ICT and Children's Leisure Time

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Considering that IT, personal computers, and smartphones have become an indispensable part of everyday life and 'must have' gadget for kids, their excessive use has certain consequences that may result in particular disorders. The question we propose to answer is how long children uses ICT devices during school days and over the weekend, and how much time children use the same devices during school days and during the weekends. The research presented in the paper shows that sedentary life is very dangerous for children, especially in the preschool and primary school period. Our research shows that 5–8% of our children are under high risk, while 34% are under risk in relation to their biological development.

Keywords: education, ICT usage, child development, child movement, education, free time

Introduction

The need for different aspects of physical activity belongs to the one of basic human needs and it is especially pronounced in childhood (Kamenov 2008). Physical activity in preschool age has an important input in physical, social and psychological health (Strong et al. 2005, 732–737).

In the region of southeast Europe, the number of children with developmental disorders is on the rise (Rajović, Davidović Rakić, and Munižaba 2012). In comparison to previous generation, changing trend in regard to developmental problems, such as speech disorders, dyslexia, dysgraphia, orthopaedic disorders, disorders regarding attention deficit, behaviour, emotional, and impulse control, has been noticed (Rajović et al. 2014).

In several studies carried out in the last 10 years in the countries of former Yugoslavia it has been shown that approximately 70% of preschool children has flat feet. Research conducted in Ljubljana on a sample of 127 chil-

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dren aged three years, showed that 72% of respondents had fallen arches (Videmšek et al. 2006). In Novi Sad, it has been found that, on the sample of the 377 respondents aged six years, only 31.66% of children had healthy feet (Milosevic in Obradović 2008, 301–309). The causes may be different, such as inadequate footwear, premature attempts to walk as baby-child, certain illnesses, injuries or not enough walking bare feet or total lack of movement (Brecelj 1997, 12–13; Brecelj 2000, 39–43). If we look at a simple analogy, living beings that do not move do not have nerve cells and nervous system, and species that move have a nervous system, then it is clear that one of the important characteristics of the human species is upright gait and movement. Fine motor skills, dynamic eye accommodation, speech, balance and rotation-based games are important for an optimal synaptic development and the development of cortical structures (Rajović and Rajović 2014, 42–45). The most intense period of synaptogenesis occurs in first few years of life and different brain regions reach maximum of synaptic density at different time; audio cortex already in the third postnatal month (Huttenlocker and Dabholkar 1997). PET imaging studies revealed that overall brain metabolism rises to twice that of adult levels by 4–5 years of age and remains high until 9–10 years of age (Tau and Peterson 2010, 147–168). Increased brain metabolic activity likely reflects the rapid growth of Scudder and glia, as well as the process myelination and synaptic remodelling (Tau and Peterson 2010, 147–168). Findings like these help us understand the importance of the first few years of life for brain development. Accordingly, it is important to understand that a child that is not spending enough time in activities that require physical movement – walking, running, dynamic plays, will not have optimally stimulated development of particular cortex regions.

The Impact of Physical Activity

According to the theory of integral development (Ismail and Gruber 1971) there is a correlation between motor, cognitive and emotional development. This correlation decreases with age, and therefore it is much easier for one domain of development to be affected through other two. According to this theory, developmental domains a child goes through are not independent of one another and so the progress in one domain affects the progress in other domains, which is especially typical for the motor development in early childhood (Trajkovski, Tomac, and Maric 2014, 22–27). In the first two years of life, motor development has a key role in the development of intellectual capabilities and motorically capable children take the information from the environment more easily (Parizkova 1996). The research has shown a significant

positive correlation of motor abilities development and the level of physical activity in preschool age (Cliff et al. 2009, 436–449; Oliver, Schofield, and Kolt 2007, 1015–1070). It has been found that the least physically active children perform poorest on the motor skills tests (Fisher et al. 2005, 684–688).

The Impact of Physical Activity on Cognitive Development

The idea that there is a connection between motor and cognitive development is not radically new. In 1953, Piaget suggested the importance of sensorimotor experience for the development of cognitive abilities (Piaget 1953). Bushnell and Boudreau suggested that early motor development may act as a 'control parameter' for further development, in that some motor abilities may be a prerequisite for the acquisition or practice of other developmental functions such as perceptual or cognitive ability. This was supported by the research which showed that the perception of object is the result of tactile exploration of infants (Bushnell and Boudreau 1993, 1005–1021).

So far, much research was conducted with the aim of understanding the possible correlation of motor and cognitive abilities in children and adults. As a result of this statistical review of the literature (Sibley and Etnier 2003, 243–256), it is concluded that there is a significant positive relationship between physical activity and cognitive functioning (Piek et al. 2008, 668–681). The development of gross motor skills during the first four years of life is the predictor of cognitive development in early school age, especially of information processing speed and working memory. Moreover, it has been found that preadolescent children perform better on school test after 20 minutes of walking prior to the test (Hillman et al. 2009). Brain regions responsible for focused attention and filtration of noisy distractions, i.e. cognitive control were shown to be highly active in comparison to the control group (children who did not take a walk prior to test) (Hillman et al. 2009). It is also known that regular physical exercise improves the object recognition memory (Hopkins et al. 2012, 215, 59–68), whereas physically fit children have better language skills that their peers (Scudder et al. 2014, 140–152). Research carried out in 2015 has shown that physically fit and active preadolescent children show greater hippocampal and basal ganglia volume, greater white matter integrity, elevated and more efficient patterns of brain activity and superior cognitive performance and scholastic achievement (Erickson, Hillman, and Kramer 2015, 27–32). Long term effect of properly developed fine motor skills was also observed. On the school readiness test, fine motor skills, together with attention and general knowledge, have shown to be much stronger overall predictors of later math, reading, and science scorer than early math and reading scores

alone (Grissmer et al. 2010, 1008–1017). Recent study (Chaddock-Heyman et al. 2016, 1005–1021) which was the first to investigate the correlation of cerebral blood flow in the hippocampus and aerobic fitness in children, found that aerobic fitness is directly linked to the greater perfusion in the hippocampus. These results suggest improved microcirculation and cerebral vasculature in preadolescent children with higher levels of aerobic fitness.

Sattelmair and Ratey (2009) suggest that the link between learning and physical activity may be strong: Students who engaged in a high level of strenuous physical activity exhibited higher test scores than those who did not. The researchers suggest that 'physical activity or fitness are not causes per se of enhanced academic performance,' but that enhancing learning, concentration, memory, and mood helps children to be better learners (Sattelmair and Ratey 2009).

Basal ganglia are not only important for motor control but these structures also contribute to a variety of cognitive functions, such as learning, memory, and planning (Aron, Poldrack, and Wise 2009, 1069–1077). It has been shown that childhood aerobic fitness is associated with deep brain structures and function. Compared to their peers, higher-fit children showed greater volumes of the dorsal striatum (component of basal ganglia) as well as better performance on a flanker task that measures both, attention and inhibitory control (Chaddock et al. 2010, 249–256). In addition, the results also revealed a link between childhood aerobic fitness, globus pallidus (component of basal ganglia) volume and flanker task performance (Chaddock et al. 2010, 249–256). Thus, children that were more fit showed enhanced cognitive control. Much research carried out recently suggests that a cerebellum, beside its well-known motor control function, is directly linked to cognitive processing (Koziol et al. 2014).

Research

This paper presents part of the results of the research we have conducted to verify how children spend their free time in front of various smart devices, including PC or in activities that involves movement. We made a differentiation among the working days and the weekends asking to rank the amount of time for each activity for these two categories.

The data collection has been conducted in 15 schools in Croatia, Italia and Serbia from May 2015 to May 2016. In Croatia we have analysed 8 primary schools, 6 in Istria (3 Italian, 2 Croatian and one with Italian and Croatian as teaching languages) and 2 in Zagreb. In Italy we analysed 4 primary schools and in Serbia 3 primary schools. In total we interviewed 1286 children, 630 boys and 656 girls from the first to the fifth grade of elementary school. For

the purpose of the research we divided them in two categories: 7–8 and 9–10.

The questionnaire has seven questions with 19 variables. We decided to avoid a long questionnaire to minimize the risk of superficial and quick answering. All the questions and possible answers were on the same sheet of paper. The main hypothesis was that children today have a sedentary lifestyle due to massive use of TV, computer and smartphone use. The answers to the questionnaires have been statistically analysed using the IBM SPSS 21 software. In the analysis were kept only the questionnaires that answered all the question in a readable way.

For this purpose, we analysed the following questions:

1. How long do you watch TV during working days?
2. How long do you watch TV during weekends?
3. How long do you use the smartphone during working days?
4. How long do you use the smartphone during weekends?
5. How much do use the PC during working days?
6. How much do use the PC during weekends?
7. How much do you play outdoor during working days?
8. How much do you play outdoor during weekends?

Results of the Research and Discussion

The Results of Research about Watching TV During Working Days

During the working day, most of the respondents in Croatia watch TV less than one hour a day (40.3%), while 37.3% of respondents watch TV 1:00 to 3:00 hours. 9.2% are watching TV from three to five hours a day watching television, while and more than five hours a day, 5.9% of respondents. In Italy 45.9% respondents watches TV less than one hour during the working day, and 29.9% from one to three hours. 7.5% watches more than five hours of television. In Serbia, during the working days, most people watch television than one to three hours (38.9%), while 30.3% from three to five hours and 3.8% more than 5 hours. According to participants answers, it is evident that all the respondents on average watch television from 1:00 to 3:00 hours per day (36.4%), which may be an indication that the respondents during the week spend too much time in front of the TV ($\chi^2 = 156.675$, df (10), $p = 0.000$). The results can be considered statistically significant.

The Results of Research about Watching TV During Weekends

The results shows that the majority of respondents in all three countries, on average, watch TV 1:00 to 3:00 hours. Compared to watching TV during the week, weekends respondents spend more time in front of TV: 26.7% of re-

spondents watch TV 3:00 to 5:00 hours, and 12.2% more than five hours (χ^2 = 126.652 *df* (10), p = 0.000). The results can be considered statistically significant.

Results of Research on the Use of Smartphones during the Workday

Respondents in all three countries use the smart phone during the working day less than one hour (34.7%). 24.3% uses it only for calling, while 23.5% of respondents do not own a smartphone. In Croatia, the smart phone is used, during the working day, less than an hour by 35.5% of respondents, while 14.7% of respondents uses them from one to three hours. In Italy the smartphone is used less than an hour by 40.4% of respondents, and from one to three hours 10.5% of respondents. In Serbia 31.5% of respondents uses less than an hour the smartphone, while from one to three hours 9% of respondents. In all three countries 2.8% of respondents uses more than 5 hours the smartphone during the day (χ_2 = 48.705 *df* (10), p = 0.000). The results can be considered statistically significant.

Results of the Use of Smart Phones during the Weekend

Over the weekend 31.7% of the respondents in all three countries, use the smart phone less than an hour, 16.7% from one to three hours. Five% of respondents uses the smartphone more than 5 hours. Compared to use during the working day there is a major number of respondents that uses longer the smartphone. We notice also that a higher percentage of respondents in all three countries uses smartphone 1:00 to 3:00 hours (16.7%) over the weekend as compared to working Day (χ_2 = 47.006 *df* (10), p = 0.000). The results can be considered statistically significant.

Results of Research on the Use of Computers during the Week

The survey results show that respondents in all three countries use the computer during working days less than one hour a day (48%). 3.2% uses it from three to five hours during the week in all three countries. Indicative is the figure that by respondents in Croatia, 28.2% of them are not used as the respondents in Serbia (33.6%), while in Italy it is not used only 1.5% of respondents (χ_2 = 57.729 *df* (8), p = 0.000). The results can be considered statistically significant.

Results of Research on the Use of Computers over the Weekend

Respondents in all three countries use much more the personal computer compared in relation to the use of the same during the week over the week-

end. The number of hours of use over the weekend was also higher than in the weeks where 6.8% of respondents use the computer for three to five hours and 5% more than five hours. A total of 37% of respondents over the weekend uses a computer less than an hour, 23% of one to three hours during the weekend ($\chi_2 = 292.162$ *df* (10), $p = 0.000$). The results can be considered statistically significant.

The Results of Playing Outdoors during the Week

45.3% of the respondents in all three countries during the workday playing outside 1:00 to 3:00 hours, 14.3% 3:00 to 5:00 pm outside the game of respondents. Total 8.5% of respondents did not play out (9.2% of respondents in Croatia, 12.4% of respondents in Italy and 6.2% of respondents in Serbia). More than five hours outside to play in all three countries total 6.7% of respondents ($\chi_2 = 29.446$ *df* (8), $p = 0.000$). The results can be considered statistically significant.

The Results of Playing Outdoors during the Weekend

Over the weekend 39% of respondents play outdoor from 1:00 to 3:00, and from three to five hours in total 24.2% of respondents. The 17.7% of respondents play more than five hours playing outdoor. In Italy, 10.2%, in Croatia 6.1% and in Serbia 3.2% of the respondents do not play outside during weekends ($\chi_2 = 71.087$, *df* (8), $p = 0.000$). The results can be considered statistically significant.

Conclusions

Studies, such as the one carried out in 2014 as part of the 'Influence of Modern Devices use on Development of School-Age Children' project (Rajović et al. 2014), has shown that children spend little time outdoors and a lot of time in front of computers or other modern technical devices and gadgets (Đedović, Rackov, and Stanojev 2015, 225–228). Above mentioned study found that children (9–10 years old), during the workweek, spend two hours a day on average in front of a screen (TV or computer), and four hours on the weekends. In this age group, 84.4% of students own a cell phone and use it mainly for video games, social networks and messaging. More than 90% of children have access to a computer that is almost exclusively used for games, and over 30% of them use it more than three hours a day.

Although positive aspects of social media should not be neglected, there are numerous downsides. It has been shown that social media can affect the mental health of teenagers, and this influence corresponds to the time spent

on social media. Spending time on social media increases the risk of developing depression (Rideout, Foehr, and Roberts 2010). Additionally, teenagers and young adults who use Facebook more often show more narcissistic tendencies and antisocial behaviours, mania and aggressive tendencies, respectively (American Psychological Association 2011). Study conducted in 2013 has shown that Facebook use influences subjective well-being over time. The more people used Facebook at one time point, the worse they felt afterwards (Kross et al. 2013). Moreover, the more they used Facebook over two-weeks, the more their life satisfaction levels declined over time (Kross et al. 2013). Studies found that adolescents and even college students who have tendencies to often check Facebook achieve lower grades (American Psychological Association 2011).

Considering the age of our research participants, as well as the potential sources of danger, we think it is necessary to educate not only children but their parents and teachers as well. Viewed from the physiologically developmental perspective of children, physical activity as a way of preschool age play forms the firm ground for the future scholastic achievement. Guided by intrinsic need, a child uses her body as an instrument of play and the modern lifestyle provides less and less possibilities for the satisfaction of these needs. At the preschool age, play-based learning includes not only intellectual but emotional and motivational development as well.

It is extremely important to educate parents and teachers on this issue, because recent research indicates that a lack of aerobic activities can have an impact on decline of cognitive abilities (Chadock et al. 2010). It is known that the most sensitive brain function are those that are the evolutionary youngest-most recently evolved; among which are cognitive processes required for reading, writing, and calculating. If some areas of the cortex are underdeveloped or not stimulated enough, the first function to be affected will be those required for reading, writing, and calculating. The fact is that modern society, in addition to the many benefits, carries with it many potentially dangerous consequences. Recommendation of American Society of Pediatricians (AAP) is that children and teens should spend no more than an hour or two a day in front of screens. Despite this recommendation, it has been shown the children in the United States, born after year 2005, are spending on average 35 hours per week watching television; not including the time spent on a video game or other technological devices and gadgets (Rothman 2013). On the other hand, the World Health Organization (WHO) recommends at least 60 minutes of daily physical activity (moderate to strong) for children 5–17 years old. Although the use of modern technology devices is useful, it is

needed to limit the time spent on those devices, especially to children in development. Parents must provide as much evolutionary accordant and outdoor activities as possible to children. This will enable children to develop their overall abilities.

Based on the results of our research, we can conclude that respondents spend too much time in front of various ICT devices and not enough time outdoors or at least doing physical activity. During the day 36.4% of respondents watch TV one to three hours a daily, 18.3% of respondents more than five hours daily during the week. During weekends 34.9% of respondents watch TV from one to three hours, 26% of respondents from three to five hours, and 12.2% of respondents more than five hours. From the results of our research about watching TV we can conclude that on kids watch TV more during the weekends.

On weekdays 11.3% of respondents use the smartphone from one to three hours a day and 3.5% of respondents use it from three to five hours a day. On weekends, 16.7% use the smartphone from one to three hours daily and 5.4% of respondents use it from three to five hours. The results show that the use of smart phone over the weekend is the rising. Regarding the PC 18.8% of respondents uses them from one to three hours, 3.2% of respondents from three to five hours, and 2.2% of more than five hours. During weekends computer 26.3% of respondents use them from one to three hours, 6.8% use them from three to five hours, and 5% of respondents use then more than five hours. Results show that the use of computers is increasing over the weekend. 8.5% of respondents do not even play outside during the week, and 25.2% do so less than an hour. During the weekends the situation is even worst: 5.6% of respondents does not play, and 13.4% of respondents plays less than one hour daily.

It can be concluded that respondents over the weekend longer watch television, use the computer and smartphones that that, unfortunately, there are still subjects that even during the week even over the weekend cannot play outside. The problem now is clear and is much deeper of the micro data we presented in this paper and question is: what now? We propose a new approach to schooling and to parent education. Our approach will include part of the Montessori, Waldorf and Dewey point of view combined with what we have today as new scientific knowledge.

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Informacijsko-komunikacijska tehnologija in prosti čas otroka

Glede na to, da so informacijsko-komunikacijska tehnologija (IKT), osebni računalniki in pametni telefoni postali nepogrešljiv del vsakdanjega življenja ter otrokom potreben pripomoček, ima njihova pretirana uporaba določene posledice, ki lahko povzročijo določene motnje. Vprašanje, na katerega želimo odgovoriti, je, kako pogosto in koliko časa otroci uporabljajo IKT pri učnih urah ter med vikendom. Raziskava je pokazala, da otroci živijo v zelo nevarnem okolju, še posebej v predšolskem in osnovnošolskem obdobju, in da je 5–8 % naših otrok izpostavljeno visokemu tveganju, medtem ko je 34 % izpostavljeno tveganju glede na njihov biološki razvoj.

Ključne besede: izobraževanje, uporaba IKT, razvoj otrok, gibanje otrok, izobraževanje, prosti čas