

## Reciprocal Links between Cyberaddiction and Depression in Adolescents: A Cross-Sectional General Population Study in Casablanca

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### Abstract

### Original Research Article

Cyberaddiction, a relatively new phenomenon, is a recent field of research in mental health, particularly among adolescents. Recent research indicates that depression and cyberaddiction are two closely related phenomena. This work aims to determine its characteristics of the cyberaddiction and highlight a probable link between cyberaddiction and depression. This is a cross-sectional descriptive and analytical study conducted on a population of adolescents between the ages of 13 and 19. The study was preceded by a pre-test. Adolescents were recruited in public places and in a medical general practice in Casablanca. An anonymous voluntary self-administered questionnaire was administered to them. We noted socio-demographic characteristics, internet use, internet addiction with IAT, video game addiction with GAS, depression with BDI-2, and drug use. Our study included 102 adolescents. 85.3% consider their parents to be available and 81.4% have good communication with their parents. 97.1% use the Smartphone and 93.1% use Social Networks. As for cyberaddiction, 36.3% have a problematic use or moderate addiction and 3.9% have a severe addiction to the Internet. Several variables significantly related to cyber addiction were found. In the end, internet can lead vulnerable people to real addictive behaviors. This vulnerability is particularly exacerbated during adolescence. There is a link between cyberaddiction and depression. We need to be able to identify and treat these two pathologies in order to ensure better mental health for adolescents.

**Keywords:** Cyberaddiction, Non-substance addictions, Internet, Depression, Adolescence.

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## I. INTRODUCTION

The Internet has become a totally fascinating tool, a media that we can no longer do without in our daily lives. In this hyper-connected world, we talk about a digital revolution. However, the Internet is a Pharmakon and contains, for some of us, its own traps, among which is excessive use. The existence of non-substance related addiction, including Internet addiction (IA), remains a subject of contention.

Adolescence is a period of transformation and great changes, during which not only does the body undergo changes but also the cognitive-behavioral sphere and the appearance of hypothetical-deductive thinking. It is also a period that leads to the onset of an addiction such as Internet addiction.

Depression is a serious pathology, especially if it emerges during adolescence, a particularly difficult period of detection and diagnosis. The "crisis of juvenile

originality" accounts for the depressive affects at this age, without distinguishing the vagaries of a maturative process and a pathology in its own right.

If there is a "depressive component" in all adolescence, the borders become blurred, and so does the limits of the semiological frameworks. The depressive syndrome of the adolescent represents a risk of hindering the maturative process, and a high risk of leading to unsafe behaviors, or even repeated suicide attempts.

This work aims to determine its characteristics of the cyberaddiction and highlight a probable link between cyberaddiction and depression.

## II. METHOD

### 1. Type of study:

Descriptive and analytical cross-sectional epidemiological study by a self-questionnaire over a 3-month period (October to December 2020).

**2. Target population:** Adolescents aged between 13 and 19 years.

No exclusion criteria were applied apart from age, lack of consent and internet connection.

### 3. Tools

We set up an anonymous, voluntary, paper-based self-administered questionnaire in French.

It consists of 69 items in 5 parts as well as an identification of socio-demographic data and evaluation of the use of psychoactive substances, tobacco, alcohol, cannabis.

Scales validated in French version have been integrated:

- Internet Addiction Test (IAT)
- Game Addiction Scale (GAS)
- Beck Depression Inventory 2 BDI-2.

### 4. Procedure:

In order to ensure that the questionnaire was well understood, a pre-test study was carried out on a population of 12 students enrolled in a school that takes up middle and high school students after class in Casablanca, and whose average age was 14.92. The result came back positive, the study was spread over a larger sample. Adolescents were met in public places in the city of Casablanca and in a private clinic of a general practitioner. Those whose age matched were asked to complete the questionnaire.

### 5. Statistical analysis:

Data entry and statistical analysis were carried out by the software "Statistical Package for the Social Sciences" (SPSS) in its 18th version.

The results are presented in descriptive form, for the qualitative and quantitative variables, and analytically using the Pearson's Chi<sup>2</sup> test or the Fisher's exact test, the Student's test to identify the variables associated with cyberaddiction. The significance level was set at 5%.

## III. RESULTS

### A) Descriptive study:

Of a total of 116 questionnaires, only 102 were usable. The incomplete questionnaires were excluded from the study.

#### 1. Socio-demographic data

The sample consisted of 55 girls (53, 9%) and 47 boys (46, 1%). The average age is 16.52. The average number of family members is 4.45, varying between 2 and 7.

In this sample, 57.8% do not practice sports and 42.2% practice a regular physical activity. 10.8% do not practice any leisure activities.

Regarding family dynamics, 14.7% consider their parents to be unavailable and 18.6% do not communicate with their parents.

92.2% have a working father. 61.8% have a working mother. 83.3% live in urban areas and 78.4% have a good socio-economic level.

#### 2. The link to the Internet:

86, 6% have connected to the Internet before the age of 10. The Smartphone and the PC are also the two preferred accesses for adolescents (Table 1).

**Table 1: Adolescents' preferred accesses**

Smartphone	82,4%
PC	13,7%
Digital tablet	2%
Console	2%

87.3% have Internet access in their room. 90.2% have daily access to the Internet. 29.4% spend less than 3 hours/day on the Internet, 48% spend between 3 and 6 hours daily on the Internet, and 22.5% spend more than 6 hours/day. As for the weekend, 49% spend more than 6 hours, 38.2% spend between 3 and 6 hours and 12.7% spend less than 3 hours a day.

On the other hand, 58.8% of the parents spend less than 3 hours/day, 32.4% between 3 and 6 hours/day and 8.8% more than 6 hours/day. Meanwhile siblings spend 27.8% less than 3 hours/day, 51.1% between 3 and 6 hours and 21.1% more than 6 hours.

Only 37.3% are supervised by their parents during their use of internet. On the other hand, 52.9% go online during class.

52.9% of adolescents prefer to use social networks, 20.6% chat and 8.8% online music (Table 2).

**Table 2: Internet use by adolescents**

Social network	93,1%
Online music, streaming movies and series	89,2%
Downloading of music/movies	81,4%
Chat	71,6%
Searching for information	50%
Online games	43,1%
Search for documentation (more complete)	41,2%
Buying, selling, exchanging online	37,3%
Reading/magazine, digital books online	33,3%
E-mail	32,4%
Gambling	7,8%
Other	1%

#### 3. Prevalence of cyberaddiction

23.5% have a normal use of the Internet (IAT between 0 and 30 points), 36.3% have a controlled use of the Internet (IAT between 31 and 49 points), while 36.3% have a problematic use of the Internet (IAT

between 31 and 49 points) and 3.9% have a severe addiction to the Internet (IAT between 80 and 100 points).

#### 4. Video games

60.8% of respondents play video games. 21.6% spend less than one hour per week playing video games, 19.6% between 1 and 3 hours, 19.6% more than 3 hours and 39.2% do not play video games. As for the time spent playing on weekends, 10.8% of players play less than 1 hour, 20.6% between 1 and 3 hours and 29.4% more than 3 hours.

#### 5. Prevalence of gambling addiction

66.7% do not have a gambling addiction (gamblers and non-gamblers) and 33.3% have a gambling addiction.

#### 6. Prevalence and severity of depression

After scoring, 69.6% of adolescents didn't have depression, 13.7% have mild depression, 9.8% have moderate depression and 6.9% have severe depression.

No statistically significant correlation was found between gender and depression. ( $\chi^2 = 0.472$ )

#### 7. Use of psychoactive substances

17.6% smoke tobacco and 15.7% have smoked cannabis. 81.4% have never consumed alcohol, including 13.7% who have ever been drunk after binge drinking. 5.9% have ever used psychoactive substances.

#### B) Factors associated with internet addiction

According to this study, several variables significantly related to cyber addiction were found (Table 3).

**Table 3: Several variables significantly related to cyber addiction**

Variable	khi-2 Person
Parental availability	0,002
Communication with parent	0,006
Number of hours spent on the Internet	0,001
Number of hours spent on the Internet on weekend	0,000
The number of hours spent by siblings on the Internet	0,022
The current connection	0,004
The type of activity preferred on the Internet	0,003
Type of gambling activity	0,018
Gambling addiction	0,004
Depression	0,000
Frequency of cannabis use	0,031
Alcohol use	0,000
Use of psychoactive substances	0,000

## IV. DISCUSSION

The Internet is a tool particularly used by teenagers because it responds perfectly to their desire to distance themselves and explore the world while allowing them to remain in the reassuring family cocoon. Daily connection, individual, isolated, multimodal (games, surfing, social networks) and simultaneous use characterize their consumption mode [1].

There is no consensual definition of an addiction or pathological use of the Internet. This can be explained by the difficulty of establishing a border between the pathological and the normal. When does one become addicted to the Internet? What makes a use become pathological?

Despite the multiplication of studies on Internet use and attempts to describe diagnostic criteria, there is still no consensus on the nosological existence of Internet addiction at the international level. Nevertheless, Internet gambling is listed in the DSM-5

as a Substance-Related and Addictive Disorder, and a hypersexuality disorder is described in the DSM-5 [2].

The diagnostic criteria for Internet Gaming Disorder are [2]:

- Preoccupation with Internet gaming
- Withdrawal symptoms when the Internet is not accessible
- Tolerance: need to spend an increasing amount of time playing on the Internet
- Unsuccessful attempts to control Internet gambling use
- Excessive Internet use despite knowledge of negative psychosocial problems
- Loss of interests, previous hobbies, entertainment as a result of, and apart from, Internet gambling use.
- Use of Internet gambling to escape or relieve a dysphoric mood
- Compromise or loss of a significant relationship, job, or educational or career opportunity as a result of Internet gambling

The Work Health Association defines addiction as "a state of periodic or chronic dependence on substances or behaviors".

The notion of addiction, thus broadened and freed from that of drug dependence, is currently extended to behaviors whose addictive nature seems obvious, despite the absence of use of a toxic product [1].

Non-substance addictions include exercise, eating, gambling, Internet gaming, Internet browsing, e-mailing and texting, kleptomania, sex, dating, shopping, tanning and work

According to the Internet World Stat, there will be 4,833,521,806 internet users in the world in June 2020, representing 62% penetration. According to the Digital 2020 report, We are social and Hootsuite [3]. In Morocco, there would be 25.32 million internet users, 2.9 millions (+13%) more than in 2019.

Young people (ages 15-24) are the most connected age group. Globally, 71% of them use the internet, as shown in a 2017 UNICEF report [4,5].

Our study focused on adolescents aged 13 to 19, who are no exception to the trend, with internet access in 100% of the sample.

The majority of moroccan youth connect to the internet from their cell phones. 97.1% connect from a smartphone, 73.5% from a PC, 21.6% from a tablet, 17.6% from a console and 1% from another access [4].

In fact, in our sample, the smartphone is also the preferred access to the Internet for 82.4% of our

adolescents and 75% spend more than 30 minutes a day on it.

As for the daily time spent on the Internet, 66% of moroccan youth go online for more than an hour a day [6]. In our study, 90% have daily access to the Internet and 29.4% spend more than three hours on the Internet.

By the multitude of possibilities that it grants to its users, the Internet reveals itself as a totally fascinating tool with different uses. The National Agency of Telecommunication Regulations, has revealed different uses of the Internet in Morocco [5]. Communication and entertainment come in first place (social networks and downloading) [7]. We found the same figures for social networks with 93.1%, 89.2% for streaming and 81.4% for downloading online, 71.6% for chatting, 50% for searching for various information, 43.1% for online games. The latter are mainly the prerogative of teenagers and young adults. They are played on game consoles connected to the Internet as well as from a computer or a smartphone.

The use of the Internet can also lead to risky behaviors due to its content, its misuse, the addictive nature of certain applications, games or social media, poor parental control or poor parental guidance on the use.

The prevalence of cyberaddiction in our study is 36.3% for moderate addiction and 3.9% for severe addiction. These figures are comparable to those found in Germany, Italy and Norway. In the literature, the prevalence figures for cyberaddiction are very disparate, with prevalences varying widely (Table 4).

**Table 4: Some prevalences of Internet addiction**

Author	Country	Diagnosis Tests	Size	Prevalence
Chérif L, <i>et al.</i> , (2015) [8]	Tunisia	YDO-10	-587 adolescents -16 years	<b>18,05%</b>
J. Ben Thabet <i>et al.</i> , (2019) [9]	Tunisia	YDO-10	-253 adolescents -16,28 years	<b>43,9%.</b>
Obeid <i>et al.</i> , (2019) [10]	Lebanon	IAT	-1103 adolescents -15,50 years	<b>43,6%</b> (40%UPI 3.6%Addiction)
Jee Hyun Ha <i>et al.</i> , (2007) [10, 11]	South Korea	IAT	-452 adolescents -15.8 years	<b>30,8%</b> (29%UPI 1.8%Addiction)
Dufour <i>et al.</i> , (2016) [12]	Canada	IAT	-3938 adolescents -15.3	<b>18.47%</b>
Chi <i>et al.</i> , (2019) [13]	China	YDO-10	-522 adolescents -12.33 years	<b>20.44%</b>
Lindenber <i>et al.</i> , (2018) [30]	Germany	CIUS	-1723adolescents -15.5 years	<b>3.2%</b>
Bianchi <i>et al.</i> , (2017) [31]	Italy	IAT	-1129adolescents -19years	<b>23.7%</b> (23% UPI 0.7% Addiction)

Factors associated with this addiction include :

1. **Age:** in the Eu Kids Online survey, 15-16 year olds spend twice as much time online as other younger age groups [14, 15].
2. **Gender:** During adolescence, Internet addiction was associated with male gender [14, 16, 17].
3. **Environment:** Adolescents living in rural areas are more likely to develop Internet addiction (less access to information, fewer leisure activities) [18].
4. **Family dynamics:** Poor communication with parents, and their inaccessibility, is thought to make young people more addicted to the Internet [10]. Our study found a significant relationship with availability and communication with parents.
5. **Parental and sibling Internet use:** Both parental and sibling Internet use are significantly associated with the risk of Internet addiction in adolescents [9]. This supports the role of family and friends in the initiation of adolescent Internet use. Our study found a significant association with sibling Internet time.
6. **Other leisure activities:** Internet-dependent adolescents had significantly fewer leisure activities other than the Internet compared to normal Internet users [9].
7. **Length of time spent online:** Young (1996) [16] found that Internet addicts spent approximately 39 hours/week online. Indeed, the amount of time spent online is associated with Internet addiction [18,9, 10]. Our study confirmed that the amount of time spent online is associated with the risk of cyberaddiction.
8. **Type of online activities:** According to Ferron [29], Internet addicts enjoy highly interactive applications. They have an attraction to entertainment activities such as using social networks like Facebook and gaming. Our study found an association with the type of online activities and gambling.
9. **Logging on during class** was a factor in internet addiction found in our study.

Furthermore, Internet addiction and substance addiction are phenomenologically connected [19]. The study by Rucker *et al.*, [20], conducted in Switzerland in 2015 among young adolescents, demonstrated that Internet addiction would be an important early predictor of drug use (tobacco, cannabis, alcohol, other drugs). Indeed, our study objectified a significant link between cyberaddiction and addiction to alcohol, tobacco and psychoactive substances.

As for behavioral co-addictions, Semaille (2009) [21] reported the relationship between the various disorders corresponding to behavioral

addictions. We have also found a link between gambling addiction and Internet addiction.

Hence the interest in systematically looking for polyaddictions in any subject suffering from any form of addiction.

Nevertheless our results should be interpreted considering the limitations of our study. It is difficult to establish a causal link from this transversal study, needing longitudinal studies to make a more complete analysis. Moreover, our study was based on a self-questionnaire. These questionnaires do not manage to overcome the automatisms developed as a defense mechanism; hence the necessity to make studies with directed/semi-directed interviews.

With regard to the question of Internet use by adolescents and depression, a meta-analysis of 8 studies deal with depression and social media use disorder was conducted in China, of which seven reporting a link between depression and social networks, and one finding no link [22]. A meta-analysis in Europe, including 9 studies, was conducted to investigate an association between social media use disorder and psychiatric disorders. Of the eight studies conducted on depression and problematic media use, seven found an association between the two [23].

Our study finds a significant association between depression and cyberaddiction, however the nature of this association is difficult to establish. Could it be that cyberaddiction or digital media misuse causes depression, and is thus a risk factor for it? Or would the opposite be true, with depressed adolescents using the Internet and becoming addicted to it?

Some authors claim that Internet addiction leads to depression. The use of social media is linked to depression in adolescents, and would even be a cause of depression [24-26]. Depression is also said to be caused by the substitution of communication through digital media for face-to-face exchange, resulting in the social isolation of the adolescent [27].

Others claim that being depressed leads to Internet addiction and is a risk factor. Some would explain this by the fact that the adolescent would use the Internet as a coping strategy through recreational activities and anonymous communication in order to externalize and relieve their internal problems (example: depression) [24].

The relative risk of developing depression for those with pathological Internet use was two and a half times higher than those without pathological Internet use [26].

In the end, depression and Internet addiction are two very intertwined phenomena. Therefore, we

proposed to make a study to prove this link and describe it. The association between cyberaddiction and Depression appears in the end to be reciprocal, even if the causality cannot be affirmed, indicating that cyberaddiction is a risk factor for depression and that depression aggravates cyberaddiction. Both may be cause and consequence of each other [28].

## V. CONCLUSION

The Internet is a ubiquitous tool, and has conquered all areas of the public and private sphere, it can lead vulnerable people to real addictive behaviors. This vulnerability is particularly exacerbated during adolescence.

Depression and Internet addiction are therefore two very intertwined phenomena. Cyberaddiction is a risk factor for depression, and depression worsens cyberaddiction. Great interest in prevention campaigns on the risks of screen use among our young patients.

## VI. Declaration of competing interest

All authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence this Work.

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