Prevalence and Predictors of Internet Addiction among College Students in Sousse, Tunisia

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ABSTRACT

Background: Internet represents a revolution in the world of technology and communication all over the world including Tunisia. However, this technology has also introduced problematic use, especially among students. The current study aimed to determine the prevalence of internet addiction among college students and its predictors in the region of Sousse, Tunisia.

Methods: A cross-sectional study.

Results: The response rate was 96%. The mean age of participants was 21.8 ±2.2 yr. Females represented 51.8% of them. Poor control of internet use was found among 280 (54.0%; 95% CI: 49.7%, 58.3%) participants. Low education levels among parents, the young age, lifetime tobacco use and lifetime illicit drugs use were significantly associated with poor control of internet use among students (P<0.001). While, the most influential factor on internet use among them was under-graduation with an adjusted odds ratio of 2.4 (95% CI: 1.7, 3.6).

Conclusions: Poor control of internet use is highly prevalent among the college students of Sousse especially those under graduate. A national intervention program is required to reduce this problem among youth. A national study among both in-school and out-of-school adolescents and young people would identify at-risk groups and determine the most efficient time to intervene and prevent internet addiction.

Introduction

Internet represents a revolution in the world of technology and changed the world in term of communication. In 2013, more than the third of the world’s population and almost all college students were using the internet. However, this “new” technology has also introduced, especially among young people, problematic use such as addiction to online gaming, gambling, chatting and pornographic videos watching. Since the 1990s, internet addiction has been recognized as a mental health problem similar to the other established addictions. Nevertheless, internet addiction was not officially recognized as a disorder by the psychiatric community. In addition, there were various tools and cutoff points to measure the addiction levels and thus, there was a wide range of reports on the prevalence rate of internet addiction among youth.

Internet addiction can cause several issues including psychosocial, academic, occupational and financial difficulties besides health problems such as carpal tunnel syndrome, dry eyes, neck muscular problems, headaches and sleeping problems. Internet addiction depends on personal characteristics. While the environmental and the socio-cultural factors seem to have a great influence on internet use, in Tunisia, the internet use rose from 17% in 2008 to 52.1% in 2016. In 2014, 45% of Tunisian people over 18 yr had computer in their households, 25% had landline in their houses, 12% had smartphone and 77% were accessing the internet daily. In the education sector, the Tunisian internet agency reported 100% connectivity including universities. Nevertheless, few studies were led to explore internet addiction among youth in Tunisia.

This study aimed to determine the level of internet addiction and its predictors among college students in Sousse, Tunisia. Better understanding of such emergent mental health problems in Tunisia could place them on the national public agenda and catalyze prevention actions at the national and local levels.

Methods

Study design

This cross-sectional study was conducted in the region of Sousse, Tunisia in 2012-2013 among college students in order...
to determine the prevalence and the predictors of addictive behaviors among them.

**Study population**

Sample size calculation was based on an expected prevalence of addictive behaviors of 13% based on a previous study, a precision of 3% and confidence level of 95% which gave a required sample of at least 483 patients. Considering an attrition rate of 20%, a sample of 580 was estimated. For this, a list of the 17 colleges of the region was composed. Then, the colleges were divided into 5 fields of study: Economy, Arts, Letters, Health, and Technology. From each specialty, one faculty was randomly selected. The 5 colleges obtained were as follows: the Institute of Fiscal Studies, the Institute of Music, the Faculty of Law, the Faculty of Medicine and the Higher Institute of Applied Sciences and Technology. Students enrolled in these 5 colleges, who were present in the premises of the campuses after the completion of a course, a lecture or a break near to the classrooms, the lecture theaters, the refreshment bars or in the gardens during the days of data collection were approached and asked for participation.

**Data collection**

Anonymous questionnaire served to collect data. Each participant filled it up separately after giving verbal explanation by a pre-trained investigator. Collected data concerned socio-demographic characteristics, substances use, and internet use. Use of illicit drug, tobacco, and alcohol were defined as never used or ever used (lifetime use) with ever use divided into regular use (at least once per week during at least 1 month) and irregular use (less than once per week) for illicit substances and alcohol use. Concerning tobacco, participants were asked about its daily use during the last month. The tools used to measure the cannabis, alcohol, and tobacco addictions were respectively:

- **The Cannabis Abuse Screening Test (CAST)**, a 6-item scale assessing the frequency of the following events within the past 12 months: on recreational use (2 questions), memory disorders, being encouraged to reduce or stop using cannabis, unsuccessful attempts to quit, problems linked to cannabis consumption. All items were answered on a 5-point scale (0 “never”, 1 “rarely”, 2 “from time to time”, 3 “quite often”, and 4 “very often”). Then the original five-point scale was dichotimized differentiating “never” versus any occurrence of these events in the past year. Using this algorithm, individual test scores ranged from 0 to 6. Low addiction level was considered for people who obtained one, moderate level was for those who obtained scores of 2 and high level was for those who obtained at least 3.

- **The Fast Alcohol Consumption Evaluation questionnaire (FACE)**, a 5 questions interview, for each gender the questionnaire contains two distinct cutoffs that separate nondependent heavy drinkers from the “low-risk group” and the “dependence group”. Accordingly, scores <5, between 5 and 8 and >8 indicate low risk, heavy drinking, and alcohol abuse respectively for men and scores <4, between 4 and 8 and >8 indicate low risk, heavy drinking and alcohol abuse respectively for women.

Two questions from the Fagerström Tolerance Questionnaire and the Fagerström Test for Nicotine Dependence about the number of cigarettes smoked per day and the time to the first cigarette after waking were used to obtain a six-point scale (The Heaviness of Smoking Index (HSI)). Nicotine dependence was then categorized into a three-category variable: low (0–1), medium (2–4) and high (5–6).

The tool used to measure internet use was the Young Internet Addiction Test (IAT) developed by Kimberly Young. It has an excellent internal consistency reliability and face and constructs validity in addition to an adequate concurrent validity. It consists of 20 items questionnaire answered in a 6 options Likert scale: (0: does not apply, 1: rarely, 2: occasionally, 3: frequently, 4: often, 5: always). It explores the degree to which internet use affects: daily routine, social life, productivity, sleeping pattern, and feelings. The minimum score is 0, and the maximum is 100. The higher the score, the greater the level of addiction is. The obtained scores were categorized into four categories: no addiction (0-30), mild dependence (31–49), moderate dependence (50-79) and severe dependence (80-100). Scores upper than 50, indicate poor control of internet use.

**Data analyses**

Data were analyzed using SPSS Statistics for Windows, ver. 18.0 (SPSS Inc., Chicago, IL, USA). Quantitative variables were presented as means with standard deviations (SD), and qualitative ones as absolute frequencies and percentages. Differences between groups were examined using Student’s t-test to compare means and using Chi-square and Fisher’s exact tests to compare proportions. The dependent variable “Internet addiction score ≥ 50” was coded in two categories (yes and no). All associated factors to this variable that were significant at the 20% level were included in a multivariable model. Then, a stepwise backward approach was used to select the independent variables significantly associated with poor control of internet use for the final model. Results of logistic models were expressed as odds ratios (ORs) with confidence level (CI) of 95%. All statistical tests were 2-tailed, and p values <0.05 were considered statistically significant.

In the univariable and multivariable analysis, information about the dependent variable “poor control of internet use” was missing for 38 participants. Accordingly, their correspondent observations were omitted.

**Ethical considerations**

This study was undertaken with respect to the rights and integrity of people. Permissions were obtained from the Ethical Committee of the Faculty of Medicine of Sousse and from the regional Higher Education authorities.

Besides, verbally informed consents were obtained from all participants. Participation was voluntary, and the participants did not receive any payment or supervision. Confidentiality and anonymity were ensured by coding data collection sheets.

**Results**

The responses of 556 college students were obtained (participation rate of 96%). The mean age of participants was 21.8 (±2.2) yr. Females represented 51.8% of them. The mean IAT score was 51.4 (±4.6). Concerning the control of internet use, 42 of respondents (8.1%; 95% CI: 5.8%, 10.4%) had no features of internet addiction. 196 (37.8%; 95% CI: 33.6%, 42.0%) had mild level of internet addiction, 262 (50.6%; 95% CI: 46.3%, 54.9%) had moderate level of internet addiction and 18 (3.5%; 95% CI: 1.9%, 5.1%) had severe level of...
internet addiction. Otherwise, 280 (54.0%; 95% CI: 49.7%, 58.3%) of participants had poor control of internet use (scores of IAT upper than 50).

Univariate analysis revealed that participants with IAT upper than 50, were significantly younger (21.5 ±2 yr) than those with IAT lower than 50 (22.1 ±2.3 yr) (P=0.001). Besides, a low parental educational level was significantly more common among students with IAT upper than 50 than among those with IAT lower than 50 (Table 1). Concerning the other risk behaviors, unlike alcohol use, lifetime tobacco use and lifetime illicit drug use were significantly associated with the poor control of internet use (Table 1). The association between poor control of internet use and lifetime illicit drug use was stronger (OR=2.33 95% CI: 1.01, 5.36) than its association with lifetime tobacco use (OR=1.59; 95% CI: 1.03, 2.45) (Table 1).

After adjustment for the other individual characteristics, only under-graduation remained significantly associated with poor control of internet use with an adjusted odds ratio of 2.32 (Table 2). Furthermore, a dose-response relationship between under-graduation and an increased level of internet addiction was highlighted (Table 3).

Even after binary logistic regression, the most influential risk factor on poor control of internet use was under-graduation with an adjusted odds ratio of 2.45 (95% CI: 1.68, 3.57) (Table 4).

Discussion

The current study highlighted that 54% of participants showed features of internet addiction. Low parental educational levels, the younger age, lifetime tobacco use and lifetime illicit drug use were significantly associated with poor control of internet use among them. While the main predictor of poor control of internet use was under-graduation.

Compared to a recent multinational study led among medical students in 3 developing countries, the mean IAT score observed among participants was higher: 51.4 (±14.6) versus 31.4 (15.4). The student's repartition according to the 3 levels of internet addiction was also different: Among participants, 37.8% scored in the mild level category and 50.6% scored in the moderate level category of internet addiction versus 38.7 and only 10.5% in the multinational study. In the severe level of internet addiction category, 3.5% of participants were identified versus a smaller fraction of 0.5% in the multinational study. Otherwise, the prevalence of internet addiction among college students varies according to the countries, the cultural contexts, the tools and the cutoff point used to define the addiction levels. In Jordan for example, prevalence of poor control of internet use was 40% (using the IAT with a cutoff of 50); in Egypt it was 13.2% (using the Young Internet Addiction Test with a cutoff point of 70); in Turkey: 9.7% (using the 36 items Internet Addiction Scale); in the United States and Europe, it ranged between 1.5% and 8.2%. In Tunisia, using Young's 8-item questionnaire a prevalence of 23.6% among Medical students and a prevalence of 26.8% among Science students were reported. The high prevalence of internet use poor control among college students was explained by a need to escape the university stress and to develop new relationships. Among university graduates, might explain overuse of internet among young adults. Actually, internet represents a way to overcome geographic barriers and to broaden professional horizons.

Table 1: Control of internet use according to the individual characteristics of the participants from the colleges of Sousse, Tunisia in 2012-2013 school year

| Characteristics | Internet addiction score | Unadjusted OR (95% CI) |
|-----------------|--------------------------|------------------------|
| Age (yr)        | ≥50(n=280) <50(n=238)    |                        |
| Gender          |                          |                        |
| Female          | 21.5 (2.0) 22.1 (2.3)    | 0.87 (0.79, 0.94)      |
| Male            | 139 (49.6) 136 (57.1)    | 1.00                   |
| Field of study  |                          |                        |
| Health          | 55 (19.6) 62 (26.1)      | 1.00                   |
| Law             | 68 (24.3) 63 (26.5)      | 1.00                   |
| Economy         | 33 (11.8) 22 (9.2)       | 1.00                   |
| Technology      | 114 (40.7) 87 (36.6)     | 1.00                   |
| Art             | 10 (3.6)   4 (1.7)       | 1.00                   |
| Degree level    |                          |                        |
| Graduate degree | 96 (34.5) 132 (55.5)     | 1.00                   |
| Undergraduate degree | 182 (65.5) 106 (44.5) | 2.36 (1.65, 3.36)     |
| Academic success|                          |                        |
| Yes             | 250 (89.6) 218 (91.6)    | 1.00                   |
| No              | 29 (10.4)   20 (8.4)     | 1.00                   |
| Location        |                          |                        |
| Rural           | 220 (79.4) 184 (77.3)    | 1.00                   |
| Urban           | 57 (20.6)   54 (22.7)    | 1.00                   |
| Single          |                          |                        |
| No              | 68 (24.5)   56 (23.6)    | 1.00                   |
| Yes             | 210 (75.5) 181 (76.4)    | 0.95 (0.64, 1.43)     |
| Socioeconomic level |            |                        |
| High            | 25 (9.0)    19 (8.0)     | 1.00                   |
| Medium          | 240 (86.3) 212 (89.5)    | 0.86 (0.46, 1.60)     |
| Low             | 13 (4.7)    6 (2.5)      | 1.65 (0.53, 5.13)     |
| Parental marital status |            |                        |
| Married         | 265 (96.7) 228 (97.9)    | 1.00                   |
| Divorced/widow  | 9 (3.3)     5 (2.1)      | 1.54 (0.51, 4.69)     |
| Current residential status |        |                        |
| Alone or sharing with friends | 71 (25.4) 62 (26.2) | 1.00                   |
| With family     | 208 (74.6) 175 (73.8)    | 1.04 (0.69, 1.54)     |
| Substances use  |                          |                        |
| Lifetime tobacco use |            |                        |
| No              | 212 (75.7) 198 (83.2)    | 1.00                   |
| Yes             | 68 (24.3)   40 (16.8)    | 1.59 (1.03, 2.45)     |
| Tobacco use during the last month | |                        |
| No              | 21 (32.8)   16 (41.0)    | 1.00                   |
| Yes             | 43 (67.2)   23 (59.0)    | 1.03 (0.31, 3.40)     |
| Tobacco dependence |            |                        |
| Low             | 39 (63.9)   26 (66.7)    | 1.00                   |
| Moderate        | 20 (32.8)   12 (30.8)    | 1.11 (0.46, 2.65)     |
| High            | 2 (3.3)     1 (2.6)      | 1.33 (0.11, 15.47)    |
| Alcohol lifetime use |            |                        |
| No              | 234 (83.6) 209 (87.8)    | 1.00                   |
| Yes             | 46 (16.4)   29 (12.2)    | 1.12 (0.44, 2.89)     |
| Alcohol regular use |            |                        |
| No              | 26 (57.8)   18 (62.1)    | 1.00                   |
| Yes             | 19 (42.2)   11 (37.9)    | 0.84 (0.32, 2.17)     |
| Alcohol dependence |            |                        |
| Low/moderate    | 3 (7.0)     1 (3.4)      | 1.00                   |
| High            | 40 (93.0)   28 (96.9)    | 0.47 (0.05, 4.82)     |
| Illicit drug lifetime use | |                        |
| No              | 259 (92.5) 230 (96.6)    | 1.00                   |
| Yes             | 21 (7.5)    8 (3.4)      | 2.33 (1.01, 5.36)     |
| Illicit drug regular use |        |                        |
| No              | 8 (40.0)    2 (28.6)     | 1.00                   |
| Yes             | 12 (60.0)   5 (71.4)     | 0.60 (0.09, 3.88)     |
| Illicit drug dependence |        |                        |
| Low             | 10 (50.0)   4 (57.1)     | 1.00                   |
| Moderate        | 2 (10.0)    2 (28.6)     | 0.40 (0.04, 3.90)     |
| High            | 8 (40.0)    1 (14.3)     | 3.20 (0.29, 34.59)    |
The present study showed that younger students are more vulnerable to internet addiction. Indeed, due to their age-related features, they could be more interested than older students in enjoyment and adventure that internet offers. The observation of a greater proportion of females scoring lower than 30 compared to males, corroborates several studies findings highlighting that males are at greater risk for developing internet addiction than females. This was explained by a greater interest among males in sexual contents, technology, a lower parental supervision and more difficulties to make successful friendships than females.

Under-graduation was the main predictor of poor control of internet use. Internet addiction is more common among freshman students due to their poor social relations as they are not familiarized yet with the new environment of the university. Low parent’s educational level was found to be another associated risk factor with poor control of internet use among especially among the mother. Parent’s education level is directly related to the amount of internet use but inversely related to the rate of internet addiction. In fact, qualified parents may spend less time with their children but on the other hand, they are more able to guide them to put the internet to good use. Moreover, students whose parents had higher educational level and accordingly higher socioeconomic status might be less vulnerable to internet addiction due to their higher self-esteem.

Similarly, to another study showing association between internet addiction and substances use, poor control of internet use among participants was significantly associated with lifetime tobacco use and lifetime illicit drugs use. In addition, the association between internet addiction and illicit drugs use was stronger than its associations with tobacco use, which joins the current study finding. Association between substances use and internet addiction could be explained by two facts: internet might serve as a channel to initiate substances use. On the other side, the substance effect may increase the level of internet use and thus the risk of internet addiction. While no significant association was found between alcohol use and internet addiction. The sedative effect of alcohol may explain this result.

Unlike the previous studies led by Tunisia, the present study has the advantage of including college students from 5 different universities. Considering other concomitant addictive behaviors such as tobacco use, alcohol use and illicit drugs use represents another strong point of this study. However, the current results should be interpreted in the light of some limitations. Firstly, because of the cross-sectional nature of the study, it was not possible to report causal relationships but only simple associations. Another limitation was that data were self-reported which might result in under or over reporting addictive behaviors. While participants were asked out of classrooms and it was made clear to them that the questionnaire is anonymous and the participation is voluntary. Finally, for practical considerations, participants from each college were not randomly selected which could affect the sample representativeness. While, from each field of study, one college was randomly selected.

A national prevention program is required in Tunisia in order to reduce problematic internet use among youth. Early intervention targeting freshman students, self-esteem improvement and skills of life development may represent the key elements of internet addiction prevention among them. It is important also, to organize social activities at the campuses with the participation of the teachers as leaders in order to improve face-to-face interactions between students instead of virtual contact. Otherwise, monitoring software’s and other technology based solutions could help in reducing the extreme forms of internet overuse. Reducing internet addiction might contribute to reducing substances use among them, as they are associated. Further national research among different age groups of youth is required to determine the most efficient time to intervene.

Table 2: Adjusted odds ratios (OR) and 95% confidence intervals of reporting poor control of internet use by the individual characteristics among the participants from the colleges of Sousse, Tunisia in 2012-2013 school-year

| Characteristics                        | Internet addiction score | Adjusted OR (95% CI) |
|----------------------------------------|--------------------------|---------------------|
| Continuous variables                   | ≥50(t=20)                | <50(t=20)           |
| Age (yr)                               | 21.5 (2.0)               | 22.1 (2.3)          | 0.98 (0.86, 1.14)  |
| Gender                                 | 139 (49.6)               | 136 (51.7)          | 1.00               |
| Female                                 | 141 (50.4)               | 102 (42.9)          | 1.35 (0.83, 2.19)  |
| Field of study                         | 55 (19.6)                | 62 (26.1)           | 1.00               |
| Health                                 | 68 (24.3)                | 63 (26.5)           | 1.00               |
| Law                                    | 33 (11.8)                | 22 (9.2)            | 1.07 (0.44, 2.54)  |
| Technology                             | 114 (40.7)               | 87 (36.6)           | 1.34 (0.71, 2.49)  |
| Arts                                   | 10 (3.6)                 | 4 (1.7)             | 2.45 (0.58,10.36)  |
| Degree level                           | 96 (34.5)                | 132 (55.5)          | 1.00               |
| Academic success                       | 182 (65.5)               | 106 (44.5)          | 2.32 (1.23, 4.35)  |
| Yes                                    | 250 (89.6)               | 218 (91.6)          | 1.00               |
| No                                     | 29 (10.4)                | 20 (8.4)            | 0.93 (0.46, 1.88)  |
| Location                               | 220 (79.4)               | 184 (77.3)          | 1.00               |
| Urban                                  | 57 (20.6)                | 54 (22.7)           | 1.27 (0.75, 2.16)  |
| Single                                 | 68 (24.5)                | 56 (23.6)           | 1.00               |
| Yes                                    | 210 (75.5)               | 181 (76.4)          | 0.91 (0.57, 1.45)  |
| Low                                    | 240 (86.3)               | 212 (89.5)          | 0.87 (0.43, 1.76)  |
| Medium                                 | 13 (4.7)                 | 6 (2.5)             | 1.76 (0.45, 6.82)  |
| No                                     | 78 (30.7)                | 59 (26.0)           | 1.00               |
| Yes                                    | 176 (69.3)               | 168 (74.0)          | 0.87 (0.50, 1.51)  |
| Parental marital status                | 43 (17.6)                | 57 (26.0)           | 1.00               |
| Married                                | 201 (82.4)               | 158 (73.5)          | 1.39 (0.80, 2.44)  |
| Married                                | 100 (40.2)               | 117 (53.2)          | 1.00               |
| Parental marital status                | 149 (59.8)               | 103 (46.8)          | 1.58 (0.94, 2.64)  |
| Divorced/widow                         | 265 (96.7)               | 228 (97.9)          | 1.00               |
| Divorced/widow                         | 9 (3.3)                  | 5 (2.1)             | 1.69 (0.43, 6.68)  |
| Divorced/widow                         | 212 (75.7)               | 198 (83.2)          | 1.00               |
| Current residential status             | 68 (24.3)                | 40 (16.8)           | 1.44 (0.73, 2.84)  |
| Alone or sharing with friends          | 71 (25.4)                | 62 (26.2)           | 1.00               |
| With family                            | 208 (74.6)               | 175 (73.8)          | 1.37 (0.83, 2.27)  |
| With family                            | 212 (75.7)               | 198 (83.2)          | 1.00               |
| No                                     | 68 (24.3)                | 40 (16.8)           | 1.44 (0.73, 2.84)  |
| Yes                                    | 234 (83.6)               | 209 (87.8)          | 1.00               |
| No                                     | 46 (16.4)                | 29 (12.2)           | 0.87 (0.39, 1.94)  |
| Yes                                    | 259 (92.5)               | 230 (96.6)          | 1.00               |
| Yes                                    | 21 (7.5)                 | 8 (3.4)             | 1.17 (0.39, 3.50)  |

* Adjusted for all the variables in the table
Table 3: Internet addiction scores categories according to the individual characteristics among the participants from the colleges of Sousse, Tunisia in 2012-2013 school years

| Variables                              | No addiction n=42 | Mild dependence n=196 | Moderate dependence n=262 | Severe dependence n=18 | P value |
|----------------------------------------|-------------------|-----------------------|---------------------------|------------------------|---------|
| Gender                                 |                   |                       |                           |                        |         |
| Male                                   | 14 (33.3)         | 88 (44.9)             | 132 (50.4)                | 9 (50.0)               | 0.190   |
| Female                                 | 28 (66.7)         | 108 (55.1)            | 130 (49.6)                | 9 (50.0)               |         |
| Field of study                         |                   |                       |                           |                        |         |
| Health                                 | 14 (33.3)         | 48 (24.5)             | 54 (20.6)                 | 1 (5.6)                | 0.144   |
| Law                                    | 15 (35.7)         | 48 (24.5)             | 63 (24.0)                 | 5 (27.8)               |         |
| Economy                                | 1 (2.4)           | 21 (10.7)             | 31 (11.8)                 | 2 (11.1)               |         |
| Technology                             | 10 (23.8)         | 77 (39.3)             | 105 (40.1)                | 9 (50.0)               |         |
| Arts                                   | 2 (4.8)           | 2 (1.0)               | 9 (3.4)                   | 1 (5.6)                |         |
| Degree level                           |                   |                       |                           |                        | 0.001   |
| Graduate degree                        | 30 (71.4)         | 102 (52.0)            | 93 (35.6)                 | 3 (17.6)               |         |
| Undergraduate degree                   | 12 (28.6)         | 94 (48.0)             | 168 (64.4)                | 14 (82.4)              |         |
| Academic success                       |                   |                       |                           |                        | 0.128   |
| Yes                                    | 42 (100.0)        | 176 (89.8)            | 236 (90.1)                | 14 (82.4)              |         |
| No                                     | 0 (0.0)           | 20 (10.2)             | 26 (9.9)                  | 3 (17.6)               |         |
| Location                               |                   |                       |                           |                        | 0.868   |
| Rural                                  | 34 (81.0)         | 150 (76.5)            | 206 (79.5)                | 14 (77.8)              |         |
| Urban                                  | 8 (19.0)          | 46 (23.5)             | 53 (20.5)                 | 4 (22.2)               |         |
| Single                                 |                   |                       |                           |                        | 0.823   |
| No                                     | 10 (23.8)         | 46 (23.6)             | 62 (23.8)                 | 6 (33.3)               |         |
| Yes                                    | 32 (76.2)         | 149 (76.4)            | 198 (76.2)                | 12 (66.7)              |         |
| Socioeconomic level                    |                   |                       |                           |                        | 0.277   |
| High                                   | 1 (2.4)           | 18 (9.2)              | 24 (9.2)                  | 1 (5.6)                |         |
| Medium                                 | 41 (97.6)         | 171 (87.7)            | 225 (86.5)                | 15 (83.3)              |         |
| Low                                    | 0 (0.0)           | 6 (3.1)               | 11 (4.2)                  | 2 (11.1)               |         |
| Mother is jobless                      |                   |                       |                           |                        | 0.047   |
| No                                     | 9 (22.5)          | 50 (26.7)             | 70 (29.3)                 | 8 (53.3)               |         |
| Yes                                    | 31 (77.5)         | 137 (73.3)            | 169 (70.7)                | 7 (46.7)               |         |
| Father’s educational level             |                   |                       |                           |                        | 0.056   |
| Secondary school/ university level     | 12 (33.3)         | 45 (25.1)             | 40 (17.5)                 | 3 (18.8)               |         |
| Illiterate/ primary school             | 24 (66.7)         | 134 (74.9)            | 188 (82.5)                | 13 (81.3)              |         |
| Mother’s educational level             |                   |                       |                           |                        | 0.030   |
| Secondary school/ university level     | 23 (60.5)         | 94 (51.6)             | 94 (40.2)                 | 6 (40.0)               |         |
| Illiterate/ primary level              | 15 (39.5)         | 88 (48.4)             | 140 (59.8)                | 9 (60.0)               |         |
| Parental marital status                |                   |                       |                           |                        | 0.783   |
| Married                                | 41 (97.6)         | 187 (97.9)            | 249 (96.9)                | 16 (94.1)              |         |
| Divorced/widow                        | 1 (2.4)           | 4 (2.1)               | 8 (3.1)                   | 1 (5.9)                |         |
| Current residential status             |                   |                       |                           |                        | 0.285   |
| Alone or sharing with friends          | 6 (14.3)          | 56 (28.7)             | 66 (25.3)                 | 5 (27.8)               |         |
| With family                            | 36 (85.7)         | 139 (71.3)            | 195 (74.7)                | 13 (72.2)              |         |
| Substances use                         |                   |                       |                           |                        | 0.108   |
| Lifetime tobacco use                   | 37 (88.1)         | 161 (82.1)            | 200 (76.3)                | 12 (66.7)              |         |
| Yes                                    | 5 (11.9)          | 35 (17.9)             | 62 (23.7)                 | 6 (33.3)               |         |
| Tobacco use during the last month      |                   |                       |                           |                        | 0.330   |
| No                                     | 1 (16.7)          | 4 (12.1)              | 8 (13.6)                  | 0 (0.0)                |         |
| Yes                                    | 5 (83.3)          | 29 (87.9)             | 51 (86.4)                 | 5 (100.0)              |         |
| Tobacco dependence                     |                   |                       |                           |                        | 0.987   |
| Low                                    | 4 (66.7)          | 22 (66.7)             | 35 (62.5)                 | 4 (80.0)               |         |
| Moderate                               | 2 (33.3)          | 10 (30.3)             | 19 (33.9)                 | 1 (20.0)               |         |
| High                                   | 0 (0.0)           | 1 (3.0)               | 2 (3.6)                   | 0 (0.0)                |         |
| Alcohol use                            |                   |                       |                           |                        | 0.205   |
| Lifetime use                           | 40 (95.2)         | 169 (86.2)            | 218 (83.2)                | 16 (88.9)              |         |
| Yes                                    | 2 (4.8)           | 27 (13.8)             | 44 (16.8)                 | 2 (11.1)               |         |
| Regular use                            |                   |                       |                           |                        | 0.354   |
| No                                     | 1 (50.0)          | 17 (63.0)             | 25 (58.1)                 | 1 (50.0)               |         |
| Yes                                    | 1 (50.0)          | 10 (37.0)             | 18 (41.9)                 | 1 (50.0)               |         |
| Alcohol dependence                     |                   |                       |                           |                        | 0.067   |
| Low/moderate                           | 0 (0.0)           | 3 (11.1)              | 4 (9.8)                   | 0 (0.0)                |         |
| High                                   | 2 (100)           | 24 (88.9)             | 37 (90.2)                 | 2 (100.0)              |         |
| Illicit drugs lifetime use             |                   |                       |                           |                        | 0.063   |
| No                                     | 42 (100)          | 188 (95.9)            | 241 (92.0)                | 18 (100)               |         |
| Yes                                    | 0 (0.0)           | 8 (4.1)               | 21 (8.0)                  | 0 (0.0)                |         |
| Illicit drugs regular use              |                   |                       |                           |                        | 0.001   |
| No                                     | 0 (0.0)           | 5 (71.4)              | 12 (60.0)                 | 0 (0.0)                |         |
| Yes                                    | 0 (0.0)           | 2 (28.6)              | 8 (40.0)                  | 0 (0.0)                |         |
| Illicit drug dependence                |                   |                       |                           |                        | 0.354   |
| Low                                    | 0 (0.0)           | 4 (57.1)              | 10 (50.0)                 | 0 (0.0)                |         |
| Moderate                               | 0 (0.0)           | 2 (28.6)              | 2 (10.0)                  | 0 (0.0)                |         |
| High                                   | 0 (0.0)           | 1 (14.3)              | 8 (40.0)                  | 0 (0.0)                |         |
Table 4: Binary logistic regression analysis for socio-demographic characteristics related to poor control of internet use among participants from the colleges of Sousse, Tunisia in 2012-2013 school year (n=518)

| Characteristics                        | Unadjusted OR (95% CI) | P value | Adjusted OR (95% CI) | P value |
|----------------------------------------|------------------------|---------|----------------------|---------|
| Degree level                           |                        |         |                      |         |
| Graduate degree                        | 1.00                   |         | 1.00                 |         |
| Undergraduate degree                   | 2.36 (1.65, 3.36)      | 0.001   | 2.45 (1.68, 3.57)    | 0.001   |
| Mother’s educational level             | 1.00                   |         | 1.00                 |         |
| Secondary school/ university level     | 1.69 (1.17, 2.44)      | 0.005   | 1.75 (1.20, 2.54)    | 0.004   |
| Illiterate/ primary level              |                        |         |                      |         |

Conclusions

Poor control of internet use is highly prevalent among the college students of Sousse especially those under graduate. A national intervention program would reduce this problem among youth. Further research is required to determine the national prevalence of internet addiction among both in school and out-of-school youth in Tunisia and to identify at-risk groups. This study will provide data used by health policymakers to address public health priority needs.

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Highlights

- Poor control of internet use is highly prevalent among college students of Sousse, Tunisia
- Internet overuse among students in Sousse is associated with tobacco use
- Internet overuse among students in Sousse is associated with illicit substances use
- Internet overuse in Sousse students is inversely related to parent’s education level
- Undergraduate students are the most vulnerable group to internet addiction

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