Assessing The Psychometric Properties of the Internet Addiction Test (IAT) Among Indian School Students

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DOI: 10.55489/njcm.140820233024

ABSTRACT

Background: Internet addiction is found to be a growing global problem and India is not exceptional. Adolescents are more over addicted to internet and suffering with mental confusions and deviation in behaviour. Several instruments have been developed for assessment of Internet addiction. Internet Addiction Test (IAT) is the most widely used tool to assess internet addiction, but psychometric properties of the IAT have not yet been examined in the Indian adolescence. The aim was to examine the validity and reliability of the 20-item Internet Addiction Test in Indian School Students.

Methodology: Seven hundred fifty-two students from a CBSE school of Raipur, India was randomly selected in our study. The reliability and validity of IAT was examined. Confirmatory factor analysis was used to examine the structural validity of IAT.

Results: It was found that the factor loading of the IAT varied between 0.40 and 0.82. Cronbach’s alpha coefficient for the scale was found to be 0.905. The total correlations were calculated and had a value range from 0.406 to 0.659 for the 20 items. The psychometric properties indicate that the factor loading reveal that the test revolve around six factors (Salience, Excessive Use, Neglected Work, Anticipation, Lack of Control, and Neglected Social Life). The Cronbach’s alpha is high for all the 6 components. IAT is a proper tool for evaluating internet addiction in Indian school students.

Conclusions: The findings obtained in this study indicate that overall, IAT has adequate psychometric properties for the assessment of internet addiction in Indian school students.

Keywords: Reliability, Validity, Internet Addiction Test

ARTICLE INFO

Financial Support: None declared
Conflict of Interest: None declared
Received: 28-05-2023, Accepted: 01-07-2023, Published: 01-08-2023
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www.njcmindia.com | pISSN09763325 | eISSN22296816 | Published by Medsci Publications
INTRODUCTION

Internet has an important part in our daily life. The use of the internet has a rapid growth not only in India but also worldwide in the last 10 years. Internet and Mobile association of India reported there were 42 million active internet users in urban India in 2008, compared to 5 million in 2000 as cited by Goel et al.\(^3\) In the present scenario, Internet is used for education, entertainment, social networking, information sharing and to facilitate research. On the other hand, internet can be used for pornography, excessive gaming, chatting for long hours, and gambling. In 1995 Dr. Ivan proposed the term “internet addiction” for pathological compulsive internet use.\(^4\) Excessive use of internet is associated with various negative symptoms.\(^5\) The Symptoms of internet addiction that are usually detected in clinical environments include obsession, withdrawal, and lack of control and performance deficiency.\(^6\) The significant existence of internet in our communities has created unease over the potential presence of an internet addiction condition. Therefore, assessment of internet addiction and early intervention for reducing internet addiction are needed in Indian population. For the purpose, firstly, developing a tool for examining internet addiction in clinical and research backgrounds is a much-needed step. There are various internet addiction scales published previously. A large number of tools to measure internet addiction have been developed abroad. But few scales are developed scientifically to assess internet addiction in India. In the present scenario, 5 scales which are being used most frequently in studies for diagnosing Internet addiction or problematic Internet use.\(^7\) The most commonly used are the Internet Addiction Test (IAT) of the Young, Chen’s Internet Addiction Scale (CIAS) and the Internet Addiction Scale (IAS). The Internet Addiction Test (IAT) was created by Young to evaluate the existence and intensity of internet addiction in an American population sample. Satisfactory psychometric characteristics of the internet addiction test have been reported in the different countries.\(^8\) Systemic review and Meta-analysis of psychometric properties of Internet Addiction Test (IAT) was done on 25 studies including 18,421 subjects.\(^9\) Based on meta-analysis for internal consistency, the pooled Cronbach’s alpha coefficient was 0.90 (95 percent confidence interval [CI], 0.89–0.91). According to test–retest analysis, the pooled Spearman’s correlation coefficient was high at 0.83 (95 percent CI, 0.81–0.85), along with low publication bias. Convergent validity showed correlation coefficients of 0.62–0.84, as compared with major tools. Another Meta-analysis of the Reliability of Young’s Internet Addiction test reported the overall Cronbach’s alpha computed from the studies was 0.889 (95% CI 0.884–0.895).\(^10\)

Studies have shown that cultures are associated with a variation in presentation of internet addiction. The reasons highlighted include: the limited validity in diagnostic criteria or lack of measurement equivalence: the exclusion of different cultural presentations of internet addiction symptoms in existing diagnostic criteria. It has been suggested that the instruments and scales used in the developing country may need to be modified appropriately in order to efficiently pick up the regional variations in the manifestation of a psychiatric disorder, e.g., somatic symptoms.\(^11\) The application of internet addiction test with satisfactory psychometric properties can be effective in the recognition of internet addiction. Therefore, this is the first study undertaken among CBSE Indian students to examine the psychometric properties of an instrument that specifically assesses the internet addiction.

The objectives of our study were (1) to examine the structure validity, and reliability of the 20-item internet addiction test in Indian School Students. (2) To study the internet addiction of secondary school students.

METHODOLOGY

Participants: A sample of students enrolled in a private and government English schools in Raipur. School students were chosen as they are considered very frequent users of internet. The sample size calculation was based on the guidelines for estimating sample size for intra class correlation coefficient (ICC), for two observations, with a pre specified alpha value of 0.05, power of 0.95, and ICC value of 0.25 was 202. Participants were selected based on a priori power analysis by G*Power computer program.\(^12\) A total of 755 students of the CBSE School of Chhattisgarh were selected for the study through stratified random sampling. In the first stage, a list of schools was made from all the four blocks of Raipur district. In the second stage, from the list of all the schools within Raipur district 10 higher secondary CBSE schools (7 Private and 3 Government Schools) were selected. In the third stage, students were selected from different schools belonging to arts, commerce and science subject streams and data was collected. The details of the schools and number of students are reported in table-1. All 755 participants were assessed on Internet addiction test along with basic demographic information.

The students who fulfilled the following criteria were included in the study:

**Inclusion criteria**: Able to communicate, read, write and comprehend in Hindi and English, willing to participate.

**Exclusion criteria**: Not present at the time of the study, not willing to participate in the study, those with any chronic medical or psychiatric disorder were excluded.

**Ethics approval**: The research method of the present study was approved by Institutional Ethics Committee of Pt. Ravishankar Shukla University,
Results

The mean age of the participants was 15.81 (.73) years. The number of participants under the age of 15-19 was 87.4%. Of the participants, 215 and 540 belong to rural and urban area, respectively. The detailed characteristics of the participants are reported in Table 1.

CFA was performed by using Maximum Likelihood Estimation Method to determine whether factorial structure of the IAT reported by researcher can be confirmed in a sample consisting of school students of Chhattisgarh. Values over 0.95 for Comparative Fit Index (CFI), Incremental Fit Index (IFI), Relative Fit Index (RFI), Non-Normed Fit Index (NNFI) indicate goodness-of-fit and values between 0.90 and 0.94 indicate acceptable fit.19 Standardised Root Mean Square Residual (SRMR) less than 0.05 indicate goodness-of-fit and values between 0.06 and 0.08 indicate acceptable fit.20-23 Several types of research have suggested that all the indexes are supposed to be above 0.90 to be a good fit24-30 as also cited in Kumar & Shrivastava.31 Values for Root Mean Square Error of Approximation (RMSEA) should be accepted in the range of 0.05 to 1.00 the lower value is said to be a good level. Model fit was excellent in the samples (see table 3).

Table 2 shows the regression weights for CFA model. All values depicted in table for all the participants – subscales show the largest values (>0.40). As mentioned above, all factor loadings of Salience, Excessive Use, Neglect Work, Anticipation, Lack of Control, and Neglected Social Life statistically were significant (p <0.001) and large. With regard to the first factor (Salience), all standardized loadings were in the range from 0.45 to 0.74. Regarding the second factor (Excessive Use), again standardized loadings were large, with a minimum of 0.40 and a maximum of 0.66. Regarding the third factor (Neglected Work), again standardized loadings were large, with a minimum of 0.51 and a maximum of 0.82. Regarding the fourth factor (Anticipation), again standardized loadings were large, with a minimum of 0.51 and a maximum of 0.82. Regarding the fifth factor (Lack of Control), again standardized loadings were large. Regarding the sixth factor (Neglect Social Life), again standardized loadings were large. Standardized factor loads, z-value, regarding items of CFA are presented in Table-2.

Table 1: Sociodemographic characteristics of the total sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Participants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>493 (65.3)</td>
</tr>
<tr>
<td>Female</td>
<td>262 (34.7)</td>
</tr>
<tr>
<td>Total</td>
<td>755 (100)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>540 (71.5)</td>
</tr>
<tr>
<td>15</td>
<td>215 (28.5)</td>
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<tr>
<td>16</td>
<td>540 (71.5)</td>
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<tr>
<td>17</td>
<td>220 (29.1)</td>
</tr>
<tr>
<td>18</td>
<td>425 (56.3)</td>
</tr>
<tr>
<td>19</td>
<td>5 (0.7)</td>
</tr>
<tr>
<td>Total</td>
<td>755 (100)</td>
</tr>
<tr>
<td>Locality</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>215 (28.5)</td>
</tr>
<tr>
<td>Urban</td>
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<td></td>
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<td>Unmarried</td>
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</tr>
</tbody>
</table>

Confirmatory Factor Analysis (CFA)

Study Tools

Internet addiction test (IAT)15: We used the English version of the internet addiction test (IAT) for this study. It includes 20 items that are rated on a likert scale range of 0 to 5 (0 = Never; 1 = Seldom; 2 = Occasionally; 3 = Frequently; 4 = very often, 5 = always). The internal consistency coefficient (Cronbach alpha) on this sample is 0.91. Participants can be classified into several categories and the result of 0 to 19 indicates the absence of addiction, from 20 to 39 indicates a low level of addiction and average online user, from 40 to 69 represents a moderate level of addiction, while the result of 70 to 100 assumes severe level of internet addiction.

Statistical Analysis: The scale was administered during class hours and volunteer students were required to attend the study after necessary information was given. Summary statistics mean and standard deviation, frequencies, and percentages were used for reporting demographic. We conducted confirmatory factor analysis (CFA) using the R Core Team16-18 with maximum likelihood method to examine the factor structure in sample. The satisfactory indices of fitness of the CFA model were evaluated with the help of the Goodness of Fit Index (GFI), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR). Reliability was analyzed by calculating internal consistency (Cronbach alpha). One-way ANOVAs were performed to analyse whether there were statistically significant differences in the scores on the IAT based on demographic.

Analysis was performed by using Maximum Likelihood Estimation Method to determine whether factorial structure of the IAT reported by researcher can be confirmed in a sample consisting of school students of Chhattisgarh. Values over 0.95 for Comparative Fit Index (CFI), Incremental Fit Index (IFI), Relative Fit Index (RFI), Normed Fit Index (NFI), Non-Normed Fit Index (NNFI) indicate goodness-of-fit and values between 0.90 and 0.94 indicate acceptable fit.19 Standardised Root Mean Square Residual (SRMR) less than 0.05 indicate goodness-of-fit and values between 0.06 and 0.08 indicate acceptable fit.20-23 Several types of research have suggested that all the indexes are supposed to be above 0.90 to be a good fit24-30 as also cited in Kumar & Shrivastava.31 Values for Root Mean Square Error of Approximation (RMSEA) should be accepted in the range of 0.05 to 1.00 the lower value is said to be a good level. Model fit was excellent in the samples (see table 3).

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<td>Marital Status</td>
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<tr>
<td>Unmarried</td>
<td>755 (100)</td>
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</tbody>
</table>

Confirmatory Factor Analysis (CFA)
Table 2: Factor Loadings of Confirmatory Factor Analysis (CFA)

<table>
<thead>
<tr>
<th>Factor &amp; Item Number</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
<th>Z Value</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Salience</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q19</td>
<td>0.748</td>
<td>0.0337</td>
<td>0.682</td>
<td>0.814</td>
<td>22.2</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Q13</td>
<td>0.653</td>
<td>0.0585</td>
<td>0.721</td>
<td>18.8</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Q12</td>
<td>0.854</td>
<td>0.0774</td>
<td>0.935</td>
<td>20.8</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>Q15</td>
<td>0.634</td>
<td>0.0557</td>
<td>0.711</td>
<td>16.1</td>
<td>&lt;.001</td>
<td></td>
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<tr>
<td>Q10</td>
<td>0.419</td>
<td>0.0531</td>
<td>0.390</td>
<td>0.789</td>
<td>19.6</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Excessive Use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>0.468</td>
<td>0.381</td>
<td>10.5</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q14</td>
<td>0.476</td>
<td>0.408</td>
<td>13.7</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q20</td>
<td>0.854</td>
<td>0.633</td>
<td>16.5</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1</td>
<td>0.394</td>
<td>0.390</td>
<td>11.9</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q18</td>
<td>0.365</td>
<td>0.646</td>
<td>19.6</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neglect Work</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q6</td>
<td>0.352</td>
<td>0.814</td>
<td>25.1</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q8</td>
<td>0.366</td>
<td>0.779</td>
<td>23.3</td>
<td>&lt;.001</td>
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<tr>
<td>Q9</td>
<td>0.397</td>
<td>0.471</td>
<td>13.8</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Anticipation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Q11</td>
<td>0.040</td>
<td>0.489</td>
<td>14.1</td>
<td>&lt;.001</td>
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<tr>
<td>Q7</td>
<td>0.040</td>
<td>0.775</td>
<td>21.2</td>
<td>&lt;.001</td>
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<td></td>
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<tr>
<td><strong>Self-Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q17</td>
<td>0.0415</td>
<td>0.501</td>
<td>14.0</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q5</td>
<td>0.0350</td>
<td>0.675</td>
<td>21.3</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q16</td>
<td>0.0406</td>
<td>0.710</td>
<td>19.5</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neglect Social Life</strong></td>
<td>0.0470</td>
<td>0.409</td>
<td>10.7</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>0.0528</td>
<td>0.425</td>
<td>10.0</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Sin=Salience, ExU=Excessive Use, NgW=Neglected Work, Ant=Anticipation, LoC=Lack of Control, NSL=Neglected Social Life]
has high level of reliability values. Examination of the Cronbach α values if an item is deleted showed that the removal of any of the items on the test will significantly not improve the overall Cronbach α values (table-4).

### DISCUSSION

This study aimed to evaluate the psychometric properties of internet addiction developed among young Indian adolescents. For this purpose, validity of internet addiction was tested by descriptive and confirmatory factor analysis methods; reliability was tested by internal consistencies, and split half reliability methods. Confirmatory factor analysis was performed to determine confirmation of six factorial structures in a sample consisting of Indian school students. It was concluded that six factorial structures were preserved by CFA. Widyanto and McMurran carried out an exploratory factor analysis (EFA) on six factors with IAT.

Another research enrolled university students in the United Kingdom (U.K.) carried out by Widyanto, Griffiths, and Brunsden revealed a 3-factor solution. In current research, a two-factor solution of the IAT was revealed among U.S. university students. The IAT was also employed for evaluation of psychometric properties in different populations including French, Italian, Finnish, Korean, Malay, and Chinese.

In the Italian study, six-factor solution was found. A one-factor solution in the French and Finnish versions and five factors in the Malay version were reported. These variations in results on the psychometric properties of the IAT could be due to differences in culture, and statistical techniques being employed. Our findings indicate that internet addiction test has similar psychometric properties with its original version. The results of this study support the factorial validity of the internet addiction as a six-dimensional measure among Indian school students. The present study also replicates these findings and provides cross-cultural validation of the staging model proposed by the author. These findings provide evidence for the construct validity. The scale demonstrated high internal consistency (Cronbach’s alpha = 0.905), for the internet addiction test. A Cronbach’s alpha value of 0.905 for a scale is considered as a good indicator of internal consistency of the scale. Hence, it can be presumed that the internet addiction test has good internal consistency and the items of each factor assess similar characteristics. When the Cronbach’s alpha values were compared with recent research, for the internet addiction test in the study were similar. Our study has some limitations. First of all, it was performed in a sample consisting of only school students. Some item of the scale was low factor load and total item correlation. There was an agreement that this item could not be fully understood by participants. In this study, our targeted population was school students. Therefore, generalizing findings to other teenage or adult populations might not be recommended.

### CONCLUSION

The findings of this study indicate that overall, IAT has adequate psychometric properties for the assessment of internet addiction in an Indian population. Further work is required to examine psychometric properties of the internet addiction test in samples who are other than school students. In this study, reliability of the scale was examined by inner consistency. Determining reliability of the scale can be suggested by test-retest method in future studies.
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