**Original Article**

# The Relation between Physical Activity and the use of Internet in Schoolchildren Aged 13-15 Years Old

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### ABSTRACT

A lot of evidences suggest that heavy internet use impacts negatively with health, when the use is almost ubiquitous among adolescents The purpose of the study was to investigate the association between exercise and physical activity with internet use and other basic sociodemographics factors. In the study involved 136 boys and 108 girls, aged 13–15 years old. For the purpose of the survey it was administered a questionnaire. For statistical analyses one way ANOVA and factor analysis was used to explore the variables. Results revealed that there were significant effects of exercise and physical activity on "reduction of stay online" $F_{(2,239)}=4,21$, $p=0, 041$. There was a significant effect of gender on "negative feelings because of non-internet access" $F_{(1,239)}=10,93$, $p=0,001$ and on "reduction of stay on the internet" $F_{(1,239)}=10,93$, $p=0,001$. In conclusion, the use of the internet was found to have a negative relationship with exercise, physical activity, health and school performance between teenagers who took part in the survey.

**Keywords:** Exercise, internet, teens, physical activity

## INTRODUCTION

The internet is a global system of interconnected computer networks, serves millions of user's everyday worldwide and its use has quickly become a common way of engagement, especially among youth and adolescents. Young people and teenagers have adopted the use of the internet to a large extent and have incorporated many aspects of their daily lives (Paul and Bryant, 2005; Tsitsika et al., 2009). In the most countries, (Tsitsika et al., 2009; Bayraktar and Gun 2007; Sun et al., 2005; Fu et al., 2010) the vast majority of young people use the internet several times a week (Indicateurs de la Société de l'Information en Suisse, 2010).

There are a lot of inquiries about the role of the internet, for information and communication, for the promotion of health, giving special emphasis to the role of social perspective and social interaction (Lintonen et al., 2007). It has not been sufficiently clarified the role that can be played the online connection in the internet with the health sector. Some studies indicate that appropriate interventions can lead to results that are beneficial for health (Kreps, 2005; Shaw et al., 2006). But the lack of such intervention, however, it seems that maybe the use of the internet, may worsen in the area of health, mental and physical condition of participating in this.

In its current form the internet provides not only information, but can be considered more as a telecommunications tool, since it tends to increase social interactions between people (Robinson et al., 2000). In addition, the basic properties of the Internet, as is the anonymity, the asynchronous communication, the liberation from the limitations of time and space, that makes quite the formation of close personal relationships (Bargh, et al., 2002). Several studies

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claim that the internet can be considered as facilitate the social support and solidarity between individuals (Glasgow, et al., 2002; Barrera, et al., 2002; Shaw, et al., 2006). However, in another study (Eysenbach, et al., 2004), stated that there is no irrefutable evidence on the existence of positive results due to the use of the internet to provide social support.

From the other side the interest and the growth trends in the use of it make teenagers has gradually led those involved at a professional level with health, to examine the impact on the health of this activity (Borzekowski, 2006). Recently, it has been proven that there is a close connection between the mental and physical health problems with excessive use of the internet by young people and adolescents. Some of the symptoms listed among teenagers who use the internet heavily are anxiety disorders, depression and suicidal ideation (Kim, et al., 2006; Ko, et al., 2009; Shapira, et al., 2000; Kim, et al., 2010; Ybarra, et al., 2005). It is known that teenagers often experience physical problems such as headaches and pain in the bones and muscles, associated with lack of muscle contractions and lack of physical activity and exercise, because they spend a considerable amount of time on the internet (Chou, 2001; Hakala, et al., 2006). Important problem mentioned by young people who are internet users, is reduce the sleep time, because the use of the internet for several hours until late at night (Chou, 2001; Hakala, et al., 2006; Van den Bulck, 2004).

Furthermore, today that obesity is a critical risk factor for cardiovascular diseases, several studies have proven that the body mass index (BMI) is increased among adolescents who spend many hours every day on the internet and therefore, they do not deal with physical activity and sports (Berkey, et al., 2008; Kautiainen, et al., 2005). All the studies that have been published, however, tend to focus only on excessive use of the internet by young people, while some have not significantly associated the little or normal internet use (Willoughby, 2008). Finally, the analysis of gender in how to use the internet in relation to health claims that teenagers boys and girls interact similarly with the internet, but still signed unverified by the research view (Willoughby, 2008).

In addition, it is a common observation that the health problems of the human population keep growing despite the development of medical science and technology. Many expert researchers argue that several of these problems could have been avoided, and therefore their effects have been mitigated if the lifestyle, habits and behavior of individuals, in the teens was different in relation to physical activity and exercise. It is also known that cardiovascular disease is the leading cause of death in the U.S.A. and this trend is growing significantly throughout the world (Heart Disease and Stroke Statistics, 2011). Obesity during childhood is an important risk factor for developing cardiovascular diseases during adulthood (Eckel, et al., 1998) while in the U.S.A. the prevalence of childhood obesity tripled between 1980 and 2000 (Magarey, et al., 2001). Diachronic studies in populations, such as the Framingham study, (Rexrode et al., (1996) have shown that the body weight is associated strongly with cardiovascular diseases (Kannel, et al., 1996). Obesity in adulthood and subsequent cardiovascular diseases is starting during childhood (Dietz, 1998).

The prevalence and spread of obesity in childhood have increased dramatically. Childhood obesity is one of the most important social problems, which threatens to reverse the positive trends of cardiovascular morbidity and fatality that occurred in the last decade. Immediate measures must be taken to prevent excessive weight gain in children. Children and teenagers, who are near the limits of obesity, must promptly realize the problems they will encounter in the future because of this situation. Most studies that have succeeded in reducing body weight, gave emphasis to the importance of the incorporation of physical activity and the reduction of sedentary lifestyle (watching TV, dealing with video games and the computer) for intervention programs. Regular physical activity is important for the prevention of obesity and weight gain (Carnethon, et al., 2003).

Additionally, it was investigated the relationship between the level of fitness and disease of the heart or other problems related to health. These studies confirmed the previous comments about the importance of the minimum level of activity with the purpose of reduction of high-risk groups who were sedentary. The greatest reduction of risk for causing heart disease comes from the existence of minimum natural or physical activity. The gradually increasing activity and the higher levels of activity and fitness, shows obvious benefits in lessening the chances of heart disease (Carnethon, et al., 2003).

The main purpose of this research was to study the population of teenagers of the effect of the use of the computer and the internet to students aged 13-15 years, as well as the association with: a) physical activity and exercise b) school achievement c) age and d) sex.

## MATERIALS AND METHODS

### Participants

For the purposes of our study, we selected by randomized selection a sample of 244 high school students, from 13 to 15 years old (mean age 14,05 ± 0,38). Of the studied sample, 136 (55,7%) were male and 108 were female (44,3%). The choice of schools was based on random sampling. Prior to the initiation of the investigation, the approval was secured for conducting specific schools. The participants were informed about the purpose and usefulness of research and they gave their oral consent for participation. Students were given a questionnaire and were asked to respond in writing.

### Questionnaire

For the purpose of the survey was administered a questionnaire, through which assessed students ' participation in sports activities and the use of the internet from them. The first part of the questionnaire contained questions about the basic sociodemographics characteristics of participants (age, sex), the school achievement (previous class rating) and their own exercise or not in clubs or gyms. In the second part of the questionnaire participants reported the use of the internet in accordance with the Scale of Teen Addiction to Computers (STAC). The STACK emerged from the 20 questions of internet Addiction Test (Young, 1998) where questions concerning retained widespread aspects of PC use in conjunction with the internet, in accordance with the process of creating the questionnaire CRABI to Korean teenage population (Yang, 2001).

### Characteristics of STACK Questionnaire

The scale STACK Questionnaire, as indicated by its name, counts the technology addiction occurs when the teenager expresses behavior, excessive use of PCs is not limited only to the use of the internet, but extends to all activities that develop a PC user (non online game, application programming, hacking activity). STACK consists of 20 questions, which scored with the Likert scale and specific 1 = never, 2 = rarely,

3 = often, 4 = occasionally and 5 = always. The STACK's questions cover the effects of the use of computers in everyday life of the teenager, his social life, sleep, emotions and its productivity. The higher the total score on the scale the greater problem of using PCs. Overall internal consistency of the scale is extremely high, the reliability scale STACK reallocation is satisfactory, while excellent are the results of the audit of the structural validity. The answer procedure of the questionnaires was the presence of the researcher. Provided clarifying responses and provide assistance where necessary. The questionnaires were anonymous and kids entertained themselves. The response time of the questionnaires ranged around 25 minutes.

### Statistical Analysis

Data analysis: Data from the questionnaires were analyzed using descriptive statistics. A principal component analysis was conducted and secondly, varimax orthogonal rotation was used. A one-way ANOVA was used to determine whether there was a statistically significant difference in factors that were exported from the factor analysis and between the four independent variables that were a) gender (boys, girls), b) age 13-15, c) physical activity and exercise and d) school achievement (previous class rating, less from 10, between 10-13, between 13-16, more than 16). The data were analyzed using the Statistical Package for the Social Sciences version 20.0 (SPSS Inc., Chicago, IL, USA). A p-value of $<0.05$ was considered statistically significant.

## RESULTS

Descriptive statistical analysis revealed that in the study involved 136 boys (55.7%) and 108 girls (44.3%). From them in 28 students (11.5%) the rating in the courses ranged from 10-13, in 88 students (36.1%) the rating ranged from 13-16 and in 128 students (52.4%) the rating ranged from 16-20. Analysis revealed that 76 students (percentage of 52.5%) was participating in a team, group or in a gym from 0 to 2 times per week, 124 students (50.8%), from 3 to 4 times per week and 44 people (18%) from 5 to 7 times per week. Finally a rate of 44.3% exercised at an earlier time, but they have stopped exercising (Tables 1 and 2).

A principal component analysis was conducted to explore the association (correlation) between the 20 outcome measures from the questionnaire.

Secondly, varimax orthogonal rotation was used to explore whether the 20 items were made up of distinctive groupings (factors). It was decided a priori that the number of factors in the varimax rotation would be based on the number of Eigenvalues ≥1.0 in the principal component analysis.

The questionnaire examined 5 factors that were a) the first factor «negative feelings because of non-internet access», b) the second factor «excessive internet use», c) the third factor «neglect of school obligations» d) «abnormal reaction» e) and the fifth factor «reduction of stay online».

On the first factor load 4 topics that explain the variance 17,21% of the total. The second factor load

**Table 1:** Descriptive data of independent research variables

| Sex | Number of students (Percentage) | Exercise | Number of students (Percentage) |
|---|---|---|---|
| Boys | 136 (55,7) | Yes | 116 (47,5) |
| Girls | 108 (44,3) | No | 128 (52,5) |

**Table 2:** Descriptive data of independent research variables

| Age | Number of students (Percentage) | Days trainings per week | Number of students (Percentage) | School rating | Number of students (Percentage) |
|---|---|---|---|---|---|
| 13 | 72 (29,5) | 0-1-2 | 76 (31,2) | From 10-13 | 28 (11,5) |
| 14 | 88 (36,1) | 3-4 | 124 (50,8) | From 3-16 | 88 (36,1) |
| 15 | 84 (34,4) | 5-7 | 44 (18) | From 16-20 | 128 (52,4) |

**Table 3:** Item loadings>0.56 for Varimax-rotated solution with five principal components

| Variables | Factors | | | | |
|---|---|---|---|---|---|
| How often… | 1ος | 2ος | 3ος | 4ος | 5ος |
| … Do you prefer to spend more time online with the computer than going out with friends? | ,763 | | | | |
| …Do you feel the fear that life without the computer would be boring, empty and without joy? | ,755 | | | | |
| … Do you feel your concern to the connection while you are outside the computer and how often fantasiwneste that you're online? | ,695 | | | | |
| … When you are offline, you feel depressed, Moody, or nervous, something that disappears when you return to login? | ,634 | | | | |
| … Do you find that you remain connected to the computer more than that originally intended | | ,765 | | | |
| ... Do you more neglecting jobs at home in order to spend more time online to computer how often you create new friendships with other users of the internet | | ,721 | | | |
| ... Do you capture yourself be eager to deal again with the computer | | ,623 | | | |
| ... Do you capture yourself as saying during the connection "just a few more minutes | | ,606 | | | |
| … Do you find that you remain connected to the computer more than that originally intended | | ,560 | | | |
| … The grades or your school achievement are adversely affected, because of the time you spend online with the computer | | | ,747 | | |
| ... Your student achievement or productivity adversely affected because of your involvement with the computer | | | ,702 | | |
| ... Are you trying to even apologize or lie when someone asks what you do, when you are connected to the computer | | | ,690 | | |
| ... Do you lose your sleep, because of your all night online connection with computer | | | | ,827 | |
| ... You check your electronic mail (e-mail), before anything else you need to do | | | | ,731 | |
| ... Do you become curt, you cry or react with irritation, if someone bother you during your connection with the computer | | | | ,607 | |
| ... Do you make efforts to limit the time you spend online with the computer and you fail | | | | | ,782 |
| ... You have more dismissed the unpleasant thoughts about your life with soothing thoughts related to the use of the computer | | | | | ,635 |

5 topics that explain the variance 14,89% of the total. The third factor loads 3 topics explaining the 14.71% of total variance. On the fourth factor load 3 topics explaining the fluctuation 12,34% of the total. The fifth factor loads 2 topics explaining the 9.36% of the total variance.

A one-way ANOVA was used to determine whether there was a statistically significant difference. As for exercise, a one-way between subjects ANOVA was conducted to compare the effect on "reduction of stay online". There was a significant effect of exercise on "reduction of stay online" at the $p<.05$ level [F (2,239)= 4,21, p=0,041]. Comparisons indicated that the mean score for those that was exercised (M=1,91, SD=0,97) was significantly lower than those that was not exercised (M=2,17,SD=1,01).

As for school achievement, one-way between subjects ANOVA was conducted to compare the effect of school achievement on: a) negative feelings because of non-internet access, b) excessive internet use, c) neglect of school obligations, d) abnormal reaction, e) reduction of stay on the internet in males, and females. Results revealed that there was a significant effect on school achievement on "negative feelings because of non-internet access" at the $p<.05$ level [F(2,239)=52,98, p=0,000]. Also a significant effect, there was on school achievement on "excessive internet use" at the $p<.05$ level [F (2,239)=17,52, p=0,000]. Significant effect, there were on school achievement on "neglect of school obligations" at the $p<.05$ level [F (2,239)=33,72, p=0,000]. There was a significant effect on school achievement on "abnormal reaction" at the $p<.05$ level [F (2,239)=12,83, p =0,000]. Finally there was a significant effect of school achievement on "reduction of stay on the internet" at the $p<.05$ level [F (2,239)=26,40, p=0,000]. Post Hoc comparisons using the Scheffe Post Hoc test indicated that the better school achievement the less addiction from the internet.

As for sex, a one-way between subjects ANOVA was conducted to compare the effect of gender on: a) negative feelings because of non-internet access, b) excessive internet use, c) neglect of school obligations, d) abnormal reaction, e) reduction of stay online in males, and females. There was a significant effect of gender on "negative feelings because of non-internet access" at the $p<.05$ level for males, and females [F(1,239)=10,93, p=0,001]. Comparisons indicated that the mean score for the males (M=1, 91, SD=0,92)

was significantly higher than the females (M=1,54, SD=0,77). Also, there was a significant effect of gender on "reduction of stay on the internet" at the $p<.05$ level for in males, and females [F(1,239)=10,93, p=0,001]. Comparisons indicated that the mean score for the males (M=2,34, SD=1,06) was significantly higher than the females (M=1,68, SD=0,77). There was not a significant effect of gender on "excessive internet use", "neglect of school obligations", and "abnormal reacti0o.n", at the $p<.05$ level for males and females.

As for age one-way between subjects ANOVA was conducted to compare the effect of age on: a) negative feelings because of non-internet access, b) excessive internet use, c) neglect of school obligations, d) abnormal reaction, e) reduction of stay on the internet in males, and females. Results revealed that there was a significant effect of age on "negative feelings because of non-internet access" at the $p<.05$ level for 13, 14 and 15 years of age [F (2,239)=7,14, p=0,001]. Post Hoc comparisons using the Scheffe Post Hoc test indicated that the mean score for the age of 13 was significantly different than the mean score for the age of 14 and 15 years old. However, the score of 14 years old did not significantly differ from the score of 15 years old. There was a significant effect of age on "excessive internet use" at the $p<.05$ level for 13, 14 and 15 years of age [F (2,239) =12,65, p=0,000].

With Post Hoc comparisons using the Scheffe Post Hoc test indicated that the mean score for the age of 13 was significantly different than the mean score for the age of 14 and 15 years old, but, the score of 14 years old did not significantly differ, from the score of 15 years old. There was a significant effect of age on "neglect of school obligations" at the $p<.05$ level for 13, 14 and 15 years of age [F (2,239)=29,65, p=0,000]. Post Hoc comparisons using the Scheffe Post Hoc test indicated that the mean score for the age of 13 was significantly different than the mean score for the age of 14 and 15 years old, as well as, the score of 14 years old significantly differ, from the score of 15 years old. There was a significant effect of age on "abnormal reaction" at the $p<.05$ level for 13, 14 and 15 years of age [F (2,239)=16,46, p=0,000].

Using Scheffe Post Hoc test it was indicated that the mean score for the age of 13 was significantly different than the mean score for the age of 14 and 15 years old, as well as, the score of 14 years old significantly differ, from the score of 15 years old. Finally, there was

a significant effect of age on "reduction of stay on the internet" at the $p < .05$ level for 13, 14 and 15 years of age [F $(2,239) = 9,54$, $p = 0,000$]. Post Hoc comparisons using the Scheffe Post Hoc test indicated that the mean score for the age of 13 was significantly different than the mean score for the age of 14. Also the mean score from the age of 13 years differs significally from the score of the age 15 years old, but, the score of 13 years old did not significantly differ, from the score of 15 years old.

## CONCLUSION

The present study aimed to examine the interrelationship and the association between exercise and physical activity with internet use, school performance and other sociodemographic factors in a representative adolescent sample. According to the study it was found specific characteristics for students using the computer and the internet. The results indicated that the reduction of stay online between to the students was higher to those that were exercised. This is a reality, due to that the exercise and other physical activities can help adolescences keep them away from the computers and the internet. The most times per week that exercised the bigger the reduction of staying online. This is the most imported because exercise and physical activity related to the health at these ages. These findings agree with the literature that indicates the negative impact of health because of the internet addiction in adolescents on both physical and psychosocial domains (Cheung and Wong, 2011; Choi, et al., 2009). The sedentary act of prolonged computer use resulting in physical inactivity may increase the level of body fat and risk of obesity (Matusitz, et al., 2012) with the same way as they are inactive and not involve in physical activities. In addition, the excessive time spent online, was well documented to be associated with insomnia and sleep disturbances.

Adolescent internet users were reported to have shorter total sleep time and delayed bedtime (Cain and Gradisar 2010). Negative feelings because of non-internet access, the excessive of the internet use, the neglect of school obligations, the abnormal reactions, like irritability, poor sleep and arguments as well as the reduction of stay on the internet is age related something that is expected because as age of the students increases, they deal more with computers and new technologies (Choy, 2007). It is known that the internet can offer many possibilities for learning, education and leisure, therefore increasing the use of the internet is analogous to the increasing age of the users and the problems that this entails (Siomos, et al., 2008). According the age of users, data from scientific studies indicate that there is a big difference in the use of computers and internet among young people, ranging from 1.1% in Cyprus (Bayraktar and Gun 2007), by 7.5% in Taiwan (Ko, et al., 2007) with too many intermediate values of other countries.

Results suggest that the most notable differences were in terms of sex that the negative feelings because of non-internet access, the excessive internet use, the neglect of school obligations and abnormal reactions from the students. These results are in agreement with the results of the survey Kiraly et al., (2014), that the boys more than girls are more prone to the internet. The boys had a higher prevalence of their behavior activity at internet than girls and this agree with other findings (Tsitsika et al., 2009), that specifying that boys spend more time than girls on the internet weekly and this is a reason that serve as a potential confounder for the development of internet addiction with all the above negative factors. There is no consensus if internet addiction was associated with the gender (Chou, et al., 2005). Some researchers attributed the gender difference in prevalence of internet addiction to different preferences of online applications between males and females (Wang, et al., 2011; Weiser, 2000). In conclusion, this study has provided an assessment of internet use by adolescence addiction, which could benefit future research on the life-course risks of internet use and addiction.

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