Electronic forms of entertainment in the context of physical activity and addiction risk – a knowledge review

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Abstract

A new way of spending leisure time browsing the Internet, using social networking sites, and playing games has created a new health problem: cell phone addiction. So-called phonoholism or netholism is most thriving among young people, who prioritize entertainment in the real world, which most often necessitates physical activity, over entertainment in the virtual world, which requires a more static approach. However, some companies have gone

against the traditional use of phone games by creating multimedia city games that require a dynamic-movement approach.

The aim of this review is to gather current theoretical knowledge about electronic forms of entertainment in the context of their influence on users' physical activity, creation of health potential and formation of risk of addiction to such forms of entertainment.

Key words: physical activity, electronic entertainment, urban multimedia games, multimedia addiction

Background

We live in a time of rapid technological advancement. In 1956, the first cell phone prototype was created, today cell phones, smartphones, and tablets are elementary objects of many people's daily lives [1]. However, the use of mobile cellular connectivity has not just been limited to an easier way to communicate. Nowadays, smartphones and tablets, usually via the Internet, serve as a source of information, a locator, a means of payment, an exercise coordinator, a health indicator meter, and also as a source of entertainment. There are many games designed for this type of portable computer, which are increasingly used by children as well [2].

A new way of spending leisure time browsing the Internet, using social networking sites, and playing games has created a new health problem: cell phone addiction. So-called phonoholism or netholism is most thriving among young people, who prioritize entertainment in the real world, which most often necessitates physical activity, over entertainment in the virtual world, which requires a more static approach. However, some companies have gone against the traditional use of phone games by creating multimedia city games that require a dynamic-movement approach [1, 2]. Ingress Prime, Pokemon Go, Draconius Go, Jurassic World Alive, and Harry Potter: Wizards Unite combine multimedia gaming standards with physical activity to help combat one of the main effects of excessive cell phone use, low physical activity. Innovation of a new generation of games along with the combination of cult titles (such as Pokemon, Jurassic Park or Harry Potter) attracted a large number of users from different age groups. However, mobile urban games still have a tendency to become addictive, causing the translation of the virtual world into the real world, causing many social, psychological and economic problems [3].

The purpose of this review was to gather knowledge about the nature of electronic entertainment and to place it in the context of physical activity and addiction. The article

discusses issues such as the determinants of physical activity, technological advances from a psychosocial perspective, the development of electronic entertainment, urban multimedia games as a public health problem, and electronic entertainment addiction.

Determinants of physical activity

The way in which health is defined depends on the level of scientific knowledge and worldview, and over the centuries, health has been explained in different ways, mainly focusing on disease, to which this scientific term has been compared [1]. In the currently available literature, there are many definitions of health, but the most popular one, to which most researchers tend to adhere, is the definition proposed by the World Health Organization, according to which 'health is the fullness of physical, mental and social well-being and not merely the absence of disease or infirmity'. In this definition, in addition to physical health, which mainly concerns biological elements, attention is paid to the psychological dimension and social health [1, 2].

Nowadays, health is also considered to be a highly placed value in the hierarchy of life values, but, like the definition, the perception of the value of health has changed over the centuries, and is usually strongly influenced by the treatment of life as the highest value [2]. In past and some current cultures, life did not always have a supreme value, and a higher rank in life was often held by religion, beliefs, honor, or devotion or subordination to particular elements. For example, Nordic warriors were not afraid to die or be wounded because they had faith in an afterlife (Walhalle), and they also placed the value of their lives and health lower than merit in battle and a worthy warrior's death [3].

One of the original and most well-known concepts of health originated in Ancient Greece, through the teachings of Hippocrates, who defined health as wellbeing, while illness was attributed to malaise, both of which must be balanced in order to maintain internal equilibrium (full health) [3]. The treatment of well-being as a key element of health persisted until the 17th century. With a new vision of defining health (as well as the whole world) came Rene Descartes, called Descartes. Using the universal laws of mathematics, geometry and mechanics that he developed, he compared the human body to a machine that works if all of its parts are in working order. Descartes compared disease to the 'failure' of one part of the body, and human health began to be perceived as the absence of disease. In the 1950s, the complexity of the concepts of 'health' and 'disease' began to be understood, influenced not only by biological, but also by social factors [2]. Health was defined as the ability of an organism to function normally with regard to all its organs and functions, as the ability to

adapt to a changing environment or as the physical and mental potential for active development, while disease was considered a threat to health and its potentiality. With a new theory trying to define health came out the holistic view, which assumes that a person is an integral whole that cannot be divided, and medicine should focus on its totality [3]. Although some approaches and methods of the holistic view are not consistent with existing knowledge, holistic thinking has penetrated many fields of science, including medicine. The World Health Organization in 1946 developed a concept of health using the holistic paradigm, which reads as follows 'Health is not only the complete absence of disease or infirmity, but also a state of complete physical, mental, and social well-being (good health)' [2].

With the development of the concept of health and disease, where began to pay attention to the factors affecting the well-being of human life. Marc Lalonde in his 1974 report 'A New Perspective on the Health of Canadians' introduced the concept of estimating the degree of influence of certain factors on human health [1]. Later, many attempts were made to improve the report in estimating individual health phenomena, but the lifestyle was always the most important determinant of health [4]. It has been attributed up to 50% of the total incidence of cancer, according to Professor Robert Thomas, a renowned oncologist from the United Kingdom [5]. The elements that build the main determinant of health include diet, ability to cope with stress, sexual behavior, use of products containing nicotine, alcohol or psychoactive substances, and one of the most important, whose insufficient level predisposes to many diseases and health problems, namely physical activity [2].

Physical activity is usually defined as 'any form of bodily movement caused by muscular contraction at which energy expenditure exceeds resting energy levels'. The forms of physical activity can be divided into recreational, professional sports, physical activity in and around the home and transportation-related physical activity, and the level of physical activity is influenced not only by the personal dimension but also by the social, economic and environmental dimensions [6]. The rank of physical activity is extremely important in the development of diseases of civilization, and its lack can predispose, at least 20 chronic diseases, such as cardiovascular diseases, type 2 diabetes, cardiopulmonary diseases, hypertension, cancer (e.g. chronic diseases such as cardiovascular diseases, type 2 diabetes, cardiopulmonary diseases, hypertension, cancer (e.g. breast, colon, prostate cancers), psychological problems (low self-esteem, stress reduction) and a civilisation disease which has become a pandemic in the modern world and its connection with physical activity is very large, i.e. obesity. Adequate physical activity has many health benefits, such as improved

fitness and delayed onset of many cardiovascular, respiratory, nervous, skeletal, muscular and ligamentous diseases [4].

Regular exercise also corrects postural defects, motor coordination and maintains proper mineral balance. Additionally, systematic and moderate exercise activities help strengthen the immune system and reduce the risk of infectious diseases [3]. Nowadays, with the development of civilization, earlier occurrence of symptoms of old age in younger people and increased frequency of chronic diseases classified as civilization diseases are observed, despite the fact that the average life expectancy has been extended in comparison to several years ago. The most common reasons for this phenomenon are lifestyle changes, which significantly reduce physical exertion. Technological progress has meant that everyday household chores require less energy and effort. The same is true for transport and mobility, where walking and cycling have been massively replaced by cars and public mass transit (buses, streetcars, trains). There is also a change in leisure patterns among children, who tend to be more physically active than their elders. Children very often engage in playing computer games, browsing the Internet and TV programs that require a more static approach, and this coincides with an increase in the problem of obesity and overweight in children [6].

Insufficient physical activity, which has gained the term hypokinesia, along with its associated metabolic syndrome, has been classified by WHO (World Health Organization), UNESCO (United Nations Educational Scientific Organization), NIH (National Institute of Health in the United States), and FIMS (International Federation of Sports Medicine), as one of the major problems borne by society and calls for health-promoting physical activity for a modern public health strategy [7].

Technological progress from a psychosocial perspective

Nowadays, the improvement of physical activity among certain population groups is attempted by using the latest technology. The electronics market offers many devices for sports, tourism and recreation, but equipment for professional use is relatively expensive. An alternative application may be devices that are in common use nowadays, e.g. smartphones. Technological advances along with miniaturization and decreasing prices of production of high-integrity devices have resulted in the proliferation of devices and development of new areas of their applications [1]. Currently available smartphones on the market are equipped with a satellite navigation module, facilitating orientation in the field, access to a wide selection of communicators and the Internet [4].

The aspect of technological development and wide access to equipment often has extremely different levels of evaluation. Computers and robots often replace people in work that is heavy, exhausting or dangerous to health and life, but on the other hand the mechanization of the labor market causes a lower demand for workers (increase in unemployment) and a change in leisure activities (less dynamic movement) [3]. Multimedia can have an addictive effect on individuals, which brings consequences in the form of changing the social basis, among others to the alienation of the person, peer conflicts, as well as deteriorating mental and physical state of the individual. It also happens that with the indiscriminate and unbridled use of online portals (instant messaging, forums, fanpage), it becomes very difficult to establish or rebuild a 'non-virtual' relationship with people. Nevertheless, computers can support physical activity and image our body parameters, including those directly threatening our health or life [4].

There are many apps available that present an exercise plan, routes to run or arrange a proper diet [2]. It is also possible to visualize our physiological data with the help of so-called wearable devices, i.e. accessories like a watch or a shirt containing a computer inside. With the help of a smartphone application connected to them, it is possible to read the amount of calories burned, the need for protein, the amount of fat or water in our body, the quality of our sleep, as well as our heart rate or blood glucose levels, so that with prior information the app user can react accordingly. It is estimated that by the year 2025, at least 80% of the world's humanity will have access to an ICT network, through social networks such as Facebook [5]. However, the use of widespread access to Internet-connected computing devices also comes with many dangers, including those related to security and privacy. Most electronic devices, exhibiting actions through artificial intelligence, are equipped with relays that use radio waves to transmit data min. RFID (Radio Frequency Identification Technologies). At the same time, a computing device (e.g., a smartphone) can have identifiable objects assigned to a person, e.g., e-passport, e-legitimation, city card, or bank account card, which allows, using appropriate technology, to accurately locate the user using the device [6].

In addition, most devices allow the stored data to be read using contactless technology, e.g. in the form of proximity cards, and the threat of copying the contents of a magnetic reader without the knowledge of its owner has arisen. This crime is so popular that the term Skimming has been assigned to it [7]. Of course, there are methods to protect against surveillance or theft, through cryptographic pograms. The problem of security and privacy is now very publicized in the media, of course beyond the realm of conjecture and conspiracy theories, in 2013 it was proven that the National Security Agency (NSA) collects data shared

by Microsoft applications (e.g. Yahoo, Skype, Facebook, Google) and Google (e.g. YouTube), so it is assumed that other countries besides the U.S. use similar methods. Security services explain to citizens that the collection of data is done only for the purpose of national security, and if someone does not arouse suspicion by his behavior is not a point of interest [8].

Development of electronic entertainment

Electronic games, especially those available for personal computers, consoles, smartphones and tablets, are an important element of the modern social space. A game is an entertainment activity with strictly codified rules, in which one or more people take part. Each game is characterized by a specific goal, which can vary, although mostly it is to be better than the competitors. Games can be divided into several categories. There are games where the physical factor is the most important (motor games, sports games), mental games (all kinds of logical games such as chess, checkers, shogi) and random games (also called gambling games, where the random factor is the most important, e.g. card games, roulette, dice games) [9]. There is also a fourth category among these three basic groups, which is currently developing rapidly, and that is computer games that function in the virtual world.

The beginnings of graphical computer games can be traced back to 1949, when Maurice Wilkes's team from the University of Cambridge Mathematical Laboratory constructed the first computer in the form of a calculating machine with a display (EDSAC) [9]. It was on this computer in 1952 that the first display game was created by Alexander Sandy Douglas of the University of Cambridge as part of his PhD thesis entitled Noughts and Crosses. The program was based on the classic game of tic-tac-toe. However, the forerunner of games with vector computer graphics is considered to be the game Spacewar!, created in 1961, where players take the role of pilots of spaceships. With the development of technology and new discoveries, more and more games were created for the first computers. Commercial success with the spread of computers brought the creation in 1972 by the Atari industry slot game called Pong, a simulation of table tennis. The popularization and very good reception of the form of entertainment that was the computer game led to the rapid creation of newer and newer slot games, such as Tanka, Shark Jaws, Gun Fight, Galaxian, Mario Bros and Donkey Kong. In 1977, Atari created one of the first consoles, the Atari 2600, which gave games a portable receiver, providing the opportunity to play computer games at home [8].

An important element shaping the gaming world was the emergence of the MMORPG (Massively Multiplayer Online Role Playing Game) genre in the late 1990s, in tandem with the development of three-dimensional graphics and the spread of the Internet. MMORPG is a

game genre where the main emphasis is put on the story and development of the lead character. Currently, it is the most popular and widespread game genre, especially among the younger generation, and the number of users of games of this type is estimated at around 20 million worldwide. Popular titles such as Tibia, EverQuest or Metin can be found among this genre [10]. The computer games industry has been increasingly successful, more and more games for desktops and consoles were created, so it could be expected that with the development of the technological branch, which were the cell phones, also games designed for this type of computer would be created. The smartphone, as a combination of cell phone and portable computer, now offers many types of games. The Angry Birds game, which as a series has been downloaded over one billion times by 2012, has been a success [11].

Multimedia urban games as a public health problem

With the progress and new technologies used in smartphones, many games and applications have been created for this type of device. An innovation in the world of games for the phone have become multimedia city games. An urban game is a form of play that is carried out in an urban space. It usually requires active movement, but also mental effort and sometimes sports. We can include all kinds of games such as stealth games, but also computer games using augmented reality [12]. One of them was the Pokemon Go game released by the Niantic company in July 2016, combining the principles of a multimedia urban game with fictional creatures created in 1996 in Japan and spread around the world with console games, card games and animated movies. The game has been very well received worldwide, being the most used and profitable mobile app in 2016. By May 2018, it had over 147 active users [13].

Pokemon Go, as an urban game, requires the player to actively move around the area to catch virtual creatures and use other game mechanics. They also include tasks in the form of covering a given distance, for example to hatch a 'Pokemon egg' (2 km, 5 km, 7 km or 10 km). The popularity of the game has attracted the interest of public health researchers, who have found both positive and negative aspects of using the app [12, 13]. In surveys, Pokemon Go users indicated an increase in individual physical activity, which was also a good method to fight obesity. Nevertheless, many news media have reported car accidents, injuries, trespassing in dangerous areas, or assaults through the Pokemon Go app [14].

With the development and popularization of gaming also came the health problem of addiction to this form of entertainment. Most research on addiction refers to two primary factors in behavioral disorders: functional impairment and dysfunctional behavior. Obviously,

when comparing functional impairment in alcohol, cocaine, or heroin abuse with computer game addiction, a significant difference will emerge [10]. The consequences of excessive computer game playing are less severe than drug substance use, although going another way nicotine addiction usually does not have significant consequences in family, work or academic life unlike game addiction, although it has much more harmful effects on the human body. Among the causes of addiction to computer games proposed by researcher Héctor Fuster of Ramon Llull University is the translation of the virtual world over the real one and identification with the avatar in the game [12].

Games from the MMORPG genre have the greatest predisposition to addiction, as it is there that the user creates his/her character and gets to know the fictional world, which at the same time may cause forgetting about the problems of the real world [14]. Significant differences in the consequences of game abuse also depend on the mechanics of the game itself. When playing games of the MMORPG genre, a person playing World of Warcraft alone and statically at home will have different health consequences from a person playing Pokemon Go dynamically on the street [15]. The term Internet Addiction Disorder (IAD) was introduced in 2013 by the American Psychiatric Association. IAD has been defined as persistent, recurrent, and excessive involvement in computer and video games that is not controlled despite co-existing problems. The term has also been identified as needing further research work, and its standardization is expected to help gather more information about it [16].

Addiction to electronic entertainment

With new discoveries and advancement of time, more and more types of addictions are emerging. Tobacco addiction was an indirect result of the discovery of the American continents, where tobacco was widely grown and was spread to European countries around the 16th century [17]. Similarities can also be found in the beginning of coffee cultivation, the production of the first medicines, but also the creation of the first computer. With the development of the new technological branch, a health problem appeared, which is infoholic addiction, attracting a person with a specific functionality, which is cyberspace and virtual world [16]. The cell phone is now one of the most popular leisure activities, which dominates not only the girls of individual life, but also cultural and social life [17]. The problem of infoholic addiction, in spite of being recognized as a serious trouble by specialists, is still underestimated by the general public, especially because its effects do not bring as visible and severe health problems as, for example, addiction to narcotic substances. However, the

problem is serious, especially that the sources of virtual entertainment are being used by younger and younger people (especially children) who are not aware of their destructive impact on mental, physical and social health [18].

The definition of infoholic addiction is not currently standardized. One refers to the inability to function in society without direct or indirect contact with a telecommunication object. However, the problem can be much broader than just the difficulty in interpersonal interactions. In cyber addiction, the main causal object is the telecommunication device, which is most often the telephone [19, 20]. Often its connection to the user exceeds the human-machine relationship, creating a kind of emotional bond. The cell phone becomes an object that provides the experience of pleasure. As a consequence, phone addiction is characterized by the repetition of certain behaviors and a strong devotion to the device, without which the user cannot do without [21]. The psychological dependence is so strong that it often turns into a mental compulsion that requires repetition of the given activity. The mechanism leads to an effect that relieves tension, mental hunger, or improves well-being, and the addicted person is unable to stop the compulsive behavior on their own [22, 23].

Summary

New forms of entertainment undeniably provide entertainment for the user, but also can be a preventive factor in sedentary lifestyles that predispose to chronic non-communicable diseases such as obesity. The current technological trend indicates that the development of mobile gaming using augmented reality to travel and succeed in mobile gaming, that this segment of entertainment will continue to grow rapidly [19]. Despite the fact that mobile gaming that activates people has many advantages, the effects of this type of entertainment in terms of addiction risk are still not fully understood. There is a chance to learn more about the phenomenon because WHO includ Gaming Disorder (GD) in the 11th revision of the International Classification of Diseases (ICD 11) [24].

The paradox is that the rapid development of knowledge leads to the rapid development of means of communication at the same time it effectively upsets the proportions towards an excess of information and a relative poverty of knowledge in our minds, which brings concrete danger. The processes of development of computer and information technology cannot be stopped and it will always be attractive, so the problem of threats should be known to all who have any influence on education, to all for whom the proper development of a person is important.

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