Examining the diagnostic criteria for Internet addiction: Expert validation

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diagnosis criteria;  
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Background/Purpose: Internet addiction is the coming problem around the world. The diagnostic criteria for Internet addiction among adolescents (DC-IA-A) has become a widely used measure for assessing the presence of Internet addiction in Taiwan. This study examined the diagnosis criteria for Internet addiction in adolescents by expert evaluation.

Methods: Twenty psychiatrists rated the adequacy of each criterion in DC-IA-A. The content validity and homogeneity reliability proposed by Aiken were calculated.

Results: The coefficients content validity and homogeneity reliability showed twenty psychiatrists agreed on each of DC-IA-A as relevant to the diagnosis of Internet addiction, though several criteria need improvements. Two criteria “excessive time spent on Internet activities and leaving the Internet” and “excessive effort spent on activities necessary to obtain access to the Internet” should be omitted, and the criteria of “tolerance” should be modified.

Conclusion: The diagnostic criteria for Internet addiction among adolescents should be revised to meet the real condition of this population.

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Introduction

Since its introduction in the 1990s, the widespread use of the Internet has transformed the daily lives of most people. However, since then problematic patterns of Internet use have gradually become prevalent, resulting in the coining of terms such as pathologic Internet use, problematic Internet use, Internet use disorder, and Internet addiction, which are meant to describe a maladaptive form of Internet use. Professionals have long debated whether pathological Internet use should be considered as an addictive disorder. In 1995, New York psychiatrist Ivan Goldberg was the first to propose that Internet addiction may be a clinically relevant disorder. Recent data suggest that Internet use disorders may be associated with specific brain lesions or dysfunction. For example, Kim and colleagues reported abnormal brain activation among adolescents with Internet addiction in a ball-throwing animation task. The results demonstrated that disembodiment-related activation of the brain is easily manifested in adolescents with Internet addiction. Hou and colleagues found that people with Internet addiction disorder had reduced striatal dopamine transporters and suggest that Internet addiction disorder might cause serious damage to the brain. In addition, neuroimaging findings further demonstrate that Internet addiction disorder is associated with dysfunction in the dopaminergic brain systems, suggesting that Internet use disorder shares similar neurobiological abnormalities with substance use disorders.

Although various prevalence rates have previously been suggested based on different screening methods (e.g., self-report questionnaires or clinical diagnostic interview), the majority of the international prevalence rate reports suggest that teenagers and adults in their twenties are the population that suffer the most with Internet addiction disorder or pathological Internet use. For example, the prevalence of pathological Internet use among adolescents in Europe as assessed by the Young Diagnostic Questionnaire (DQ) for Internet Addiction was 4.4%. In a UK survey of university students, 18.3% were considered to be pathological Internet users as assessed by the Pathological Internet Use Scale. In a review by Moreno et al., the prevalence rates of pathological Internet use ranged from 0% to 26.3% among U.S. youth. Approximately 8.1% of adolescents in China showed evidence of problematic Internet use as assessed by the 20-item Young Internet Addiction Test. The prevalence rate of Internet addiction as estimated by the Chinese Internet Addiction Scale, revised version, was 13.4% among incoming university students in Taiwan. The prevalence estimate using the diagnostic criteria for Internet addiction was found to be 15.3% among college students in Taiwan.

Internet addiction disorder is a relatively new condition, and the criteria to diagnose it have only been developed over the past 17 years. This diagnostic entity has attracted the attention of an increasing number of clinicians as more and more patients present with Internet-based conditions, although it is not listed in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR). The DSM-5 has been published in May 2013. Because there has been no consensus concerning the diagnostic criteria for this condition in the academic and clinical fields, the inclusion of the diagnosis of Internet use disorder remains controversial, requiring further research.

The first proposal for the Internet addiction diagnostic criteria was presented by Young in 1996. She developed an eight-item questionnaire, the DQ, which modified the criteria for pathological gambling to provide a screening instrument for addictive Internet use. The presence of five or more of the criteria was used to identify addicted Internet users. By contrast, Shapiro and his research team proposed another broad diagnostic criterion for problematic Internet use, which was based on the criteria for impulse control disorders. They suggested that Criteria A should include the presence of preoccupation with Internet use or the excessive use of the Internet for longer periods than planned, whereas functional impairments should define Criteria B, and exclusionary diagnoses should define Criteria C. Later, Griffiths suggested that there were six components that identified behavioral addiction, which are as follows: salience, mood modification, tolerance, withdrawal symptoms, conflicts, and relapse.

Ko and colleagues established the diagnostic criteria for Internet addiction among Taiwanese adolescents (DC-IA-A), which included Criteria A-C. The diagnosis of Internet addiction requires six or more of the nine characteristic symptoms in Criteria A (i.e., preoccupation, uncontrolled impulse, usage for more than intended, tolerance, withdrawal, impairment of control, excessive time and effort spent on Internet use, and impairment in decision-making ability), at least one of the three functional impairments described in Criteria B, and the exclusion criteria of Criteria C. They suggested that the cutoff point of at least six of the nine Criteria A items had the best diagnostic accuracy, the highest specificity, acceptable sensitivity, high negative predictive rate, and an acceptable positive predictive rate in a sample of 468 Taiwan junior and senior high-school students.

The DC-IA-A has become a widely used measure for assessing the presence of Internet addiction in Taiwan. However, there is considerable debate on several items of the DC-IA-A in clinical practice. For example, since October 7, 2011, the Taiwanese government has been providing citizens with free wireless Internet and basic information services at selected indoor government offices, tourist attractions, and public transportation stations. Because of the recent increase in Internet accessibility in Taiwan, the authors proposed that the "excessive effort spent on Internet use" in Criteria A of DC-IA-A would not be as valid as it had previously been. We also posited that there would be few Internet-addicted patients with recurrent legal problems, as there are only limited laws or regulations that have been established concerning Internet use, which negate the use of the recurrent legal problems criteria in the DC-IA-A. Because of these controversial issues, we tried to reexamine the effectiveness of the DC-IA-A.

Methods

This study addressed the adequacy of the DC-IA-A in the following way: determination of expert opinion with
respect to the content validity and reliability of each criterion. Psychiatrists were invited to rate the adequacy of each criterion in the DC-IA-A as the diagnostic criteria of Internet addiction. The content validity and homogeneity reliability coefficients proposed by Aiken\textsuperscript{18,19} were used to quantify expert evaluations of the suitability of the criteria. We expected the criteria described in the DC-IA-A to demonstrate reasonable content validity and homogeneity reliability (value \( \geq 0.70 \)).\textsuperscript{20}

**Participants and procedure**

We sent a letter to 30 psychiatrists outlining the goals of the research project and the importance of their replies concerning the Internet addiction criteria. The psychiatrists were selected based on the fact that they had developed expertise in the area of psychiatry by attending one or more national training seminars. Most of them are either board-certified addition specialists or child-adolescent specialists. We believe that our raters are the most relevant experts for this issue. A total of 24 psychiatrists replied, and 20 replies were valid. They did not receive any compensation for their participation in the research.

**Measures**

To evaluate the content domain representation, domain experts are required to rate the adequacy/relevance of test items to the content domain.\textsuperscript{21–23} Therefore, we asked experts to rate the adequacy of each criterion in DC-IA-A based on their view that the criterion was necessary for the definition of Internet addiction.

The DC-IA-A consists of three components, which are as follows: (1) nine characteristic symptoms of Internet addiction (hereinafter, Criteria A1–A9), (2) three functional impairments secondary to Internet use (Criteria B1–B3), and (3) exclusive criteria (Criteria C). The experts rated each criterion on a scale from 1 (fully disagree) to 6 (fully agree) and were asked to provide comments on each criterion.

**Data analysis**

Aiken’s content validity index (V) for each criterion is computed to show the difference between the expert rating and the lowest rating possible.\textsuperscript{18,19} When the V value is large (i.e., \( \geq 0.70 \)) and statistically significant, the experts agree that the behavioral description is adequate to be included in the diagnosis for Internet addiction.\textsuperscript{20} When the Aiken’s V is small (i.e., \( < 0.3 \)) and statistically significant, the experts regard the criterion as inadequate to be included. Moderate and statistically significant values (\( > 0.3 \) and \( < 0.7 \)) signify poor adequacy of the criteria to the prescribed goal. To understand whether the experts share the same opinions (i.e., the reliability of expert ratings), Aiken also proposed a statistic called the homogeneity reliability coefficient (H), which is used to quantify the experts’ degree of consistency for the item evaluations.\textsuperscript{18,19} Many researchers suggest using Cohen’s kappa coefficient, introduced by Jacob Cohen\textsuperscript{24} in 1960, as a statistical measure of inter-rater agreement for nominal-scale items. It is generally thought that kappa is a more robust measure than simple percent agreement calculation as shown in Aiken’s reliability coefficient, because kappa takes into account the agreement occurring by chance. However, we collected data with a Likert-style scale (1–6, fully disagree to fully agree) and not with a nominal scale; therefore, kappa coefficient cannot be used to evaluate the reliability.

**Results**

Table 1 provides mean scores, standard deviations, Aiken’s V and H coefficients, and expert comments concerning each diagnostic criterion on the DC-IA-C. All V values for characteristic symptoms, functional impairment, and exclusion criteria were significant and high (V values range from 0.72 to 0.96, \( p < 0.01 \)), meaning 20 psychiatrists agreed that three categories of criteria were relevant to the diagnosis of Internet addiction. The two items with the lowest V values were as follows: Impairment B3 and Symptom A8. For the homogeneity reliability, the H coefficient for each criterion was significant. The lowest H values were noted for B3, A8, the exclusion item, and A7. Experts’ comments about A3, A7, A8, B3, and C are presented in Table 1. Discussion concerning the weakness of each criterion and how it might be improved are presented in the “Discussion” section.

**Discussion**

Internet addiction disorder is considered to be a serious problem around the world, especially among adolescents and young adults.\textsuperscript{7,9,10} As computer technology and Internet use continue to develop, societies should focus on this issue. However, the diagnostic criteria for Internet addiction disorder remain controversial. The DSM-5 has no clear definition of Internet addiction disorder, and it states that more research is required in this area.

In our study, 20 psychiatrist specialists examined the DC-IA-A. Although all psychiatrists agreed that the three categories of criteria were relevant to the diagnosis of Internet addiction, relatively low values were noted for A3, A7, A8, and B3. In addition, low homogeneity reliability values were also found for A3, A7, A8, and B3. Symptom A3 in the DC-IA-A, which defines tolerance as a “marked increase in the duration of Internet use needed to achieve satisfaction,” merely focuses on the length of Internet use as the indication of tolerance. From our interviews, we found that addicts often sought increased strength of stimulation from games or other Internet information. In addition, in our study, high-risk students rarely spent more time on the Internet than other students at every time point. Furthermore, the diagnostic criteria for Internet addiction proposed by Tao and his team\textsuperscript{10} did not merely focus on the duration of Internet use. Taken together, the authors did not feel that it would be easy to observe the tolerance symptom in terms of “time duration” in dependent Internet users. The pursuit of increasing stimulation (not necessarily seeking a longer duration of use) could be considered an indication of tolerance in Internet addiction. In summary, we suggest that the definition of tolerance for
Internet addiction be rewritten, and more research is needed.

The presence of Criterion A7, which states "excessive time spent on Internet activities and leaving the Internet," was difficult to ascertain in our population of high-risk college students. In our study, eight experts addressed the vagueness of the phrase "leaving the Internet" because many academic tasks must be completed and social communications need to be connected on the Internet for college students. In both Young’s\textsuperscript{14} and Shapira et al’s\textsuperscript{15} criteria, there is no criterion that dictates "excessive time spent on leaving the Internet." In addition, there was no difference between Internet usage among our high-risk students and other students in our sample for most time points. As such, Criteria A7 may need to be modified or omitted. In Tao’s\textsuperscript{10} criteria, the author uses the phrasing "persistent desire and/or unsuccessful attempts to control, cut back or discontinue Internet use,” which might be more comprehensive and takes into account the desire and craving aspects of Internet addiction.

Symptom A8, that is, "excessive effort spent on activities necessary to obtain access to the Internet," does not seem to reflect the way in which the real world functions, at least in most advanced countries and college campuses. Internet access is completely different from access to an illegal substance. Many cities around the world have established increasing areas of public wireless Internet access, and an increasing number of people use mobile

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>M (SD)</th>
<th>(V_j)</th>
<th>(H_j)</th>
<th>Comments</th>
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<tbody>
<tr>
<td>A</td>
<td><strong>Characteristic symptoms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptom 1</td>
<td>Preoccupation with Internet activities</td>
<td>5.40 (0.681)</td>
<td>0.88**</td>
<td>0.73**</td>
<td></td>
</tr>
<tr>
<td>Symptom 2</td>
<td>Recurrent failure to resist the impulse to use the Internet</td>
<td>5.80 (0.410)</td>
<td>0.96**</td>
<td>0.85**</td>
<td></td>
</tr>
<tr>
<td>Symptom 3</td>
<td><strong>Tolerance</strong>: A marked increase in the duration of Internet use needed to achieve satisfaction</td>
<td>4.95 (0.826)</td>
<td>0.79**</td>
<td>0.63**</td>
<td>Not easily observed</td>
</tr>
<tr>
<td>Symptom 4-1</td>
<td>Symptoms of dysphoric mood, anxiety, irritability, and boredom after several days without Internet activity</td>
<td>5.35 (0.671)</td>
<td>0.87**</td>
<td>0.72**</td>
<td></td>
</tr>
<tr>
<td>Symptom 4-2</td>
<td>Use of Internet to relieve or avoid withdrawal symptoms</td>
<td>5.30 (0.733)</td>
<td>0.86**</td>
<td>0.69**</td>
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<tr>
<td>Symptom 5</td>
<td>Use of Internet for a period of time longer than intended</td>
<td>5.50 (0.761)</td>
<td>0.90**</td>
<td>0.71**</td>
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<tr>
<td>Symptom 6</td>
<td>Persistent desire and/or unsuccessful attempts to cut down or reduce Internet use</td>
<td>5.15 (0.745)</td>
<td>0.83**</td>
<td>0.62**</td>
<td></td>
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<tr>
<td>Symptom 7</td>
<td>Excessive time spent on Internet activities and leaving the Internet</td>
<td>4.95 (0.999)</td>
<td>0.79**</td>
<td>0.56**</td>
<td>Wording vagueness: (leaving the Internet)</td>
</tr>
<tr>
<td>Symptom 8</td>
<td>Excessive effort spent on activities necessary to obtain access to the Internet</td>
<td>4.70 (1.129)</td>
<td>0.74**</td>
<td>0.51**</td>
<td>Invalid item: in Taiwan, Internet access is not effortful at all</td>
</tr>
<tr>
<td>Symptom 9</td>
<td>Continued heavy Internet use despite knowledge of having a persistent or recurrent physical or psychological problem likely to have been caused or exacerbated by Internet use</td>
<td>5.70 (0.470)</td>
<td>0.94**</td>
<td>0.82**</td>
<td></td>
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</tbody>
</table>

| B        | **Functional impairments**                                           |                      |         |         |                                               |
| Impairment 1 | Recurrent Internet use resulting in a failure to fulfill major role obligations at school and home | 5.85 (0.366)         | 0.97**  | 0.85**  |                                               |
| Impairment 2 | Impairment of social relationships Behavior violating school rules or laws due to Internet use | 5.20 (0.894)         | 0.84**  | 0.61**  | Invalid item: few schools have clearly stated rules associated with Internet use |
| Impairment 3 | Exclusion The Internet addictive behavior is not better accounted for by psychotic disorder or bipolar I disorder | 5.15 (1.089)         | 0.83**  | 0.55**  | Studies are needed to examine the comorbidity of Internet addiction and psychotic disorder |

*\(p < 0.05\).  
**\(p < 0.01\).  
***\(p < 0.001\).
phone networks. Unlike policies toward substance use, the government would likely not prohibit the use of the Internet. Therefore, some criteria for substance addiction might not be transferable to Internet addiction. People, especially college students, with Internet addiction might not need to expend excessive effort to access the Internet. The Young’s14 DQ for Internet addiction, Shapiro’s15 criteria, and Tao’s10 diagnostic criteria do not include this item. Therefore, we suggest that the Criterion A8 should be omitted.

Symptom B3, that is, “behavior violating school rules or laws due to Internet use,” is rarely observed in clinical practice and our study. There is no criterion for “behavior violating school rules or laws due to Internet use” in the Young14 DQ, Shapiro’s15 criteria, and Tao’s10 diagnostic criteria. Few schools/universities have clearly stated rules associated with Internet use. Schools punish behaviors that violate school rules (e.g., class absence or plagiarism); however, it is often difficult to explicitly trace the association between such behaviors and Internet use. The diagnostic criteria for substance use disorder in the DSM-5 do not consist of items related to the violation of school rules or the law.

Ko et al25 suggested that the cutoff point to make the diagnosis of Internet addiction was six or more of the nine symptoms in Criterion A of the DC-IA-A. However, we suggest that two of the nine A criteria, A7 and A8, be omitted based on the data collected from this study. These criteria need to be further modified based on the results of well-designed studies.

The criterion of Internet addiction diagnosis is still an issue of controversy. However, more related research in this field would be helpful to clarify this challenge. Our findings support the necessity of modifying the DC-IA-A, especially with respect to Criteria A. Additional well-designed studies that examine the diagnostic criteria and the relationship between factors are needed.

Acknowledgments

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