Internet abuse in children and adolescents during COVID-19 pandemic in Egypt

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Intro
duction Internet addiction among children and adolescents is a serious issue they face and can present with an array of negative consequences. The lockdown owing to COVID-19 pandemic has increased the possibility of this type of addiction.
Aim
To investigate the prevalence of internet abuse among Egyptian children and adolescents during COVID-19 pandemic and to explore factors associated with internet abuse.
Patients and methods
An online cross-sectional survey was carried out among school children and adolescents (aged 6–18) at Alexandria, Egypt, using the online SurveyMonkey platform. The survey questionnaire included data about demographic characteristics, lifestyle practices, and internet use during and before the pandemic in addition to the translated Young's Internet Addiction Test.
Results
The questionnaire was completed by 580 children and adolescents. During the period of COVID-19 pandemic and according to Young's Internet Addiction Test, only 14.66% of participants were considered as average internet users, the majority (74.65%) were problematic users, and 10.69% were classified as internet addicts. Lack of regular exercises during the period of pandemic was significantly higher among internet addicts as compared with average and problematic users (P=0.018). Lack of good parent–child relationship and lack of supervision from the side of the parents on their children and adolescents were significantly associated with higher probability of internet addiction or being a problematic user (P=0.001 and 0.002, respectively). Older children and adolescents were at a higher risk for internet addiction.
Conclusion
Special attention should be given to the pattern of internet use among children and adolescents. Parents should be encouraged to control internet use among children and adolescents through encouraging physical activity, lifestyle modification, offering alternatives, intermittent supervision, strengthening the relation with them, and providing support.

Keywords:
adolescents, COVID-19 lockdown, internet addiction, problematic users

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Introduction

There were 54.74 million internet users in Egypt in January 2020 compared with 44.94 million in 2019 (+22%). Among those users, the number of social media users increased by 7.3% between April 2019 and January 2020 (39.1 million and 42 million, respectively) (Kemp, 2020).

Starting from March 14, 2020, Egypt took precautionary measures to battle COVID-19 such as a nationwide curfew, school and university closures, and an increased number of self-quarantined citizens. Although quarantine means that the time that can be shared with loved ones has increased, it also poses a major burden on families' shoulders where internet usage increased dramatically; as it was the main means for socialization, especially for adolescents, it became the only meaning for remote learning and entertainment through games and various applications (Siommos and Angelopoulos, 2008).

The Egyptian National Telecom Regulatory Authority has released the latest internet usage statistics which focused on the period between the second week of March to the second week of April 2020. The report shows a significant increase in overall internet usage, with home internet increasing by 87% and mobile

internet by 18%. Most notably in the report, the number of peak hours for the internet services and applications doubled to 15 h per day, that is, from 12 pm to 3 am during the second week of April, compared with only 7 h during the second week of March. Although web browsing saw an increase of 131%, mobile applications still came out on top (Egyptian National Telecom Regulatory Authority, 2020).

Historically, internet addiction disorder was first reported by Ivan Goldberg, a psychiatrist in New York, in 1996. Goldberg used criteria of DSM-IV from addiction to substances, replacing the term substance to that of the internet (Hsu *et al.*, 2015). In Substance-Related and Addictive Disorders on DSM-5, behavioral addiction was introduced as a new category of psychiatric disorders, with pathological gambling as a diagnosis and internet gaming disorder as a subtype. Four components were originally suggested as essential to the diagnosis of internet addiction disorder including excessive internet use, withdrawal, tolerance, and lastly, adverse consequences like arguments, lying, poor performance at school, or a decrease in work achievement, social isolation, and a feeling of exhaustion. The symptoms of internet addiction are usually associated with substance-related addiction, namely salience or preoccupation, tolerance, mood modification, loss of control, withdrawal, denial and concealment, and relapse (American Psychiatric Association, 2013).

Quarantine during COVID-19 pandemic implies many psychological stresses such as separation from loved ones, loss of freedom, insecurity about illness, and boredom. Many children expressed disorders such as anxiety, depression, dysfunction, or unwillingness to perform daily activities. The fear and anxiety caused by the virus can negatively affect a person's mental health, and hence, internet addiction might be the defence mechanism (Akin and Iskender, 2011; Bazrafshan *et al.*, 2020).

The current study aimed to investigate the prevalence of internet abuse among Egyptian children and adolescents during COVID-19 pandemic and to explore factors associated with internet abuse. This will help in evaluating the extent of the problem and guide development of national programs for prevention and control of internet addiction in youth after such unprecedented period.

Patients and methods

An online cross-sectional survey was carried out among school children and adolescents at Alexandria, Egypt, using online SurveyMonkey platform.

Target population

This included all school children and adolescents aged 6–18 years old who were enrolled in schools at Alexandria Governorate. Those who reported experiencing cognitive impairment or severe mental disorders were excluded.

The link to the online survey questionnaire was sent to schools and parents' social group networks, and they were encouraged to help their children and adolescents for completing the questionnaire.

Sample size calculation

Using Epi Info 7 software [CDC (center for disease control and prevention) Atlanta, Georgia] program for calculation of sample size and based on expected (36.05%) frequency of problematic and addictive internet use (Dong *et al.*, 2020), 95% confidence level, and 5% confidence limits, the minimum sample size required is 354.

Data collection

Social distancing restrictions and lockdown due to COVID-19 pandemic in Egypt started on March 14, 2020 with gradual release of lockdown measures started from July 2020. Complete lockdown included closure of schools and all recreational places with encouragement of online schooling and remote working from home. So, data were collected during the period from April till end of June 2020 when children and adolescent movements were totally restricted, and they were forced to stay at home.

An anonymous self-administered structured questionnaire was designed by the investigators to collect data regarding demographic characteristics, lifestyle behaviors, history of psychological/behavioral problems, and recreational internet use characteristics before and during COVID-19 pandemic lockdown. Moreover, child/adolescent exposure to cyberbullying during the pandemic was explored.

Arabic translation (Hawi, 2013) of the Chinese version of Young's Internet Addiction Test (IAT) (Young, 1998) was used to assess symptoms of internet addiction. It is composed of 20 self-reported items on a five-point scale. The items measure frequency of engagement in defined internet behaviors, including affection of daily routine, social life, productivity, sleeping pattern, and feelings. According to the total score gained, participants were classified into normal internet users (score≤39), problematic internet users (score 40–69), and addictive internet users (score 70 and higher). The Arabic version of the

questionnaire has high internal consistency and reliability (Cronbach's α=0.921) (Hawi, 2013).

Ethical considerations

The study was approved by the Alexandria Faculty of Medicine ethics committee. The link to the online survey questionnaire was labeled with the aim of the study and sent to parents to be shared with their children. Completing and submitting the online questionnaire was considered as a written consent from the parent approving his child participation in the study.

Statistical analysis

Data were coded and fed to the computer. Analysis was done using IBM SPSS Statistics for Windows, Version 20.0. (IBM Corp., Armonk, New York, USA). Qualitative variables were presented as number and percentage. Comparison between groups was done using χ^2 test. Factors that were significantly associated with internet addiction entered in a linear regression model to identify predictors of internet addiction score after controlling for confounding factors. Analysis was done at 5% level of significance.

Results

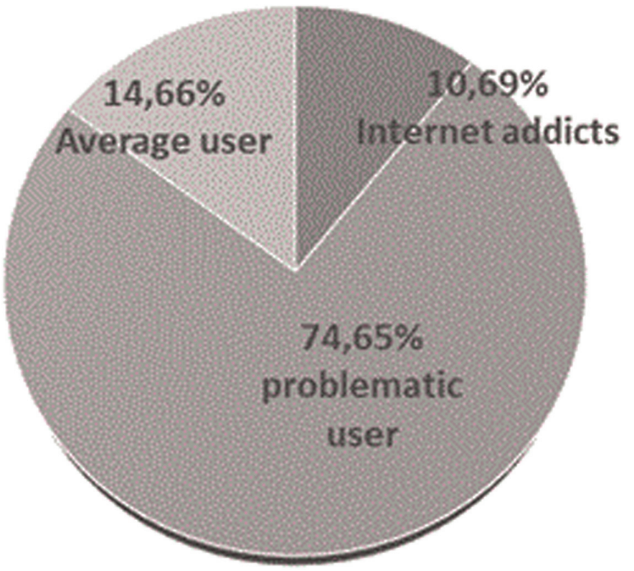
The questionnaire was completed by 580 children and adolescents. Overall, 60.3% were males. Their age ranged from 6 to 18 years. Nearly a third were in each age group (from 6 to 10 years, from 11 to 14 years, and from 15 to 18 years). Only 8.8% are enrolled in public schools, more than half (57%) in a national private school, and the remaining 33.3% are in international schools.

During the period of COVID-19 pandemic and according to Young's IAT, only 14.66% of participants were considered as average internet users, the majority (74.65%) were problematic users, and 10.69% were classified as internet addicts (Fig. 1).

Association between the pattern of internet use among participants and their demographic characteristics is shown in Table 1. Table 1 shows no significant difference between males and females regarding internet use; however, problematic users and internet addicts were significantly higher among those in the higher age group (11–18 years) as compared with younger age. Regarding the type of school, problematic users and internet addicts were significantly higher among those in private and international school as compared with those in the public schools, as shown in Table 1.

Table 2 shows the daily use of the internet in hours before and during the pandemic. Among the three groups of participants, namely, the average users, problematic users, and internet addicts, there is a

Figure 1



Internet use among the studied children and adolescents during COVID-19 pandemic.

Table 1 Distribution of studied children and adolescents according to their demographic characteristics and pattern of internet use

Demographic characteristics	Average users (*N*=62)	Problematic users (*N*=433)	Internet addicts (*N*=85)	Significance
Sex				
Male	35 (56.5)	263 (60.7)	52 (61.2)	0.80
Female	27 (48.5)	170 (39.3)	33 (38.8)	
Age group (years)				
6 to <11	26 (41.9)	144 (33.3)	15 (17.6)	0.007*
11 to <15	19 (30.6)	158 (36.5)	31 (36.5)	
15–18	17 (27.5)	131 (30.2)	39 (54.9)	
Type of school				
Public	8 (12.9)	32 (7.4)	11 (12.9)	0.039*
Private national	40 (64.5)	257 (59.4)	39 (54.9)	
International	14 (22.6)	144 (33.2)	35 (41.1)	

*If less than 0.05 is significant. If less than 0.01 highly significant.

Table 2 Duration of internet use among studied children and adolescents before and during COVID-19 pandemic

	Average users (*N*=62) [*n* (%)]	Problematic users (*N*=433) [*n* (%)]	Internet addicts (*N*=85) [*n* (%)]	Significance
Daily internet use before COVID-19 pandemic				
<2 h	25 (40.3)	118 (27.3)	13 (15.3)	<0.001*
2 to <4 h	22 (35.5)	134 (30.9)	14 (16.5)	
4 to < 6 h	6 (9.7)	79 (18.2)	19 (22.4)	
6 to <8 h	5 (8.1)	50 (11.5)	18 (21.2)	
8 h or more	4 (6.5)	52 (12.0)	21 (24.7)	
Daily internet use during COVID-19 pandemic				
<2 h	19 (30.6)	29 (6.7)	2 (2.4)	
2 to <4 h	11 (17.7)	52 (12.0)	9 (10.6)	<0.001*
4 to <6 h	15 (24.2)	107 (24.7)	6 (7.1)	
6 to <8 h	11 (17.7)	125 (28.9)	12 (14.1)	
8 h or more	6 (9.7)	120 (27.7)	56 (65.9)	
P value for paired comparison (before and after)	0.006*	<0.001*	<0.001*	
The type of activity practiced on recreational devices using the internet				
Social media	29 (46.8)	249 (57.5)	50 (58.8)	0.253
Games	50 (80.6)	351 (81.1)	73 (85.9)	0.560
Watching movies	36 (58.1)	262 (60.5)	57 (67.1)	0.455
News	3 (4.8)	32 (7.4)	6 (7.1)	0.764
Readings	11 (17.7)	58 (13.4)	8 (9.4)	0.336

*If less than 0.05 is significant. If less than 0.01 highly significant.

Table 3 Relation of internet use among the studied children and adolescents and some studied risk factors

	Average users (*N*=62) [*n* (%)]	Problematic users (*N*=433) [*n* (%)]	Internet addicts (*N*=85) [*n* (%)]	Significance
Practicing sports regularly during the pandemic				
Yes	48 (77.4)	300 (69.3)	48 (56.5)	0.018*
No	14 (22.6)	133 (30.7)	37 (43.5)	
History of psychological disorder (anxiety–depression)				
Yes	4 (6.5)	69 (15.9)	19 (22.4)	0.033*
No	58 (93.5)	364 (84.1)	66 (77.6)	
Good parent–child relationship				
Yes	62 (100)	402 (92.8)	70 (82.4)	<0.001*
No	0	31 (7.2)	15 (17.6)	
Continuous supervision of parents on children and adolescents				
Yes	51 (82.3)	301 (69.5)	47 (55.3)	0.002
No	11 (17.7)	132 (30.5)	38 (44.7)	

*If less than 0.05 is significant. If less than 0.01 highly significant.

significant increase in the daily use of the internet. Nearly two-thirds (65%) of internet addicts were using the internet more than eight hours per day as compared with 27% of problematic users and 9.7% among average users, and this difference was statistically significant (*P*? 0.001).

There were no significant differences between the three groups regarding the type of activity practiced on recreational devices using the internet, as the majority were playing games, followed by watching movies or communicate via social media. Minorities follow news or read.

Table 3 shows that lack of regular exercises during the period of pandemic was significantly higher among internet addicts as compared with average and problematic users (*P*=0.018).

Lack of good parent–child relationship and lack of supervision from the side of the parents on their children and adolescents were significantly associated with higher probability of internet addiction or being a problematic user (*P*=0.001 and 0.002, respectively) (Table 3).

Having a psychological disorder, namely, anxiety or depression as reported by the participants was significantly associated with internet addiction, as 22.4% of those considered as internet addicts reported history of psychiatric illness as compared with only 9% of average users.

Table 4 Possible consequences of internet overuse among children and adolescents

	Average users (*N*=62) [*n* (%)]	Problematic users (*N*=433) [*n* (%)]	Internet addicts (*N*=85) [*n* (%)]	Significance
Excess weight gain during pandemic				
Yes	14 (22.6)	120 (27.7)	25 (29.4)	0.632
No	48 (77.4)	313 (72.3)	60 (70.6)	
Increased monthly cost of the internet during the pandemic				
Yes	28 (45.2)	284 (65.6)	70 (82.4)	<0.001*
No	34 (54.8)	149 (34.4)	15 (17.6)	
Reaction to internet disconnection				
Accepting	41 (66.1)	175 (40.4)	12 (14.1)	<0.001*
Verbal violence	19 (30.6)	221 (51.1)	61 (71.8)	
Physical violence	2 (3.3)	37 (8.5)	12 (14.1)	
History of exposure to cyberbullying				
Yes	4 (6.5)	23 (5.3)	8 (9.4)	0.345
No	58 (93.5)	410 (94.7)	77 (90.6)	

*If less than 0.05 is significant. If less than 0.01 highly significant.

Table 5 Linear regression for factors predicting the score of internet use

	Regression coefficient (*B*)	*t* test	*P* value
Regular sport practicing	–2.887	–2.486	0.013*
History of psychiatric illness	2.114	1.479	0.140
Type of school	–0.427	–0.228	0.819
Age group[a]	3.130	2.726	0.007*
Parent supervision	–2.408	–2.066	0.039*
Good child–parent relationship	–6.992	–3.566	<0.001*

[a]The reference group those aged from 6 to 10.F=10.176; R^2=0.081; P value less than 0.001. *If less than 0.05 is significant. If less than 0.01 highly significant.

Regarding possible consequences of above-average internet use, Table 4 shows that there is no significant association between internet use and excessive weight gain during the pandemic (P=0.632).

Increase in the cost of the internet was significantly more reported among internet addicts and problematic users ($P\leq$0.001). Moreover, Table 4 shows that the exaggerated reaction of participants to internet disconnection in the form of verbal or physical violence is significantly more common among internet addicts as compared with average and problematic users ($P<$0.001).

Overall, 6% (n=35) of the studied children and adolescents reported experiencing a sort of cyberbullying through the internet; however, no significant association was found between internet addiction and history of cyberbullying (P=0.345).

Table 5 shows the results of multivariate linear regression analysis for factors predicting the score of internet use among children and adolescents after controlling for confounding factors. Table 5 shows that practicing regular physical exercise, good child–parent relationship, and presence of parental supervision on the internet use significantly decreased the score; however, higher age was significantly associated with higher score. On the contrary, the type of school and having psychiatric illness were not significant predictors of the type of internet use.

Discussion

The present study showed that 10.69% of participants experienced internet addiction, 74.65% had problematic use of internet, and 14.66% are average users. In a similar Chinese study using Young criteria in assessing internet addiction among children during COVID-19 lockdown, the prevalence of children classified as addicted to the internet was 33.37% (Dong *et al.*, 2020).

Previous studies started to investigate the prevalence of internet addiction among children and adolescents several years before lockdown. In a study conducted among adolescents in El-Minia, Egypt, during the year 2013 estimated 2.6% prevalence of internet addiction, whereas the prevalence of potential Internet addiction was 18.2% (Kamal and Mosallem, 2013). In another study conducted by Ismail among adolescents in Zagazig, Egypt, in

the year 2007, revealed that the overall prevalence of internet addiction was 54.6% (Ismail, 2007). Those results reflect the dramatic increase in internet abuse during COVID-19 lockdown, which may reflect major sequelae of quarantine. On the contrary, the great variation in the estimated prevalence even before that may be attributed to the lack of solid criteria for diagnosis of internet addiction and reflects the need to include it in a solid classification.

This study demonstrated that older age is significantly associated with internet addiction, as ~55% of those classified as internet addict were between 15 and 18 years old. This was in accordance with a Korean survey conducted by Yangmi, who reported that problematic internet use was more among adolescence than children (Lim and Nam, 2020). This finding could be justified by the nature of adolescence, which is characterized by peer pressure, rebellion, need of exploration, and need for secrecy, while children are usually amenable to parental control and supervision.

In the present study, internet addiction was significantly more prevalent in private national (55%) and international schools (41%). The type of school might be just a reflection of higher social class or higher level of parents' education. This is similar to what was reported in two studies which revealed that more than 50% of students with moderate and severe internet addiction had highly educated fathers compared with students with average use (Ahmadi, 2014; Desouky and Ibrahem, 2015). This might be attributed to the tendency of highly educated parents to socialize their children into the world of modern information technology. Moreover, international schools in Egypt continued learning remotely during lockdown, which made availability of internet connection at homes mandatory. On the contrary, governmental schools stopped learning soon after the start of lockdown.

Regular physical exercises during the lockdown period proved to be significantly protective against internet addiction in adolescence. Same results have been replicated in a study conducted in Korea, which indicated a significant effect of sports participation on internet addiction mediated by self-control (Parka *et al.*, 2016). The effect of physical exercises surpasses simple socialization and physical health to affect neurotransmitters and brain functions.

Regular exercises can also produce a transient state of euphoria associated with feelings of elation and well-being (Tantimonaco *et al.*, 2014), which may promote engagement in family gatherings, talks, and activities instead of escaping to the internet.

A significant association was found between internet addiction among studied children and adolescents and previous psychiatric illness before the pandemic (22.4% of children classified as addicted and of them 80% actually are receiving psychiatric treatment). Similarly, Cho *et al.* (2013), found that children who had been diagnosed with withdrawal, anxious/depressed, and thought problems at childhood were also at a higher risk of internet addiction 7 years later in adolescence. This may be explained by one of the explanatory theories for internet addiction, which stated that the motivation for the behavioral maintenance of internet addiction of 'over-users' is the stress or tension reduction associated with internet use (Kim and Davis, 2009).

Parental control includes behavioral and psychological control. Behavioral control pertains to the use of disciplinary strategies and supervisory functions to regulate children's behavior, whereas psychological control attempts to shape children's behaviors through strategies like guilt or anxiety induction and love withdrawal. In the current study, good parent–child relationship and continuous parent supervision was considered a protective factor against internet addiction. This is in accordance to what was reported in a study conducted in Hong Kong which showed that parental behavioral control and relationships between parents and children were inversely associated with children; however, there was a positive correlation between parental psychological control and children's internet addiction (Shek *et al.*, 2019).

During this major crisis where everyone is already on edge, hostility toward others tends to escalate along with self-preserving and self-defensive behaviors. This may manifest even more so between students in their posts, comments, pictures, and videos. A study performed a comprehensive Bayesian analysis of the daily count of cyberbullying occurrences and revealed increase in the cyberbullying discussion trend by Twitter users during COVID-19 (Karmakar and Das, 2020).In the current study, we found that 6% of studied children/adolescents were exposed to a sort of cyberbullying in spite of lack of significant association between internet addiction and cyberbullying.

Nomophobia, or no mobile phone phobia, is the fear of being out of mobile phone contact and considered a

modern age phobia particularly common among young smartphone users (Garcia *et al.*, 2020). This was reflected on our sample, which showed significant difference between different age groups regarding their reaction to internet disconnection, which could be explained by the fact that teenagers with internet addiction exhibit compulsive behavior that is difficult to control. This could be explained by a few studies that reported a disturbance in the frontal region of the brain, especially the prefrontal dorsolateral cortex, the area responsible for cognitive function, motivation, and impulse control (Kurniasanti *et al.*, 2019).

Based on the results of the current study, special attention should be given to the pattern of internet use among children and adolescents. Parents should be encouraged to control internet use among their children through encouraging physical activity, lifestyle modification, offering alternatives, intermittent supervision, strengthening the relation with them, and providing support all of the time, and especially during unusual events that are associated with restrictions of movements and recreational activities.

Limitations of the study

Data collection was based on self-reporting, knowing that denial is one of the major defences used in addictive behavior; the reliability of answers is to be considered as this method is subjective in spite of the high prevalence of problematic internet users and addicts revealed. Owing to the circumstances of COVID-19 pandemic, the only feasible and secure way for data collection was through using online survey platforms, which hinder the feasibility of using a probability sampling technique and limits the generalizability of results.

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Conflicts of interest

There are no conflicts of interest.

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