INFLUENCE OF EXCESSIVE SCREEN TIME ON PHYSICAL ACTIVITY LEVEL, EXCESS WEIGHT AND BACK PAIN IN CHILDHOOD: A LITERATURE REVIEW


1Núcleo de Pesquisas Tecnológicas (NPT) da Universidade de Mogi das Cruzes (UMC). Mogi das Cruzes – SP, Brazil
2Centro Universitário Carlos Drummond de Andrade (Unidrummond). São Paulo – SP, Brazil
3Universidade Estácio de Sá (ESTACIO CETEC). São Paulo – SP, Brazil
4Centro de Estudos do Laboratório de Aptidão Física de São Caetano do Sul (CELAFISCs). São Caetano do Sul– SP, Brazil
5Universidade do Vale do Paraíba (UNIVAP). São José dos Campos – SP, Brazil

DOI: http://dx.doi.org/10.24327/ijrsr.2020.1103.5187

ARTICLE INFO

Article History:
Received 13th December, 2019
Received in revised form 11th January, 2020
Accepted 8th February, 2020
Published online 28th March, 2020

Key Words:
Screen time; Childhood physical activity; Child obesity; Back pain;

ABSTRACT

The excessive use of technological devices in childhood, such mobile phones, televisions, computers, video games and tablets, can cause a reduction in physical activity levels, increasing the susceptibility to development of childhood obesity. Additionally, scientific literature has been describing that spending long periods in incorrect postures, such as sitting watching television or similar activities, can cause postural deviations and consequently back pain in children and adolescents. Therefore, due to relevance of topic, this study aims to investigate influence of excessive screen time on physical activity level, overweight and back pain in childhood by a literature narrative review.

INTRODUCTION

Screen habits (habits related to use of technological devices that have an electronic display such mobile phones, televisions, computers, video games and tablets) are increasingly present in daily routine of humanity, including by children and adolescents. This fact resulted in habitual and behavioral changes, mainly with regard to level of physical activity in population. In children and adolescents, specifically, this is very worrying, because a good part of the world population in this age group is not adopting recommendations regarding minimum weekly time of physical activity for maintenance of health. Today, insufficient physical activity levels of children and adolescents are directly contributing to increase a serious public health problem, childhood obesity. This is an extremely worrying situation, as obesity can persist into adulthood in addition it is a major risk factor for development of metabolic syndrome and chronic non-communicable diseases in childhood.

In addition, excessive screen time also contribute to appearing of deviations and postural changes in the spine. This is due to the long periods when children and adolescents remain in incorrect static postures, such as sitting watching television or...
similar activities. These postural deviations can negatively influence quality life of children and adolescents, because in addition to causing pain in some cases, they can be a predisposing factor to spinal degenerative conditions. Therefore, due to relevance of topic, this study aims to investigate influence of excessive screen time on physical activity level, overweight and back pain in childhood by a literature narrative review.

LITERATURE REVIEW

Excessive screen time by children and adolescents

Since the dawn of humanity, with the rise of prehistoric man, the need to move has been present in society. The movement in question, guaranteed much more than locomotion or performing simple daily tasks, it represented a crucial and extremely important element for survival. The lifestyle of prehistoric man demanded a great physical effort in carrying out daily activities, because absence of technological devices unlike current days, demanded high levels of physical activities in tasks such as fight/flight, locomotion and the looking for food. Thus, physical capacities such as strength, endurance and other skills, guaranteed man's survival, especially in critical periods such as drought.

In addition to adults, children and adolescents were also influenced by this growing technological revolution. Indeed, the contact of children and adolescents with several technological devices has been happening in increasingly early age groups, whether through television, mobile phone, computer, a tablet device, video game, among others. The time spent daily using these devices is commonly described in the literature as "screen time". Among the main screen habits, there are several electronic games and real-time messaging applications, widely used mainly by children and adolescents. It should be noted that a representative portion of the world population of children and adolescents exceeds the recommendation of American Academy of Pediatrics and accumulates more than two hours of screen time daily.

In the vast majority of times, the use of technological devices happens without any prior control by the parents, which can harm the development of children and adolescents, negatively influencing their habits throughout life. However, it is known that technological devices in childhood are important didactic-pedagogical tools and can positively influence development, especially in cognitive aspects. About excessive screen time, on June 18, 2018, in 11th update of the International Classification of Diseases (ICD), a manual that describes the definition and codes of pathologies, serving as a parameter for the work of physicians from all over the world, obsessed electronic-game started to be considered a mental disorder and was called "game disorder". In guideline, disorder is described as a pattern of frequent or persistent behavior of obsessed electronic-game started addiction, so severe that it makes one prefer games to any other daily life activity. According to the board of the WHO Department of Mental Health, this inclusion of the gaming disorder that had already been processed in the committees of the organ since the year 2014, has become emerging due to scientific evidence that the increase in the demand for the treatment of this, now disturbance, in various parts of the world.

In this context, it is increasingly common for the “traditional games” that were part of children's culture to be replaced by the social isolation caused by technology. This directly influences the physical activity level of children and adolescents, in order to make them less and less physically active.

Physical inactivity in children and adolescents

We can understand physical activity as any body movement performed voluntarily through the contraction of skeletal muscles, which raises energy expenditure beyond resting levels. This definition was developed by Carpensen and cols (1985) and is still adopted by the World Health Organization (WHO). Thus, the most varied movements performed in different contexts, when they require a caloric expenditure, greater than when they are at rest, are considered physical activities.

It is very common that the terms physical activity and physical exercise are used without distinction. This error occurs because the practice of physical exercise is one of the subcategories of physical activities, and because both have the central characteristic of performing body movements that require greater energy expenditure than in rest. However, the key factor that differentiates these two terms is that physical exercise is carried out in a systematic and structured way, with specific objectives in relation to physical fitness, whether sports or health related. By physical fitness, we mean the ability of an individual to perform physical activities and/or physical exercises with vigor and disposition. In this way, the less effort an individual has to perform a task, the greater his physical fitness level, that is, his physical fitness.

Excessive screen time by children and adolescents negatively influences the levels of physical activity in this audience. A good part of the world population of children and adolescents is not obeying the recommendations regarding the minimum weekly time of ideal physical activity for the maintenance of health. According to the WHO, children and adolescents should perform at least 300 minutes of moderate to vigorous physical activity per week. According to the minimum recommendation of physical activity suggested by WHO for children and adolescents, it is possible to verify a high rate of physical inactivity in this public.

Regarding the high levels of physical inactivity in children and adolescents, the specific scientific literature points out that this can vary from 18.7% to 90.6% in the world. An interesting fact is that the highest percentages of physical inactivity were present in underdeveloped countries. Additionally, it was possible to verify that girls are less active than boys, and that sociodemographic variables such as place of residence, socioeconomic profile and use of electronic devices such as computers, video games and television, significantly influence the high levels of physical inactivity in childhood and adolescence.

The high rates of physical inactivity in children and adolescents directly contribute to increase obesity in this public, which is already considered a worldwide pandemic. Indeed, it is already well described that although obesity is influenced, in part, by the biology of the individual, habits such as excessive screen time and its subsequent impact on the reduction in
physical activity levels also contribute directly to childhood obesity\textsuperscript{2,4,24,25}.

**Obesity in children and adolescents**

Obesity is considered a metabolic disorder, characterized by the excessive accumulation of body fat that can cause damage to health\textsuperscript{26}. Once established, obesity presents health risks, as it is associated with a greater susceptibility to the development of chronic non-communicable diseases\textsuperscript{27,28}. Although not yet fully understood, it is known that the etiology of obesity can be associated with numerous factors, such as gene polymorphisms\textsuperscript{29,30}, dysfunctions in hormone signaling and production\textsuperscript{31,32}, increased production of pro-inflammatory adipokines\textsuperscript{33}, changes in the positive energy balance, in which the calorie intake is greater than your daily expenditure\textsuperscript{34} and also due to a greater use of technological devices that imply a decrease in the levels of physical activity, especially in children and adolescents\textsuperscript{4,5,20}.

Childhood obesity can be defined as a condition in which excessive accumulation of body fat occurs in adipose tissue during childhood\textsuperscript{35,37}. This accumulation, in turn, brings a series of physical and metabolic changes that are harmful to child health and development\textsuperscript{29,33}. In childhood and adolescence, obesity is usually classified through the Body Mass Index (BMI), with percentile values equal to or greater than 95, according to sex and age group. A worrying fact is that the development of childhood obesity may be associated with the maintenance of this pathophysiological state during adulthood\textsuperscript{38}. In addition, childhood obesity is associated with a greater susceptibility to the development of chronic non-communicable diseases\textsuperscript{30,33}, such as metabolic syndrome\textsuperscript{36}, type 2 diabetes mellitus\textsuperscript{37} and systemic arterial hypertension\textsuperscript{39}.

Since foundation of WHO in 1948, obesity has become part of the International Classification of Diseases (ICD), receiving the status of pathology\textsuperscript{39}. Around 1948, obesity officially received greater attention by health authorities, this was due mainly to the perception that, besides physical and metabolic impairment, obesity brings with it large expenditures to public health systems\textsuperscript{39}. In this sense, it has been pointed out that expenditures due to obesity in the world, represent 2 to 7% of the world revenue with health\textsuperscript{40}.

Around 1970, there was an exponential growth of childhood obesity in the world\textsuperscript{41}, especially in industrialized countries\textsuperscript{24,41,42}. Underdeveloped countries have higher rates of childhood obesity when compared to developed countries. Paradoxically, it is still possible to observe in some developing countries, especially on the African continent, a high number of malnourished children, that is, well below the ideal weight for their height and age group\textsuperscript{42}.

A high incidence of overweight in children has been observed worldwide. This can be seen clearly in United States\textsuperscript{41,44}, Europe\textsuperscript{45} and Latin America\textsuperscript{46}. In 2010, there were approximately 42 million overweight children in the world. As if this phenomenon were not enough, it continues to grow, especially in developing countries where excess child weight can vary from 10 to 40%, with a greater incidence in the age group between 5 and 6 years\textsuperscript{26}.

In 2011, the prevalence of childhood obesity in the world in children under 5 years of age was 7%, which represented an increase of 54% when compared to an estimate made in 1990. Additionally, it is believed that in 2025 this number even greater, in this case, 10% of the population in that age group may be obese\textsuperscript{47}. These estimates make sense, because in United States, for example, childhood obesity has tripled in the last 40 years, so that in 2011, 8.1% of babies and children were overweight\textsuperscript{48}. This fact is worrying, since childhood obesity begins to appear in increasingly tenuous age groups\textsuperscript{26,47,48}.

**Back pain in children and adolescents**

The body posture of the man in a biped position can be defined as the organization of body segments that each individual does to ensure the ideal balance between the skeletal muscle system in the most varied situations, whether static or in motion\textsuperscript{49}. In addition, a good body posture, must present symmetry between the body segments as well as the absence of pain\textsuperscript{50}. As if that were not enough, the sedentary lifestyle characteristic of excessive screen time, due to the long periods in which young people remain in incorrect postures, such as sitting watching television, overload the spine and may also influence the appearance of postural deviations and/or additions\textsuperscript{11,15}.

Back pain affects a representative portion of adult population\textsuperscript{51}, especially in developing countries\textsuperscript{52}. A study conducted by Ferreira and collaborators (2011)\textsuperscript{53} in brazilian city of Pelotas, state of Rio Grande do Sul, investigated the prevalence of back pain in 972 adults aged between 20 and 69 years. In this case, it was observed that 63.1% of interviewees complained of back pain, that the region of the spine most affected by pain was the lower back, with a higher prevalence in females. In case of a highly productive age group, this has a negative impact on the country's economy\textsuperscript{54}. Furthermore, it is worth mentioning that this condition can also negatively affect the ability to perform activities of daily living\textsuperscript{55}.

In addition to the adult population, research indicates that school-age children and adolescents have also been affected by back pain. In a Danish study conducted by Skoffer (2007)\textsuperscript{56}, which evaluated 546 schoolchildren aged 14 to 17, it was found that 60% of students complained of back pain in the last 12 months. Martinez-Crespo et al. (2009)\textsuperscript{57}, when investigating the prevalence of back pain in 887 students from Seville city in Spain, found an even higher prevalence, in this case, 66%. In brazilian schoolchildren this phenomenon is very similar. Noll et al. (2016)\textsuperscript{58} found in 1720 schoolchildren aged 11 to 16 years living in Teutonia city, belonging to the state of Rio Grande do Sul, that 55% of this sample reported experiencing pain in their back in last 3 months.

Although the prevalence of back pain is well described in literature\textsuperscript{51,52,56,58}, the factors involved in its genesis are not yet fully understood and are conflicting in some cases, especially among schoolchildren. The scientific literature suggests that the prevalence of back pain in children and adolescents is influenced by multiple factors, such as behavioral, physical, psychosocial and genetic\textsuperscript{59}. Thus, age, sex, sleep habits, physical activity level, anxiety and depression, heredity and screen time can be predictors of back pain in children and adolescents\textsuperscript{60,65}.
CONCLUSION

In summary, excessive screen time by children and adolescents cause a reduction in physical activity levels, which increases the susceptibility for the development of childhood obesity, which in turn is an important risk factor for onset of diseases chronic non-communicable diseases in childhood. In addition, it is well described that long periods in static positions with incorrect postures, such as sitting watching television or in similar activities, typical of use of computers, mobile phones, video games and tablets cause postural deviations and consequently back pain, including in children and adolescents.

Acknowledgement

This study was supported by Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq). In addition, the authors thank the support provided by the staff of Secretaria de Educação do Estado de São Paulo (SEESP).

References

28. Pereira-Lancha, Luciana O., Patricia L. Campos-Ferraz,


