Despite the significant contributions from previous studies about the prevalence of problematic Internet use (PIU) among adolescents in Europe, important questions remain regarding adverse consequences of PIU. This study aims to assess the relation between duration of Internet use and adverse psychosocial effects among adolescents from six European countries. The final sample included 7,351 adolescents (50.8% male and 49.2% female; mean age: 14.6±1.90) recruited from randomly selected schools within the six study sites. Results showed that 12.9% of adolescents used Internet more than 20 hours per week. There was a significant relationship between duration of Internet use and frequency of alcohol, tobacco, cannabis and other illegal drug use. Duration of Internet use is also significantly associated with school problems, with use of slot machines and with other psychosocial problems. These findings highlight the need to strengthen preventive efforts for reducing PIU and related consequences among adolescents.

**Key Words:** Internet, adolescents, psychosocial problems.
Usando la Internet ha sido una de las actividades de ocio más populares en los países occidentales. Particularmente entre los adolescentes, el uso de la Internet se ha visto aumentado en el tiempo como una forma accesible de obtener información, entretenimiento, y socialización (Kormas, Critselis, Janikian, Kafetzis, & Tsitsika, 2011). Para la mayoría de los usuarios de Internet, el mundo de Internet representa un inmenso paraíso que mejorará la calidad de vida. Sin embargo, para algunas personas la Internet puede llevar a problemas psicosociales, incluyendo trastornos mentales (Aboujaoude, 2010).

Debido a la falta de consenso sobre los criterios diagnósticos y el hecho de que la mayoría de los estudios epidemiológicos se han centrado en la edad adulta, no se han establecido claramente los criterios diagnósticos utilizados (Aboujaoude, 2010). Considerando que el uso de Internet ha sido asociado con una mayor prevalencia de problemas psicosociales en general, se ha realizado la investigación en línea para establecer una asociación entre el uso de Internet y la prevalencia de trastornos mentales. No obstante, hay estudios que se han centrado en regiones geográficas específicas, principalmente en Asia, principalmente en China, y algunos en Europa. Por tanto, es necesario realizar más estudios en otras regiones del mundo. Es esencial hacer más investigación en esta área que mejore la comprensión de la relación entre el uso de Internet y los problemas psicosociales.
or almost”. Frequency of drunkenness was determining by asking individuals: How many times have you been drunk in the last month?” For the assessment of smoking we used the item: “Read the following statements and tick the box for that which best describes you: I have never smoked, I have only tried smoking once, I have smoked once or twice in the past but now I don’t, I smoke cigarettes but not more than one a week, I smoke between one and six cigarettes a week, In general I smoke more than six cigarettes a week”. For the evaluation of cannabis use we asked: “Have you ever used cannabis?”, the response options being: “No”, “Yes, at some time in my life”, “Yes, in the last 12 months” and “Yes, in the last 30 days”. For the evaluation of illegal drug use we used a dichotomous response question: “Have you ever used illegal drugs (cocaine, ecstasy, amphetamine, heroin, others.)?”.

The school variables have been classified into three different dimensions: Performance (“It is difficult to pay attention in class”, “I forget things” and “I have trouble keeping up with homework”), Absenteeism (“I missed class because I feel sick”, “I go to school but sometimes I miss some classes”, “Sometimes I’m not going to school because I do not want to go”, and “Sometimes I’m not going to school because my parents/caregivers not let me go to school”) and Satisfaction (“I am happy to be at school/college/university” and “I feel safe at school/college/university”).

For the evaluation of other different psychosocial problems the question used was: “Have you experienced any of these problems during the past six months?” The items were: “injured after drinking”, “having trouble with the police”, “having family problems”, “regret having had sex with someone”, “sexually transmitted diseases”, “have lost friends, “put on weight”. Responses were categorized as “yes” or “no”. Finally, slot machines use was determined by asking respondents about “how often do you play on slot machines”. Response options were: “never”, “a few times a year”, “once or twice a month”, “at least once a month” and “almost every day”.

**Data analyses**

Various descriptive and frequency analyses in relation to participants’ characteristics were carried out. The relationship between different variables measured by the questionnaire and frequency of Internet use were analyzed using chi-squared tests. Effect sizes of principal comparisons were calculated using phi (Φ) for χ² tests, in order to maintain values for small, medium and large effects (.10, .30 and .50). Confidence level was 95%, and the statistical package used was the SPSS-15.

**Results**

**Duration of Internet use and Internet sited used**

Ninety-four percent of adolescents use the Internet at home. Rates of Internet use were as follows: 3.0% of adolescents never used Internet, 36.2% used Internet between 1 and 5 hours per week; 29.3% used Internet between 6 and 10 hours per week; 18.7% used Internet between 11 and 20 hours per week and 12.9% used Internet more than 20 hours per week. Seventy-five percent of adolescents used social networking (e.g. Facebook), 28.6% chat rooms, 62.25% downloading movies, music, etc., 28.8% for watching TV, 15.2% for shopping, 53.8% to email, 41.5% for gaming and 64.8% for school work. Fifty six percent of respondents reported that parents do not limit the time they can use the Internet.

**Duration of Internet use and drug use**

There is a statistically significant relationship (p= .000) between duration of Internet use and alcohol use (Table 1). Among adolescents who use the Internet less time (1-5 hours) the frequency of alcohol consumption is lower than expected. The opposite trend occurs with adolescents who use the Internet more than 20 hours a week. Chi-square tests also showed a significant positive relationship between duration of Internet use and tobacco use (p= .000).

Adolescents who use the Internet more time per week tend to use more cannabis (p= .000) and other illegal drugs (p= .000). Specifically, among those who use the Internet more than 20 hours per week are twice more likely to be cannabis users than expected by chance. In contrast, among those who use the Internet between 1-5 hours are half as many likely to be regular users than expected by chance (Table 1).

<table>
<thead>
<tr>
<th>Drug use</th>
<th>Chi square</th>
<th>N</th>
<th>Df</th>
<th>P</th>
<th>Effect size (Φ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol use</td>
<td>411.273</td>
<td>6678</td>
<td>24</td>
<td>.000</td>
<td>.248</td>
</tr>
<tr>
<td>Frequency of drunkenness</td>
<td>115.880</td>
<td>3594</td>
<td>80</td>
<td>.005</td>
<td>.180</td>
</tr>
<tr>
<td>Tobacco use</td>
<td>220.509</td>
<td>7439</td>
<td>20</td>
<td>.000</td>
<td>.172</td>
</tr>
<tr>
<td>Cannabis use</td>
<td>186.707</td>
<td>7294</td>
<td>12</td>
<td>.000</td>
<td>.160</td>
</tr>
<tr>
<td>Other illegal drugs</td>
<td>108.096</td>
<td>7556</td>
<td>4</td>
<td>.000</td>
<td>.120</td>
</tr>
</tbody>
</table>

* With Yates continuity correction
Duration of Internet use and adverse psychosocial effects among European adolescents

Table 2
Relationship between Internet use and school factors

<table>
<thead>
<tr>
<th>School factors</th>
<th>Chi square*</th>
<th>N</th>
<th>Df</th>
<th>P</th>
<th>Effect size (Φ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem paying attention in class</td>
<td>233.749</td>
<td>7565</td>
<td>16</td>
<td>.000</td>
<td>.176</td>
</tr>
<tr>
<td>Forget things</td>
<td>123.979</td>
<td>7552</td>
<td>12</td>
<td>.000</td>
<td>.128</td>
</tr>
<tr>
<td>Trouble keeping up with homework</td>
<td>129.406</td>
<td>7528</td>
<td>12</td>
<td>.000</td>
<td>.131</td>
</tr>
<tr>
<td>Missed class because sickness</td>
<td>68.014</td>
<td>7524</td>
<td>12</td>
<td>.000</td>
<td>.095</td>
</tr>
<tr>
<td>Sometimes miss some classes</td>
<td>162.507</td>
<td>7535</td>
<td>12</td>
<td>.000</td>
<td>.147</td>
</tr>
<tr>
<td>Sometimes not going to school because do not want to go</td>
<td>185.773</td>
<td>7539</td>
<td>12</td>
<td>.000</td>
<td>.157</td>
</tr>
<tr>
<td>Sometimes not going to school because my parents/caregivers let me not go to school</td>
<td>145.391</td>
<td>7544</td>
<td>12</td>
<td>.000</td>
<td>.139</td>
</tr>
<tr>
<td>Happy to be at school</td>
<td>140.408</td>
<td>7529</td>
<td>12</td>
<td>.000</td>
<td>.137</td>
</tr>
<tr>
<td>Feel safe at school</td>
<td>127.848</td>
<td>7481</td>
<td>12</td>
<td>.000</td>
<td>.131</td>
</tr>
</tbody>
</table>

* With Yates continuity correction

Table 3
Relationship between Internet use and interpersonal and psychosocial problems

<table>
<thead>
<tr>
<th>Psychosocial problems</th>
<th>Chi square*</th>
<th>N</th>
<th>Df</th>
<th>P</th>
<th>Effect size (Φ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injured after alcohol</td>
<td>109.441</td>
<td>7557</td>
<td>4</td>
<td>.000</td>
<td>.120</td>
</tr>
<tr>
<td>Trouble with police</td>
<td>95.049</td>
<td>7556</td>
<td>4</td>
<td>.000</td>
<td>.112</td>
</tr>
<tr>
<td>Family problems</td>
<td>47.866</td>
<td>7554</td>
<td>4</td>
<td>.000</td>
<td>.79</td>
</tr>
<tr>
<td>Had regretted sex</td>
<td>63.761</td>
<td>7546</td>
<td>4</td>
<td>.000</td>
<td>.092</td>
</tr>
<tr>
<td>Losing friends</td>
<td>41.925</td>
<td>7538</td>
<td>4</td>
<td>.000</td>
<td>.075</td>
</tr>
<tr>
<td>Put on weight</td>
<td>22.685</td>
<td>7503</td>
<td>4</td>
<td>.000</td>
<td>.055</td>
</tr>
<tr>
<td>Sexually transmitted diseases</td>
<td>115.510</td>
<td>7544</td>
<td>4</td>
<td>.000</td>
<td>.124</td>
</tr>
</tbody>
</table>

* With Yates continuity correction

Duration of Internet use and school factors

There is a significant relationship between duration of Internet use and school problems (p=.000) (Table 2). In all cases, adolescents using more than 20 hours of Internet per week have a lower school performance and school satisfaction, and higher rates of absenteeism than expected by chance.

Duration of Internet use and interpersonal and psychosocial problems

There are statistically significant relationships between duration of Internet use and the following problems: injured after drinking, trouble with police, family problems, regretted having sex with someone, losing friends, put on weight and have sexually transmitted diseases (Table 3). In all cases, the likelihood of such problems is higher than expected by chance among teens who use the Internet more than 20 hours per week. Conversely, the likelihood of problems is lower than expected by chance among those who use the Internet between 1-5 hours (Table 3).

Duration of Internet use and use of slot machines

There is a statistically significant relationship between duration of Internet use and the frequency of playing on slot machines $\chi^2 (16, N = 7411) = 113.100, p= .000; \Phi = .124$. We also performed the same analysis but collapsing the variable ‘frequency slot game’ in two categories; 0 (never) and 1 (other cases, from ‘a few times a year’ to ‘almost every day’). The results also show a statistically significant relationship between the two variables $\chi^2 (4, N = 7411) = 70.346, p= .000; \Phi = .097$.

Discussion

To our knowledge, this is the first study to examine the relation between duration of Internet use and psychosocial problems in an adolescent community sample from several regions in Europe. The study findings suggest that adolescents who use the Internet for longer are more likely to concomitantly exhibit psychosocial problems. Specifically,
we emphasized four major results: 1) A high percentage of the study population is at risk of PIU, as the number of hours per week using the Internet is very high; 2) adolescents who use the Internet excessively compared to their peers are at greater risk to use drugs; 3) adolescents who use Internet for longer have poorer school performance and miss more school classes; 4) the odds of psychosocial problems are greater among adolescents who use the Internet more than 20 hours per week; and 5) the frequency of gambling among those who use the Internet more hours is greater than among adolescents who use Internet less time.

In line with other studies, our results showed that excessive Internet use is very high. There is increasing evidence that PIU among adolescents is emerging due to easy access to the Internet (Gómez Salgado, Rial Boubeta, Braña Tobío, & Varela Mallou, 2014). Adolescents may be particularly vulnerable to the development of PIU and addictive behavioral patterns in general (Griffiths & Wood, 2000; Pallanti et al., 2006; Puerta-Cortés, & Carbonell, 2014; van den Eijnden, Spijkerman, Vermulst, van Rooj, & Engels, 2010).

Consistent with findings from previous studies (Fisoun, Flores, Siomos, Geroukalis, & Navridis, 2012; Kim, 2012; Lam, Peng, Mai, & Jing, 2009; Liu, Desai, Krishnan-Sarin, Cavallo, & Potenza, 2011; Pawlikowski, Nader, Burger, Stieger, & Brand, 2013), we found an association between the duration of Internet use and drug use. Those who use the Internet excessively compared to their peers were seen to be at increased risk of drug use: alcohol, tobacco, cannabis and other illegal drugs. The results also showed that the more adolescents use the Internet the more often they reported being drunk. There are several possible mechanisms explaining this association. Out-of-control gambling, eating, and Internet use may share the same neurobiological mechanism of substance dependence and can be termed “behavioral addiction” (Holden, 2001). Thus, if the Internet had the potential to be addictive, adolescents with vulnerability to drug use would be vulnerable to excessive Internet use and PIU. Alternatively, the co-occurrence of excessive Internet use and drug use may also be due to shared risk factors such as neurobehavioral disinhibition, high novelty-seeking and low reward dependence (Lam et al., 2009), low self-esteem, low family function, and low life satisfaction (Ko et al., 2008b). It is also possible that one behavior may cause the other.

Using the Internet for over 20 hours per week was associated with increased risk of lower school performance, lower satisfaction and higher absenteeism. Several factors may contribute to the high risk of school problems among adolescents who spend much time connected to Internet. The poor mental health can affect school performance and several studies reported strong association between PIU and depression (Ceyhan & Ceyhan, 2008; Kim et al., 2006; Yen, Ko, Yen, Chang, & Cheng, 2009), and between PIU and ADHD (Yen, Ko, Yen, Chang, & Cheng, 2009), and between PIU and ADHD (Ko, Yen, Chen, Chen, & Yen, 2008; Yoo et al., 2004).

Previous studies also suggest that individuals with Internet addiction exhibit more impulsivity than those who use the Internet less frequently (Cao & Su, 2007). Adolescents tend to use the Internet as a medium for socializing (Carballo, Perez-Jover, Espada, Orgiles, & Piqueras, 2012), but PIU can result in individuals spending ever-increasing amounts of time in online activities (Cao et al., 2011; Gámez-Guadix, Orue, & Calvete, 2013), leading to school problems. Late night use of the Internet can cause sleep deprivation and fatigue, which can adversely affect academic performance (Flisher, 2010).

Our results are consistent with previous work (Cao & Su, 2007; Seo et al., 2009) documenting that higher use of Internet is associated with increased risk of having interpersonal or psychosocial problems such as injured after drinking, trouble with the police, family problems, regretted having sex with someone, loss of friends and have gained weight. Several studies have reported significant correlations between PIU and hostility and aggressive behavior (Ko, Yen, Chen, Yeh, & Yen, 2009; Xiuqin et al., 2010). For adolescents with interpersonal conflict or rejection, the Internet could provide a more accessible world, free and virtual interpersonal difficulties escape from real life. Also, many Internet activities, especially in online games offer a world in which they learn to express hostility and violence perpetrated without restriction (Ko et al., 2008). Spending much time on the Internet can lead to social isolation, self-neglect, poor nutrition, and family problems. A sedentary lifestyle can increase risk of obesity and its associated complications.

Previous studies identified association between PIU and gambling and our results are in agreement with them. The availability of the Internet as a medium for gambling practices among adolescents may contribute to increase and generalize the overall gambling behaviors (Tsitsika, Critselis, Janikian, Kormas, & Kafetzis, 2011). It is also plausible that some pre-existing problem gamblers may more readily adopt this accessible medium for the purposes of gambling. However, it is also upheld that internet gambling may potentially confound the development of problematic Internet use. Additional longitudinal studies are necessary in order to elucidate the etiological association between gambling, internet gambling practices and the development of PIU among adolescents (Tsitsika et al., 2011).

Our study has the limitations common to most large-scale surveys. First, the cross-sectional design prevents any attribution of causality between Internet using time and psychosocial problems. Second, measures of Internet time use and the other study variable were based on self-reports, rather than on direct observation of the respondents’ behavior or confirmation by third parties. However, it would be difficult to obtain such information in sample as large as the one that comprises the present study. Third, the results of this study were based on schools and their students, so adolescents who do not go to school are excluded from the list of sub-
Duration of Internet use and adverse psychosocial effects among European adolescents

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jects for investigation. There is a possibility that adolescents who do not go to school might have different Internet use and this fact needs to be considered in interpretation of the results of this study. Fourth, this study focused on time spent on the Internet per week. However, previous studies showed that the frequency spent using the Internet per week is highly associated with PIU (Carli et al., 2011; Durkee et al., 2012), suggesting a high degree of overlap between these two categories. However, from what has been said above, it should be concluded that in the future, for public health studies and policies concerning adolescent Internet problems, both Internet addiction and Internet using time need to be considered (Kim, 2012).

Despite these limitations, our study indicates that excessive time spent on the Internet (and probably the risk of PIU) is common among European adolescents, and that duration of Internet use was significantly associated with drug use, school problems, gambling and a variety of psychosocial problems. These findings highlight the need to strengthen preventive efforts for reducing PIU and related consequences among adolescents. Particularly, Internet-specific parenting practices (van den Eijnden et al., 2010) may help prevent internet-related problems among this population.

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Conflict of interest
Authors declare no interest conflict.

References