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Pathological Internet Use Is on the Rise Among European Adolescents

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ABSTRACT

Purpose: Increased Internet accessibility has been accompanied by an increased awareness of pathological Internet use (PIU). The aim of the study was to investigate a potential increase of PIU among European adolescents.

Methods: Comparable data from two large cross-sectional multicentre, school-based studies conducted in 2009/2010 and 2011/2012 in five European countries (Estonia, Germany, Italy, Romania, and Spain) were used. The Young's Diagnostic Questionnaire was used to assess the prevalence of PIU.

Results: The comparison of the two samples provides evidence that the prevalence of PIU is on the rise (4.01%–6.87%, odds ratio = 1.69, $p < .001$) except in Germany. Comparison with data on Internet accessibility suggests that the rise in prevalence of adolescent PIU may be a consequence of increased Internet accessibility.

Conclusions: Our findings are the first data to confirm the rise of PIU among European adolescents. They definitively warrant further efforts in the implementation and evaluation of preventive interventions.

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IMPLICATIONS AND CONTRIBUTION

This study provides evidence of an increase in pathological Internet use among adolescents in Europe, which may result from growing Internet accessibility. This increase should alarm scientific and societal leaders to further promote both prevention and intervention efforts of pathological Internet use.

Conflicts of Interest: The authors have no conflicts of interest or financial disclosures to report.

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The Internet has become an integral part in the daily lives of adolescents, with >3 billion users worldwide [1]. A growing number of parents are seeking advice by professionals in child and adolescent psychiatry, to share their concerns about their children's excessive use of the Internet. Pathological Internet use (PIU) is classified as an emerging form of behavioral addiction, particularly in boys, and gains increasing attention. Pathological

Table 1

Frequencies of normal, risky, and PIU in the SEYLE and WE-STAY samples for each country and the whole sample respectively including OR^a as a measure of increase of PIU (adjusted for gender and age)

	SEYLE (2009/2010)						WE-STAY (2011/2012)						Relative risk of PIU in WE-STAY compared with the SEYLE sample ^a		
	Normal Internet use		Risky Internet use		PIU		Normal Internet use		Risky Internet use		PIU		OR	SE	p value
	n	%	n	%	n	%	n	%	n	%	n	%			
Estonia	804	77.68	176	17.00	55	5.31	996	63.36	395	25.13	181	11.51	2.09	.29	<.001
Germany	1,161	80.74	208	14.46	69	4.80	2,051	79.71	392	15.24	130	5.05	1.09	.13	.479
Italy	1,073	90.09	104	8.73	14	1.18	1,784	83.44	260	12.16	94	4.40	2.17	.36	<.001
Romania	935	82.09	152	13.35	52	4.57	858	68.92	279	22.41	108	8.67	1.86	.32	<.001
Spain	845	82.28	138	13.44	44	4.28	1,011	75.50	232	17.33	96	7.17	1.52	.18	<.001
Total	4,818	82.64	778	13.34	234	4.01	6,700	75.56	1,558	17.57	609	6.87	1.69	.11	<.001

OR = odds ratio; PIU = pathological Internet use; SE = standard error; SEYLE = Saving and Empowering Young Lives in Europe; WE-STAY = Working in Europe to Stop Truancy Among Youth.

^a OR represents the ratio of the odds of fulfilling Young's Diagnostic Questionnaire criteria for PIU in the WE-STAY sample compared with the SEYLE sample.

exacerbations of Internet gaming have recently been included as "Internet Gaming Disorder" in the new DSM-5 under conditions that warrant further research, and a diagnosis of "computer and Internet addiction" is proposed for the inclusion in the new ICD-11. It has previously been shown that country differences in Internet accessibility influence the prevalence of PIU [2]. Given the perpetual increase in Internet use and accessibility in European countries [3], an increase of PIU among adolescents in Europe can be expected. To the best of our knowledge, up-to-now there are no empirical data in support of this assumption. Thus, this study aimed to test if the prevalence of PIU has increased among European adolescents.

Methods

Samples

Two cross-sectional surveys of PIU were conducted within the framework of projects funded by the European Union: SEYLE [2] was implemented during 2009/2010 within 10 EU countries, whereas "Working in Europe to Stop Truancy Among Youth" (WE-STAY) [4] was performed in 2011/2012 within five EU countries. For both projects, approval from local ethical committees was granted in each participating center, and representative school-based samples of European adolescents were recruited in accordance with exactly the same procedures that have previously been established and validated (described elsewhere) [5]. Importantly, both studies applied randomization procedure to select schools eligible for recruitment, and both studies recruited adolescents from 8th to 10th grade only, minimizing the risk of resampling participants for the present analysis. To interpret the potential representativeness of the sample, key parameters (i.e., age, population density, and gender proportion) for each site were compared with national data [6]. The five overlapping countries participating in both projects were Estonia (ES), Germany (GE), Italy (IT), Romania (RO), and Spain (SP). The same regional catchment areas were used for both projects in 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 WE-STAY 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

two overall samples showed significant differences with regards to gender distribution ($\chi^2 = 9.31, p = .002$) and age ($t = -14.28, p < .001$). Furthermore, the participation rate in SEYLE (ES: 100%; GE: 98%; IT: 93%; RO: 78%; SP: 75%) and the WE-STAY (ES: 72%; GE: 72%; IT: 59%; RO: 73%; SP: 53%) samples differed.

Assessment

Pathological patterns of Internet use were evaluated in both studies using the Young's Diagnostic Questionnaire [7], which has been widely used in epidemiological research [2,4,8]. Categories of PIU are based on a pattern of Internet use resulting in symptoms of clinical impairment or distress, that are retrospectively evaluated 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 Internet users (scoring: 0–2), risky Internet users (scoring: 3–4), and pathological Internet users (scoring: ≥ 5).

Statistical analyses

Analysis were performed using χ^2 tests for categorical and t tests for ordinal variables. The increase of Internet use between 2009/2010 and 2011/2012 was estimated with a mixed effects logistic regression for ordered categories. The dependent variable was Internet use (i.e., 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, gender and age were added. The interaction of the factors country and sample estimated the change in PIU for each country. Analyses were conducted using Stata, version 14.0 (StataCorp LP, College Station, TX).

Results

Patterns of Internet use in SEYLE and WE-STAY, including the respective group differences, are presented in Table 1. Analysis showed an increase in the prevalence of PIU from 4.01% to 6.87%, while the frequency of risky Internet users increased from 13.34% to 17.57%, as illustrated in Figure 1. There were marginal significant differences in PIU increase as a function of gender ($\chi^2 = 8.52; p = .004$), with gender differences of PIU in the WE-STAY (female, 6.27%; male, 5.69%; $\chi^2 = 6.11, p = .047$) but not the SEYLE sample (female, 3.99%; male, 4.06%; $\chi^2 = 4.25, p = .120$)—highlighting that while the prevalence of PIU

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