaching are not followed (Constantinides, 2019); (d) the budget for equipment and other needs for the class is usually minimal; (e) there is minimal support for staff development, especially for those teachers who are really interested to teach the class effectively; (f) some of the teachers who choose to teach physical education, have made their decision based on the fact that nobody will ask questions about physical education (Constantinides, 2016) and that they felt bored in the classroom; (g) there is no fitness or any other testing in physical education, as opposed to other classes taught in elementary school and no report is given to the parents; (h) curriculum learning outcomes cannot be reached in most cases (Constantinides & Silverman, 2018, Constantinides, Montalvo & Silverman, 2013); and (i) principals', teachers' and parents' attitudes towards physical education is rather negative (Constantinides & Silverman, 2018).

In addition to the factors mentioned above, one needs to take a closer look at the school physical education time table, to get a better picture of elementary physical education in Cyprus (Table 1). Table 1 demonstrates the timetable for elementary physical education and the actual time spent for physical activity (Constantinides, 2015).

Table 1: Timetable for elementary physical education and actual time spend in school physical activity (based on Constantinides, 2015).

#	Grades	Length of School Period	Times/week	Scheduled time for PE	Actual Physical Activity time/week
1	1 st – 4 th	40 min.	2	80 min.	10-30 min.
2	5 th – 6 th	40 min.	3	120 min.	30-90 min.

Although 80 minutes are scheduled for physical education for grades 1st - 4th, the actual time spent for physical activity is ranged between 10-30 minutes per week. Something similar applies to grades 5th – 6th. The results from a study conducted by Constantinides (2015), specifically for elementary physical education, clearly demonstrates that children in Cyprus do not meet the guidelines of the World Health Organization for at least 60 minutes of physical activity, in a daily basis.

II. Material And Methods

In an effort to increase the time spent in physical activity and particularly in school physical activity in Cypriot elementary schools, an intervention study was conducted during 2018-19 academic year. Upon receiving consent forms from the Ministry of Education, school principals, parents and teachers, information about the intervention was provided to all participants and questions were answered about the procedure and the role of the participants. In addition, school principals were reassured that the school's regular programme would not be affected in any way from the intervention.

Sample size. The participants were 22 elementary school classroom teachers (6 male and 16 female) & their students (class size in the participating classes ranged from 21-25 students) from 10 urban public schools (Table 2). Teachers were randomly selected from elementary public schools in Nicosia. Both teachers' and schools' names were coded (Table 2). Upon signing their consent to participate in this study, teachers were asked to participate in 3 sample lessons/ workshops, as part of their training, so that they would all be aware of what they were asked to do in their classes and to answer to possible questions.

Table 2. Recruited teachers, schools, class size and number of activity breaks/day.

#	Teacher	School	Gender	# of students	# of activity breaks/day
1	Teacher 1	School 1	Female	24	4-6
2	Teacher 2	School 1	Male	23	3-4
3	Teacher 3	School 2	Female	25	1-2
4	Teacher 4	School 3	Female	21	1-2
5	Teacher 5	School 4	Female	23	1-2
6	Teacher 6	School 4	Female	24	3-4
7	Teacher 7	School 4	Male	21	3-4
8	Teacher 8	School 5	Female	22	5-6
9	Teacher 9	School 5	Female	24	3-4
10	Teacher 10	School 6	Female	23	1-2
11	Teacher 11	School 6	Female	22	1-2
12	Teacher 12	School 6	Female	23	3-4
13	Teacher 13	School 6	Male	24	3-4
14	Teacher 14	School 7	Female	23	1-2
15	Teacher 15	School 7	Female	21	1-2
16	Teacher 16	School 8	Male	24	5-6
17	Teacher 17	School 8	Male	24	3-4
18	Teacher 18	School 9	Female	22	1-2
19	Teacher 19	School 9	Female	23	3-4
20	Teacher 20	School 10	Male	24	1-2
21	Teacher 21	School 10	Female	23	1-2
22	Teacher 22	School 10	Female	23	1-2

The purpose of the study was made clear to the teachers and then teachers were asked to use activity breaks in their regular classes, no more than 5 minutes in length, to help increase their students' physical activity levels. A common question rose by many teachers was "How can I stop my class to give students a break?" Teachers were explained that there are many reasons to give an activity break in their classes. For example, when students feel tired or sleepy and they cannot follow the lesson, or when the teacher wants to connect theory with practice demonstrating in the beginning and then having the students practice.

Procedure methodology. Teachers were asked to use activity breaks in their classes and take a note, as far as the length and the type of the break. They were encouraged to use as many activity breaks as possible and have all their students participate. Since teachers were assigned to teach multiple classes such as math, English, science, etc., activity breaks could be used throughout the school day and for different classes. Five school

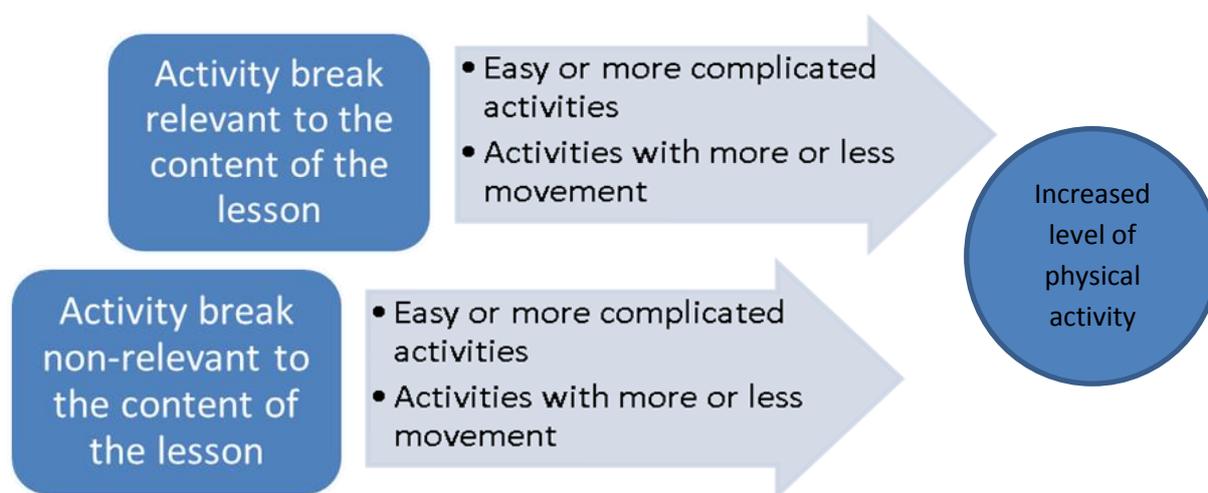
visits were arranged for each one of the 22 teachers and a variety of upper elementary classes were observed. School visits were scheduled in a way that would not disturb the regular class timetable in each school.

Data collection. Data collection took place during the 2018-19 academic year. It included notes taken during the observation and teachers' notes about the activity breaks, as well as informal interviews before and after the observation. Additional helpful notes were taken for the size of the class (number of students), the available space in the class, material in the class, type of class, etc.

III. Results

Activity breaks used by the participating teachers in their regular classes could be categorized in 2 main types and 4 sub-types, as seen in Figure 1. Teachers in this study have used relevant or non-relevant to the content of the lesson activity breaks (two main categories). Either category could be divided in two smaller subcategories, according to the observations: (a) activity breaks with easy or more complicated activities, and (b) activity breaks

Figure1. Type of activity breaks used by the participating teachers.



with more or less movement. In addition, the number of activity breaks given from each teacher during the day varied.

According to the observations and the informal interviews, some teachers felt more comfortable using activity breaks in their classes, as opposed to others. For example, teacher 1, an athletic type teacher felt comfortable using 4-6 activity breaks per day, to help students relax from classes like math and science. She believed, according to her own experiences, that students would be able to pay more attention if they were given “waken up” breaks, as she used to call activity breaks. A similar behavior was observed in classes of teachers 8 and 16. These teachers (Teachers 1, 8 and 16) have used either relevant or non-relevant activity breaks, targeting to help students relax and fill in their batteries for the rest of the class followed. Teacher 16 mentioned that “it’s not the type of break, but the result that counts at the end of the day.” Asking this teacher to clarify that, he added that “keeping your students on track was the main target, since they could learn more.” All three of them were teaching in different schools. Their participating colleagues in their school gave less activity breaks in their classes. For example, teachers 2, 9 and 17 gave 3-4 activity breaks each day, some relevant to the content taught and some irrelevant. As teachers 2 and 17 explained, they wanted to give activity breaks relevant to the content, so that the break would be more useful to the class. They wanted to connect theory with daily activity applications, to make the content easier to understand by the students.

The number of activity breaks varied among participating teachers from 1-2 to 5-6 per day. In this study, 11 teachers gave 1-2 activity breaks per day, 8 teachers gave 3-4 activity breaks per day and 3 teachers gave 5-6 activity breaks per day (Table 3). During the observations, the activity breaks given in each class varied from 1-2. Teachers who gave more than 1 break in the observed classes, tended to connect their breaks with the topic taught that day (e.g. teachers 1, 4, 8, 9, 12, 16, 17, 19). Participating teachers who gave 1 activity break during the observations gave a break either relevant or irrelevant to the topic taught.

Table 3. Number of activity breaks per day and per visit.

#	Teacher	# of activity breaks/day	Visit1	Visit2	Visit3	Visit4	Visit5
1	Teacher 1	5-6	2	2	2	2	2
2	Teacher 2	3-4	1	1	1	1	1
3	Teacher 3	1-2	2	1	1	1	1
4	Teacher 4	1-2	1	2	1	1	2
5	Teacher 5	1-2	1	1	1	1	1
6	Teacher 6	3-4	1	2	1	1	1
7	Teacher 7	3-4	2	1	1	1	1
8	Teacher 8	5-6	2	2	2	1	2
9	Teacher 9	3-4	1	2	2	1	1
10	Teacher 10	1-2	1	1	1	1	1
11	Teacher 11	1-2	1	1	1	1	1
12	Teacher 12	3-4	1	2	2	1	1
13	Teacher 13	3-4	1	1	1	1	1
14	Teacher 14	1-2	1	1	1	1	1
15	Teacher 15	1-2	1	1	1	1	1
16	Teacher 16	5-6	2	2	1	2	2
17	Teacher 17	3-4	1	2	1	1	1
18	Teacher 18	1-2	1	1	1	1	1
19	Teacher 19	3-4	1	2	1	1	1
20	Teacher 20	1-2	1	1	1	1	1
21	Teacher 21	1-2	1	1	1	1	1
22	Teacher 22	1-2	1	1	1	1	1

As mentioned before the activity breaks given by the teachers, relevant or irrelevant to the lesson, could be divided in two sub-categories (Chart 1): (a) activity breaks with easy or more complicated activities, and (b) activity breaks with more or less movement. Teachers in this study have used activity breaks from all sub-categories, however, only a couple of those have used activity breaks with less movement (teachers 14 and 22). These teachers were extremely sensitive with students' safety in class, due to limitations of space, which resulted in activity breaks with minimal or less movement. Students in their classes were asked to do an activity while sitting in their chairs (e.g. to start telling the ABC with their eyes closed, without telling them which student should start. The student who was calling a letter had to do so while getting up and sitting down. If students were successful calling all the letters, they would get up and start applauding for a minute).

Other teachers, although student safety was an issue to consider, have used ideas discussed and applied during the preparation workshops. Some activity breaks that were presented could easily be modified and used in any class. For example, teachers 1, 8 and 16 have used activities non-relevant to the content of the lesson such as "turn the clock" activity, which allowed the whole class to participate simultaneously. Students had to make a hoola-hoop move around the circle as they were holding each other's' hands, without using their hands. If the hoop was far away, they had to keep marching. In an alternative activity to that, students had to move around two or three hoops, which made them act faster in a rather competitive but fun situation. The same teachers have also used activities relevant to the content of their lesson. For example, in a math class, students had to figure out the answer and jump over a line accordingly (e.g., divide 48/12).

Classroom teachers in this study have used a variety of ideas exactly the way they were given to them during the preparation meetings. A group of teachers (teachers 2, 3, 5, 6, 7, 10, 11, 13, 15, 18, 20 and 21) have used activity breaks non-relevant to the content of the lesson, to cheer up the students and enable them to follow the lesson. These teachers have used activities non relevant to the content, but they succeeded having all the students participating. Using material easy to carry in class, such as tennis balls and plastic cups, they organized their students in groups using small areas in class and introduced more complicated activities. Some activities included fundamental movement skills such as walking or running quick (a very small distance) as well as throwing and catching, or throwing to moving target simultaneously. In addition, the whole group had to be alert during the activity, because the pace of it was fast and demanding. Other activities, gave little time to the students to think and react, keeping them alert not to make a mistake, since they had to operate as a group. With this kind of activities, teachers made the students breath faster, increasing their heart and breathing rate, enhancing student endurance.

IV. Discussion

Participating teachers in this study have used activity breaks both relevant and non-relevant to the content, with easy or more complicated activities, or with more or less movement. It was encouraging that only two out of the twenty-two participants used activities with less movement (teachers 14 and 22). Perhaps these teachers could not overpass considering kids' safety issues during these activity breaks and preferred to give activity breaks with less movement.

The rest of the teachers have used activity breaks either relevant or non-relevant to the content of the lesson. Teachers were not creative, instead, they preferred to use ideas introduced to them during the preparation sessions. No matter of the type of activity breaks used, students' physical activity time was increased. For instance, teachers 1, 8 and 16 gave 5-6 physical activity breaks per week. This is translated to approximately 25-30 minutes of additional physical activity during school hours. Considering that students' curriculum includes two or three 40-minute school periods of physical education per week for 4th graders and 5-6th graders respectively, it's easy to figure out the multiple benefits, especially the health benefits, of providing physical activity breaks in school. For teachers who gave 3-4 physical activity breaks per week and for teachers who gave 1-2 breaks, the benefit for students in terms of additional physical activity time in schools is 15-20 and 5-10 minutes respectively.

According to previous findings (Cothran et al. 2010; Webster et al., 2013) teachers engage with activity breaks if they align with their philosophies and priorities as teachers. The participating teachers in this study taught in mixed skill and ability classes, therefore, one may reasonably suggest that when it comes to effective physical activity break implementation, the characteristics of the students weigh less than the values of the teacher. However, the question that arises is: Why some teachers give more activity breaks than others; well, according to the observations and the informal interviews, a number of negative themes occurred that made most teachers hesitate to provide activity breaks:

Limited space for some activities. When thinking of a classroom, one understands that tables and chairs fill in most of the space. Considering teachers' concern about student safety, makes it easy to understand why some teachers hesitate to provide activity breaks in their classes, even when their students seem to be very tired to follow the class. In addition, in case of an injury, teachers have to fill in an incident report and give explanation to school principals and parents, therefore, they think about it twice, before giving an activity break.

Limited time. Teachers have to struggle with a lot of pressure by the Ministry of Education to cover the curriculum for each class they teach. In addition, teachers are assigned to prepare and organize class and school celebrations for national days, religious days and other occasions, which makes them more sceptical to allow time for activity breaks.

For all the above reasons, teachers' pressure to satisfy all these expectations, both academic and non-academic, may negatively affect them in using activity breaks in their classrooms (Cothran, Kulinna & Garn, 2010; Parks, Solmon & Lee, 2007). If you are struggling to find the time for extra class activities, such as school celebrations, it seems obvious, that you wouldn't like to "waist" you time in other things, including activity breaks. For classroom teachers in Cyprus, this is particularly important when we consider that they teach in classes where students' skills and abilities vary a lot, but the pressure is always there.

Class management difficulties during the activity breaks. Teachers in this study had a hard time to control the class, when an activity break was given. On one hand, some students would take advantage on the "kind of freedom" offered to them to move around, talk to each other and socialize in class. On the other hand, classroom teachers who are used to manage their class when students are sitting down in a limited space without been allowed to talk unless they get permission. Class mobility seems to distract the peaceful class environment. Teachers, who are in control of their classes, are more hesitant to provide activity breaks. Instead, they prefer to work on their "safety zone", that is an environment without mobility which is easy for them to manage.

Kulinna et al. (2013) stated that modifying management practices in physical education to fit the classroom setting may help classroom teachers. Some basic management principles that could be applied in the classroom are: (1) use different start and stop signals but use them consistently (e.g., 1 whistle to start and 2 whistles to stop); (2) use "when" before "what" when giving directions (e.g., When I say go, start jumping..."); (3) organize your students efficiently (e.g., in small groups, pairs, or individually); (4) give your instructions quickly (e.g., in 30seconds or less); and (5) have the necessary equipment ready.

Difficulties to restart the lesson. Upon completion of the activity break, most of the teachers had a hard time to restart the lesson. Students were excited and wanted more activities, but the teachers wanted them to sit down and be quiet to restart the lesson. That made them waste valuable class time. This is aligned with what McMullen, Kulinna & Kothran (2014) found about restarting the lesson. Teachers in their study discussed students' ability to get back on task after an activity break and the difficulty teachers had to deal with, when they wanted them to sit down and continue the lesson. It seems clear that classroom teachers might need help broadening their management skills, to be able to include physical activity in their classes in a daily basis. Specific skills that physical education teachers use, but classroom teachers may not be familiar with. Introducing

such skills during teacher education programs, will likely encourage classroom teachers to use activity breaks in their classes and restarting the lesson will not be a limitation.

Beyond the negative themes, a couple of positive themes emerged from this study. First, students from all classes observed participated in the activity breaks. Activity breaks in a regular class was something unusual for the students, therefore, they were excited about it. All students were curious to see what these activity breaks were, therefore, full class participation was observed. Second, physical activity levels of all students were increased according to the number of breaks given by the teacher. Since all students were participating, the increase was observed in all students; however, there was a variation in that increase, based on the activity breaks given by the teacher.

Generally speaking, teachers in this study could easily understand that when students are tired or feel sleepy, an activity break would help them wake up and follow the rest of the lesson, which is translated in better student performance in school, better understanding and hopefully better report cards. However, most of them did not seem to be comfortable when giving activity breaks in their classes. Furthermore, it's questionable if the participating teachers would continue to give activity breaks after the intervention. Although the purpose of the study was to convince classroom teachers to use activity breaks in a daily basis, for health reasons and to fight obesity, many of them would do so just to awaken the students and help them follow the lesson.

V. Conclusion

The high levels of obesity among Cypriot children were the spark for the present paper. This intervention study clearly revealed that school may significantly contribute to the increase of daily physical activity time. No matter of the type of activity break used, students' physical activity levels were increased. If schools and teachers understand the meaning of providing more time for physical activity to students health and organize their classes in such a way that activity breaks will be given regularly in a safe classroom environment, they will be able to provide much more physical activity to students contributing to the fight against obesity.

It seems clear, however, that common branch teachers will need help broadening their management skills to feel comfortable in giving activity breaks, during a regular school day. Introducing these skills during teacher education programs by demonstrating physical activity breaks to preservice teachers and allowing time for them to practice during their student teaching placement, may encourage them to provide these activity breaks to their students.

The difference on the number of activity breaks given among teachers in this study, demands further investigation for teachers' perceptions as far as the use of activity breaks and furthermore, for teachers' perceptions for physical activity. Collecting further information will help us better understand why some teachers provide more activity breaks than others, how they feel about activity breaks, why some teachers connect activity breaks with the content of the class and others don't, etc. In addition, if teachers are convinced to use activity breaks as an alternative teaching method in a future intervention, this may have a greater impact among teachers and may be easier accepted and implemented in their classes, contributing in kids' higher levels of physical activity.

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