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Internet Addiction: Do Two Diagnostic Criteria Measure the Same Thing?

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Abstract

Aim and Objective: To assess the agreement or concordance between two diagnostic criteria for Internet addiction (IA) and to study the relationship between IA as per these criteria and socio-demographic and Internet use profile. **Methodology:** A cross-sectional design was followed. Six hundred participants, aged 18–40 years, having a personal Internet connection and using Internet for at least 1 year were evaluated using a semi-structured interview, on the Young's Diagnostic Questionnaire, and IA diagnostic criteria developed by Tao *et al*., (2009). **Results:** Prevalence of IA varied from 1.2% to 21% depending on the assessment instrument. There is good level of concordance between Young's IA criteria and Tao *et al*. "2 + 1" criteria, but the level of concordance reduced with the use of course and dysfunction criteria of Tao *et al*. Among the different Internet variables, age at first use, age at which the person starts regular use and total duration of nonessential use were related to development of IA. **Conclusion:** Findings of the present study suggest that there is good level of concordance between Young's IA criteria and Tao *et al*. "2 + 1" criteria but the level of concordance reduces with the use of course and dysfunction criteria. This study also suggests that chances of IA increases with regular use of Internet and for a longer duration for nonessential uses.

Key Words: *Diagnostic criteria, Internet addiction, Nosology*

Introduction

Over the last 2 decades or so, Internet has greatly facilitated social interactions and communications, entertainment like gambling, academics and research, commercial activities, and many other areas which may have addictive potential.[1-3] Such a phenomenal spread of technology has significantly influenced the ways of life all over the world. Its immense utility in many areas has made it an indispensable part of the human being in a modern era. However, some people get captivated or engrossed by Internet and use it excessively.[4]

The excessive use of Internet has been described in the literature since 1970s; however, the first description of it appeared in the medical and psychological literature in early 1990s.[5,6] New York psychiatrist Ivan Goldberg in 1995 first proposed that excess use of Internet may be considered as Internet addiction (IA).[7] However, no formal diagnostic criteria were available till mid-1990s. Young[5] was the first person to describe "problematic Internet use" and study IA. Young,[8] modified the diagnostic criteria of pathological gambling of Diagnostic and Statistical Manual of Mental Disorders version IV (DSM-IV) to construct diagnostic criteria for "problematic Internet use." According to her, if a subject fulfilled 5 or more of 8 characteristic symptoms, then the person should be considered to have "problematic Internet use." After this, over the years, many researchers have given different diagnostic criteria for IA but still the universally acceptable criteria has yet to come.[9-12] Concerns continue to grow regarding problematic Internet use behaviors.[13] A recent review reported that excessive Internet use has been shown to be associated with depression, hostility, low self-esteem, and emotional instability.[14] Taking into account the harmful consequences of excessive Internet use, DSM-IV has listed Internet Gaming Disorder in its section-III, along with other conditions, for which more research is required before these might be considered for inclusion into the formal classification.[15]

Prevalence studies from various parts of the world suggest a wide variation in the prevalence of IA ranging from 0.3% to 38%.[10,12] The major reason for this wide variation is varying diagnostic criteria used in these studies to define IA, and this suggests that still there is no consensus with regard to how to define IA as a disorder. Emerging literature suggest that the

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different instruments mostly evaluate the negative outcomes and compulsive use as the key elements of IA.[14] As there is no consensus on the evaluation instrument, the challenge to researchers/clinicians is to develop a diagnostic criteria that are not only convincing but decisive, covering all ages, gender, and educational levels. Recently, Tao *et al*.,[16] have developed diagnostic criteria for IA and applied the same among the Chinese population and claimed high sensitivity and specificity of the instrument. It is possibly one of the few instruments for assessment of IA for which psychometric properties have been evaluated. Further, very few studies have compared the various diagnostic criteria in the same set of subjects to show the concordance rates and superiority of one over the other.[17]

Therefore, the present study aimed to investigate the agreement or concordance between Young's most accepted IA diagnostic criteria and latest diagnostic criteria developed by Tao *et al*.[16] Furthermore, an attempt was made to study the relationship of IA as per these criteria and socio-demographic and Internet use profile especially in Indian context.

Methodology

This was a cross-sectional study approved by the Institute Ethics Committee. Participants were selected by purposive sampling. To be included in the study, participants were required to be in the age group of 18–40 years and using the personal Internet connection for at least 1 year. An additional inclusion criterion was the requirement of use of Internet for nonessential purposes which were defined as "use other than that required for educational and professional purposes and beyond causal checking for mails. Use of Internet for gaming, watching pornography, excessive social networking, get rid of boredom, etc., was categorized as nonessential use." Participants with a history of psychotic disorders or bipolar I disorder (current or in the past) were excluded.

Participants were approached and explained the purpose of the study, those who consented were evaluated on selection criteria. Written informed consent was obtained from participants meeting the selection criteria. By using a semi-structured interview, participants were evaluated on the Young's Diagnostic Questionnaire,[8] and IA diagnostic criteria developed by Tao *et al*.[16] Data on Internet use pattern were collected using a checklist designed for the study.

Instruments

Young's Diagnostic Questionnaire

Young,[8] developed the first questionnaire for diagnosing IA. This 8-item screening instrument was based on the DSM-IV diagnostic criteria for pathological gambling. The eight questions incorporated the following aspects of addiction: Preoccupation with the Internet; tolerance (needing to spend increasing amounts of time on the Internet to achieve satisfaction); inability to cut back or stop Internet use; spending more time online than intended; adverse consequences in interpersonal, educational or vocational spheres of life; lying to conceal the true extent of Internet use; and use of the Internet as an attempt to escape from problems. According to this questionnaire, if a person replies affirmatively to 5 or more items, then he is considered to have IA. It considers only nonessential usage (nonbusiness, nonacademic) and requires ruling out of mania. However, the questions do not have an attached time reference (e.g., past month, past year).

Tao et al.'s questionnaire for Internet addiction

It is the latest diagnostic criteria given in this field.[16] It is synthesized on the concept of drug dependence as defined in ICD-10 and DSM-IV. Questionnaire is detailed and has explicit criteria and rating instructions. It is derived from Young's Diagnostic Questionnaire and those of Ko *et al*. criteria for IA.[11] Items 1–8 of initial symptom criterion list include most of the items used in other diagnostic criteria of IA such as Young's DQ and those of Ko *et al*.[11] However, item 5 of the Young's Diagnostic Questionnaire ("has stayed online longer than originally intended") and item 8 of Ko *et al*.'s diagnostic criteria ("excessive effort spent on activities necessary to obtain access to the Internet") were omitted by Tao *et al*.[16] Unlike Ko *et al*.,[11] in items 5 and 7 of their symptom criterion list, "use of Internet for a period of time longer than expected" and "excessive time spent on Internet activities and leaving the Internet" – the variable "time," are defined in terms of daily Internet use for at least 6 h, and meets the symptom criterion for at least 3 months. This questionnaire was evaluated for the psychometric properties and a cut-off score of "2 + 1," in which the client has to endorse the first 2 items (preoccupation, withdrawal symptoms) and one or more of the last 5 items resulted in the best diagnostic accuracy (99.26%), specificity (100.0%) and positive predictive value (100.0%).

Internet use profile sheet

A specific "Internet use profile sheet" was constructed for this study to record age at first use of Internet, age since using the Internet regularly, duration since the subject has a personal Internet connection, duration of essential use/day, duration of nonessential use/day, purpose (essential and nonessential) of Internet use, family history of substance dependence, personal history of regular use of nicotine, alcohol or other substance and personal history of any other psychiatric disorder etc.

Statistical analysis

Data were analyzed using SPSS version 14.0 for Windows SPSS for Windows, Version 14.0. Chicago, SPSS Inc. Mean and standard deviation was calculated for continuous variables. Frequencies and percentage were computed for discontinuous variables. Cohen's Kappa and Pearson's correlation coefficient were calculated to

study the concordance between the two diagnostic criteria. Comparisons were done using *t*-test or Chi-square test. Relationship between IA and other variables was studied using Pearson correlation coefficient and Spearman Rank correlation coefficient test.

Result

Totally, 1000 participants were approached and evaluated on inclusion and exclusion criteria. Of these, 360 participants were excluded as they were not fulfilling the eligibility criteria. Among 640 participants who were fulfilling the eligibility criteria, 40 participants refused to participate in the study. Hence, the final study sample was of 600 participants.

The details of the socio-demographic profile, Internet connection, and Internet use profile are shown in Table 1. The mean age of the study sample was 21.84 years (18–37 years), with only 20% (n = 59) aged more than 25 years and only 1% (n = 7) aged ≥30 years. Three-fourth of the study sample comprised of males and almost all (98%) were unmarried at the time of assessment. More than two-third (71.3%) of the participants belonged to nuclear families, and the majority (83%) of them were Hindu by religion. Majority of the participants were continuing their graduation course (61.7%), slightly more than one-fourth of them were pursuing postgraduation courses (28%) and another one-tenth were pursuing their postdoctoral courses. The mean number of years of education was 15.35 years (standard deviation [SD] - 2.22; range: 13–25). Three-fourth (76.7%) of the participants belonged to urban locality, and another one-fourth (23.3%) came from the rural background. With regard to the type of Internet connection more than one-third (36.8%) relied upon Wi-Fi connection and another 30% were using data card connections in addition to the Wi-Fi connection. A small proportion of the participants relied on only the broadband connection (13.3%) or the data card (19.2%) only.

The mean age for first use of Internet was 15.9 (SD - 3.09; range 8–30) years and the age since the person was using Internet regularly was 17.92 (SD - 3.12; range 8–30) years. On an average, the participants had a personal Internet connection for 30.18 (SD - 22.32; range 1–180) months prior to assessment for the study. Participants spent more than 1 h a day on essential use (checking of E-mail, academic related activities) of Internet and 2 h a day for nonessential use (pornography, gaming, gambling) of Internet. In addition, the participants spent on an average 1 ½ h on mixed use (included activities such as shopping, chatting, and social networking) activities on Internet. When the extra time during the weekend was taken into account, total duration of nonessential use was 14.28 h (SD - 16.17) per week.

Prevalence of Internet addiction

Among the eight criteria of Young's IA Diagnostic Questionnaire, the criterion which was most commonly met by the study participants was "need to use the Internet with increasing amounts of time in order to achieve satisfaction" and this was closely followed by "staying on-line longer than originally intended." Both these criteria were met by more than two-fifth of the study sample. The criterion which was met by least number of participants was "Have you jeopardized or risked the loss of a significant relationship, job, educational, or career opportunity because of the Internet." When the number of criteria endorsed by the participants was evaluated, about one-fifth (21.8%) did not meet any criterion. More than half (57.2%) endorsed 1–4 criteria of Young IA Questionnaire and only one-fifth (21%) met the criteria of IA as per Young IA Questionnaire.

When the participants were evaluated on Tao *et al*.'s IA criteria, of the 7 criteria, "the need for use of Internet

Table 1: Socio-demographic and Internet use profile of the study sample

Variable	Mean±SD/*n* (%)/ frequency (%)
Age in years	21.84±2.73
Gender-male	457 (76.2)
Marital status-single	588 (98.0)
Type of family-nuclear	428 (71.3)
Education	
Graduate	370 (61.7)
Postgraduate	168 (28.0)
M.Phil., Ph.D.	62 (10.3)
Locality - Urban	460 (76.7)
Education in years	15.34±2.22
Family income (Rs./month)	60239±69422
Amount of money spent on Internet connection (Rs./month)	425±463
Type of connection	
Wi-Fi	221 (36.8)
Broadband	80 (13.3)
Data card	115 (19.2)
Wi-Fi and data card	184 (30.7)
Age in years at first use of Internet	15.90±3.09
Age in years since using the Internet regularly	17.92±3.12
Duration in months since has a personal Internet connection	30.18±22.32
Total duration in hours of essential use/day	1.28±1.05
Total duration in hours of nonessential use/day	1.93±2.49
Duration of mixed use (h/day)	1.47±1.94
Mixed plus nonessential (h/day)	3.27±2.85
Average number of hours of nonessential use of Internet per week (including extra usage during weekends/holidays)	14.28±16.17
How many times one remain awake more than one's usual time to use Internet	
Often	147 (24.5)
Occasional	359 (59.8)
Never	94 (15.7)

SD: Standard deviation

with increasing amount of time in order to achieve satisfaction" and "preference for Internet use over other areas of interest/entertainment and hobbies which were previously interesting" were met by two-fifth of the participants [Table 2].

Relationship of Young's Internet addiction questionnaire and Tao et al. diagnostic criteria

As shown in Table 3, there was a significant relationship between the Young's IA Questionnaire and Tao's diagnostic criteria. Kappa value, Chi-square value, and Pearson correlation coefficient was significant for Young's IA criteria and those who fulfilled the first two criteria, 2 + 1 criteria, met the dysfunction criteria, met the course criteria of more than 6 h of daily use, course criteria of regular use of Internet for 3 months, course criteria of both regular Internet use for more than 3 months and 6 h of daily use, 2 + 1 along with the course criteria and all the criteria as given by Tao *et al*. (i.e., 2 + 1, course + dysfunction).

Factors associated with Internet addiction

Different correlates of IA as per Young's diagnostic criteria were evaluated in the whole study sample. As is evident from Table 4, compared to those without IA, those with IA belonged to families with higher income, had lower age at first Internet use, started using Internet regularly at an younger age, used Internet for longer duration for nonessential use, mixed use and overall spent more time per day on Internet use. As expected those with IA endorsed a higher number of Young's IA Questionnaire. There was no significant difference on any other socio-demographic variable, prevalence of comorbid substance use in self or family history of substance use and other Internet use variables.

As is evident from Table 4, those with IA as per Tao *et al*. criteria, used Internet for a longer duration for nonessential use, mixed use and overall spent more time per day on Internet use. Those with IA also more frequently reported a history of failure in a major examination; more frequently attributed failure to excessive Internet use and more often remained awake more than their usual time to use Internet. There was no significant difference on any other variables.

Table 2: IA profile

	Frequency (%)
Young's Diagnostic Questionnaire	
Do you feel preoccupied with the Internet	191 (31.8)
Do you feel the need to use the Internet with increasing amounts of time in order to achieve satisfaction?	275 (45.8)
Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?	149 (24.8)
Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?	193 (32.1)
Do you stay on-line longer than originally intended?	255 (42.5)
Have you jeopardized or risked the loss of a significant relationship, job, educational, or career opportunity because of the Internet?	103 (17.1)
Have you lied to family members, a therapist, or others to conceal the extent of involvement with the Internet?	121 (20.1)
Do you use the Internet as a way of escaping from problems or of relieving a dysphoric mood	228 (38)
Young diagnostic criteria positive ≥5	126 (21.0)
Tao *et al*. Diagnostic Questionnaire	
Do you feel preoccupied with the Internet	191 (31.8)
Do you feel restless, moody, anxious, depressed, and irritable and boredom after several days without Internet activity	193 (32.1)
Do you feel the need to use the Internet with increasing amounts of time in order to achieve satisfaction?	275 (45.8)
Have you repeatedly made unsuccessful efforts to control, cut back, or stopped Internet use?	149 (24.8)
Despite knowledge of having persistent or recurrent physical problems or psychological problem like depression caused due to Internet use in excess, do you still continue with heavy Internet use?	128 (21.3)
Have you preferred Internet use over other areas of interest/entertainment and hobbies which were previously interesting before Internet use?	241 (40.1)
Do you use the Internet as a way of escaping from problems or of relieving a dysphoric mood	228 (38)
First 2 criteria met	89 (14.8)
First 2+1 criteria met	86 (14.3)

IA: Internet addiction

Discussion

Although many studies have used different criteria to diagnose IA, very few studies have compared the various diagnostic criteria in the same set of subjects to show the concordance rates and superiority of one over the other. In one of studies done from this center, it was seen there was a wide variation in the prevalence rate of IA in the same sample (3.8–52%)[17] according to the definition used. Accordingly, there is a further need to evaluate the diagnostic criteria for IA.

The present study included participants aged 18–37 years with a mean of 21.84 years and three fourth of the study sample comprised of males. Three-fourth (76.7%) of the study participants belonged to urban locality. Participants were specifically selected with this profile, in view of the available literature which suggests that IA is more common in males,[4,17-33] those living in metropolitan areas,[32] and in younger people.[34,35]

The mean age in years for first use of Internet was 15.9 (SD - 3.09; range 8–30) and the age since the person was using Internet regularly was 17.92 (SD - 3.12; range 8–30) years. On an average, the participants had a personal Internet connection for 30.18 (SD - 22.32; range 1–180) months prior to assessment for the study. When we compare

Table 3: Relationship of Young's IA Questionnaire and Tao *et al.* diagnostic criteria

Tao *et al.* Diagnostic Questionnaire	Young's dependence criteria		Kappa value	χ^2	Pearson's correlation coefficient
	Yes	No			
Fulfills both the essential criteria	70	56	0.578***	209.36***	0.591***
Tao *et al*. diagnostic criteria (2+1)	70	16	0.591***	220.72***	0.607***
Met the dysfunction criteria[1]	26	10	0.251***	60.58***	0.318***
Tao, course criteria (>6 h/day)	51	75	0.320***	62.29***	0.322***
Met Tao *et al*. course criteria (>3 months of regular use)	118	390	0.054**	9.91**	0.129**
Met Tao *et al*., both course criteria (i.e., duration more than 3 months and at least 6 h of use/day)	50	48	0.322***	63.63***	0.326***
Met Tao *et al*. diagnostic criteria (2+1) + course criteria positive	30	5	0.310***	93.82***	0.395***
Met Tao 2+1, course+impairment	7	0	0.085***	22.04***#	0.211***

**P<0.01, ***P<0.001, #Chi-square value with Yates correction. IA: Internet addiction

Table 4: Comparison of demographic and Internet use profile of those with met IA criteria and those did not meet IA criteria

	Young diagnostic criteria		
	Yes (126) (mean±SD)	No (474) (mean±SD)	*t*
Family income (Rs./month)	56,800±63,773	73,200±86,549	−29,826*
Age in years at first use of Internet	15.44±2.65	16.02±3.18	1.861*
Age in years since using the Internet regularly	17.35±2.86	18.07±3.17	2.311*
Duration in hours of nonessential use/day	2.92±1.77	1.56±1.34	−9.43***
Duration in hours of mixed use/day	2.29±1.63	1.19±1.34	16,750***#
Duration in hours of nonessential + mixed use/day	5.23±3.23	2.75±2.51	−9.218***
Duration in hours of total use/day	6.50±3.41	4.03±2.99	−8.00***
Number of Young's criteria endorsed	5.70±0.90	1.67±1.39	−30.68***
	Tao *et al.* Diagnostic Questionnaire		
	Yes (86) (mean±SD)	No (514) (mean±SD)	*t*
Duration in hours of nonessential use/day	3.02±1.76	1.65±1.41	−8.034***
Duration in hours of mixed use/day	2.38±1.58	1.26±1.40	−6.741***
Duration in hours of nonessential + mixed use/day	5.42±3.15	2.92±2.64	−7.883***
Duration in hours of total use/day	6.77±3.28	4.18±3.09	−7.129***
Duration in hours of nonessential use/day	3.02±1.76	1.65±1.41	−8.034***
Duration in hours of mixed use/day	2.38±1.58	1.26±1.40	−6.741***

#Mann–Whitney U value, *P<0.05, **P<0.01, ***P<0.001. SD: Standard deviation, IA: Internet addiction

this Internet use profile, the age at first use, and regular use are higher compared to some of the studies from China.[36] The higher age at the first use compared to some of the studies from South East Asia may also be a reflection of differences in the evolution of Internet technology in different countries. Participants spent 2 h a day for nonessential use (pornography, gaming, gambling) of Internet. In addition, the participants spent on an average 1½ h on mixed use (included activities such as shopping, chatting, and social networking) activities on Internet, all of which could also be categorized as nonessential use. In total participants spent on an average 3½ h a day on nonessential use of Internet. This was much less than that reported by other studies which have evaluated IA from different parts of the world.[16]

Typology of excessive Internet use

Of eight questions of Young's Diagnostic Questionnaire, the criteria which were most commonly endorsed was "need to use the Internet with increasing amounts of time in order to achieve satisfaction" (45.8%), closely followed by "staying on-line longer than originally intended" (42.5%). About two-fifth of the participants (38%) also endorsed "they use Internet as a way of escaping from problems or of relieving a dysphoric mood." On Tao *et al*. criteria, participants endorsed the similar criteria with same frequency and another one criteria, that is, "Have you preferred Internet use over other areas of interest/entertainment and hobbies which were previously interesting before Internet use?" was endorsed by 40.1%. This profile is similar to many studies which have evaluated IA either in term of frequency of endorsement for different criteria or hierarchy of the criteria endorsed.[17,21]

Prevalence of Internet use as per Young's criteria and Tao et al.'s criteria

In the present study, 21% of participants met the criteria

of IA as per the Young's criteria and 14.3% of participants fulfilled "2 + 1" criteria of Tao *et al*.[16] However, when the course criterion was taken into account, only 5.8% of participants met the criteria for IA. Further when the criterion for dysfunction was added, the prevalence of IA reduced to 1.2%.

When one looks at the available literature, data suggest that the prevalence of IA varies from 0.3–38%.[10,12] Findings of the present study are within this range. This suggests that at least a proportion of people who use Internet get hooked to the same and suffer from dysfunction. Taking this into account it can be said that there is a need to evaluate excessive Internet use as a diagnostic category and the American Psychiatric Associations's decision to include Internet Gaming Addiction in the appendix of DSM-5[15] as a disorder for which further research is required to be in the nosological system is a step in the right direction.

However, the present study highlights the fact that the prevalence of IA varies according to the diagnostic criteria even in the same study population and echo the findings of Grover *et al*.[17] who reported the prevalence of IA to be 3.8% according to Young's criteria, which increased to as high as 52% when IA was evaluated by use of ICD-10 criteria. However, this study was based on self-rated questionnaires and not on clinical interview. Hence, it can be concluded that whenever an attempt is made to define IA, concurrent validity of the proposed criteria must be established more stringently possibly against a clinical interview by a qualified psychiatrist, who specialize in drug dependence.

Concordance between the two diagnostic criteria

Results of the present study showed a significant relationship between the Young's IA Questionnaire and Tao's diagnostic criteria. Kappa value, Chi-square value, and Pearson correlation coefficient was significant for Young's IA criteria and those who fulfilled the first 2 criteria, 2 + 1 criteria, met the dysfunction criteria, met the course criteria of more than 6 h of daily use, course criteria of regular use of Internet for 3 months, course criteria of both regular Internet use for more than 3 months and 6 h of daily use, 2 + 1 along with the course criteria and all the criteria as given by Tao *et al*.(i.e., 2 + 1, course + dysfunction). However, it was seen that Kappa value was highest for "2 + 1" symptom criteria and least for duration criteria for 3 months, closely followed by all the criteria (symptom, dysfunction, and course) evaluated together against the Young's criteria. These findings suggest that there is a need to refine the course criterion of Tao *et al*.

Correlates of Internet addiction

Earlier studies have reported that IA is more prevalent in males,[4,17-33] and those living in metropolitan areas[32] and in younger people.[34,35] However, in the present study, we did not find any relationship of IA with any socio-demographic variables except that participants who fulfilled Tao *et al*. "2 + 1" criteria had higher family income.

Among the different Internet variables age at first use, age at which the person starts regular use, total duration of nonessential use had an association with IA. Similar finding has been reported by studies from other parts of the world. These findings can have policy level implications, that is, for prevention of IA, it is important that regular use of IA should be delayed and the parents or those using Internet regularly should keep a track of total duration of nonessential Internet use.

Evaluation of Internet addiction as per Tao et al. criteria

Only 14.3% of participants met the "2 + 1" criteria of Tao *et al*. and as the IA criteria were made more stringent, the prevalence of IA came down to 1.2%. When one compares the findings of the present study with Tao *et al*., certain important limitations of these criteria emerge. First, Tao *et al*., suggested a cut-off of 6 h/day for considering IA. This was based on the finding of mean duration of nonessential use for more than 9 h/day in their study sample. It appears that the criterion of "more than 6 h" is arbitrary, and some persons may fulfill all other criteria including the presence of dysfunction, except for the 6 h duration. This could be just because of the person's lifestyle and other commitments in life, but they may still be distressed by the time they are spending on Internet.

In the present study, the mean duration of nonessential use per day was only 2 h/day, and only a minority (n = 102; 20.1%) of sample fulfilled the 6 h duration criteria. When we evaluated the participants who fulfilled the 6 h criteria and looks for the prevalence of IA as per Young's criteria, presence of "2 + 1" criteria of Tao *et al*., 3 months duration criterion and dysfunction criterion, as shown in Table 5, at least 14 participants met all other criteria, which actually means increase in prevalence of IA to double as per Tao's *et al*. criteria (except for the inclusion of 6 h/day criteria). Further when the criterion of duration per day of nonessential use was reduced to 3–5 h, the prevalence of IA kept on increasing and the prevalence was 3.5% (n = 21) with 4 h/day as the cut-off, that is three times that of the IA prevalence as per the original criteria. Accordingly, it can be proposed that Tao *et al*. criteria with modifications in the course and dysfunction criteria [Table 6] will have better sensitivity and specificity. Future studies should evaluate the suggested modifications for the establishment of the validity of the same against the diagnosis made by a psychiatrist.

The present study is limited by purposive sampling and cross-sectional assessment. The present study also did not evaluate the impact of IA and various other factors which could be closely associated with IA.

Table 5: Relationship of duration of Internet use per day with other Internet dependence variables

***n*=102**	**6 h yes**	**6 h no**
Young criteria	51	51
2+1	37	65
3 or more months	98	4
Dysfunction	14	88
***n*=129**	**5 h yes**	**5 h no**
Young criteria	55	74
2+1	37	92
3 or more months	122	7
Dysfunction	15	114
***n*=195**	**4 h yes**	**4 h no**
Young criteria	69	74
2+1	37	74
3 or more months	175	7
Dysfunction	21	114
***n*=238**	**3 h yes**	**3 h no**
Young criteria	69	169
2+1	37	201
3 or more months	214	24
Dysfunction	18	220

Table 6: Modifications in Tao *et al.* criteria based on the findings in current study

Tao *et al.*	**Modified Tao *et al.***
"2+1" rule, in which the client had only to endorse the first 2 items (preoccupation, withdrawal symptoms) and 1 or more of the last 5 items	"2+1" rule, in which the client had only to endorse the first 2 items (preoccupation, withdrawal symptoms) and 1 or more of the last 5 items
Exclusion criterion: Excessive Internet use is not better accounted for by psychotic disorders or bipolar I disorder	Exclusion criterion: Excessive Internet use is not better accounted for by psychotic disorders or bipolar I disorder
Clinically significant impairment criterion: Functional impairments (reduced social, academic, working ability), including loss of a significant relationship, job, educational or career opportunities	Clinically significant impairment criterion : Functional impairments (reduced social, academic, working ability), including loss of a significant relationship, job, educational or career opportunities due to at least 4 h of Internet usage (nonbusiness/ nonacademic) per day
Course criterion: Duration of IA must have lasted for an excess of 3 months, with at least 6 h of Internet usage (nonbusiness/ nonacademic) per day	Course criterion: Duration of Internet addiction must have lasted for an excess of 3 months

IA: Internet addiction

To conclude, this study suggests that prevalence of IA varies from 1.2% to 21% depending on the assessment instrument. There is a good level of concordance between Young's IA criteria and Tao *et al*. "2 + 1" criteria but the level of concordance reduces with the use of course and dysfunction criteria. These findings suggest that there is need to refine the course criterion of Tao *et al*. by reducing the duration of daily nonessential use to 4 h, duration of regular nonessential use to an excess of 3 months and validation of the same against the diagnosis made by a psychiatrist. Taken together, these findings show the fragility in the construct of IA as understood at present and there is a need for a cautious approach in adopting and accepting IA into nosological system as understood now. This study also suggests that chances of IA increases with regular use of Internet and for a longer duration for nonessential uses. Hence, regular nonessential use of Internet for longer duration should be discouraged both at family and government level to prevent dependence on it.

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Conflicts of interest

There are no conflicts of interest.

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