



## SYSTEMATIC REVIEW OF INTERNET DEPENDENCY

## Medicine

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## ABSTRACT

Internet addiction is characterized as a compulsive-impulsive spectrum disorder and it has four components: excessive use, withdrawal, tolerance and negative repercussions. The objective of this study is to review the world literature regarding the prevalence of Internet addiction and to verify comorbidities associated with the disorder. Pubmed, Scielo, and Google Scholar databases were consulted, and 61 articles were included in the review. The prevalence of Internet addiction is higher in developed countries and in the male gender and there are no differences among socioeconomic classes. Internet addicts have sleep disturbances, a tendency to sedentarism and overweight, low self-esteem, depression and musculoskeletal injuries.

## KEYWORDS

Internet Addiction Disorder. Problematic Internet Use. Internet Dependence.

## INTRODUCTION

Internet dependence is characterized as a compulsive-impulsive spectrum disorder and it presents four elements: excessive use, abstinence, tolerance and negative consequences such as poor academic performance, social isolation and fatigue<sup>1,3</sup>. There is no consensus among researchers concerning which terms better define the disorder such as: internet dependence disorder, pathological internet use, internet dependence behavior, problematic internet use and internet dependence<sup>3</sup>.

In 2004, the Internet Addiction Test<sup>4</sup> was created, the first validated instrument to evaluate the internet dependence which covers characteristics that enable evaluating the pathologic internet use. In Brazil<sup>5</sup> it was validated in 2012 presenting good internal consistency ( $\alpha=0.85$ ) and in 2014 Pontes et al<sup>6</sup> also carried out the validation of the Portuguese version of the test being considered satisfactory ( $\alpha=0.90$ ). The purpose of the present article is to provide an overview of internet dependence in the world and in Brazil and detect the consequences for the teen and young adult physical and mental health.

## METHODS

Search carried out in the databases: Pubmed, Google Scholar and Scielo, using the following descriptors: Internet addiction disorder, Internet dependence and Problematic internet use

In the Pubmed database, using the descriptor internet addiction disorder, limiting it for adults, articles published in the last 10 years, 30 articles were found and using the descriptor internet dependence we found 36 articles. Were excluded 15 articles as they comprised themes concerning cyberbullying and treatment.

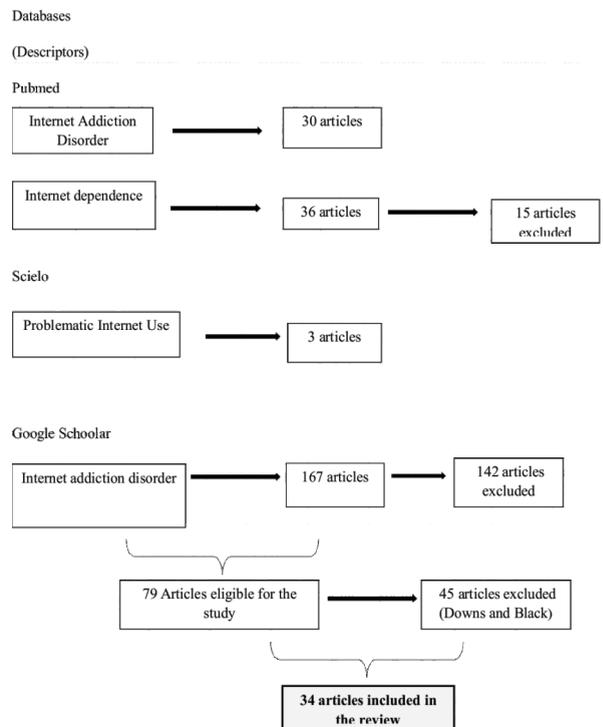
In Scielo, using the descriptor: Problematic internet use, three articles were found.

In Google Scholar, using the descriptor: Internet addiction disorder, 167 articles were found, 142 were not selected as they were related to bullying, pornography, marital unfaithfulness and treatment.

Considering all databases researched, we found 79 elective articles for the study. The abstracts of the articles found were reviewed by two independent researchers and those which involved original articles, studies of prevalence and systematic reviews were selected resulting in a total of 34 articles included in the study. The quality of the articles was assessed through the Checklist Downs and Black<sup>7</sup>. The present article used the version comprised by 27 items as the ones related to experimental studies were excluded. Therefore, at the end, 17 items were evaluated, in a total of, at most, 18 points. The items which ranked above 70% (more than 12 points) were included in the study as they

were considered by the authors as of suitable methodological accuracy.

**FIGURE 1.** Diagram of Systematic Review



## EPIDEMIOLOGY

## Prevalence of internet dependence

The prevalence of internet dependence ranges from 0.8% to 26.7%. In Europe the prevalence of internet dependence among teens ranges from 1% to 18.3%<sup>8-11</sup>. In the United States, the prevalence of internet dependence found was of 26.3%, using the Internet Usage Questionnaire<sup>12,13</sup>.

Most studies carried out in Asia finds higher rates of prevalence of internet when compared to Europe<sup>14,15</sup>. A cross-sectional study with 1,708 teens aged between 17 to 19, from four schools of the two largest cities in Taiwan was found a prevalence of 13.8% of internet addiction, with higher prevalence in the male gender, with significant losses in the relationship of the addicted teen with parents, teachers and poor school

performance when compared to non-addicted teens<sup>16</sup>.

Another cross-sectional study carried out in China, with 3,557 university students from the first semester, highlighted a prevalence of internet dependence of 6.4%. Internet Addiction Test (IAT) was used and there was no statistical significant difference between the genders. In terms of age, the prevalence was higher in university students above 21 years old. Concerning psychiatric comorbidities, the internet dependent presented higher scores in depression and anxiety scales when compared to the non-dependent showing, then, a statistical significant difference<sup>17</sup>.

In Brazil, there is a lack of studies in the field. There is no consensus among researchers when using the tools which define the dependence. The heterogeneity of the studies makes it hard to compare the findings and the extrapolation of the results<sup>18-21</sup>.

### Hours of connection

Anderson<sup>15</sup> carried out a study online with freshman university students from eight American universities with the purpose of assessing the time of internet connection, the impact of the use of the web in the academic life, in extracurricular activities, in interpersonal relationships and in sleep. It has been noticed that the average connection time was of 100 minutes a day and that 9.8% of the 1,078 students who responded to the questionnaire presented criteria for internet dependence. Those ranked as internet dependent reported a higher time of connection, around 229 minutes a day while the non-dependent used the web 73 minutes a day and this is a statistical significant difference.

Another studies found positive correlation between the number of hours online and internet addiction. Addicted teens used twice as much the number of hours if compared to non-addicted ones and the students who used the internet for entertainment, through social networking sites, had higher prevalence of internet addiction than those who used it for information<sup>20,22</sup>.

### Use of social networks

A cross-sectional study carried out in India with a sample of 724 teens found a prevalence of internet dependence of 8.7%, using the Internet Addiction Test (IAT). More than half of the sample used the internet for interpersonal relationships through the use of chats and social networks. The use of the internet for the purpose of making virtual friendships was considered as a risk factor for internet addiction (OR 2.4) while the use of it for searching information was considered as a protection factor (OR 0.20)<sup>23</sup>.

Social networks play a key role in the dependence behavior as the user sets interpersonal communication through the networks, undergoing changes in the self-esteem, changing his/her humor according to the approvals or rejections in his/her personal profile<sup>24</sup>.

Some studies refer that individuals with problematic internet use prefer virtual interactions than face-to-face and such preference might be related to psychosocial problems such as anxiety, depression, low self-esteem, loneliness and difficulties in social skills<sup>25,26</sup>. Another study carried out with American students to assess the relationship between the use of Facebook and problematic internet use found a statistical significant association concerning gender. Female students used the social network more than once a day and for more time when compared to male students<sup>27</sup>.

## COMORBIDITIES RELATED TO INTERNET DEPENDENCE

### Psychiatric disorders and behavioral problems

Individuals with internet dependence may have several comorbidities such as mood disorder, depression, suicidal ideation, social phobia, social anxiety, attention deficit and hyperactivity and substance abuse<sup>23,28</sup>. Depression is considered a predisposing factor for internet dependence and depressed individuals end up isolating themselves in the web, interacting very little with their family, relatives and friends thus increasing their loneliness, resulting in a vicious cycle<sup>3,29,30</sup>.

A recent meta-analysis of 1,641 patients and 11,210 controls found a significant association between depression (OR 2.77), anxiety (OR 2.70), attention deficit hyperactivity disorder (OR 2.85), alcohol abuse (OR 3.05) and internet addiction. There are controversies in the literature whether depression is a cause or consequence of internet dependence<sup>31,15</sup>.

### Sleep disturbances

Study carried out in Norway, using the YDQ (Young Diagnostic Questionnaire) with a representative sample of the population from 16 to 74 years old, found a statistical significant association between sleep disturbances and internet addiction ( $P < 0.001$ )<sup>31</sup>.

Another study in the USA highlighted that 90% of the Americans made use of some form of technology up to one hour before sleeping. The highest prevalence referred to the television although in young adults and teens the cell phone was the most used. 22% reported using the cell phone before falling asleep. From these, 10% had nocturnal awakenings due to the use of the cell phone<sup>32</sup>.

A study carried out with 2,336 students in South Korea aimed to evaluate the relationship between the excessive internet use and the presence of daytime sleepiness in teens found a prevalence of 37.7%, 13.9% and 7.4% among the students ranked as addicted, possibly addicted and non-addicted respectively. The prevalence of sleep disturbances such as insomnia, snore, apnea, bruxism and nightmares was higher in the group of internet addicted<sup>33</sup>.

### Sedentary lifestyle and weight excess

Cross-sectional study carried out in seven European countries with a sample of 10,287 teen students aimed to check the association between the problematic internet use, sociodemographic variables and obesity, found a prevalence of 12.4% of overweight and obesity and 14.1% of dysfunctional behavior in the internet. In Greece, a higher prevalence of overweight and obese teens was found, 19.8% while the Netherlands had the lowest prevalence in the sample, 6.8%. Heavy internet use - heavy users, use of social-networking sites (OR= 1.26, 95% IC: 1.09-1.46) and male gender (OR=2.89, 95% IC: 2.46-3.38) were some risk factors associated to the outcome<sup>34</sup>.

Another studied carried out online with a sample of 392 participants aged between 19 and 35 years old ( $M=25.20$ ,  $SD=4.25$ ), used the Internet Addiction Test, Body Image Avoidance Questionnaire and the Body Mass Index (self-reported), and there was some highlight among women concerning an association between avoidance of body image and eating disorders among those who used social networks like facebook and Messenger (MSN), which did not occur in the male gender ( $p < 0.05$ ). The authors believe that the dissatisfaction with the body image may contribute for the internet addiction but the study presents methodological limitations which hinder establishing a casual relationship<sup>35</sup>.

### Musculoskeletal injuries

The long-term use of devices such as cell phones, smart phones, tablets and desktops may cause musculoskeletal injuries due to the user's bad positioning while using such devices, resulting in back pain, cervical spine pain, bad posture, repetitive strain injuries<sup>36</sup>.

A cross-sectional study with 961 teens of public schools from Recife, highlighted that 65.1% of the teens mentioned musculoskeletal pain and the one in the thoracolumbar spine was the most prevalent one (46.9%) followed by a pain in the upper members (20%). The purpose of the study was to check the relationship between computer use and electronic games with the presence of musculoskeletal pain. These devices were considered as risk factors for the occurrence of cervical and lumbar pain. The use of electronic devices for over 4 hours every day was statistically relevant for triggering the back pain in teens ( $p < 0.026$ )<sup>37</sup>.

## DISCUSSION

The importance of the internet for the modern society is undeniable due to its endless features<sup>38</sup> which results in a difficulty to determine to what extent this use becomes pathologic. The prevalence of internet dependence is very wide, ranging from 0.8 to 26.7%<sup>8-16</sup> leading us to some consideration concerning the possibility of methodological errors which make it difficult to interpret and compare the results. Research on this issue in Brazil is very restricted<sup>18-21</sup>. They are often studies with small samples, of convenience, without a suitable methodological accuracy.

Numerous studies<sup>24,26,28-31</sup>, report that the internet dependent presents various psychiatric comorbidities, especially anxiety, depression, attention deficit disorder and hyperactivity, low self-esteem and loneliness and that the adequate management of internet dependence requires the setting of an approach for the dependent in a complete

way, trying to establish the reason that lead him/her to prefer virtual interactions to real ones<sup>3</sup>. Studies emphasize a significant association between depression and internet dependence. The relationship cause and effect is not exactly known. It is believed that depression causes the isolation of the individual<sup>29,30</sup>, who tries to set his/her mood through the web, seeking virtual relationships where many times anonymity brings a comfort zone for the dependent user. The use of social networking sites such as facebook is more commonly related to the dependence process especially from the females<sup>22,23</sup>. Other studies<sup>3,16,31</sup>, question whether the number of hours online would be implied in the triggering of the internet dependence as, in order to establish the diagnosis of disturbance, the time spent online is not enough but the losses the dependent faces by getting isolated in the virtual world and not participating in family gatherings, academic or social activities and/or at work. The isolated analysis of the number of hours online without evaluating the losses the user suffers in his/her routine can overestimate the diagnosis of internet dependence and as the modern society is totally linked to the new technologies, caution is needed to provide a diagnosis using screening instruments and careful clinical evaluation.

Based on what has been mentioned, it can be concluded that the prevalence of internet dependence is higher in developed countries and there are no differences between socioeconomic classes<sup>11,17</sup>. There are several psychiatric disorders and psychosocial disturbances related to internet dependence. It is difficult to find a consensus concerning the influence of depression in the dependence process. The prevalence of internet dependence is higher in Asian countries than in the rest of the world. In Brazil, the research on this issue is very limited and then it is difficult to provide an overview on prevalence and associated factors.

The study presents some limitations due to the difficulty of the authors to standardize the instruments and cut-off points to establish a diagnosis for the disorder. This non-standardization of the criteria used for ranking makes it hard to set a comparison between the findings, the internal and external validity of the study. It is necessary to make use of a standardization of terms which define the internet dependence and the implementation of longitudinal studies so that it is possible to establish a relation of causality and a better understanding of etiological factors in the process of behavioral dependence in order to include the internet dependence in the next Mental Health Diagnoses, thus facilitating the diagnosis and the adequate approach of these patients.

## DISCLOSURE

The authors inform that there are no conflicts of interest.

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