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Internet Usage in Primary and Secondary School Children: A Multi-Center, School-Based, Cross-Sectional Study in Greece

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Abstract

Background: Little is known regarding the Internet activities of children, although Internet habits and pathological usage have been previously described in adolescents.
Objectives: This study aimed in describing Internet use in both primary and secondary school children in order to early detect habits with high risks of developing pathological Internet use.
Patients and Methods: 2,473 children from 26 primary (aged from 6 to 12) and 16 secondary schools (12 - 15 years old) from seven different regions in Greece participated. Participants answered questions regarding their Internet activities and demographics.
Results: 367 (40.9 %) children from primary and 707 (44.9 %) from secondary schools played online games daily, while 115 (12.8 %) and 965 (61.2 %) respectively had a Facebook profile. The boys played games and used Facebook more than girls [primary: OR = 1.2, 95% CI (1.0, 1.9), secondary school: OR = 2.3, 95% CI (1.9, 2.9), and [OR = 2.1, 95% CI (1.3, 3.2), OR = 1.3, 95% (1.1, 1.6), accordingly]. Students with home Internet access were more likely to use online games and go on Facebook.
Conclusions: The male gender and home Internet access are both associated with the higher usage of online games and Facebook, while profiles in Facebook are illegally created at the first years of primary school. Since both Internet activities have been repetitively associated with pathological Internet usage, educators and social services should work on increasing awareness in young children and their parents.

Keywords: Primary School, Secondary School, Internet, Habits, Children, Social Networks

1. Background

Internet is a very popular and useful mean of information retrieval, social networking and entertainment for children and young adolescents. Although moderate use of the Internet has been associated with positive effects, negative influences and potential hazards it is expected to affect the more vulnerable group of younger users (1, 2). Internet addiction, grooming and cyber-bulling are some of the described hazards and awareness that are essential for both parents and anyone who works with children, in order to apply preventive measures and teach children how to use internet safely (3-7). Although there is growing concern regarding the way younger school children use Internet, their Internet practices have received little research attention.

Although little is known regarding the Internet use of children under the age of 12 years old, Internet habits and pathological use has been previously described in adolescents (5, 6, 8-15). The use of social networking sites and online games have been previously associated with the increased possibility of pathological Internet use that could lead to Internet addiction in adolescents (5, 8-10). Moreover, previous studies in adolescents have shown that the most significant predictors of overall Internet usage included accessing the Internet via one's own home portal (8, 9). On the influence of gender, controversial findings have been reported, indicating that either there is no difference or that the male gender is associated with high possibility of developing problematic Internet use (5, 9-13).

2. Objectives

The aim of this study was to explore the way school children spent time online in order to detect habits with the high risk of developing pathological Internet use. Moreover the effect of gender and home Internet access on their Internet activities was examined.

3. Patients and Methods

3.1. Participants

Seven primary health care centers (PHCCs) in North Greece jointly investigated the Internet habits of children

attending the 26 primary and 16 secondary schools in their areas. Education in Greece is compulsory for all children from the ages of 6 to 15 years old, including 6 years of primary and 3 years of secondary school.

The study was organized and supervised by the 3rd regional health authority of Macedonia. It took place from October 2010 until May 2011. Approval from the Greek Ministry of Education was obtained.

3.2. Procedure

The director of each PHCC informed the principals of all the neighboring primary and secondary schools regarding the purposes of the study and arranged visits at the school campuses. Children's guardians were informed by a leaflet regarding the purposes of the study and were asked to provide informed consent for the participation of their child. GPs and nurses from the local PHCC visited the schools and facilitated the pupils to answer the questionnaire of the study.

3.3. Questionnaire

The children were invited to answer 14 questions regarding how much time they spent online daily, what Internet activities they use and where they access Internet from (home, Internet café, etc.), as well as demographics. The tool of the study was developed for the needs of this study by the research team, after thorough literature research.

3.4. Data Analysis

Data was analyzed using the SPSS 15.0 statistical package (SPSS Inc., Chicago, IL, USA). Very few questions that were not fully or clearly completed were reported as missing data. Responses of the children were presented as counts and proportions. Descriptive results for the children from A to D primary school classes and from E to F were presented as two separate groups, as similar findings were revealed. Pearson's chi square tests were used in order to calculate whether statistically significant differences existed in the engagement in online activities amongst "A to D classes" primary school and "E to F" or secondary school students. Pearson's chi square tests and crude odds ratios (OR) with 95% confidence intervals (CI) were calculated in order to compare Internet activities in relation to gender (boys compared to girls) and presence of home Internet access (compared to absence). Logistic regression models were used in order to calculate the adjusted odds ratio with 95% confidence intervals (CI), using it as a dependent variable for online activity and as an independent variable for gender, Internet access and primary versus secondary school. The Enter method was employed. $P < 0.05$ were considered as statistically significant.

4. Results

897 students from primary schools (aged from 6 to 12 years old) and 1,576 from secondary schools (12 to 15 years old) completed the tool of the study. The response rate was 71.8% and 73.4%, respectively. There were 421 males (46.9%) from the primary schools and 783 (49.7%) of the secondary school. All school classes were represented in the study sample [primary schools- A: 84 (9.4% of the sample), B: 172 (19.2%), C: 125 (13.9%), D: 225 (25.1%), E: 150 (16.7%), F: 129 (14.4%), secondary schools- A: 591 (37.5%), B: 515 (32.7%), C: 470 (29.8%)]. The differences in the percentages of the 6 classes of the primary school within the total sample reflect the differences in the total numbers of their children and not in the response rates.

Table 1 presents how primary and secondary school children spent their time online and where they access the Internet. The percentages of pupils using online games and Facebook increased gradually as they proceed in the 6 classes from the primary school. For the secondary school children, the percentages for playing online games in the three classes were A: 288 (48.8%), B: 242 (47%), C: 208 (44.3%), while increasing prevalence was found in the use of Facebook (A: 319 (54%), B: 320 (62.1%), C: 326 (69.4%).

In Table 2, crude odds ratios (OR) with 95% confidence intervals (CI) are presented in order to compare Internet activities in relation to gender and home Internet access. Boys were found to spend more time playing online games compared to their female classmates, marginally in primary school [OR = 1.2, $P < 0.05$, 95% CI (1.0, 1.9)] and more profoundly in secondary school [OR = 2.3, $P < 0.001$, 95% CI (1.9, 2.9)]. Boys have also declared using Facebook more than girls in primary school [OR = 2.1, $P < 0.001$, 95% CI (1.3, 3.2)] and marginally more in secondary school [OR = 1.3, $P<0.05$, 95% CI (1.1, 1.6)].

Children that had Internet access at home were more likely to play online games [primary school: OR = 1.8, $P < 0.001$, 95% CI (1.1, 2.8)], secondary school: [OR = 1.6, $P < 0.001$, 95% CI (1.2, 2.2)] and to use Facebook [primary school: OR = 1.2 $P < 0.05$, 95% CI (0.7, 2.0), secondary school: OR = 3.7, $P < 0.001$, 95% CI (2.9, 4.9)].

Logistic regression models were used in order to calculate the adjusted odds ratio with 95% confidence intervals (CI), for each online activity, with gender, Internet access and primary versus secondary school as independent variables. The results are presented in Table 3.

5. Discussion

This school-based study revealed a high prevalence of Internet usage, especially on online games and social networks both in children and young adolescents. Although

Table 1. Internet Use in Primary and Secondary School Students[a]

Internet Use	Primary School		Secondary School
	A to D Class, n = 606	E to F Class, n = 279	A to C Class, n = 1576
Daily internet use, hour			
0.5 - 2	26.2 (159)	50.7 (141)[b]	65.6 (1034)[b]
2.1 - 4	0.9 (6)	1.1% (3)	4.5 (71)[b]
> 4	1.2 (7)	46.6 (130)	44.9 (707)
Online games	38.1 (231)	46.6 (130)	44.9 (707)
Facebook	6.9 (42)	25.5 (71)[b]	61.2 (965)[b]
Information seeking for school activities	10.4 (63	24 (67)[b]	38.5 (607)[b]
General information seeking	5 (30)	19.4 (54)[b]	25.6 (403)[c]
Downloading movies	7.6 (46)	14 (39)[c]	22.1 (349)[b]
Downloading music	12.7 (77)	36.2 (101)[b]	46.5 (733)[b]
Internet café access	11.2 (68)	23.7 (66)[b]	30.5 (480)[b]
Home Internet access	48.4 (293)	54.1 (151)	81.9 (1291)[b]

[a]Values are expressed as No. (%).
[b]P < 0.05 (compared to "A to D classes of primary school").
[c]P < 0.001 (compared to "A to D classes of primary school").

Table 2. Internet Activities in Primary and Secondary School Students In Relation to Gender and Internet Access at Home[a]

Internet Use	Boys[b]		Internet Access at Home[c]	
	Primary School	Secondary School	Primary School	Secondary School
Online games	1.2 (0.9 - 1.9)[d]	2.3 (1.9 - 2.9)[e]	1.8 (1.1 - 2.8)[e]	1.6 (1.2 - 2.2)[e]
Facebook	2.1 (1.3 - 3.2)[e]	1.3 (1.1 - 1.6)[d]	1.2 (0.7 - 2.0)[d]	3.7 (2.9 - 4.9)[e]
Information seeking for school activities	0.7 (0.5-1)	0.8 (0.6 - 1)[d]	0.8 (0.5-1.3)	2 (1.4 - 2.7)[e]
General information seeking	0.9 (0.6 - 1.5)	1.0 (0.8 - 1.3)	1 (0.6 - 1.8)	2.3 (1.5 - 3.3)[e]
Downloading movies	1.8 (1.1 - 3)[e]	1.2 (0.9 - 1.5)	0.8 (0.5 - 1.4)	2.2 (1.4 - 3.2)[e]
Downloading music	0.5 (0.4 - 0.7)[e]	0.8 (0.7 - 1)	0.9 (0.6-1.4)	2.6 (1.9 - 3.5)[e]

[a]Values are expressed as OR (95% CI); Crude Odds Ratios (95% CI).
[b]Reference category: Girls.
[c]Reference category: not having internet access at home
[d]P < 0.05.
[e]P < 0.001.

the use of Facebook is not allowed under the age of 13, children create profiles from the age of six with increasing prevalence, as they grow older. The male gender was associated with higher prevalence in the use of online games and Facebook. The presence of Internet access at home was also associated with a significantly higher use of online games and social networking sites, both in primary and secondary school students and with higher use of all Internet activities in secondary school students.

The main strength of this multi-center, school-based, cross-sectional study is that it is the first in North Greece and one of the few internationally, to our knowledge, to report on the way not only young adolescents, but also younger children use Internet. Our findings indicate the gradually increasing prevalence of both online games and Facebook in the children from the age of 6 years and older. The prevalence of Facebook users amongst the children younger than the age of 13 has not been previously described and arises major concerns, especially in safety issues. For the online games, since there are no previous data on the Internet behavior of children from the age of six years old in Greece, no comparison is possible. However, these findings indicate that Internet activities are adopted by younger ages, changing the previously described age

Table 3. Logistic Regression Models for Each Online Activity, With Gender, Internet Access and School (Primary Versus Secondary) as Independent Variables[a]

Online Activity	OR (95% CI)	P Value
Independent variables		
Gender (Boys)	0.55 (0.43, 0.72)	< 0.001
Home internet access	1.55 (1.12, 2.16)	0.009
School	0.33 (0.25, 0.43)	< 0.001
Facebook		
Gender	0.67 (0.51, 0.87	0.003
Home internet access	1.64 (1.15, 2.34)	0.006
School	5.97 (4.54, 7.84)	< 0.001
Information seeking for school activities		
Gender	1.52 (1.18, 1.96)	0.850
Home internet access	1.11 (0.79, 1.56	0.061
School	1.99 (1.53, 2.58)	< 0.001
General information seeking		
Gender	1.02 (0.78, 1.36)	0.850
Home internet access	1.46 (0.98, 2.16)	0.061
School	2.14 (1.59, 2.86)	< 0.001
Downloading movies		
Gender	0.70 (0.53, 0.94)	0.016
Home internet access	1.4 (0.94, 2.08)	0.096
School	2.14 (1.59, 2.87)	< 0.001
Downloading music		
Gender	1.54 (1.20, 1.97)	0.001
Home internet access	1.43 (1.03, 1.98)	0.031
School	2.64 (2.06, 3.39)	< 0.001

[a] Adjusted odds ratio with 95% confidence intervals (CI).

profile of users (10, 13).

The finding that boys are more likely to use online games is congruent with previous studies (5, 12, 13). Boys were also more likely to use Facebook more that their female schoolmates, while in college students and older adolescents, females have been previously reported to use Internet for communication and therefore social network sites more than males (9, 11). The fact that this gender difference is diminished in secondary school is in line with previous studies, supporting that the females' preference for social networking develops gradually as adolescents grow older. Finally, the association of both online gaming and the use of Facebook with accessing the Internet via one's own home portal is also in line with previous findings, indicating the importance of parental online security practices at home (8, 9).

There are some limitations that have to be mentioned. First of all the tool of the study was developed for the needs of this study and was not a previously published questionnaire. It was developed by the research team after thorough literature research, because no established and published tool was applicable to the youngest children of the study and the need for the same tool for all the participants was recognized. Furthermore, another limitation could concern the refusal of some pupils to complete the study tool. Although the achieved response rate is high, the fact that some pupils refused to participate could reinforce our findings, since children with pathological use have a higher possibility to be included amongst non-responders.

In conclusion, high prevalence of online activities that put children in high risk of developing pathological Internet use was found. Our findings indicate that Inter-

net activities are becoming more popular in younger ages, changing the previously described age profile of Internet users. The role of parents, school teachers and health care providers is extremely important in preventing the potential hazards by providing guidance on how to use Internet safely, but also in detecting pathological behaviors at early stages. School-based assessment of Internet use for both screening and surveillance could be a part of a multifaceted strategy for reducing both child and adolescent pathological Internet use. The current study provides important information that could be useful in formulating age-specific health policies in Internet safety. Finally, it provides evidence that the need for training for safe Internet use should start at the very first stages of school life, since this is when both Internet usage and the exposure to Internet hazards begin.

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