The Relationship between Excessive Internet Use and Depression: A Questionnaire-Based Study of 1,319 Young People and Adults

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Key Words
Internet use, excessive • Addiction • Depression • Suicide

Abstract
Background: There is a growing awareness of a psychiatric construct that needs to be better defined and understood: Internet addiction (IA). Recently there has been much public concern over the relationship between Internet use and negative affect. This study explored the concept of IA and examined the relationship between addictive symptoms and depression. Sampling and Methods: An online questionnaire was used to measure participants’ Internet use, the functions for which they used the Internet, and their depressive tendencies. Three scales were included: the IA Test, the Internet Function Questionnaire and the Beck Depression Inventory (BDI). 1,319 respondents completed the questionnaires, with 18 (1.2%) identified as falling in the IA category. Results: Correlational analyses were conducted across the whole data sample. In factorial analyses, the 18 IA respondents were compared to a matched group of non-addicted (NA) respondents in terms of their scores on the Function Test and the BDI. Across the whole data sample, there was a close relationship between IA tendencies and depression, such that IA respondents were more depressed; there were also significant differences between the sexes, with men showing more addictive tendencies than women. In addition, young people were significantly more likely to show addictive symptoms than were older people. There was a significant difference between the IA and the NA group in their levels of depressive symptoms, with the NA group firmly in the non-depressed range, and the IA group in the moderately-to-severely depressed range ($F_{1,34} = 22.35; p < 0.001$).

In terms of the function for which they used the Internet, the IA group engaged significantly more than the NA group in sexually gratifying websites, gaming websites and online community/chat websites. Conclusions: The concept of IA is emerging as a construct that must be taken seriously. Moreover, it is linked to depression, such that those who regard themselves as dependent on the Internet report high levels of depressive symptoms. Those who show symptoms of IA are likely to engage proportionately more than the normal population in sites that serve as a replacement for real-life socialising. Further work needs to be done on validating this relationship. Future research is needed to corroborate the existing evidence and address the nature of the relationship between IA and depression: there is comorbidity between these conditions that needs greater investigation.

Introduction

The Internet has become an essential part of modern life, bringing huge benefits in terms of living and working flexibly. However, there is a darker side to the Internet, and a hot social and medical issue currently is the question of whether Internet sites, particularly those involv-
ing online communities, influence behaviour and induce or support pathological thinking.

Although not a recognised syndrome in ICD-10 or DSM-IV, the term Internet addiction (IA) is commonly used [1]. The definition of IA is ‘an individual’s inability to control their Internet use, which in turn leads to feelings of distress and functional impairment of daily activities’ [2]. A quick Internet search shows that some are cashing in on this concept by offering treatment and remedial programmes for those who fear they have become addicted to the Internet. However sceptical one might be about this, there seems to be a growing awareness in the psychiatric community that there is validity in this construct as a distinct psychiatric condition. Indeed, a recent editorial in the American Journal of Psychiatry [3] has called for IA to be recognised as a syndrome in the forthcoming DSM-V. In this article, Block [3] argues that in societies in which the Internet infrastructure is very well developed, i.e. in East Asia, the case for IA is very evident; however, in the West, the prevalence of the condition is less well understood. But with increasingly sophisticated infrastructures developing in the West, it seems fairly certain that where the Far East leads, the West will follow [4, 5].

There is no doubt that some people develop what they and/or others recognise subjectively as compulsive tendencies towards Internet use, and the symptoms they report, including physiological arousal and psychological withdrawal, seem to mirror symptoms that are understood to be related to well-established addictive behaviours. Since the early 1990s there has been a growing body of literature arguing for the acknowledgement of IA as a distinct psychological construct [3, 6, 7]. With DSM-V in development, it is essential that the case for IA as a separate psychiatric condition is made now.

One of the problems in examining IA is that there is a paucity of tools with which to measure this condition, and some inconsistencies between the tools available [8]. The most widely used test of IA was developed by Young [9, 10], and it has been refined to provide a tool for determining whether someone meets the criteria for addiction as identified by Young. We recognise that Beard [11] urged caution in accepting the reliability and validity of the tools currently available, but with that caveat in mind, and in view of the fact that the Young test is widely reported in the literature, we chose this measure in the present study.

In addition to considering time spent online, it is important to bear in mind that the Internet has multiple ways by which people can engage; Young [9] makes the point that it allows for any and every virtual experience. Given the multi-faceted way in which an individual can interact with the Internet, there is a growing appreciation that Internet use needs to be analysed systematically. Hence it is not enough simply to ask people the extent to which they use the Internet, it is important also to ask what they use it for. Recent research has suggested that those who are more dependent on the Internet are likely to engage proportionately more in sites related to sexual gratification, online gaming or e-mail/text messaging [2].

One function of the Internet that seems to have taken a firm grip on young people is the involvement in online, virtual communities such as Facebook, Bebo and, most recently, Twitter. A recent spate of suicides amongst teenagers and young adults in South Wales, UK, has led to questions being raised in the media about the extent to which online communities foster suicidal tendencies in young people [12]. This is one of many reasons why there is a growing public awareness of the existence of online communities, with questions being raised about the extent to which online communities may play some role in encouraging those with suicidal tendencies to follow through on their suicidal thoughts or, indeed, about the possibility that these communities might encourage the development of such thoughts in previously healthy young people [12, 13]. The Internet is coming to be popularly regarded as a breeding ground for dark, depressive thoughts and as providing encouragement to those with suicidal tendencies.

Despite the media speculation, what is not yet evident is whether excessive Internet use is clearly associated with depressive symptoms. The link between IA and depression was first suggested more than a decade ago, when Young and Rogers [14] reported a relationship between high levels of depressions as measured by the Beck Depression Inventory (BDI) and IA as measured by the IA Test (IAT) [9] in a sample of 259 adults. Despite this intriguing evidence, little has appeared in the literature since. However, a recent study of South Korean adolescents added weight to this evidence [15], suggesting that those with a tendency towards IA exhibited more symptoms of depression. However, this study was limited in terms of a low sample size and the fact that only 8 participants were firmly classifiable as Internet addicted.

The present study was a much larger-scale analysis of IA and its relationship to depression in young adults in the UK. We aimed to identify whether there was a link between depressive tendencies and Internet use, and fur-
thermore whether any link was associated with particular aspects of Internet use, in view of the literature outlined above.

**Method**

**Participants**

A total of 1,319 respondents completed the questionnaires. Recruitment was via links placed on UK-based social networking sites. The age range of the respondents was 16–51 years, with a mean age of 21.24 years (SE = 0.11). Sixty-three percent of the respondents were women.

**Materials**

Three questionnaires were applied: Young’s IAT [9], the Internet Function Questionnaire and the BDI [15]. The IAT consisted of 20 questions designed to identify people as mildly, moderately or severely addicted. It is scored on a 100-point scale: ≤49 is considered normal, 50–79 is considered problematic and 80–100 is classed as significantly problematic. Questions include items such as ‘How often do you find that you stay on-line longer than you intended?’ and respondents are required to rate them on a 5-point scale where 1 = rarely and 5 = always. The Internet Function Questionnaire measured the different uses people have for the Internet (eBay/shopping, communities, browsing, games, chat, gambling, e-mail, research and sexually gratifying sites), taking into account the percentage of time spent browsing these respective forms of website. It includes questions such as ‘How much of your online time do you spend on e-mail?’, again on a 5-point scale: 1 = 0–20%, 2 = 21–40%, 3 = 41–60%, 4 = 61–80% and 5 = 81–100%. The BDI is a long-standing, widely used, self-evaluation depression scale. Online versions of the questionnaires were constructed using UCCASS software and were hosted on a Tsohost server. Data were recorded by the SQL database programme. Ethical approval was obtained from the Institute of Psychological Sciences Ethics Committee and procedures were put in place to offer advice to any respondent who reacted adversely to the questionnaires.

**Design**

The primary method of data analysis was correlational analysis. Furthermore, we aimed to identify a subgroup of participants in the ‘addicted’ range as measured by the IAT and match them with ‘non-addicted’ respondents in a factorial analysis in order to explore the links between Internet dependence, depression and different forms of online activity.

**Results**

The data were heavily skewed as far as age was concerned, with a range of 16–51, but a mean of 21.24 years (SE = 0.11). Skewness analysis yielded a value of 2.55, indicating a positive skew to the data. The age data were log_{10} transformed, which reduced the skewness value to 1.40. Correlational analyses of the total data sample showed a close relationship between scores on the IAT and BDI, such that those with more addictive tendencies also tended to be more depressed. This is shown in Table 1, with a highly significant positive correlation between IA and BDI. It also seems that there is an age bias, with younger people being more addicted than middle-aged people. There was also, as would be expected, a highly significant correlation between IA score and the average time spent online. And when asked how they apportion time to different activities, those who scored more highly on IA spent proportionately more time on online gaming sites, sexually gratifying websites, browsing, online communities and chat sites. There were only weak negative correlations, though some suggestion that less addicted people use the Internet more for research. These patterns are mirrored, though less strongly, in the BDI scores: people who were more depressed spent proportionately more time on browsing, sexually gratifying sites, chat, online gaming sites and online communities. The lack of any significant negative correlations between BDI and the different activities suggests that non-depressed people did not use the Internet principally for a limited range of activities, but have a broad range of uses. The correlations with age show that older people use chat sites less and gambling sites more than young people. And sex differences are evident in that women use the Internet more for research, e-mail and chat than do men, and less for sexually gratifying sites, games and browsing.

Multiple regression analysis was used to examine the predictors of IA. The independent variables were BDI score, age and sex. The overall equation was highly significant: MS = 16,637; R^2 = 0.256; F3, 1,315 = 150.68, and p < 0.0001. The BDI was the best predictor of IA (t = 20.57; p < 0.0001), such that high IA scores were linked to high levels of depression; the unstandardised coefficient was 0.78 (95% confidence interval: 0.70–0.85). Sex was also significant, such that men reported more addictive tendencies than women (t = 3.61; p < 0.0001; unstandardised coefficient: –2.25; 95% confidence interval: –3.50 to –1.03). Age was also significant (t = –3.21; p = 0.001; unstandardised coefficient: –13.40; 95% confidence interval: –21.60 to –5.20), such that young people had higher IA scores than older people.

Of the 1,319 respondents, 18 were classed as being Internet addicted, with a score of ≥75 on the IAT; hence, only a small minority of respondents (1.2%) showed serious addictive behaviour (the IA group). These 18 addicts were matched on age and sex to participants who had low scores for IA by Young’s definition (scoring ≤45); they
formed the matched non-addicted (NA) group. In each group, there were 13 males and 5 females, and the mean age of both groups was 18.3 years. Comparisons were made between the groups on several key measures; summary descriptive statistics are shown in Table 2. Not surprisingly, the average use for those in the IA group was significantly greater than for those in the NA group ($MS = 26.69; F_{1, 34} = 50.27; p < 0.0001$).

The difference in BDI scores between the groups is illustrated in Figure 1; the difference between groups was highly significant ($F_{1, 34} = 33.3; p < 0.0001$), such that there was a higher level of depressive symptoms in the IA group than in the NA group. This mean score for the IA group puts them in the category of moderate to severe levels of depression according to Beck et al. [15].

We also compared the relative proportions of time spent on different activities, and the results are shown in
Table 3. Comparison of proportion of time spent on different Internet activities for IA and NA groups

<table>
<thead>
<tr>
<th></th>
<th>NA group</th>
<th>IA group</th>
<th>Summary statistics</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Mean (SE)</td>
<td>Mean (SE)</td>
<td>MS (df) = F (df)</td>
</tr>
<tr>
<td>Sexually gratifying sites</td>
<td>1.36 (0.169)</td>
<td>3.33 (0.513)</td>
<td>28.28 (1, 27) = 12.611</td>
</tr>
<tr>
<td></td>
<td>0.99–1.72</td>
<td>2.23–4.43</td>
<td></td>
</tr>
<tr>
<td>Games</td>
<td>2.07 (0.474)</td>
<td>4.00 (0.412)</td>
<td>29.290 (1, 30) = 9.456</td>
</tr>
<tr>
<td></td>
<td>1.05–3.10</td>
<td>3.13–4.87</td>
<td></td>
</tr>
<tr>
<td>Chat</td>
<td>2.13 (0.487)</td>
<td>4.13 (0.496)</td>
<td>30.000 (1, 28) = 8.279</td>
</tr>
<tr>
<td></td>
<td>1.09–3.18</td>
<td>3.07–5.20</td>
<td></td>
</tr>
<tr>
<td>Browsing</td>
<td>2.56 (0.353)</td>
<td>3.72 (0.360)</td>
<td>11.393 (1, 32) = 5.242</td>
</tr>
<tr>
<td></td>
<td>1.81–3.32</td>
<td>2.96–4.48</td>
<td></td>
</tr>
<tr>
<td>Community</td>
<td>2.94 (0.431)</td>
<td>4.24 (0.442)</td>
<td>14.568 (1, 33) = 4.37</td>
</tr>
<tr>
<td></td>
<td>2.03–3.85</td>
<td>3.30–5.17</td>
<td></td>
</tr>
<tr>
<td>E-mail</td>
<td>2.27 (0.419)</td>
<td>1.78 (0.275)</td>
<td>1.956 (1, 31) = 1.01</td>
</tr>
<tr>
<td></td>
<td>1.37–3.17</td>
<td>1.20–2.36</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>2.5 (0.303)</td>
<td>2.13 (0.424)</td>
<td>1.041 (1, 29) = 0.505</td>
</tr>
<tr>
<td></td>
<td>1.85–3.15</td>
<td>1.22–3.04</td>
<td></td>
</tr>
<tr>
<td>Gambling</td>
<td>1.0 (0.000)</td>
<td>1.45 (0.455)</td>
<td>1.082 (1, 19) = 0.905</td>
</tr>
<tr>
<td></td>
<td>1.00–1.00</td>
<td>0.44–2.47</td>
<td></td>
</tr>
<tr>
<td>eBay/shopping</td>
<td>1.12 (0.081)</td>
<td>1.07 (0.067)</td>
<td>0.021 (1, 30) = 0.23</td>
</tr>
<tr>
<td></td>
<td>0.95–1.29</td>
<td>0.92–1.21</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1.67 (0.333)</td>
<td>2.50 (0.562)</td>
<td>4.487 (1, 24) = 1.492</td>
</tr>
<tr>
<td></td>
<td>0.93–2.40</td>
<td>1.29–3.71</td>
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</table>

Values in the NA and IA group columns are means (SEs in parentheses), on a scale of 1 = rarely/never to 6 = very frequently. Confidence intervals are listed beneath means and SEs.

Discussion

In summary, we found a clear link between IA and depression, such that those whom we classed as addicted were significantly more depressed than those in the NA group. Hence we have identified a statistically significant relationship between IA and depression. What is not clear from these data is which comes first: are depressed people drawn to the Internet, or does excessive Internet use make one more prone to depression? This needs further work in the future, but it is clear that, for a small subgroup of the population, excessive use of the Internet is a warning signal of depressive tendencies. However, in line with previous studies, this subgroup represents <2% of the population. This is the figure typically reported in the literature, and it is higher than the incidence of gambling in the UK, which stands at around 0.6% [16].

When considering the functions of the Internet, the important point to note is that there was a significant difference between the groups in terms of sexually gratifying websites, online games and chat/community sites, such that the IA group engaged significantly more in these sites than did the NA group. This accords with recent evidence suggesting that those prone to dependence on the Internet are drawn to sites that involve these 3 types of activities [2]. This feeds the public speculation that overengagement in websites that serve/replace a so-
cial function might be linked to maladaptive psychological functioning.

This is the first large-scale study of Western young people to consider the relationship between IA and depression. Much of the research on IA has been carried out in East Asia, where Internet infrastructures are more advanced than in the West. A recent, smaller-scale study of 452 South Korean adolescents [17] presented data that accord with our findings: the authors reported a significant relationship between IA as measured by the IAT and depression as measured by a Korean version of the CES-D (Center for the Epidemiologic Study of Depression). And, similar to the present results, they found a rate of severe addiction of 1.8% (compared to our 1.2%). However, because of the relatively low number of participants in their study, the criteria for classing respondents as addicted were not as stringent as in our study; they simply did a median split of their respondents into 2 groups and classed those who scored more highly on the IAT as addicted, and the rest as non-addicted. The present study adopted a much more stringent method of group allocation, such that we were able to isolate a group we could firmly label as addicted and compare them with a matched control group. Hence, this study provides the first compelling evidence of a clear link between IA and depression.

Where we believe we need to be cautious is with the measures that are currently available to assess IA. In line with most studies on this topic, we used the IAT questionnaire [9]. Whilst this questionnaire appears to capture essential features of what addiction to the Internet might involve, other tools that have been developed subsequently, within different theoretical frameworks, include measures of social isolation [18] and loneliness [19]. Beard [11] has urged caution in accepting the reliability and validity of these tools, and we are at a juncture where, if IA is to be accepted as a distinct disorder, there is an urgent need for a well-validated assessment tool. A recent meta-analysis of the literature also urges caution in drawing conclusions from studies that use inconsistent methods and analysis [20], and an emerging view is that diagnostic tools should be used within a comprehensive framework of clinical assessment [1, 8].

In conclusion, the present data have added to the as yet small but compelling body of evidence on the link between high levels of depression and IA. Furthermore, the present data add weight to the recent suggestion that IA should be taken seriously as a distinct psychiatric construct. We echo growing calls for the inclusion of IA as a distinct disorder in the forthcoming DSM-V [2]. It is vital that this issue receives adequate attention now.

References