Pathological Internet use is on the rise among European adolescents

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Abstract (max. 100 words)

Increasing accessibility of the Internet has been accompanied by an increased public awareness of pathological Internet use (PIU). The aim of the study was to investigate a potential increase in prevalence of PIU among European adolescents. Two school-based cross-sectional studies (SEYLE in 2009/10 and WESTAY in 2011/12) were conducted in 5 European countries using the same catchment areas, sampling procedures and assessment tools (YDQ). The comparison of the samples provides first evidence for a rise of pathological Internet use (PIU) among adolescents in different European countries (4.01% to 6.87%, OR=1.69, p<0.001) that warrants further efforts for prevention and intervention.

Key words

Pathological Internet use; Internet addiction; prevalence; adolescents; SEYLE; WESTAY
**Text (max. 1200 words)**

**Introduction**

With more than 3 billion people worldwide who use the Internet, the Internet has certainly become an integral part of particularly young individuals’ daily lives. In the field of child and adolescent psychiatry, a growing number of parents are seeking advice about their children’s excessive use of the Internet. Therefore, pathological Internet use (PIU), classified as an emerging form of behavioral addiction, has gained increasing attention during the past years. Pathological exacerbations of Internet gaming have recently been included as “Internet Gaming Disorder” in the new DSM-5 under conditions that warrant further research (section 3); and a diagnosis of “computer and Internet addiction” is proposed for inclusion in the new ICD-11. A few years ago, our group found that PIU occurs among 4.4% of European adolescents (including Israel) aged 15 years showing significant country differences (prevalence range from 1.2% to 11.8%). However, a constant increase of individuals using or having access to the Internet can be observed in European countries, leading to the overall impression that PIU is an emerging phenomenon that is on the rise among adolescents in Europe. To the best of our knowledge, there are no empirical data that are able to support this impression. Thus, this study aimed to test the hypothesis that prevalence of PIU has increased among European adolescents.

**Method**

**Samples**

Two cross-sectional surveys were conducted within the framework of two European Union funded projects: “Saving and Empowering Young Lives in Europe” (SEYLE) took part in 2009/2010 within 10 EU-countries; “Working in Europe to Stop Truancy Among Youth” (WESTAY) took part in 2011/12 within 5 EU-countries. Both projects recruited school-based representative samples of European adolescents in accordance with exactly the same previously established and validated procedure. In each country, a list of all eligible schools, within the study sites, was generated according to specific inclusion and exclusion criteria. Within each study site, schools were randomly selected to participate in SEYLE/WESTAY. The 5 overlapping countries within both projects were Estonia (ES),
Germany (GE), Italy (IT), Romania (RO), and Spain (SP); the same catchment areas were used for both projects in all five participating countries.

The SEYLE sample comprised 5,839 adolescents (ES: 1,038, GE: 1,444, IT: 1,195; RO: 1,143, SP: 1,029) with 57.61% females and a mean age of 14.8 years. The WESTAY sample comprised 9,758 adolescents (ES: 1,636, GE: 2,718, IT: 2,265, RO: 1,730, SP: 1,409) with 55.10% females and a mean age of 15.03 years. The samples showed differences with regards to gender distribution ($\chi^2[2]=9.31$, $p=0.002$) and age ($t=-14.28$, $p<0.001$).

**Assessment**

PIU was assessed using the Young Diagnostic Questionnaire (YDQ),\textsuperscript{9} which has been widely used in epidemiological research.\textsuperscript{10–12} Categories of PIU are based on a pattern of Internet use resulting in clinical impairment or distress. Eight criteria that bear great similarity to the new DSM-5 criteria for “Internet gaming disorder” (see supplement) are retrospectively evaluated in the YDQ over the last year using “yes” or “no” questions, with a total score ranging from 0 to 8. The following categorical terms were used: normal users (scoring: 0-2), risky users (scoring: 3-4) and pathological users (scoring: ≥ 5).

In addition, emotional and behavioural problems

**Statistical analyses**

Descriptive statistics were performed using $\chi^2$-tests for categorical and t-tests for ordinal variables. The increase of Internet use between the two samples was estimated with a mixed effects logistic regression for ordered categories. The dependent variable was Internet use with the categories normal, risky, and pathological, the fixed effects were country and sample, the random effect was school to compensate for the greater similarity of pupils within one school, and as covariates we added gender and age. The interaction of the factors country and sample estimated the change in Internet use for each country.

**Results**

Frequencies of normal, risky and pathological Internet use in SEYLE and WESTAY including respective group differences are presented in Table 1. The overall sample showed an increase of the prevalence of PIU from 4.01% to 6.87%; the frequency of risky Internet
users increased from 13.34% to 17.57%. The regression model, adjusting for gender and age, confirmed the significant increase of PIU in Europe (OR=1.69, SE=0.11, p<0.001). Most subsamples, except GE, presented with a significant increase in PIU within the two year period.

Discussion

Our results provide first and preliminary evidence for a rise of pathological Internet use (PIU) among adolescents in different European countries. The overall increase of PIU from approximately 4% to almost 7% indicates an increasing risk for young people to excessively engage in Internet activities and subsequent behavioural addiction. Given the association of PIU with a variety of psychopathological outcomes and reduced quality of life, this increase may put young individuals at risk for the development of subsequent mental health problems. However, future research will need to clarify the implications and consequences of this development.

Exact reasons for the rise in PIU cannot be tested within our study. However, the increase of individuals who use the Internet may have had a significant influence. From 2009 to 2012, Internet use increased in all 5 countries investigated. The lowest increase (3%) and highest Internet coverage (79% to 82%) was reported for Germany, which could be a potential explanation for the insignificant increase of PIU in this country. Other countries’ increase ranged from 5% to 9% and Internet coverage ranged from 37-73% to 46-78%. In addition, the overall rise of PIU may have further been stimulated by the emergence of smart phones and the consequent increase in mobile Internet access.

A potential limitation of this study is the solely reliance on self-report for the classification of pathological Internet behaviors. In addition, randomization of participating schools within the catchment area may have led to random differences in the sample composition. Nonetheless, the large number of schools within each catchment area as well as the applied stratification procedure should have ensured high representativeness for both studies, which can be considered its major strength.
Taken together, our data show an increase of PIU among adolescents in Europe. This increase may alarm scientific and societal leaders to further promote both prevention and intervention of PIU.

References (max. 10 plus methodological references)

1 InternetWorldStats. World Internet users statistics. 2014.


5 International Telecommunication Union (ITU). Percentage of individuals using the Internet. 2015.


9 Young KS. *Caught in the net: how to recognize the signs of Internet addiction--and a winning strategy for recovery.* J. Wiley, 1998.


Table 1. Frequencies of normal, risky and pathological Internet use in the SEYLE and WESTAY samples for each country and the whole sample respectively including odds ratios (OR) as a measure of increase of pathological Internet use

<table>
<thead>
<tr>
<th></th>
<th>SEYLE (2009/10)</th>
<th>WESTAY (2011/12)</th>
<th>Differences between SEYLE and WESTAY *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal Internet use</td>
<td>Risky Internet use</td>
<td>Pathological Internet use</td>
</tr>
<tr>
<td>Estonia</td>
<td>804 77.68</td>
<td>176 17.00</td>
<td>55 5.31</td>
</tr>
<tr>
<td>Germany</td>
<td>1,161 80.74</td>
<td>208 14.46</td>
<td>69 4.80</td>
</tr>
<tr>
<td>Italy</td>
<td>1,073 90.09</td>
<td>104 8.73</td>
<td>14 1.18</td>
</tr>
<tr>
<td>Romania</td>
<td>935 82.09</td>
<td>152 13.35</td>
<td>52 4.57</td>
</tr>
<tr>
<td>Spain</td>
<td>845 82.28</td>
<td>138 13.44</td>
<td>44 4.28</td>
</tr>
<tr>
<td>Total</td>
<td>4,818 82.64</td>
<td>778 13.34</td>
<td>234 4.01</td>
</tr>
</tbody>
</table>

* results are presented as xxx