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# The Impact of TV Exposure and Computer Use on Obese Adolescents

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## Abstract

Obesity is a complex, multifactorial condition which is characterized by the increase in body weight due to adipose tissue. The sedentary lives of many children and adolescents, the growing number of hours spent in front of the computer, the game console or the TV represent risk factors for obesity. The authors conducted a prospective study between the 1st of April and the 30th of June 2017, which included 38 adolescents with obesity, aged 12 to 18 years (mean age 13.7 ± 2.6 years). To evaluate the physical activity program for obese adolescents, a questionnaire was applied which focused on the impact of computer and TV use on their behaviour. The questionnaire contained 15 items referring to the computer and television exposure. The results showed that most obese adolescents do not follow the recommended daily physical activity: 94.7% prefer to spend their free time in front of the TV compared to 68.4% who prefer computer use, with negative consequences (fatigue, addiction, isolation, boredom). The factors with a significant negative influence on healthy lifestyle were urban area, age, male gender and low self-esteem, allowing the identification of risk subjects.

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# Introduction

Obesity is a complex, multifactorial condition which is characterized by the increase in body weight due to adipose tissue. The sedentary lives of many children, the growing number of hours spent in front of the computer, the game console or the TV represent risk factors for obesity. Environmental changes which are induced by urbanization, extensive and comfortable transport networks, labor mechanization and work automation, broad access to thermally processed food, globalization of fast food products, affordable prices and aggressive marketing for their commercialization, all contributed to the creation of an "obesogenic medium" (Lipek *et al*, 2015; Lobstein & Dibbs, 2005). The obese child tends to become an obese adult, and the obese adult has a shorter life expectancy than normal-weight and consequently suffers from multiple chronic diseases, especially diabetes and cardiovascular disease. The adult also has a poor quality of life. All of this data draws attention to the importance of assessing unhealthy eating habits, sedentary lifestyles in order to formulate effective strategies to increase healthy eating habits and regular physical activity among children and adolescents. These steps are necessary to increase the probability of a healthy adult population. The authors conducted a prospective study regarding the impact of physical activity on children with obesity by evaluating the impact of computer and TV use.

# Research methodology

The authors conducted a prospective study between the 1st of April and the 30th of June 2017, which included 38 adolescents with obesity, aged 12 to 18 years (mean age $13.7 \pm 2.6$ years). The sex ratio (M/F) was 1.1 and the distribution by the background showed that 76.4% of cases are originated from urban areas. To evaluate the physical activity program for obese adolescents, a questionnaire was applied which focused on the impact of computer and TV use on their behaviour. The questionnaire contained 15 items referring to the computer and television exposure (*Table 1*). Adolescents who experienced exercise-limiting comorbidities like cardiovascular disease (hypertension, heart failure), Down syndrome, or patients who refused to complete the questionnaire were excluded from the study.

The assessment of the questionnaire was completed by analysing the total score based on the subclasses corresponding to the 15 items analysed. Adolescents of the analysed group were grouped into three categories based on the final score as it follows: (1) under 34 points – minimal impact of computer and TV use on adolescents' behaviour; (2) between 35-38 points – moderate impact of computer

and TV use on adolescents' behaviour; (3) above 39 points – major impact of computer and TV use on adolescents' behaviour.

## *Statistical Analysis*

The data were introduced and processed in SPSS v.24 (IBM SPSS Statistics). Depending on the characteristics of the value series, the statistical indicators were presented (mean, 95% CI for means, median, standard deviation, min, max etc.). The multivariate analysis of the influence factors on the total score was performed using the multiple linear regression models considering that the dependent variable is a continuous variable. Multiple Linear Regression has been applied to assess the risk factors on sedentary lifestyle. The significance level calculated in the tests used (p-value) was considered significant for values $p < 0.05$, this value representing the maximum error probability accepted.

*Table 1. Questionnaire items*

| Codification | Items |
|---|---|
| I1 | Do you enjoy watching TV? |
| I2 | Do you enjoy using your computer? |
| I3 | To what extent does your time spent in front of your TV / computer influence you? |
| I4 | Which TV shows do you prefer? |
| I5 | How many hours do you spend, on average, per day in front of the TV? |
| I6 | How many hours, on an average, do you spend per day in front of your computer? |
| I7 | What are the reasons for using the TV / computer? |
| I8 | What are the reasons why you do not use your TV / computer? |
| I9 | Experts have proven that spending time in front of the TV / computer has the following consequences. In which of these do you find yourself? |
| I10 | Make a top 5 of the positive effects on your TV / computer on you (1 - most important, 5 - least important). |
| I11 | Make a top 5 of the negative effects on your TV / computer (1 - most important, 5 - least important). |
| I12 | What other activities could you do in your spare time if you did not have the opportunity to spend it in front of the TV / computer? |
| I13 | What do you prefer to do when using your computer? |
| I14 | To what extent the TV/computer helps in your school work? |
| I15 | How does the family react to the use of TV / computer? |

# Results and discussion

A healthy lifestyle in adolescents implies practicing physical activity for at least 60 minutes a day, doubled by a balanced diet. The results obtained from the processing of the data from the questionnaire are presented in *Table 2*.

*Table 2. Results of the questionnaire on the impact of computer and television use on adolescent behaviour*

| Questionnaire item | *N (%)* |
|---|---|
| **I1.**YES/NO | *36/2 (94.7%/5.3%)* |
| **I2 .**YES/NO | *26/12 (68.4%/34.6%)* |
| **I3.**To a great extent/Largely/Moderately/To a small extent | *12/16/7/3 (31.6%/42.1%/18.4%/7.9%)* |
| **I4.** Documentation / Cartoons / Advertising / Advertisements / Sports | *14/16/4/4 (36.8%/42.1%/10.5%/10.5%)* |
| **I5.** Less than one hour/ Within 1-3 hours | *30/8 (78.9%/21.1%)* |
| **I6.** None / Less than one hour/ Between 1-3 hours / More than 5 hours | *14/8/12/4 (36.8%/21.1%/31.6%/10.5%)* |
| **I7.** Defeat boredom / I'm interested in some shows /Provide faster information / I'm having fun / Other | *8/8/4/4/14 (21.1%/21.1%/10.5%/10.5%/36.8%)* |
| **I8.** I have many homework to do / My parents forbid me / I meet with friends / I spend time with my family / Do other things | *12/4/4/4/14 (31.6%/10.5%/10.5%/10.5%/36.8%)* |
| **I9.** Fatigue / Isolation / Boredom / Addiction | *22/4/4/8 (57.9%/10.5%/10.5%/21.1%)* |
| **I10.** Communication / Information / Relaxation / Education-Learning | *4/8/12/4(10.5%/31.6%/47.4%/10.5%)* |
| **I11.** Difficulties in Communication / Attention Difficulties / Learning Issues / Violence / Aggression | *12/7/8/11 31.6%/18.4% /21.1%/28.9%* |
| **I12.** Read / I'm walking through the park / Drawing / Painting / Listening to music / Meeting with friends / Preparing for school / Others | *6/4/8/4/8/4/4 (15.8%/10.5%/21.1%/10.5%/21.1%/10.5%/10.5%)* |
| **I13.** Staying on social networks / Looking for information / downloading movies, music / exploring various WEB pages / solving tasks for school | *12/4/8/4/10 (31.6%/10.5%/21.1%/10.5%/26.3%)* |
| **I14.** To a great extent/Largely/Moderately/To a small extent | *10/8/16/4 (26.3%/21.1%/42.1%/10.5%)* |
| *I15. Are against exaggerated use / They impose program compliance / They use as much as I do* | *18/12/8 (47.4%/31.6%/21.1%)* |

Despite the importance of regular physical activity, it has been noticed that most obese adolescents do not follow the recommended daily physical activity: 94.7% prefer to spend their free time in front of the TV compared to 68.4% who prefer computer use. Out of the 31.6% who did not prefer the computer, 23.7% did not have such a device at home. The influence of the TV / the computer on their lifestyle (I3) indicates moderate lifestyle impairment for 42.1% of adolescents. The fact that daily activity is affected to a great extent was only recognized by 7.9% of the interviewed.

Taking into account the preferred type of TV shows (I4), films and cartoons are among the favourites for 78.9% of those surveyed. The time spent in front of the TV is 1-3 hours (I5) for 78.94% of adolescents and between 3-5 hours for 21.05% of them. In terms of time spent in front of the computer (I6), 42.1% of respondents said they spent more than 1 hour, only four (10.5%) said they spent more than 5 hours.
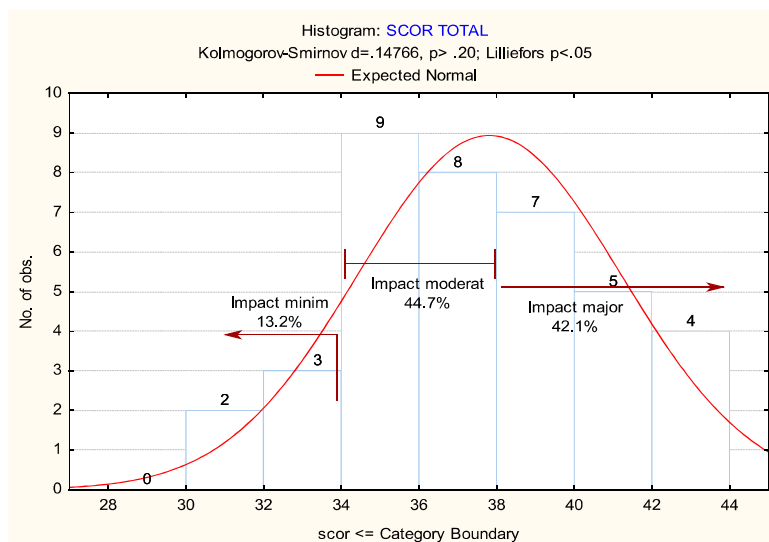
Among the reasons for which the TV/computer is preferred (I7), the most worrying aspect is that 21.1% of adolescents say it relaxes them, while only 10.55% of them use the computer to obtain information in a quick manner. Of the issues that prevent obese adolescents from using TV/computer in their spare time (I8), school activities are noted (31.6 %). Time spent with the family and socializing with friends over TV/computer exposure is only found in 20.1% of cases. Involvement of parents in managing the child's free time is only observed in 10.5% of cases. The consequences of a significantly long time spent in front of the TV/computer cited by adolescents in the study group (I9) were fatigue (57.9%), addiction (21.05%), isolation and boredom (10.5% for each).

The positive effects shared by adolescents on the use of TV/computer (I10) included relaxation (47.36%), information (31.57%) and communication (10.52%). Concerning the role of TV/computer in learning and education, it is noted that only 10.52% consider it an important tool in this particular sense. From the point of view of negative effects of TV/computer use (I11), it was noted that 28.9% mentioned violence/aggression, 21.05% learning problems and 18.42% attention difficulties and impairment of concentration. Looking at the options which teenagers have for leisure (I12), they prefer meeting with friends (21.05%) and listening to music (10.5%), while practising a sport is preferred by 10.5% of them. Of the activities performed in front of the computer (I13), the most frequently mentioned are the use of social networks (31.6%), searching for information (10.5%), watching movies and music videos (26.3%).

The impact of TV/computer on school activity (I14) is considered to be of major importance for 42.1% of adolescents and to a very small extent for 10.52% of cases. Family involvement in child education by limiting prolonged exposure to TV/computer (I15) was observed in 47.36% of cases while 21.05% of adolescents declare that all members of the family also use media sources.

The evaluation of the total score in the analysed group revealed an average score

of 37.8, a value indicating a moderate impact. Minimum values of 31 and 43 points were identified, with 50% of adolescents having a score greater than 37 points, this proving the negative effect on adolescent behaviour. Interquartile intervals indicate that 25% (Q75) of cases have a score over 40 points, indicating a major impact of computer and television use on adolescent behaviour. The quartz value of 25% demonstrates that 75% of the subjects have a score higher than 35 points correspondents to a moderate and major impact (*Figure 1*).



| Media | Media | | Dev. | Er. | Min | Max | Q10 | Q25 | Me | Q75 | Q90 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Scor | -95% | +95% | std. | std. | | | | | | | |
| 37.8 | 36.7 | 38.9 | 3.4 | 0.55 | 31.0 | 43.0 | 33 | 35 | 37 | 40 | 43 |

*Figure 1. Histogram of total score values of the impact of computer and TV use on adolescent*

The correlation of the total score with the age of the adolescents revealed a significant direct correlation (r=0.41, p=0.0195, 95% CI), an aspect which demonstrates the association of a high score with the age of patients, thus emphasizing a major impact on the obese adolescent's lifestyle.
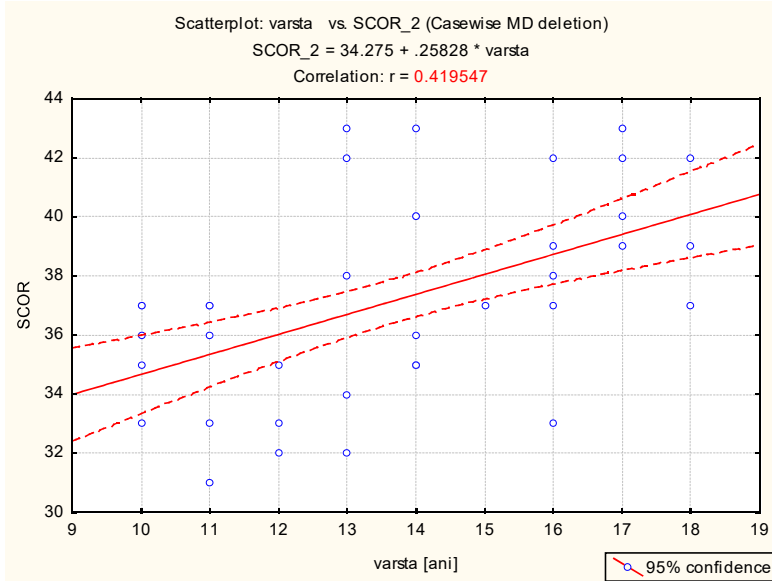
*Figure 2. Regression line in age correlation vs. total score*

We noticed that the prevalence of infant obesity is about 3 times higher in the urban area (76.4%) compared to the rural area (23.6%), predominantly in the male sex (51.3%).

*Table 3. Anamnestic characteristics and other relevant aspects of patient groups studied*

| Characteristics | N (%) |
|---|---|
| The area of origin (Urban/ Rural) | 29/9 (76.4%/23.6%) |
| Male / female | 20/18(52.6%/47.6%) |
| Family history (negative / positive: a parent/obese parents) | 2/36 (5%/95%: 70%/25%) |
| Psychological investigation | |
| Low self-esteem | 18(47.4%) |
| Hyper-protective mother | 8(21.1%) |
| Tendency to antisocial behavior | 2(5.3%) |
| Feelings of inferiority | 8(21.1%) |
| Depression | 2(5.3%) |
| *† Values were expressed as number (%) or percent at %* | |

Out of the 38 cases, 5% did not have a family history of obesity, of which 70% were single obese parents, and 25% had both obese parents. From the psychological investigation it can be pointed out that the most common pathology is low self-esteem (47.36%), followed by feelings of inferiority and maternal hyperprotection (21.05%). These patients were advised to attend psychological

counselling, but parents were also trained to encourage their child and raise their confidence in their own person.

The results of multivariate analysis (multiple linear regression) demonstrated that an important risk factor in the formation of a sedentary lifestyle associated with a high score was the urban background ($\beta$ = 11.058, p = 0.001). Also, other factors with a significant negative influence on healthy lifestyle were age ($\beta$ = 6.54, p = 0.004), male gender ($\beta$ = 3.86, p = 0.029) and low self-esteem ($\beta$2.098, p = 0.015) (*Table 4*).

*Table 4. Multiple linear regression. The evaluation of factors de risk*

| Dependent variable: | Predictors: | Coeff. Beta | Std. Error | t | p(95%CI) |
|---|---|---|---|---|---|
| Score [†] (value increase) | Age | 6.541 | 0.104 | 9.847 | 0.004* |
| | The area of origin (Urban / Rural) | 11.581 | 0.278 | 21.641 | 0.001* |
| | Masculine | 3.864 | 0.386 | 5.274 | 0.029* |
| | Family history (a parent / obese parents) | 0.654 | 0.018 | 0.643 | 0.083 |
| | Psychological Survey (Low Self-Esteem) | 2.098 | 0.095 | 2.008 | 0.015* |
| *(\*) Marked effects are significant at p <0.05* | | | | | |

With the development of technology, such as televisions, computers, computer and video games, and last but not least mobile phones, we find that all of these are ubiquitous in the lives of children, adolescents and adults. Access to technology has allowed the development of sedentary behaviour and at the same time exposure to aggressive advertising promoting unhealthy, fast-food food habits (Verloigne *et al.*, 2012). As video games and computers become more and more popular, the number of hours of inactivity/sedentary has increased. Data obtained on the American pediatric population are worrying. Thus, the majority of adolescents aged 12 to 15 (98.5%) admit that they are watching TV daily and 91.1% are using the computer outside the school (Herrick *et al.*, 2014). In children, sedentary is defined by: the child spends less than 1 hour a day making sport and/or the child spends 3 or more hours in front of the TV, computer or mobile phone. Currently, studies show that most children spend at least 4 hours daily in front of the TV (American Academy of Pediatrics, 2001; Dutra *et al.,* 2015). In our study time spent in front of the TV was over 3 hours in 21.05% of children.

According to HBSC 2014, about two-thirds of students are watching 2 hours or more on TV during the week, the percentage being even higher over the weekend. Although the sum of the hours reported by Romanian students as being spent daily in front of TV and computer probably does not match with a most sedentary life (at least 2 hours/day on TV, 2 hours game/ computer, 2 hours Internet socialization, with additional 6 hours spent in the classroom and at least 2 hours for lessons), however, we can promote an approximate figure of 12-14 hours/day in which

an alarmingly high percentage of children and adolescents do not comply with WHO's rules of involvement in physical activity (Baban, Balaszi, & Taut, 2014).

Prolonged exposure to TV computer is a key element contributing to the alarming increase in weight in the child and adolescent. In addition to weight problems associated with sedentary among children, there are other health problems that may appear secondary to low levels of physical activity in childhood: insomnia, anxiety, confusion, depression, phobias, psychotic behaviors, type 2 diabetes, cardiovascular and bone diseases (Tremblay, 2011, Goldfield, 2013, Mark, 2008). The literature data showed that screen time was associated with a higher risk of depression when it exceeds 2 h/day, whereas lesser screen time may be associated with a lower risk of depression, with the lowest risk being 1 h/day (Liu, Wu, & Yao, 2016).

Another study has shown that since the age of 6, sedentary children (those who spend hours in a row in front of the computer and TV) have the first signs indicating susceptibility to heart disease and hypertension. It has been shown that for every extra hour of inactivity a day, the risk of children having problems with blood pressure increases by 10%. The time spent in front of the TV or computer correlates with some nutritional parameters. Thus, a recent study, conducted on a group of Japanese children and adolescents, has shown that time spent on television correlates backward with the intake of protein, minerals, vitamins and dietary fiber, nutritional elements of vital importance in growth and development at these population categories (Tsujiguchi *et al.*, 2018).

A large-scale study of over 3400 children over a 5-year period has shown that caffeine intake is significantly higher in children over 2 hours/day in front of the TV, suggesting the need for continuous monitoring of nutritional behaviours and time spent on TV (Ahluwalla, Frenk, & Quan, 2018). Similar results have been obtained in studies conducted in China, demonstrating a direct and positive relationship between the presence of televisions in children's and adolescents' bedroom and the time spent in front of TV or the computer, to this also contributing the mobile phones and personal tablets (Ye *et al.,* 2018).

There is a two-way relationship between duration and quality of sleep on the one hand, and weight and nutritional status on the other. A study in a Canadian population demonstrated that the duration and quality of sleep were lower in children using mobile phones, computers or TV in the time before sleep compared to those who did not have access to these electronic devices. The risk of becoming obese was double in those who had access and used TV or computer in their own bedroom in the hour preceding sleep (Dube *et al.*, 2017).

Control sedentariness along with changing eating behaviour is a target of strategic programs to prevent and treat obesity. At the same time, physical activity is associated with a range of psychological benefits at the age of childhood and adolescence, participating in the development of healthy mechanisms in controlling the symptoms of anxiety and depression.

Thus, the role of parents and teachers, physicians in educating children about understanding the risks and how to prevent excess in terms of unhealthy eating and sedentary is essential. It is necessary to develop in the family a correct, active lifestyle from the age of childhood to prevent the development of obesity and its long-term comorbidities (de Jong *et al.*, 2013). WHO recommends parents to teach children and adolescents to become accustomed with a daily program of at least 60 minutes of moderate physical movement in order to avoid the risks of sedentariness at an early age (WHO, 2010).

It is necessary to identify and eliminate the factors in the family environment that promote sedentariness and to discourage teenagers who are already overweight and obese to use the TV, the computer, the mobile phone as the main source of leisure time. At present, particular attention is paid to monitoring the nutritional status of the population in identifying overweight and obese children, considering that early intervention can improve outcomes in the medium and long term, particularly in preventing obesity complications and comorbidities.

Teenagers living in the urban area tend to have a higher weight than those in rural areas. This is related to the presence in the cities of a large number of fast food restaurants and access to several pastry products, carbonated juices and hypercaloric foods but with low nutritional value. On the other hand, many urban children, as opposed to rural ones, spend a lot of time in front of the computer and TV, leaving little time for exercise (walking, cycling, tennis, swimming). Also, most urban children travel to school with public transport or personal cars in the detriment of walking. The Food Survey highlighted the fact that these families were eating in excess food, and the richest caloric meal was dinner, rich in carbohydrates and lipids. It is worth noticing that 2 of the cases (5%) did not have family history of obesity, but is observed the lack of physical exercise of the patients and the presence in their everyday life of fast food and excessive consumption of sweets.

## Conclusions

In conclusion, childhood and adolescence are critical periods in the formation of eating habits and a healthy lifestyle that has repercussions on long-term health. The most effective method of treating obesity remains the prevention in which the promotion of rational nutrition and regular physical activity, with avoidance of sedentary, is of great importance. In our study, at 86.85% of adolescents is noticed that TV / computer exposure has had an important negative impact, therefore prevention programs for obesity, a priority public health area in the European Union, are needed to include promoting the physical exercise in schools (physical education classes, regular sports events that become a tradition for schools and the community) as well as in free time (replacing the state in front of the computer and the TV with walks, cycling, practicing a sport). By increasing the time spent

on physical activities and reducing the number of hours spent in front of TV and / or the computer, new healthy habits are created among children. Even if the beneficial effects of these lifestyle changes are not immediately visible, in the medium and long term, the physical and mental health of children will benefit.

## Acknowledgments

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