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PRESCHOOL CHILDREN'S ENGAGEMENT IN STRUCTURED PHYSICAL ACTIVITY

Summary

The paper presents the results of research that aimed to explore preschool children's engagement during structured physical activity, and to find in which phase of the structured physical activity the children are most engaged.

The research results, obtained on a sample of 25 middle-group children, show that the children were optimally engaged in structured activities which included dance activities and movement games. The children's engagement largely depended on their motivation induced both by the contents and the teachers. Since the peak of motivation in the dance activity was based on individual success with no competitive element, the children persevered longer and tried harder to learn the given choreography. Related to the contents of the movement game, the children's engagement in the introductory phase of this activity yielded better results than in the introductory phase of the dance activity, with a complete turn of events in the central phase, when the dance choreography motivated children more and gave better results than the central phase of the movement games. It can be concluded that children's engagement in the movement games was dependent on the success, that is, victory or defeat in the game set. If the child is not successful in a movement game, their motivation drops and so does their overall engagement in the game.

The child's gender did not significantly influence the level of their physical engagement during the structured physical activity. Results show that girls were slightly more engaged in dance activities, while the movement games were dominated by the competitive spirit, regardless of the gender. Thus, it can be concluded that the driving force of a child's engagement in both types of structured activities is motivation, as well as success in the task performance.

Key words: engagement, physical education, preschool children, structured activity.

Introduction

During the early childhood, physical activity is one of the essential needs of the child. Children have a constant need for movement and play, and through such activities they develop psycho--somatically. The National Association for Sports and Physical Education (NASPE) recommends that preschoolers engage in minimum 60 minutes of physical activity daily (Clarke et al., 2002). It is generally believed that young children can meet these recommendations through free play, however there are certain indications that it is necessary to implement structured movement (motor) activities in order to achieve optimal development of the preschoolers (Tucker, 2008).

It is well-established that structured physical activity leads to positive effects on physiological and psychological characteristics of school children (Strong et al., 2005). On the other hand, for preschoolers, the effect of structured physical activity is often neglected. One of the reasons of such trend was a general opinion that children at that age are sufficiently physically active (Timmons et al., 2007). However, recent studies point out that there is a problem of increasing obesity and sedentary behaviour in children aged 2-6 years (Tucker, 2008; Marie et al., 2013). In a systematic review, Tucker (2008) concluded that nearly 50% of preschool-aged children (2-6 years) do not engage in sufficient physical activity. Furthermore, Lin et al. (2016) reported

that as many as 90% of Taiwan preschoolers do not follow the recommendations related to participation in physical activities prescribed by the National Association for Sports and Physical Education. Lack of time spent in physical activities leads to reduced motor skills (Holfelder, Schott, 2014; Santos et al., 2016), which are the basis for efficient movement in adulthood (Džinović, Pelemiš, 2016). Also, there is a connection between developed motor skills in preschool age, with engagement in physical activities and the prevalence of obesity during adolescence. Children who have adopted proper movement habits will later participate in physical activities, which certainly have a positive effect on overall health (Robinson et al., 2015). In that context, proper planning, dosing and selection of motor activities are essentials in order to promote optimal morpho-functional development of a child, and later an adult. Special attention should be paid to the selection of a movement programmeme itself, as children's motor engagement may vary according to the type of physical activity.

Probably the most utilized activity in preschoolers' physical education is movement games, which are highly effective in improving basic motor skills (Kojić, 2016). Apart from movement games, dance activities could be a useful tool in preschool curriculum. Dancing themes are always accompanied with music and listening to music has a positive effect on psychological factors during physical activity (Mohammadzadeh, Tartibiyan, Ahmadi, 2008). Also, implementing dance contents promotes significant improvements in motor abilities (Alpert et al., 1990) and can be very productive, especially for young females (Oja, Jurimae, 2002).

In adddition to that, introducing modern technologies and non-traditional equipment in the curriculum of physical education can contribute to a greater level of interest and motivation of preschool children in both competitive and relay games as well as individual motor activities. The characteristics of the external environment have a positive effect on the level of children's physical activity, where green areas and playgrounds contribute to a longer duration of physical activity (Boldemann et al., 2006). Children of more active parents and those who spend more time outdoors are also more physically active (Hinkley, Crawford, Salmon, Okely, Hesketh, 2008).

Based on the observation of traditional physical activities with preschool children, we may notice a decrease in children's interest in organized motor activities, their inactivity, and unwillingness to participate in games and exercises. Motor activities should be purposeful and need to correspond to the experience, interests, desires, and functional capabilities of preschool children. The contents of the movement should be rational, based on the optimal ratio of different types of activities, aimed at the development of mental, spiritual and physical abilities, taking into account the age and individual characteristics of children. Constant monitoring is required to meet such conditions. One of the most important areas of preschool teachers' expertise is the methodological management of the physical education syllabus fulfilment based on a range of factors. First and foremost, it includes the analysis of children's engagement and amount of activity while performing different tasks. The form in which the monitoring of children's engagement is applied mainly coincides with the children's activity in different areas of physical education, the change of their engagement in physical activities depending on the children's physical fitness, their own and their teachers' motivation, but most of all depending on the children's interest. Apart from providing feedback, the obtained results will enable comparisons with the planned outcomes, i.e., aims, which, in turn, would open the possibilities for direct monitoring of every child's progress and assessment of the level of acquired physical contents that make part of the physical education syllabus.

Previous research

Palmer, Matsuyama & Robertson (2016) investigated preschoolers' (n=87, 4.7±0.5 years) engagement during free play and during structured movement programme. The structured movement programme consisted of dance-based activity, a variety of motor skills exercises and movement games. All sessions lasted 30 minutes and physical activity was determined using the accelerometers. They found that children in structured movement programme demonstrated an average of 15 minutes more time spent in light to vigorous physical activity compared to children who played freely.

Shen et al. (2013) examined seasonal variation from autumn to winter in the physical activity among preschoolers (n=60, 3-5 years). The engagement in physical activity was measured via accelerometers during the preschool time and during the after-school or weekend time. The results indicate that overall physical activity level declined in winter, however only during no-school time. On the other hand, during school time, the level of physical activity was equal, regardless of the season. These results point to the importance of preschool institutions in maintaining the optimal dosage of children's physical activity level.

Jakson et al. (2003) compared the level of physical activity between preschool boys and girls (n=104, 52 boys, 3.7±0.4 years). The physical activity level was assessed using accelerometers over 3 days. After 1 year, the measurement was repeated for 60 children (30 boys). The main results indicated that boys were significantly more active than girls and that total activity increases after 1-year period, for both genders.

Vazou et al. (2016) investigated the influence of a 12-week structured movement programme on the physical and psycho-social outcomes with preschool children (n=27, 4 years). They found that movement intervention positively affected the children's perceived competence, which was related to higher motor engagement during the movement programme. These results indicate that success in performing motor tasks is one of the main drivers of the child's engagement in physical activity.

Janković (2013) points out that children's motor engagement varies between different phases of physical activity (introductory, preparatory, main and final phase). On a sample of 166 children, the results showed that during a 30-minute period of physical activity, the children's motor engagement was 17 minutes, and that the engagement was at its peak during the preparatory phase (22.9%), while it is the lowest in the main activity (5.7%).

Marković & Višnjić (2016) investigated preschoolers' motor engagement during the performance of dancing and movement games contents in each phase (i.e. introductory, preparatory, main and final phase). The time of the engagement was measured by random choice of one of the children, who was monitored during the structured activity. The main results indicated that the total dance contents elicited 18 seconds longer engagement compared to the movement games; however this was not statistically significant. During the introductory and final phase, the children's engagement was longer related to the dance contents, while movement games provoked greater engagement during the preparatory and main phase.

Marković et al. (2017) examined the influence of athletic, gymnastic and dance contents on the preschoolers' motor engagement during each phase (introductory, preparatory, main and final phase). They found that the total motor engagement with the athletic and dance contents was higher compared to gymnastics. Also, during the preparatory and main phase, the greatest engagement was observed with the dance contents, while elements of athletics were more efficient during the introductory and final phase. The authors concluded that athletic and dance activities influence preschoolers' motor engagement more positively than gymnastic contents.

Sharma, Chuang, Skala, Atteberry (2011) showed, by using the SOFIT protocol on a sample of children aged 3-6 years, that about 77% of the time measured was spent in light physical activity, and the rest of the time in moderate and intense activity. This study found that physical activity was more intense when the children were outdoors than when they were indoors (about 45% of outdoor time was spent in physical activities, from moderate to intense, and indoors about 13%).

Methodological framework

In the literature, research examining the involvement of preschool children in organized structured activities is scarce, and one of the main factors in the proper growth and development of children is physical activity, about which there is little empirical data; therefore, physical activity of preschool children is largely unexplored.

There is no perfect way to obtain data on physical activities, because no measuring instrument meets all the above criteria at the same time. The ideal measuring instrument or method should be accurate, precise, objective, easy to use, unaffected by the subject's activity, and should also allow continuous and detailed monitoring of motor movement, be socially acceptable and applicable to a large sample of subjects (Livingstone, Robson, Wallace, McKinley, 2003).

However, if more well-designed research is introduced into the practice of preschool education, it is possible to obtain quality data that can eventually lead to appropriate conclusions. The best way to collect data during structured activities is by direct observation because, in addition to data on children's motor engagement, data can be collected on the type of activity, work intensity, social and pedagogical context, etc. In addition, other instruments (pedometer, accelerometer and heart rate monitor) can be used, but the purpose of their use should be to supplement the discussion of the results obtained by direct observation (Janković, 2016).

The research problem refers to the analysis of children's engagement in structured physical activities. In other words, it was necessary to apply the test of children's engagement in physical activity to determine which contents and in which parts of the activity engage children the most.

The research objective was getting a clear picture of the engagement of middle-group preschool children in structured activities of different contents. What is a very important indicator of structured activity is children’s active movement, i.e. their direct engagement in the activity. Therefore, the aim of the research was to collect data that would help determine the engagement of middle-group preschool children in structured physical activity. The subsidiary aims were related to obtaining data on children's engagement by phases of activities, and on the contents which engage children more (movement games or dance activities).

Based on the set aims, the structure of the research was defined, with the following research tasks:

- to prepare and apply suitable structured physical activities in a preschool institution (dance activities and movement games),
- to measure and record chronometric values of children’s engagement in structured physical activities (dance activities and movement games),
- to determine the level of children’s engagement in a structured physical activity by its phases,
- to determine if there is a connection, and of what kind, between the type of the structured activity and the level of children’s engagement,
- to draw adequate conclusions based on the obtained results.

The following hypotheses were proposed for the needs of the research:
H1 – it is assumed that children are optimally engaged and will be able to successfully complete the structured activities (dance activities and movement games);
H2 – it is assumed that there are differences in children's engagement between structured physical activities (dance activities and movement games) related to activity phases (introductory, preparatory, main and final phase);
H3 – it is assumed that children's engagement is closely related to the type of the structured physical activity;
H4 – it is assumed that the child's gender does not affect the level of children's engagement during a structured physical activity.

Since our goal is acquiring new information and knowledge necessary for practical application in preschool physical education, this is classified as applied research. The monitoring of physical engagement was performed in a preschool institution gym, so according to the nature of scientific research, it is empirical, and in terms of duration – it is transversal. Prior to the start of the research, a written consent for conducting it was sought from the management of the preschool institution, an oral consent of the preschool teachers who lead the kindergarten group and a written consent of the parents for their child to participate in the research.

For the purposes of the research, the following instruments were used: a) the test of measuring the children's engagement in the physical activity according to its structure (Appendix 1); b) the protocol for observing children during the activity; and c) a record sheet for recording the data during each stage of measurement (Appendix 2). The dynamics of children's engagement were analyzed and assessed by monitoring the recorded values of chronometric measurement, as a reliable indicator of the level of children's physical engagement during the observed targeted activities.

The research was conducted in the school year 2019/2020. The target group of the research are 4-5 years old (middle-group) children from preschool institution "Blue bird". The sample included 25 participants – 14 girls and 11 boys.

Results and discussion

As already mentioned, a total of 25 children, 11 boys and 14 girls, participated in this research. The two observed activities were divided into four phases (introductory, preparatory, main and final), with a total duration of 30 minutes per activity. The introductory phase lasted 5 minutes, the preparatory 7 minutes, the main 14 minutes and the final 4 minutes.

Based on each child's individual results of engagement, the statistical value of the cross-section, and the arithmetic mean, we generated the average values of children's engagement in the physical activity in the movement game and dance activity areas (tables 1 and 2).

Table 1
Descriptive statistics for each phase during the movement game activity

Phase	Min	Max	Mean	Sd
Introductory (s)	196.0	512.0	310.3	101.2
Preparatory (s)	176.0	508.0	311.6	101.9
Main (s)	404.0	813.0	577.8	133.93
Final (s)	73.0	243.0	153.12	53.93
Total (s)	938.0	1988.0	1353.8	320.2

Table 1 shows that the average motor engagement of children during the movement game in the introductory phase was 310.3 seconds (5 minutes and 10 seconds), in the preparatory phase 311.6 seconds (5 minutes and 11 seconds), in the main phase 577.8 seconds (9 minutes and 37.8 seconds), and in the final phase 153.12 seconds (2 minutes and 33.12 seconds). The total average engagement of children in the structured physical activity conducted in the area of movement games is 1353.8 seconds (22 minutes and 33.8 seconds). The obtained results show that about 80% of the children were engaged in the total duration of the structured activity. A previous study conducted with children of an average age of four and a half years showed that out of the planned 30 minutes, activities lasted 24, and the children were motorically engaged 9.46 minutes (Ružić, Marincel, Runjić, 2006). The maximum and minimum score, as well as standard deviation are also shown in tables 1 and 2.

Table 2
Descriptive statistics for each phase during the dance activity

Phase	Min	Max	Mean	Sd
Introductory (s)	79.0	256.0	144.0	42.1
Preparatory (s)	114.0	381.0	245.0	60.9
Main (s)	601.0	1009.0	879.4	107.4
Final (s)	67.0	211.0	133.7	47.8
Total (s)	866.0	1771.0	1402.5	225.1

When we look at the structured physical activity performed through the dance activity (table 2), we can see that in the introductory phase, the engagement of children through different types of movement is 144.0 seconds (2 minutes and 24 seconds), in the preparatory phase 245.0 seconds (4 minutes and 5 seconds), in the main phase 879.4 seconds (14 minutes and 39.4 seconds), and in the final phase 133.7 seconds (2 minutes and 13.7 seconds). The total average engagement of children in the structured physical activity that was conducted through in the area of dance activity is 1771.4 seconds (29 minutes and 31.4 seconds). The obtained results show a high average value of motor engagement, which can be explained by the higher motivation for the performance of the activity contents, as well as a longer duration of the activity itself.

As the key part of this research was related to testing the accuracy of the proposed hypotheses, we may conclude the following:

The first hypothesis (H1), which assumes that children are optimally engaged and will be able to successfully complete the structured activities (dance activities and movement games) has been confirmed. The total average engagement of the children in the structured physical activity conducted in the field of dance was higher than the engagement of the children in the performance of movement games. Therefore, by applying different contents within structured physical activities, different results for the total motor engagement appear, since higher or lower scores are achieved due to the application of different contents.

The second hypothesis (H2) assumed that there are differences in children's engagement between structured physical activities (dance activities and movement games) related to the activity phases (introductory, preparatory, main and final phase). When looking at the obtained values in children's motor engagement between the movement games and the dance activities for each phase, there are certain diffrences, although not statistically significant (table 3).

In the introductory phase of the movement games children are more engaged than in the introductory phase of the dance activities. It was noticed that there was a lot of restraint on the part of the boys in getting involved in the dance choreography, as opposed to the movement games, which motivated them.

In the central part of the structured activity, there was a greater involvement of children in dance activities. The choice of songs and choreography motivated the children to persevere in repetitions and successfully master the tasks. The girls dominated here as well, as they did in the introductory phase of the dance activity, especially those who are already active in dancing. This result corresponds to the previous findings of Oja & Jurimae (2002), who found greater motor engagement in dance contents for young girls than boys. Nevertheless, after some time, motivated by the positive atmosphere, laughter and encouragement from their teachers, the boys also actively participated in learning the choreography. When performing the central part of the movement games, the children were motivated by personal success (victory or defeat in the game), which contributed to a certain number of children losing interest after one failure, and this was reflected in the results. Similar findings were obtained in a previous research, which reported greater engagement of children who successfully performed the given motor task (Stodden et al., 2008; Vazou et al., 2016). This indicates that perceived competence is one of the main drivers of the child's engagement in physical activity.

In the final phase of the activity, the children were more engaged in the performance of the movement games, which is explained by the choice of content. The children were motivated by the interesting rules and the way they move during the game, so the children's engagement in the final phase was greater in the movement games than in the dance activities.

While assessing the children's engagement in each individual phase of the structured activities, it was observed that in the introductory and preparatory phase, the children were most engaged in the movement games. Conversely, in the main part of the activity, children's engagement was higher during dance contents compared to movement games. This finding indicates that the interest of the children fluctuated depending on the performed activity.

Given that the third hypothesis (H3), which assumes that children's engagement is closely related to the type of the structured physical activity is also confirmed, we can conclude that children's engagement is optimal when, in addition to its main parameters (volume, duration, intensity), the choice of the content is harmonized with children's interests. Besides that, when planning children's engagement in structured physical activities, and, therefore, a successful and efficient fulfilment of physical education contents, the factors to bear in mind are: presence of interest in performing the activity; providing good atmosphere that enables cooperation and prospects of success; assistance only in extreme cases, i.e. if the child asks for it; all activities, if possible, should be conducted outdoors, or if not, then in a sports gym which fulfills all the hygienic (sanitary) conditions.

Table 3
Differences in children's motor engagement between the movement games and dance activities for each phase (mean ± standard deviation)

Phase	Movement games	Dance activities	*t*	*p*
Introductory (s)	310.3±101.2	144.0±42.1	7.573	0.000
Preparatory (s)	311.6±101.9	245.0±60.9	2.800	0.008
Main (s)	577.8±133.9	879.4±107.4	-8.778	0.000
Final (s)	153.12±53.9	133.7±47.8	1.346	0.185
Total (s)	1353.8	1402.5±225.1	-0.622	0.537

Part of the research is based on determining the differences between boys and girls, in respect to different phases of the activity and to the two differently content-oriented activities. These potential differences were examined by t-test for independent samples and can be read from tables 4 and 5. The results show that the fourth hypothesis (H4) is justified, in which it was assumed that the child's gender does not affect the degree of their engagement during the structured physical activity. It is crucial that all children be motivated not only for the contents of the games and dances, but also for a range of other contents, regardless of gender. Based on these results we can see that if all children are sufficiently motivated, there will be no differences between them in terms of their interest in the movement within the two different types of structured activities. In line with these results are the findings obtained by Janković (2016), who reported no significant differences between boys and girls in the variables used to assess the motor engagement of children in structured physical activities. This is an important factor, because preschool teachers do not have to plan programmes specifically for boys and girls, which is also reflected in the rational use of time.

Table 4
Gender differences in motor engagement during movement games for each phase (mean ± standard deviation)

Phase	Girls (n=14)	Boys (n=11)	*t*	*p*
Introductory (s)	306.2±112.1	315.54±90.4	-0.224	0.824
Preparatory (s)	316.7±114.9	305.2±87.6	0.275	0.786
Main (s)	584.4±128.4	571.5±145.3	0.235	0.816
Final (s)	151.9±56.9	154.6±52.5	-0.122	0.904
Total (s)	1359.3±356.5	1346.9±284.1	0.094	0.926

Table 5
Gender differences in motor engagement during dance activities for each phase (mean ± standard deviation)

Phase	Girls (n=14)	Boys (n=11)	*t*	*p*
Introductory (s)	146.3±30.6	141.7±55.1	0.267	0.792
Preparatory (s)	256.8±46.2	230.3±75.6	1.083	0.290
Main (s)	926.0±42.4	820.0±135.8	2.494	0.029
Final (s)	141.2±42.9	124.2±53.9	0.880	0.388
Total (s)	1470.3±103.8	1316.2±304.8	1.606	0.135

In conclusion, direct observation can be useful in many ways, because it can enable collecting relevant data on the content, type and intensity of physical activity, etc., as well as data related to their social and pedagogical aspects.

The combination of these results opens space for the improvement of structured activities themselves and contributes to a better fulfilment of the goals and tasks of physical education, which can directly be reflected in the optimal growth and development of each child.

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Appendix 1

Test: Measuring children's engagement in physical activity

In order for a preschool teacher to have an objective picture of the children's engagement, values are to be recorded for the chronometric measuring of their active engagement in a physical activity, in such a way that the assessor chooses a child and monitors them during the activity. When the child is performing the activity (running, jumping, throwing, doing warm-up or obstacle course exercises...), that is, when it is active, the assessor starts the stopwatch and records the result expressed in seconds in a designated form. Upon the completed performance, the recorded times are summed up, the children's activity (engagement) percentage value is calculated for activity phases and in total, and is graphically represented. The child whose engagement time is being measured should not know they are subject of measuring and observation.

Record

Activity_____

Type of activity_____

1 introductory phase_____

_____total_____

2 central phase

a) preparatory phase (warm-up exercises)_____

_____total_____

b) main phase _____

_____total_____

3 final phase _____

_____total_____

Appendix 2

Graphic representation

Percentage %	**Chart of children's active engagement in physical education activities in %**				
100 90 80 70 60 50 40 30 20 10					
Activity phase	introductory	warm-up	main phase	game	final phase