CHARACTERISTICS OF ACTIVITIES OF CHILDREN WITH CEREBRAL PALSY

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Abstract
Cerebral palsy represents a condition that occurs under the influence of the various factors of the prenatal, natal and postnatal nature, which leads to disorders of various levels and forms of motor, cognitive, sensory, emotional and/or social functioning of the child. It is possible to expect some improvements by the application of modern therapeutic approaches. The aim of the research was to determinate the characteristics of the activity of children with cerebral palsy and investigate differences in the preferences for certain activities in relation to their peers. The research was conducted in March 2018th on the territory of the city Belgrade at the Elementary School for Children with Cerebral Palsy "Miodrag Matic", Elementary School "Dr Dragan Hercog" and Elementary School "Braća Baruh". *The Preferences for Activities of Children* (PAC) was used to evaluate children's needs. In total, 113 children were assessed and classified into two groups, first group included children with diagnosis of cerebral palsy (N= 29), and the second, control, included 84 children from a regular school. The results of the research showed that children with cerebral palsy has the most pronounced tendency towards social activities than towards recreational activities, than the tendency towards self-improvement activities, and also to skills-based activities and physical activities. On the other hand, the children form control group has the most prominent tendency towards social activities, then to physical activities, recreational activities, followed by the inclination to skills-based activities and ultimately the tendency towards self-improvement activities.

Key words*: elementary school, participation, physical disability, preferences for activities, typical development.*

Introduction

Cerebral palsy is a common developmental disability first described by William Little in the 1840's (Sankar & Mundkur, 2005; Rapaić & Nedović, 2011).Cerebral palsy is brain damage caused by brain injury or abnormal brain development that occurs while the child's brain is still developing - before birth (prenatal), during labor (perinatal) or immediately after delivery (postnatal). According to Rapaić & Nedović (2011), cerebral palsy is non progressive condition, caused by prenatal, natal and postnatal factors which cause lesions of the central nervous system, and which is characterized by pathological movements, slow development of motility and some other associated developmental disorders. Radojičić (1985) states that cerebral palsy among children represents loss or disorder of motor function due to the effects of some physical insult, mainly on the motor system of the brain in development. The resulting damage is treated as permanent and stationary, without showing a tendency towards progression.

Cerebral palsy is traditionally classified according to topographic localization of abnormal muscle tone, posture or movement (Panet, N. & Kiely, J 1984):

- Hemiplegia (hemiparesis) – paralysis of both extremities on one side of the body.
- Diplegia – paralysis of both lower extremities;
- Quadriplegia (tetraplegia) – paralysis of the lower and upper extremities

Other classification, by form, is based on the most obvious motor damage (Hagberg et al., 1993; Bullock & Henze, 2000; Cans, 2000) and it includes: spastic form, ataxic form, athetoid form, and dystonic form.

Today the prevailing trend in practice is to classify cerebral palsy by functional independence in terms of gross motor function, fine motor function and communication, focusing on activity and participation levels as described in the World Health Organization's (WHO) international classification of functioning, disability, and health (Compagone et al., 2014). With aim to characterize mobility and communication abilities of persons with cerebral palsy, experts can use tree classification systems: The Gross Motor Function Classification System-expanded and revised (GMFCS-E&R) (Palisano et al., 2007), The Manual Abilities Classification System (MACS) (Eliasson et al., 2006) and The Communication Function Classification System (CFCS) (Hidecker et al., 2011).

In the last 25 years, enormous progress has been made in the understanding of the movement disorder associated with CP, its early detection, classification, and how to measure change over time with reliable and valid outcome measures (Richards

& Malouin, 2013). In the industrialized world the prevalence of the cerebral palsy is about 2 per 1000 live-born, while the incidence showed to be higher in males than females. Surveillance of Cerebral Palsy in Europe (SCPE) reports the ratio of men to women as 1.33: 1.

Motor functioning of the children with motor disabilities determines their ability to participate in certain school (i.e. curricular and extracurricular) activities, and cognitively defines the specificity of receiving and processing information. The nature of motor deficits can be such that interference is created in other areas of functioning. For example, motor disorders can cause limitations in performance of school tasks, activities that contain a motor component, social behavior, activities of daily living etc. Motor and cognitive deficits are functionally manifested in learning problems, even in cases of normal intellectual capacity (Nedović et al., 2002).Trough motor activity, which is one of the main factors people can establish contacts with an external world and social environment. In the case of motor disorder, these contacts are endangered, and this entails the disturbance of physical organization as well as socialization during the developmental process. The motor development goes in parallel with other, thus being mutually conditioned by cognitive, emotional and social development.

Activity limitations and participation in children with motor disabilities may be related with their impairments (Caudill et al., 2010; Mutlu et al., 2017). In the theory and practice of special education and rehabilitation, disorders of cognitive functions is more often associated with developmental period and is described as a developmental disorder (discognition). This disorder is quickly detected by beginning of the formal education. Problems are usually manifested throughout the impaired understanding the meaning of time, space, numbers, attentional and memory capacities attenuation as well.

The literature demonstrates that the participation of children with disabilities is influenced by their functional skills and environmental factors (Furtado et al., 2015).

The level of motor functioning (Milićević, Potić & Trgovčević 2011), physical, social, and attitudinal environment of disabled children influences their participation in everyday activities and social roles (Colver et al., 2012). Children with cerebral palsy have less social, family, recreational and self-care activities (i.e. activities out of the house, playing, adapted physical activities, recreation, social interaction activities) than their peers without disabilities (Slavković, Golubović, Kalaba & Borćilo, 2017). There is significant relationship between personal factors of the child with cerebral palsy and participation in physical, social and self-improvement activities, as well as physical functioning with participation in recreational activities (King et al., 2006). The level of the achieved participation of children with cerebral palsy is directly dependent on individual determinants, namely those related to the child itself (i. e. the level of motor functioning, type and severity of the motor disability, intellectual status, educational level, additional sensory, speech and language impairments and manual skills) and the environmental sociocultural factors as well as their interaction (Milićević, Potić & Trgovčević, 2011). Children with cerebral palsy may have difficulties in doing leisure activities due to social and physical barriers. Participation in various life situations and everyday activities is difficult.

Participation in different activities leads to the development of friendship, social skills, wellbeing, mental and physical aspects of health, as well as motor aspects of functioning. According to International Classification of Functioning, Disability and Health: Children & Youth Version, ICF-CY (World Health Organization, 2007, p. xvi) ‘‘participation is defined as a person’s “involvement in a life situation” and represents the societal perspective of functioning. With development, life situations change dramatically in number and complexity from the relationship with a primary caregiver and solitary play of the very young child to social play, peer relationships and schooling of children at later ages. The younger the child, the more likely it is that opportunities to participate are defined by parents, caregivers or service providers. The role of the family environment and others in the immediate environment is integral to understanding participation, especially in early childhood’’. Satisfying psychological needs through experiences gained by participating in free activities has a positive impact on mental and physical health, life satisfaction and psychological development (Tinsley & Eldredge, 1995). In a similar way, participation is motivating, and recreational activities as well as leisure activities are considered to be a very important part of the child's development (Hendry, 1983; Larson, 2000).

There is a need for assessment of children’s participation in different domains and types of activities. The aim of this research is to determinate the characteristics of the activity of children with cerebral palsy and investigate differences in the preferences for certain activities in relation to their peers. The starting hypothesis is that there will be no statistically significant differences between the students with cerebral palsy and the students without cerebral palsy in preferences towards different types of activities. Also, the assumption is that female students will be more engaged towards social activities, and that male students will be more engaged towards recreational activities

Methods

Participants

In total, 113 children were participated in this research. Total sample was classified into two groups. First group included 29 children with

cerebral palsy mean (M) age 15 years and 3 month (standard deviation (SD)= 2.10, range from 10 to 19 years), from Elementary School for Children with Cerebral Palsy ,,Miodrag Matić'' and Elementary School ,,Dr Dragan Hercog'' from Belgrade. Second, control, group included 84 children without cerebral palsy mean age 13 years and 6 months (SD= 1.30, range 11-15 years).

Table 1. Characteristics of sample by gender and age

	Frequency	Percent
Gender		
Male	55	48.7
Female	58	51.3
Age		
11	13	11.5
12	21	18.6
13	23	20.4
14	26	23.0
15	16	14.2
16	5	4.4
17	5	4.4
18	2	1.8
19	2	1.8

Assessment instrument

In accordance to theoretical framework, for measure children's needs and their preferences for activities in this study was used *The Preferences for Activities of Children* (PAC) (King et al., 2004). PAC is 55-item questionnaire designed to examine children's participation in everyday activities outside of school environment. This questionnaire is appropriate for children and youth, with and without disabilities between 6 and 21 years (King et al., 2006).
In this research PAC was used to assess children's preferences for activities in formal and informal domain, physical activities, recreational activities, social activities, skills based activities and self-improvement activities. Activities were scored in three levels: overall participation score, scores for two domains mentioned above, and scale scores for five types of activities.

Statistical Procedures

Analysis was performed using SPSS (Statistical Package for the Social Sciences), version 20.0. Measures of central tendency, dispersion measures, frequency and percentages were calculated, and results were presented tabular. To determine differences, according to aim and hypothesis of research, between groups it was used t-test for independent samples. The statistical level of significance was accepted to be $p< 0.05$.

Results

The measures of descriptive statistics for instrumental scales of activity inclination for general sample and for sub-samples of the children with cerebral palsy and the children without cerebral palsy are given in Table 2.
The arithmetic means shown in Table 2 represent that the students with cerebral palsy have the most pronounced tendency towards social activities, then the tendency towards recreational activities, as well as the tendency towards self-improvement activities, followed by the tendency towards skills-based activities and physical activities. The arithmetic means shown in Table 2 and show that among the students without cerebral palsy there is the most pronounced tendency towards social activities, the tendency towards physical activities, as well as the tendency towards recreational activities followed by the tendency towards skills-based activities and ultimately the tendency towards self-improvement activities.

Table 2. Measures of descriptive statistics – activity inclination

Scale	Sample as a whole	Children with cerebral palsy	Children without cerebral palsy
	M(SD)	M(SD)	M(SD)
Instrument as a whole	2.18 (.29)	2.17 (.27)	2.19 (.31)
Formal domain	2.04 (.39)	1.95 (.38)	2.10 (.39)
Informal domain	2.24 (.29)	2.24 (.26)	2.23 (.30)
Recreational activities	2.21 (.33)	2.30 (.28)	2.18 (.35)
Physical activities	2.18 (.43)	1.95 (.47)	2.26 (.39)
Social activities	2.56 (.32)	2.64 (.31)	2.53 (.31)
Skills-based activities	2.09 (.50)	1.96 (.48)	2.13 (.50)
Self-improvement activities	1.90 (.46)	2.01 (.51)	1.85 (.44)

***Legend: M- mean, SD- standard deviation**

The results of the t- test from Table 3 showed that children with cerebral palsy on average show fewer tendencies towards physical activities than children without cerebral palsy. The difference is statistically significant at 0.01 level.

Table 3. Results of the t- test for examining the differences in preference for activities between the children with and without cerebral palsy

Scale	Children with cerebral palsy M (SD)	Children without cerebral palsy M(SD)	Df	t
Instrument as a whole	2.17 (.27)	2.19 (.31)	111	.33
Formal domain	1.96 (.38)	2.08 (.39)	111	1.42
Informal domain	2.24 (.27)	2.23 (.30)	111	-.14
Recreational activities	2.30 (.28)	2.18 (.35)	111	-1.67
Physical activities	1.94 (.47)	2. 26 (.39)	111	3.53**
Social activities	2.64 (.31)	2.53 (.32)	111	-1.62
Skills-based activities	1.97 (.48)	2.13 (.50)	111	1.52
Self-improvement activities	2.01 (.51)	1.86 (.44)	111	-1.52

***Legend: M- mean, SD- standard deviation, df- degrees of freedom, t- t-test value **p< 0.01**

The data in Table 4 show that among the girls with cerebral palsy, there is greater preference for activities from the informal omain and self-improvement activities than it is the case with the boys, the differences are statistically significant at p <0.05 level.

Table 4. Results of the t- test for examining the differences in preference for activities between male and female children with cerebral palsy

Scale	Male M (SD)	Female M(SD)	df	t
Instrument as a whole	2.08 (.31)	2.25 (.20)	27	-1.69
Formal domain	1.93 (.41)	1.98 (.37)	27	-.33
Informal domain	2.14 (.31)	2.34 (.18)	27	-2.20*
Recreational activities	2.21 (.26)	2.38 (.27)	27	-1.70
Physical activities	2.01 (.54)	1.89 (.41)	27	.62
Social activities	2.53 (.37)	2.75 (.19)	27	-.20
Skills-based activities	1.89 (.49)	2.04 (.47)	27	-.83
Self-improvement activities	1.76 (.55)	2.23 (.35)	27	-2.74*

***Legend: M- mean, SD- standard deviation, df- degrees of freedom, t- t-test value *p<0.05**

Table 5. Results of the t-test for examining differences in preference for activities between male and female children without cerebral palsy

Scale	Male M(SD)	Female M(SD)	Df	T
Instrument as a whole	2.12 (.32)	2.24 (.28)	82	-1.64
Formal domain	1.97 (.39)	2.16 (.37)	82	-2.20*
Informal domain	2.18 (.31)	2.27 (.28)	82	-1.23
Recreational activities	2.15 (.35)	2.21 (.34)	82	-.83
Physical activities	2.33 (.35)	2.20 (.41)	82	1.44
Social activities	2.42 (.38)	2.62 (.22)	82	-2.87**
Skills-based activities	1.89 (.47)	2.33 (.44)	82	-4.33***
Self-improvement activities	1.81 (.52)	1.89 (.36)	82	-.87

***Legend: M- mean, SD- standard deviation, df- degrees of freedom, t- t-test value *p<0.05, ** p< 0. 01, *** p< 0.001**

Among the children without cerebral palsy, the girls show a statistically significantly higher tendency towards skills-based activities (p <0.001), social activities (p <.01) and activities in the formal domain (p <.05) when compared to the boys (Table 5).

Discussion

The purpose of this study was to determinate characteristics of the activity of children with cerebral palsy, and investigate the preferences for certain activities in relation to their peers.

Children with cerebral palsy against their peers without disability, give less attention to the physical activity, and more importance for them are the sedentary activities and lifestyle (Ryan, Forde, Hussey & Gormley, 2015). This assertion can be justified by the results of a research that shows that children with cerebral palsy have less preference for physical activity than their peers ($p < 0.01$), while in other areas there is no significant difference (Table 3). There was no significant difference in discrepancy scores between children with and without physical disabilities in informal and formal domain of activities (Bult et al., 2014), what we confirmed with this research. Children with cerebral palsy participate in less diverse activities, with less preference than the typical population (Fink et al., 2016), especially in sport and recreational activities, such as group sports, athletic, games and play (Woodmansse, Hahne, Imms & Shileds, 2018). Reduced participation can be justified by the presence of reduced physical abilities, cognitive and emotional experiences of participation and overall previous experience (Conchar, Bantjes, Swartz & Derman, 2014), which is often negative. Furthermore, children with more severe motor limitations often attend segregated school environments where they are exposed to more intense rehabilitation services and adapted leisure activities as compared to children in an integrated school setting (Shikako-Thomas et al., 2012). According to the other research, we can conclude that children with disabilities tend to be more restricted in their participation and in the scope of their daily activities (e.g. formal and informal leisure and recreational activities outside of school, household tasks and social engagements) than their peers (Bedell et al. 2013).

Among the children with cerebral palsy, the girls show on average greater tendencies towards the activities from the informal domain and self-improvement activities when compared to the boys, the differences are statistically significant at $p < 0.05$ level (Table 4). In their study, King et al. (2006) reported that the boys participate significantly more intensively in active physical activities than girls, whereas girls participate more intensively in social, skill-based and self-improvement activities, with higher enjoyment. Authors indicate that boys' and girls' preferences therefore mirrored the data for enjoyment and for participation intensity, but slightly less so. To obtain a rich understanding of different patterns in which children participate in their worlds, can be considered five fundamental dimensions of participation – behavioural aspects (intensity), contextual or environmental aspects (where and with whom activities take place), and affective or motivational aspects (enjoyment and preference) (King et al., 2010). Sometimes, modest correlation between formal and informal activities suggests that some preferences are not realized, that sometimes children are involved in activities not of their choosing (Manjenmer et al., 2010), especially children with disabilities.

By examining the differences in the tendencies towards activities among male and female children without cerebral palsy, the results show that among the subjects without cerebral palsy, the girls show a statistically significantly higher tendency towards skills-based activities ($p < 0.001$), to social activities ($p < 0.01$) and to the activities in the formal domain ($p < .05$) in comparison to the boys (Table 5). Gender can have a significant effect on the discrepancy scores for children without disabilities but not for children and youth with physical disabilities (Bult et al., 2014). This discrepancy could be expected because preference of children without physical disabilities varies between boys and girls.

According to World Health Organization (WHO, 2001), physical, social and personal factors, are an important aspects of environment in which people live and spend their lives. Pattern of participation often depend from opportunities that exist and the support that the environment provides (Coster et al., 2011). Conclusions from other research implicate the fact that the individual factors, such as level of motor functioning, education level, manual abilities, and environmental factors (barriers, social environment support, accessibility, economic power of social environment), can determinate participation of children, youth and adults with cerebral palsy (Milićević, Potić & Nedović, 2015).

Motor activity leads to sensory, cognitive and emotional experiences, which are in correlation with social participation and participation in everyday activities. Disorders in this area condition the occurrence of constraints and make it difficult to obtain spontaneous experiences. Preferences influence involvement in activities, and, therefore, need to be considered as part of rehabilitation interventions aimed at promoting leisure participation (Manjenmer et al., 2010). Good basis for developing social skills and social network support for each child, is participation in everyday activities (at school and the extracurricular ones), while the engagement in the activities of reduced quality and lower frequency may have a negative impact on the establishment of social relationships, accommodation and the quality of life (Milićević, Potić, Nedović & Medenica, 2012).

The limitations of the study are important for considerations the results and recommendation the future research. Number of participants, classified into two groups, it is characterized by a large difference in the number of respondents within the groups. This discrepancy can be justified by the fact that only children with cerebral palsy, who were able to contribute the answering the questionnaire was included in study. Population with disabilities,

especially with cerebral palsy diagnosis, is heterogeneous, so the diversity itself can affect the results of the research. In order to reduce the impact of heterogeneity on results, in future research, it is necessary, to limit the pattern, for example, to the type of cerebral palsy or to use on of classification systems of functioning persons with cerebral palsy.

The results obtained may be of significance for different profile of experts, services, interventions and supports for children, youth and adults persons with cerebral palsy. Teachers form elementary and special schools can involve children's preferences for activities in planning and implementation different kind of activities in school environment. Therapist can get information important for creating and sharing programs and services aimed to improve functional abilities and everyday activities of population with motor disorders.

Conclusion

The results of the study suggest that there are no major differences in the preferences towards certain activities between the children with cerebral palsy and the children of the typical population. These results show that greater involvement of the children with cerebral palsy in social activities is necessary. Within the framework of school activities, various sections and extracurricular activities, games and competitions, different forms of work and activities in nature (excursions, camping), social and entertainment life and participation of the children with cerebral palsy as active participants can be organized, as well as organized visits to cultural, artistic and sports events. Free activities in these children have a major and significant impact on physical and mental health, life satisfaction and psychological development. It also has a significant impact on reducing stress, developing skills, socializing and relaxing. All these activities contribute to better adaptation of children to life with disabilities.

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KARAKTERISTIKE AKTIVNOSTI DJECE SA CEREBRALNOM PARALIZOM

Sažetak

Cerebralna paraliza predstavlja stanje nastalo pod djelovanjem različitih faktora prenatalne, natalne i postnatalne prirode, koji dovode do poremećaja različitih nivoa i oblika motoričkog, kognitivnog, senzornog i/ili socijalnog funkcioniranja djeteta. Primjenom suvremenih terapijskih metoda, moguće je očekivati izviesna poboljšanja. Cilj istraživanja usmjeren je na određivanje karakteristika aktivnosti djece sa cerebralnom paralizom i ispitivanje razlika u sklonostima ka istim u odnosu na vršnjake tipične populacije. Istraživanje je realizirano tokom Marta meseca, 2018. godine na teritoriji Beograda u Osnovnoj školi za djecu sa cerebralnom paralizom ,,Miodrag Matić'', Osnovnoj školi ,,Dr Dragan Hercog'' i Osnovnoj školi ,,Braća Baruh''. Za potrebe procjene korišten je upitnik *The Preferences for Activities of Children* (PAC). Istraživanjem je obuhvaćeno 113 djece, klasificiranih u dvije grupe. Prvu grupu činila su djeca sa dijagnozom cerebralne paralize (N= 29), dok su drugu grupu činila djeca iz redovnih škola (N= 84). Rezultati istraživanja pokazuju da je kod djece sa cerebralnom paralizom najizraženija sklonost ka socijalnim aktivnostima, zatim rekreativnim, nakon kojih slijedi sklonost ka aktivnostima samousavršavanja, aktivnostima zasnovanim na vještinama i fizičkim aktivnostima. Kod djece bez cerebralne paralize najizraženija je sklonost ka socijalnim aktivnostima, koje slijede fizičke aktivnosti, rekreativne aktivnosti, aktivnosti zasnovane na vještinama i na kraju sklonost ka aktivnostima samousavršavanja.

Ključne riječi: *osnovna škola, participacija, sklonost ka aktivnostima, telesna invalidnost, tipičan razvoj*

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