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Original Article

# Internet Addiction among Secondary School Students in Upper Egypt

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## Abstract

**Background:** The remarkable growth of Internet usage in recent years has been accompanied with an increased risk of Internet addiction (IA). IA which is progressively becoming a societal problem affects the more vulnerable group of adolescents and children, resulting in different mental and physical health consequences.

**Objective(s):** The study aimed to assess the prevalence and predictors of IA among high school students in Sohag, Egypt and its effects on their mental health.

**Methods:** A cross-sectional study was conducted among 400 randomly selected Egyptian high school students using a self- administered structured questionnaire that included socio-demographic and Internet use characteristics, in addition to the Arabic versions of Young Internet Addiction Test (IAT) and General Health Questionnaire (GHQ).

**Results:** More than one third (34.8%) of the studied high school students were mild Internet addicts, 21% were moderate Internet addicts and 4% were severe Internet addicts. Having a Facebook account, Internet access on a smart phone, Internet access outside the house, bad family relationship, presence of the Internet at home, being in 2nd grade of high school, and access to the Internet for entertainment were the predictors of IA. A statistically significant positive correlation was found between IA and deterioration of their mental health (r= 0.33, $p < 0.001$).

**Conclusions and recommendations:** The high prevalence of IA and association with deteriorated mental health shown in the current study warrant special attention and indicate the need for better parenting style and more controlled use of smart phones.

***Keywords:*** Internet addiction, adolescents, Egypt

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## INTRODUCTION

About 4.66 billion users of the Internet were reported worldwide.[1] Excessive use of the Internet has raised attention to its potential harmful physical and mental related consequences.[2] The Internet has turned into an integral part of our daily academic, professional and social life. In Egypt, in 2015, 43.3% of the Egyptian population, were Internet users. This number was projected to 53.5% in 2019.[1] Maladaptive and excessive Internet use, as proved by many evidences, may lead to addiction, which in turn could lead to psychosocial health problems.[3] Although Internet addiction (IA) has not been officially recognized as a specific disease in the DSM-5[4], problematic Internet use had been indicated by scientists as an addictive behavior, since the four fundamental characteristics of behavioral addiction are present including uncontrolled use on expense of important activities, tolerance, withdrawal that occurs when Internet access is impossible and finally experiencing difficulties in daily life of Internet-addicted individuals with subsequent deterioration in academic or work performance and social relations.[5, 6]

Excessive use of smart phones and IA often begin during late childhood and adolescence.[7] Youth/ adolescents are also at the lead of the use of any new technologies, and non-substance-related disorders are common. Furthermore, since they have not developed yet the critical thinking skills and sense of boundaries, they are more susceptible to addiction.[8]

Variation in prevalence of IA among adolescents, has been indicated in many studies. A nationwide study in 11 European countries reported variation in the prevalence of pathological Internet use ranging from 1.2% in Italy to 4.8% in Germany.[9] However, the prevalence of IA in Arab countries is much higher, in Egypt in 2013, 2.6% of the studied high school students were Problematic Internet Users (PIUs) and 18.2% were Potential (PIUs)[10], a much recent study (2019) demonstrated that the prevalence of IA among

adolescents in Egypt was 65.6%, while Facebook addiction prevalence was 92.8%.[2] In Arab countries, 15.8% of Moroccan adolescents[11], and 5.3% of high school students in Saudia were Internet addicts[12], while the prevalence of moderate to severe IA in Jordan reached 65% of the Jordan adolescents.[13]

A large body of literature tried to explain risk factors of IA in the context of intrapersonal and interpersonal perspectives. Intrapersonal risk factors included being male, having lower self-esteem, poor academic achievement, hostile personality, and social interaction difficulty.[6] On the other hand, interpersonal risk factors that were linked to IA included family conditions as conflicting parent relationship, low education of the parents especially the mother, negative peer relationship, poor parental support or stressful life situations.[14] Young proposed that IA despite being a problematic behavioral pattern it may help to reduce negative effects and frustrations encountered in life, perhaps by reducing negative affect. Based on the theory, the frustration that originates from family conflicts, school, or social relationships and other difficulties experienced in real life may lead to IA because the Internet provides an escape from such negative affect.[15] IA creates several psychological, social, school, and work problems and difficulties in a person's life especially for adolescents.[14, 16] IA was linked in many studies to depression, anxiety disorder, sleep disturbance, shyness, social anxiety, and suicidal ideas.[14, 17, 18]

Although several studies assessed the prevalence of IA and its psychological hazards among Egyptian University students[19, 20], few studies assessed IA among high school students.[2, 10, 21] Studies conducted in other countries proposed that younger age groups became more engaged in Internet-related activities which necessitates assessing IA among these age groups in Egypt.

## METHODS

The current study aimed to determine the prevalence of IA and its predictors among high school students in Sohag, Egypt, and at the same time to assess the mental health of those students.

The current study was a cross-sectional survey. It was conducted in four public secondary schools representing the rural and urban areas of Sohag.

Based on the assumption that the proportion of Internet addiction in the study population is 20%[10], 5% precision, and design effect of 1, the minimal required sample size at 95% confidence level was calculated to be 246. The needed sample was doubled to allow better representation of the study subjects and finally, 400 high school students accepted to be recruited in this study and completed the questionnaire (80% response rate). A stratified random sample technique was used for selecting the urban and rural schools. The selected students from each school were proportional to the total number of students. From each school, one 1st and one 2nd secondary school classes were selected randomly. From each class, students were randomly selected taking into consideration the male to female ratio till reaching the proportionate sample size.

Data were collected by a structured self-administered questionnaire which included three sections, the first section collected information on socio-demographic characteristics of the participants such as age, gender, grade, residence whether urban or rural, educational level and occupation of the parents. This section also included questions about specific personal characteristics of students such as frequency of reading books, relationship with family and friends [whether bad, changeable (sometimes good and sometimes bad), or good, from the students perspective], owing a smart phone, and Internet use characteristics such as presence of home Internet, access to the Internet outside the house, Internet access on smart phone, having e-mail address and Facebook account, purpose of Internet use (browsing social media, games, entertainment, news, education, and shopping).

The second section of the questionnaire was the Arabic version of the 20 items Young's Internet Addiction Test (IAT).[22] The test consisted of 20 self-reported questions whose answers were scored on a 5-point Likert scale ranging from one point for the answer “rarely” to five points for the answer “always”. These items included questions about compulsive behavior related to the use of Internet, bad home environment, presence of problems in academic performance, relationship problems with family or friends and suffering from emotional problems.[23] Based on these items users can be categorized as normal users (score lower than 30) mild IA (30-49), moderate IA (50-79), or severe IA (over 80).

The third section of the questionnaire was the *General Health Questionnaire (GHQ)* which is a screening device designed to identify minor psychiatric disorders in the general population and primary care settings and is sensitive to short-term psychiatric state, as it asks about the difference between the respondents' current mental state and the usual state. It is suitable for all ages from adolescents upwards – not children.[24] The questionnaire was created as a 60-item instrument, and shortened to the 12-item version, which measures anxiety and depression (4 items), social dysfunction (6 items), and loss of confidence (2 items), each assessing the severity of a mental problem over the past few weeks using a 4-point Likert scale (from 0 to 3) giving a total score ranging from 0-36, the highest scores indicating worse conditions. GHQ-12 is the most popular and has been used in several countries, as well as part of multiple major national health and

social well-being surveys, achieving highly reliable and valid results.[24, 25]

The questionnaires were administered to the randomly selected students who approved using the Internet and accepted to participate in the study during the school day, in existence of the teachers, as required by the school rules. Students were informed about the nature and aim of the study and the content of the questionnaire by the researchers who gave instructions on the completion of the questionnaire and all students' questions were answered for all the class before starting to fill the questionnaire.

**Statistical analysis**

Statistical Package of Social Sciences (SPSS) version 25 was used for data entry and analysis. Numerical variables were expressed as means and standard deviations (SD), while frequencies and percentages were considered for categorical data. Chi-square test was used in testing the association between IA and socio-demographic characteristics, specific personal characteristics of students, Internet use characteristics, and purpose of Internet use. Students scoring less than 40 in IAT were considered non-addicts, while those with mild, moderate, or severe IA were considered addicts in data analysis. Binary logistic regression analysis was used to determine predictors of IA among the studied subjects. Spearman correlation was used in assessing the correlation between IAT score and GHQ score to determine the relation between IA and mental health of the study subjects.

**Ethical considerations**

The study proposal was approved by the Ethical Committee of Faculty of Medicine, Sohag University and the researchers complied with the International Guidelines for Research Ethics and principles of Helsinki declaration. Then permission was taken from the Directorate of Education. Also, the permission and cooperation of schools' directors and headmasters in the selected schools were taken to carry out the study. Informed written consents were gained from the selected high school students' parents to participate in the study and students were informed about the aim of the study, the privacy, and confidentiality of any input presented to the researchers.

## RESULTS

Table (1) presents socio-demographic and specific personal characteristics of the studied high school students in Sohag, Egypt. Among 400 students included in the study, the mean age was 15.9 ± 0.7 years, 35.8% were males, and 26.8% resided in urban areas. Regarding parents' education, 84% of fathers of the studied high school students and 73.8% of mothers completed secondary school education or higher, 14% and 19% of the fathers and mothers respectively had basic education, while 2% of the fathers and 7.2% of the mothers were illiterate. Regarding family relations, two-thirds of the studied subjects (66%) had good family relations compared to 29.5% who had changeable relationships with the family, while 4.5% had bad family relations. Regarding relationships with friends, 60.8% of the studied subjects had good relationships compared to 30.8% who had changeable relationships with friends, while 8.5% had bad relationships with friends. As regards reading, 26.2% of them read once weekly, 15% read once monthly, 23.5% reads infrequently and 35.2% of them never read. Regarding the Internet use characteristics, 75.2% of the studied subjects had access to the Internet at home.

Figure (1) shows the distribution of the purpose of Internet use by the studied Egyptian high school students. Internet was used for education and browsing social media by 80.5% and by 77.3% of the students respectively. Those who used the Internet for entertainment constituted 55%, 52% of them used it for knowing the news while 45% of them used it for checking e-mail, 42% of the students used the Internet for playing games, and 13.8% for shopping.

Figure (2) shows the distribution of the studied high school students regarding IA, 40.3% of the study subject were normal users, while 34.8% of them were mild Internet addicts, 21% were moderate Internet addicts and 4% were severe Internet addicts.

Table (2) presents the association between socio-demographic data and specific personal characteristics of high school students in Sohag and IA. No significant difference was found between Internet addict and non-Internet addict students regarding age, gender, residence, parents' education, and reading. About two thirds (65.6%) of second-grade students were Internet addicts compared to 53.2% of the first-grade students and the difference was statistically significant ($p < 0.05$). A statistically significant association between IA and bad relationships with family or friends was found among the studied high school students, as 94.4% and 85.3% of the studied students respectively who had bad family and friend relationships were Internet addicts compared to 63.6% and 56.1% of those with changeable family and friend relationships and 55.7% and 58% of the students with good family and friend relationships ($p < 0.05$).

Table (3) shows the relation between Internet use characteristics and purpose of Internet use and IA among the studied high school students in Sohag, Egypt. Regarding Internet use characteristics, a very high statistically significant association ($p < 0.001$) was found between IA and presence of Internet at home, accessing the Internet outside home, accessing Internet on the student's cell phone, and having an e-mail and Facebook account. As regards the association

between IA and the purpose of using the Internet by the study subjects, a very high statistically significant association ($p$ <0.001) was found between IA and using the Internet in browsing Facebook, entertainment, checking e-mail, and playing games.

Table (4) presents the final model of logistic regression analysis of predictors of IA among the studied high school students. Having a Facebook account, accessing the Internet on a cell phone, accessing the Internet outside the house, bad family relationships, presence of Internet at home, being in 2nd grade, and accessing the Internet for entertainment were predictors of IA among the studied Egyptian high school students.

Figure (3) shows correlation between IA and mental health of the studied Egyptian high school students. A significant weak positive correlation was found between IAT score and GHQ score (r= 0.33, $p$ < 0.001), indicating a significant association between IA and reduction in mental health of the studied students.

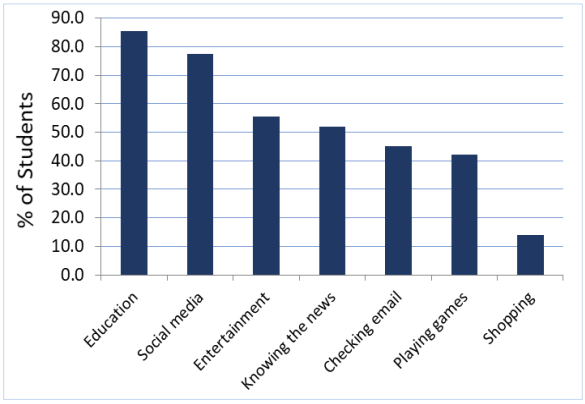



**Figure 1: Purpose of Internet use by the studied Egyptian high school students in Sohag, 2020**

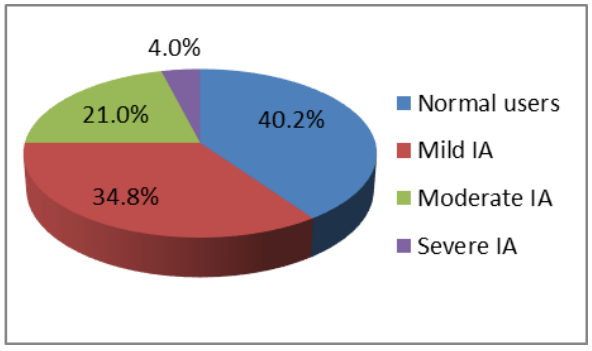



**Figure 2: Prevalence of internet addiction among the studied high school secondary students in Sohag, Egypt, 2020**

**Table 1: Socio-demographic, specific personal and Internet use characteristics of the studied Egyptian high school students in Sohag, 2020**

| Variables | High School Students (n = 400) | |
|---|---|---|
| | No. | % |
| Age (mean ± SD) years | 15.9 ± 0.7 | |
| Range (years) | 15-17 | |
| Gender | | |
| Male | 143 | 35.8 |
| Female | 257 | 64.2 |
| Residence | | |
| Urban | 107 | 26.8 |
| Rural | 293 | 73.2 |
| Father's education | | |
| Illiterate | 8 | 2.0 |
| Basic education | 56 | 14.0 |
| Secondary school or higher | 336 | 84.0 |
| Mother's education | | |
| Illiterate | 29 | 7.2 |
| Basic education | 76 | 19.0 |
| Secondary school or higher | 295 | 73.8 |
| Relationship with family | | |
| Bad | 18 | 4.5 |
| Changeable | 118 | 29.5 |
| Good | 264 | 66.0 |
| Relationship with friends | | |
| Bad | 34 | 8.5 |
| Changeable | 123 | 30.8 |
| Good | 243 | 60.8 |
| Reading | | |
| Once weekly | 105 | 26.2 |
| Once monthly | 60 | 15.0 |
| Less than once monthly | 94 | 23.5 |
| Never reads | 141 | 35.2 |
| Presence of Internet at home | | |
| Yes | 301 | 75.2 |
| No | 99 | 24.8 |
| Access Internet outside the house | | |
| Yes | 169 | 42.2 |
| No | 231 | 57.8 |
| Access Internet on smart phone | | |
| Yes | 294 | 73.5 |
| No | 106 | 26.6 |

**Table 2: Association between Internet addiction and high school students' socio-demographic and specific personal characteristics, Sohag, Egypt, 2020**

| Variables | Non- Internet addicts (n = 161) | Internet addicts (n = 239) | Significance test | COR (95% CI) |
|---|---|---|---|---|
| | No. (%) | No. (%) | | |
| Age | | | | |
| 15 years | 51 (45.1) | 62 (54.9) | $\chi^2 = 2.54$, p = 0.2 | 0.6 (0.3-1.12) |
| 16 years | 86 (40.0) | 129 (60.0) | $\chi^2 = 1.01$, $p = 0.1$ | 0.7 (0.4- 1.31) |
| 17 years (r) | 24 (71.3) | 48 (66.7) | - | 1 |
| Gender | | | | |
| Male | 50 (35.0) | 93 (65.0) | $\chi^2 = 0.6$, $p = 0.1$ | 1.4 (0.92-1.15) |
| Female (r) | 111 (43.2) | 146 (56.8) | - | 1 |
| Residence | | | | |
| Urban | 35 (32.7) | 72 (67.3) | $\chi^2 = 0.4$, p = 0.6 | 1.5 (0.9-2.7) |
| Rural (r) | 126 (43.0) | 167 (57.0) | - | 1 |
| Grade | | | | |
| Frist | 88 (46.8) | 100 (53.2) | $\chi^2 = 6.3$, $p = 0.012$* | -0.6 (0.39-0.89) |
| Second (r) | 73 (34.4) | 139 (65.6) | - | 1 |
| Father's education | | | | |
| Illiterate | 2 (25.0) | 6 (75.0) | $\chi^2 = 2.6$, $p = 0.3$ | 4.5 (0.7- 27.72) |
| Basic education | 49 (87.5) | 7 (12.5) | $\chi^2 = 0.7$, $p = 0.1$ | 1.2 (0.6-2.25) |
| Secondary school or higher (r) | 312 (92.8) | 24 (7.2) | - | 1 |
| Mother's education | | | | |
| Illiterate | 23 (79.3) | 6 (20.7) | $\chi^2 = 4.9$, $p = 0.26$ | 0.4 (0.13- 0.8) |
| Basic education | 69 (90.7) | 7 (9.3) | $\chi^2 = 1.2$, $p = 0.3$ | 0.8 (0.4- 1.3) |
| Secondary school or higher (r) | 271 (91.8) | 24 (8.2) | - | 1 |
| Relationship with family | | | | |
| Bad | 1 (5.5) | 17 (94.6) | $\chi^2 = 6.3$, $p = 0.012$* | 13.5 (1.7-103.1) |
| Changeable | 43 (36.4) | 75 (63.6) | $\chi^2 = 2.07$, $p = 0.1$ | 1.38 (0.8-2.17) |
| Good | 117 (44.3) | 147 (55.7) | - | 1 |
| Relationship with friends | | | | |
| Bad | 5 (14.7) | 29 (85.3) | $\chi^2 = 8.18$, $p = 0.04$* | 4.19 (1.6-11.2) |
| Changeable | 54 (43.9) | 69 (56.1) | $\chi^2 = 0.12$, $p = 0.7$ | 0.9 (0.59-1.4) |
| Good | 102 (42.0) | 141 (58.0) | - | 1 |
| Reading | | | | |
| Once weekly | 48 (45.7) | 57 (54.3) | $\chi^2 = 1.63$, $p = 0.2$ | 0.7 (0.4-1.19) |
| Once monthly | 24 (40.0) | 36 (60.0) | $\chi^2 = 0.1$, $p = 0.7$ | 0.9 (0.4-1.67) |
| Less than once monthly | 36 (38.3) | 58 (61.7) | $\chi^2 = 0.012$, $p = 0.9$ | 0.9 (0.5-1.66) |
| Never reads | 53 (37.6) | 88 (62.4) | - | 1 |

*Statistically significant

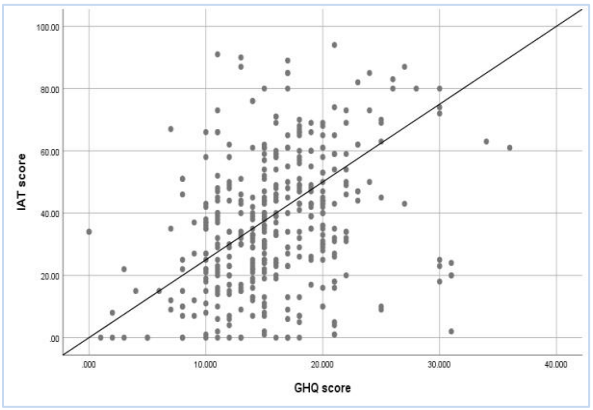
**Table 3: Association between Internet addiction, and Internet use characteristics of high school students and purposes of Internet use, Sohag, Egypt, 2020**

| Variables | Non- Internet addicts (n = 161) No. (%) | Internet addicts (n = 239) No. (%) | Significance test | COR (95% CI) |
|---|---|---|---|---|
| **Internet use characteristics** | | | | |
| Presence of Internet at home | | | | |
| Yes | 103 (34.2) | 198 (65.8) | $\chi^2$ =17.7, $p$ <0.001* | 2.7 (1.7-4.3) |
| No (r) | 58 (58.5) | 41 (41.4) | - | 1 |
| Access to Internet outside the house | | | | |
| Yes | 48 (28.4) | 121 (71.6) | $\chi^2$ =16.7, $p$ <0.001* | 2.4 (1.6-3.7) |
| No (r) | 113 (38.9) | 118 (51.1) | - | 1 |
| Access to Internet on smart phone | | | | |
| Yes | 72 (24.5) | 222 (68.7) | $\chi^2$=34.6, $p$ <0.001* | 4.09 (2.6-6.6) |
| No (r) | 69 (65.1) | 37 (34.9) | - | 1 |
| Had email address | | | | |
| Yes | 84 (30.5) | 191 (69.5) | $\chi^2$=32.8, $p$ <0.001* | 3.6 (2.3-5.7) |
| No (r) | 77 (61.6) | 48 (38.4) | - | 1 |
| Had account on social media | | | | |
| Yes | 92 (29.9) | 215 (70) | $\chi^2$ =50.6, $p$ ≤0.001* | 6.7 (3.9-11.3) |
| No (r) | 69 (74.1) | 24 (25.8) | - | 1 |
| **Purpose of Internet use** | | | | |
| Education | | | | |
| Yes | 128 (39.8) | 194 (60.2) | $\chi^2$ = 0.17, $p$ = 0.6 | 1.1 (0.67-1.8) |
| No (r) | 33 (42.3) | 45 (57.7) | - | 1 |
| Browsing Facebook | | | | |
| Yes | 100 (32.4) | 209 (67.6) | $\chi^2$ =32.4, $p$ ≤0.001* | 4.2 (2.5-6.9) |
| No (r) | 61 (67.0) | 30 (33.0) | - | 1 |
| Entertainment | | | | |
| Yes | 69 (31.1) | 153 (68.9) | $\chi^2$ =17.1, $p$ ≤0.001* | 2.3 (1.5-3.6) |
| No (r) | 92 (51.7) | 86 (48.3) | - | 1 |
| News | | | | |
| Yes | 61 (36.3) | 107 (63.7) | $\chi^2$ = 1.8, $p$ = 0.1 | 1.3 (0.89-1.9) |
| No (r) | 100 (43.1) | 132 (56.9) | - | 1 |
| Checking email | | | | |
| Yes | 54 (30.0) | 126 (70.0) | $\chi^2$=14.07, $p$ ≤0.001* | 2.2( 1.4-3.3) |
| No (r) | 107 (48.6) | 113 (51.4) | - | 1 |
| Shopping | | | | |
| Yes | 18 (32.7) | 37 (67.3) | $\chi^2$ = 1.5, $p$ = 0.2 | 1.4 (0.8-1.7) |
| No (r) | 143 (41.4) | 202 (58.6) | - | 1 |
| Games | | | | |
| Yes | 74 (35.6) | 134 (64.4) | $\chi^2$=3.92, $p$ = 0.04* | 1.5 (1-2.2) |
| No (r) | 87 (45.3) | 105 (54.7) | - | 1 |

*statistically significant

**Table 4: Logistic regression analysis of predictors of Internet addiction among the studied adolescents in Sohag, Egypt, 2020**

| Factor | OR (95% CI) | *p* value |
|---|---|---|
| Facebook account | 3.2 (1.7-5.9) | 0.000 |
| Internet access outside home | 2.01 (1.3-3.3) | 0.010 |
| Bad family relationships | 17.5 (2.2-142.9) | 0.015 |
| Access to Internet on smart phone | 2.2 (1.17-4.14) | 0.002 |
| Internet at home | 2.01 (1.1-3.7) | 0.016 |
| Entertainment | 1.8 (1.1-2.9) | 0.013 |
| 2nd Grade of high school | 0.6 (0.4-0.9) | 0.030 |




(r= 0.33 *p*-value < 0.001)

**Figure 3: Correlation between IAT score and GHQ score of the studied Egyptian high school students in Sohag, 2020**

## DISCUSSION

The Internet provides us with a communication medium that enhances access to unlimited data sources across various topics. On the other hand, excessive and uncontrolled use of the Internet has been associated with various side effects, especially among adolescents who spend more time on the Internet than adults.[17]

The current study assessed the prevalence of Internet addiction IA among a random sample of high school students in Sohag, Egypt. Using the Arabic version of (IAT), 40.3% of the study subject were non-Internet addicts while, 34.8% of them were mild Internet addicts, 21% were moderate Internet addicts and 4% were severe Internet addicts. These findings are much higher than a previous study conducted on high school students in El-Minia governorate in Egypt where 2.6% of the study subjects were Problematic Internet Users (PIUs) (severe IA) and 18.2% were Potential Internet Users (PIUs) (mild IA).[10] Moreover, the results of the current study are higher than results of Nafee et al., who assessed IA among teenagers in Saudi Arabia and in Egypt, and found that 47.7%, 45.3%, and 0.9% of the Saudi teenagers were mild, moderate and severe Internet addicts compared to 44.2%, 46.3% and 0.3% of the Egyptian teenagers.[21] Although the results of the current study are comparable to the results of Al-Shdayfat et al., who reported that 65% of Jordan adolescents were Internet addicts.[13] Comparing prevalence of IA is difficult due to the heterogeneity of assessment instruments, using varying samples and designs in the conducted studies and varying target populations. Furthermore, variation in the prevalence of IA is a known phenomenon as previous literature reported much variability in IA (15.8% of Moraccon high school students[26], 35.6% of Indian teenagers[27], 22.2% of teenagers in Iran[28] and 20% of the studied teenager in Japan[29] were Internet addicts ) and may be attributed also to variations in the accessibility of the Internet in different countries.

As regards predictors of IA among the studied Egyptian high school students, results of the current study showed no significant association between all socio-demographic characteristics of the study subjects and IA. Although several studies reported dominance of male gender in the prevalence of IA [13, 27, 30], the current study found no difference in the prevalence of IA between males and females and this was in agreement with Yadav et al.[31] In the present study Internet addiction correlated with grade but not gender. In agreement with Atthanari et al., Kawabe et al. and Sasmaz et al., who found that the higher the grade the greater the prevalence of IA.[27, 29, 30]

Adolescence is a sensitive period in the person's life, in which parents, family, and peer relationships, could be very important, as acceptance from society has a strong effect on most of his behavior. In the current study, a bad relationship with family and friends was associated with IA in bivariate analysis. But further analysis showed that bad relationship with the family was a strong predictor of IA in agreement with many previous studies.[9, 10, 14, 28]

It was noted before, that a negative relationship with family especially the parents might cause extra stress, so the adolescent tends to use the Internet as a coping method. The unhappy circumstances at home and conflicts with parents and other family members may serve as both risk factors and consequences of IA.[14]

In agreement with Mohamed and Bernouss having a smart phone and access to the Internet at home and outside the house were significant predictors of IA among the studied high school students.[26] Kawabe et al. reported a high rate of IA among teenagers who owed smart phones[29] and Arthanari et al. also reported that the presence of a source of Internet at home was a predictor of IA among teenagers.[27] Accessing Internet outside the house was prevalent among Internet addict students in the current study in agreement with Al-Shdayfat et al., who reported that the aim of using the Internet and place of Internet use are the strongest predictors of IA among Jordanian adolescents.[13]

Social networking which has become the most important means of communication among adolescents was found strongly associated with a range of psychiatric problems.[32] Moreover, it was found that the intense use of social networking is correlated with criteria for Internet addiction among adolescents. In agreement with previous literature[13, 14, 31, 33], we found that using the Internet for browsing Facebook was a very strong predictor of IA among the studied adolescents. These findings agree with Karacic et al. who found that the highest level of Internet addiction was found among the adolescents who used the Internet mainly for browsing social media without parental control.[34] In the previously mentioned study having much free time which is usually spent in entertainment by using the Internet was shown as a predictor of IA among the study subjects. This was also shown by our study, and was in agreement with Al-Shdayfat et al., and McNicol and Thorsteinsson.[13, 33] Furthermore, social networking, education, entertainment, ranked as the top three among the online activities of all the studied high school students which carry a higher risk of an increased percentage of Internet and Facebook addiction in the future, which was in agreement with Xin et al. [14]

The most important concern of IA in adolescents is the association with the deterioration of mental states. Yadav et al., stated that there was a strong positive correlation between depression, anxiety, sleep disturbances, and stress and IA.[31]
In agreement with a large body of literature[10, 17, 29, 30, 34, 35], IA in the study subjects was associated with deterioration in mental health, which is not surprising as IA is proposed as a new psychiatric disorder. However, results of the current study do not determine if psychiatric co-morbidity originated from IA or otherwise.

**Strengths and limitations**

The current study assessed Internet addiction among high school students who represent a vulnerable age group as they became subjected more to the Internet not only for entertainment but also for education with the recent use of the tablet in studying instead of books. Furthermore, we included many factors related to Internet use in the current study.

Limitations of the study included the cross-sectional design that hinders determination of causal relation and identification of whether mental health problems caused or resulted from IA among the studied high school students.

## CONCLUSION AND RECOMMENDATIONS

Results of the current study showed high prevalence of IA among the studied high school students, which associated with deteriorated mental health state. Engagement of the studied students in social networking, having smart phones, access to the Internet inside and outside the house and bad relationships with parents were strong predictors of IA and indicate a need for better parenting style and more controlled use of the smart phones. So, effective interventions are needed to allow better control of the use of smart phones to enhance reduction of IA.

Prospective studies are required to determine whether psychological disorders preceded or resulted from development of IA.

### *COMPETING INTERESTS*

The authors declare that they have no competing interests.

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