Construction And Standardization Of Internet Addiction Scale

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Abstract

The main aim of this study is to describe the method of construction and standardization of a tool to measure internet addiction. The researchers reviewed as much as research studies on internet addiction and explored the various components of the internet addictions. Based on the review of literature, the first draft of the internet addiction scale was developed by the researchers consisting of 12 items, further it was given to ten experts in the field. Based on their inputs, some of the statements in the scale were revised and two items were discarded. The modified scale was further processed and a pilot study was conducted among 100 participants. After reviewing and analyzing the items, the number of items were the same because all the items in the scale met the requisite criteria of item analysis and item selection. The researchers of the study also established the reliability and validity, statistical norms for internet addiction scale.

Key words: Internet Addiction, Scale Development, Standardization, Validity, Reliability

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Introduction:

Internet addiction is a maladaptive behavior of internet use associated with health, psychological and social problems (Chou, Condron, & Belland, 2005). There is no well recognised definition and criterias for internet addiction (Morahan-Martin, 2005). Various terms like Internet abuse, compulsive Internet use, and pathological Internet use are used for internet addiction (Fu, Chan, Wong, & Yip, 2010). The World Health Organization has not recognised internet addiction is a disorder. These make more difficulties in diagnosis of internet addiction (Beard & Wolf, 2001). Internet addiction is exploding after covid pandemic period, mainly due to covid preventive measures like online activities, lockdown, isolation procedures. Internet gaming disorder is included in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and the International Classification of Diseases 11th Revision (ICD-11) .Internet addiction is an interdisciplinary phenomenon from different perspectives from various disciplines, such as medicine, computer science, sociology, law, and psychology (Smita G, Azhar F. 2010). This phenomenon is a biological, psychological, social, economic, and cultural problem, which is impossible to be considered as a simple matter because different factors influence it (Guillot CR, Bello MS, Tsai JY, Huh J, Leventhal AM, Sussman S, 2016).

Young (1996a) conducted an empirical study in Internet addiction based on the DSM-IV-TR (American Psychiatric Association, 2000) criteria for pathological gambling and addictive behaviors. The addictive behaviors included are (1) preoccupation with the Internet; (2) need to spend increasing amounts of time online; (3) repeated but unsuccessful attempts to reduce Internet use; (4) suffering withdrawal symptoms from reduction of Internet use; (5) time management problems; (6) environmental distress from school, family, work, and friends; (7) deception of Internet time; and (8) mood modification through Internet use (Young, 1996a). Young developed internet addiction test IAT and classified internet users as an "average online user" (having complete control over one's use), "frequent online user" (having occasional or frequent problems), or "Internet addict" (having significant problems in one's life because of Internet usage). IAT removed some confusing terms like preoccupation, dysphoric mood. Various factor structures were also analyzed in internet addiction test, six-factor structure (compromised social quality of life, compromised individual quality of life, compensatory usage of the Internet, compromised academic/working careers, compromised time control, and excitatory use) was found with the Italian version (Ferraro et al., 2007), a one-factor structure was found in the French and Finnish versions (Khazaal et al., 2008; Korkeila et al., 2010), five factors including lack of control, neglect of duty, problematic use, social relationship disruption, and email primacy was found in malay version (Ng et al., 2013).

But there are still no standard instruments for assessing Internet addiction or problematic Internet use (Shaw & Black, 2008). Some other scales were developed with DSM 5, like the ten-item Internet Gaming Disorder Test and the Internet Gaming Disorder-20 Test. Discrepancies in internet gaming disorder prevalence are due to conceptual inconsistencies in diagnostic criteria of IGD and insufficient psychometric evaluation of the assessment tool in the corresponding population. Due to differences in language, culture, socio demographic factors, indigenous internet addiction scale is needed to assess and evaluate internet addiction among various populations which in turn help to diagnose, treat, and prevent internet addiction.

Concerning internet addiction, addressing the problems of individuals' mental health is of great importance. The researchers have decided to develop a tool to measure internet addiction. In the first step in the scale development is commonly referred to as "item generation" the researcher provides theoretical support for the initial item pool (Hutz et al. 2015). Methods for the initial item generation can be classified as deductive, inductive, or a combination of the two. *Deductive* methods involve item generation based on an extensive literature review and pre-existing scales (Hinkin 1995). On the other hand, *inductive* methods base item development on qualitative information regarding a construct obtained from opinions gathered from the target population—e.g., focus groups, interviews, expert panels, and qualitative exploratory research methodologies (Kapuscinski and Masters 2010). The researchers are also concerned with a variety of parameters that regulate the setting of each item and of the scale as a whole. For example, suitable scale instructions, an appropriate number of items, adequate display format, appropriate item redaction (all items should be simple, clear, specific, ensure the variability of response, remain unbiased, etc.), among other parameters (DeVellis 2003).

In the second step of internet addiction scale, usually referred to as the "theoretical analysis," the researcher assesses the content validity of the new scale, ensuring that the initial item pool reflects the desired construct. A content validity assessment is required, since inferences are made based on the final scale items. The item content must be deemed valid to instill confidence in all consequent inferences. In order to ensure the content validity, the researcher seeks other opinions about the operationalized items. The opinions can be those of expert judges (experts in the development scales or experts in the target construct) or target population judges (potential users of the scale), enabling the researcher to ensure that the hypothesis elaborated in the research appropriately represents the construct of interest (Nunnally 1967).

In the last step, psychometric analysis, the researcher should assess whether the internet addiction scale has constructed validity and reliability. Construct validity is most directly related to the question of what the instrument is in fact measuring—what construct, trait, or concept underlies an individual's performance or score on a measure (Churchill 1979). This refers to the degree to which inferences can be legitimately made from the observed scores to the theoretical constructs about which these observations are supposed to contain information (Podsakoff et al. 2013). Construct validity can be assessed with the use of exploratory factor analysis (EFA), confirmatory factor analysis (CFA), or with convergent, discriminant, predictive/nomological, criterion, internal, and external validity. In turn, reliability is a measure of score consistency, usually measured by use of internal consistency, test-retest reliability, split-half, item-total correlation/ inter-item reliability, and inter-observer reliability

(DeVellis 2003). To ensure construct validity and reliability, the data should be collected in a large and appropriately representative sample of the target population. It is a common rule of thumb that there should be at least 10 participants for each item of the scale, making an ideal of 15:1 or 20:1 (Clark and Watson 1995; DeVellis 2003).

Methods

Stage 1: Construction

During the construction stage, a draft of the internet addition measure was composed based on multiple revision rounds with two researchers. Generally, items were revised by excluding difficult wording, omitting negatively worded questions where possible, and omitting metaphors. This procedure has previously produced measures that enhance responsiveness for internet addiction (Stancliffe, Wilson, Bigby, Balandin, & Craig, 2014).

Next, to confirm face validity, focus group discussions were held with experts in the field (*n* = 10) and individual interviews were held with individuals who use the internet excessively on a daily basis (*n* = 5). Experts were recruited based on their subject and research knowledge about internet addiction, and included mental health psychologists, a communication specialist, and behavioral experts. The experts and excessive internet users and relatives gave feedback on the measure, providing input for the final revision of the measure.

During the focus group session with the experts in the field, each item was presented by providing the general description by Ryff (1989) and providing all items on the scale. Each item was discussed, and experts provided suggestions on language, relevance and conceptual accuracy.

The measure was then revised and presented to individuals who use the internet excessively in a day and few relatives also included in the study. They read the questionnaire before the interview, and then a researcher discussed every item with the respondent. The respondents had relatively few suggestions for adaptations in language. The inputs of experts were recorded systematically. Field notes were used to record the individual interviews with the experts and respondents. Based on the meeting summary and field notes, two other researchers checked whether all feedback was correctly processed. The final draft of the measure was based on a consensus in the expert group on the appropriateness, suitability, and conceptual accuracy of the measure. In this way we aimed to draft an appropriate measure for the evaluation of internet addiction in its form as well as its content.

Try out Study

The researchers of the study have prepared 12 items for the internet addiction scale based on the theoretical inputs and review of literature from various research articles. To strengthen the quality of the research the researchers also decided to go for focused group discussions with ten members. The researchers introduced the concept of internet addiction based on the review of literature and asked the participants to give their ideas or inputs on internet addiction. The consolidated inputs from the expert participants were further processed and it has 10 items only because most of the expert members suggested removing two items (11 & 12) in the scale.

Stage 2: Pilot Study

A pilot study is one of the important stages in a research project and is conducted to identify potential problem areas and deficiencies in the research instruments and protocol prior to implementation during the full study. A pilot study is the first step of the entire research protocol and is often a smaller-sized study assisting in planning and modification of the main study. A pilot study provides necessary information not only for calculating the sample size, but also for assessment of all other aspects of the main study, minimizing unnecessary effort from the researchers and participants, as well as the dissipation of research resources. In order for the pilot study to play its role, factors introduced in the text must be clearly defined before proceeding with the pilot study, and demonstrate a high level of completion. Furthermore, a pilot study provides valuable information, not only for the researcher's main study, but also for other similar studies; therefore, it is crucial to include complete information on the feasibility of the study. The main aim of the pilot study is to test the items constructed for the internet addiction scale are reliable and valid. For this, 100 samples were selected randomly from Tamilnadu and due importance is given to gender, age group and geographical location.

Measures - Internet addiction scale

The newly developed instrument on internet addition was based on the three main criterias withdrawal (1, 6, 7), loss of control (2,3,4,5,8), and functioning impairment (9,10). Respondents reported on statements of their internet usage of the past one month with the general prompt: "to what frequency do you feel with the statement?". They reported on a 4-point scale ranging from 0 (*never*) to 3 (*Always*). After scoring 10 items, higher scores on the scale indicated higher levels of internet addiction.

Item Analysis

One of the main objectives of the present investigation is to find out the internet addiction of the respondents. For this, the researchers have explored the availability of the tool to measure internet addiction and found few of them but not meet the expectation of the researchers. So, the investigators have decided to construct and validate the tool in order to realize the objectives framed. The investigators initially constructed 12 items to measure the internet addiction. The items for assessment scale were collected from the following sources: (i) Experts in the field (ii) review of literature (iii) focused group discussion with selected respondents. After the construction the scale was processed based on the expert content validity, in this stage two items were removed based on the opinion of experts. So, during the pilot study, the internet addiction scale has 10 items. One of the important steps in the standardization of any research tool is an item analysis. The data was collected from 100 samples and the individual scores were arranged from highest to the lowest score on their total scores in all ten items in the internet addiction scale. The investigators took the top 25% of the respondents which constituted the high scores and the bottom 25% constituted the low scores and they were sorted for the purpose of item selection. For all the 10 items, the number of samples coming under each category was found out separately for both the high and low groups. Then a separate work sheet was prepared for each item for the calculation of critical ratio values. Thus, the critical ratio values for all the 10 items were calculated. The calculated values are given in the following Table. According to Edwards (1957), "the value of critical ratio is a measure of the extent to which a given item differentiates between the high and low groups". If the critical ratio value is equal to or greater than 1.75 indicates that the average response of the high and low groups for the particular item differs significantly. Therefore, the investigator selected 10 items, which meets more than the above requirements. In this the present study all the ten items that have more than the required values in both item discrimination index and item total correlation. The item discrimination index is a measure of how well an item is able to distinguish between respondents who are knowledgeable and those who are not. An item-total correlation test is performed to check if any item in the set of tests is inconsistent with the averaged behavior of the others, and thus can be discarded. The analysis is performed to purify the measure by eliminating 'garbage' items prior to determining the factors that represent the construct, that is, the meaning of the averaged measure.

Item Selection based on Discrimination Index and Item Total Correlation

Item No.	Discrimination Index ('t' Value)	Item total correlation	Selected / Not Selected
1.	3.39	0.63	Selected
2.	5.51	0.74	Selected
3.	5.32	0.64	Selected
4.	5.32	0.76	Selected
5.	4.15	0.66	Selected
6.	3.92	0.65	Selected
7.	4.76	0.64	Selected
8.	3.78	0.59	Selected
9.	4.64	0.69	Selected
10.	5.93	0.75	Selected

Results of pilot study

Both item discrimination index and item total correlation methods results that all item in the internet addiction scale meet the required value. So, the researcher has selected all items constructed to measure internet addiction.

Reliability refers to the consistency with which a test is measured. The concept of reliability suggests both the stability and the consistency of the measurement. The investigators calculated the reliability analysis and the results are in Correlation between forms is 0.965, Spearman-Brown coefficient 0.982 and Guttman Split-half 0.807, Common inter item correlation 0.677, and Common reliability scale value is 0.811.

Norms

The researchers have developed a statistical norm - percentile norm for the internet addiction scale. The percentile norms for the same are - a score upto 5 indicates no internet addiction, a score between 6 and 11 indicates mild internet addiction, a score between 12 and 19 indicates moderate internet addiction and a score above 19 indicates severe internet addiction.

Discussion

Internet addiction presents physical and mental health problems in the population. An instrument providing valid and reliable scores for screening Internet addiction is needed for early detection in practice. Also, the child, adolescent community mental health services and multidisciplinary professionals need an internet addiction scale to screen Internet addiction in the community and clinical settings.

Research on internet addiction has been carried out for many years and has yielded some excellent results. However, most of these studies focus on internet addiction level but not on development of measures on internet addiction. The studies are not completely applicable to internet addiction, some of them are specific to gaming and social media addictions. Therefore, it is necessary to develop and standardize the internet addiction scale.

This study showed that 10 items internet addiction scale (IAS) can screen internet addiction and measure addiction severity. For reliability, the overall internet addiction scale displayed high internal consistency ($\alpha = 0.807$). The three factors withdrawal, loss of control, functioning impairment presented an internal consistency coefficient between 0.70 and 0.90. Internet Addiction Scale also demonstrated a satisfactory overall screening efficacy in identifying internet addiction based on DSM-5 proposed diagnostic criteria.

The current study described the development of internet addiction scale. In this study, a scale for measuring internet addiction was developed by combining qualitative research with quantitative research. The measurement scale was developed in four steps: developing initial items, refining measurement values, data collection, and evaluating the reliability and effectiveness of the proposed measurement scale. A total of 12 items were identified based on literature review and in-depth interviews, and then developed into questionnaires for formal investigation and based on the expert validity 2 items discarded. Therefore, the pilot study internet addiction scale has 10 items. Factor analysis of these 10 items produced three dimensions of internet addictions: withdrawal, loss of control, and functioning impairment. The exploratory factor analysis results show that all item items meet the measurement requirements. The final items show a high level of internal consistency in three dimensions, and the reliability estimation range is 0.68 and 0.98. Therefore, the proposed internet addiction measurement scale is reliable and effective. This survey result is relatively consistent with the previous research results of young internet addiction scale.

In conclusion, Internet Addiction Scale has provided an empirical foundation of the psychometric properties of the assessment of Internet addiction. It has evidence of being a valid and reliable scale for identifying problematic Internet use. As this study is self reporting in nature, future studies are to be done with clinical interviews to identify a diagnostic cutoff point of Internet Addiction Scale to facilitate internet addiction diagnostic efficiency. Internet addiction scale (IAS) will be useful to screen internet addiction and grade severity in the community and clinical settings.

Conflicts of Interest

The authors declare no conflicts of interest.

Funding sources

Nil

Internet Addiction Scale (IAS)

Consent form

Greetings!

Dr. Mathivanan and Dr. M. Suresh Kumar researchers from Tamil Nadu, India. As a part of our research we are conducting research on the topic "Construction and Standardization of Internet Addiction Scale". We found that you are one of the expert members for peer reviewing and validating the scale. By participating in this study, you will have an opportunity to reflect, share and be aware of your own thoughts and feelings.

Purpose of the study:
To develop a scale to measure internet addition.

Risks:
The risk of this research study includes the consumption of time. It requires little time to complete. You can decline or terminate at any time while taking part in this research study.

Benefits:
By participating in this study as an expert member, you will not get any direct benefits but indirectly you are making the field of behavioral sciences research and helping to complete the research work. It will be an opportunity for you to reflect, share and be aware of your own satisfaction with life and the coping level you have.

Confidentiality:
The responses of this study will be treated as anonymous, and the researcher will make every attempt to keep the data exchanged in this study confidential. The data of the participants will be kept private.

Contact Information:
The researcher's contact information is provided below. If you have any concerns about the study or experience any adverse effects as a result of participating in this research study, you can contact the researcher any time.
Name: Dr.Mathivanan and Dr.M.Suresh Kumar
Email id: dr.mathivanan@gmail.com +91 73583 13232
Email id : msk.rgniyd@gmail.com Mobile: +91 9750406463

Voluntary participation:
Your participation in this study is voluntary. It is your choice to decide whether to participate in this study or not. You will be asked to sign in a consent form if you decide to take part in this study. Even after signing in, you are free to withdraw the study at any point of time, even without giving any reason. Withdrawing from this study, will not affect any relationship, if any, you have with the researcher. If you withdraw from the study before completing, your incomplete will be disqualified or destroyed.

Consent form:
I _______________ have read and understood the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and I am free to withdraw any time, without giving any reason. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature:_____________
Date: _____________
Email id:_____________
Researchers' Name and Signature.: Dr.Mathivanan & Dr.Suresh Kumar
Date:__________

Try out study
Internet Addiction Scale - Content Analysis

1. When the internet, social media/mobile phone/video games are not available, I feel empty, sad and frustrated.
2. While using internet, I lose count of the time I spend on it
3. Internet usage is increasing gradually over time.
4. I am not able to stop or restrict using my phone.
5. While I study or work, I spend more time on the phone unnecessarily
6. If someone criticizes me or stops me from using my phone, I develop anger and frustration towards them.
7. Immediately after waking up, I pick up my phone first to surf the internet, social media or play video games.
8. My bedtime is delayed due to phone usage.
9. Using phones affects my education / work.
10. I prefer to spend time on mobile phone rather than with my family members
11. Always i am thinking about mobile phone

12. I find relief from worries when I use my mobile phone.

Validity Assessment
Name of the Expert:
Designation:
Contact Number:
Email Address:

S. No.	Item	Good item/ May be retained (S)	Good but Need improvement (I)	Not Relevant/ May be excluded (X)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Signature of the Expert
Rubber stamp

Date:
Note – This information was collected from the experts with their consent and consolidated for modification and removal or item

Expert Validity Assessment

Experts	1	2	3	4	5	6	7	8	9	10	Remark
Item 1	s	s	x	s	s	s	s	x	s	s	Retained
Item 2	s	s	s	s	s	s	s	s	s	s	Retained
Item 3	s	s	s	s	s	s	x	s	I	s	Retained
Item 4	s	s	s	s	x	s	s	s	s	s	Retained
Item 5	s	s	s	s	s	x	s	s	s	s	Retained
Item 6	s	s	s	s	x	s	s	s	s	s	Retained
Item 7	s	s	x	s	s	s	s	s	s	s	Retained
Item 8	s	s	s	s	s	s	s	s	s	s	Retained
Item 9	s	s	s	x	s	s	s	s	s	s	Retained
Item 10	s	s	s	x	s	s	s	x	s	s	Retained
Item 11	x	s	X	x	s	x	s	x	s	x	Removed
Item 12	s	x	S	s	x	x	s	x	x	s	Removed

Note – If more than sixty percent of experts agree with the item it should be retained. 4 to 6 experts agree with the particular item, it should be modified and retained. If the items are agreed by less than 4 experts, it should be removed from the questionnaire.

Internet addiction scale (Final)
(During past one month) N- Never, O- Occasionally, F- Frequently, A- Always

No.	Items	N	O	F	A
1	When the internet, social media/mobile phone/video game is not available, I feel empty, sad and frustrated.	0	1	2	3
2	While using internet, I lose count of the time I spend on it	0	1	2	3
3	Internet usage is increasing gradually over time.	0	1	2	3
4	I am not able to stop or restrict using my phone.	0	1	2	3
5	While I study or work, I spend more time on the phone unnecessarily	0	1	2	3
6	If someone criticizes me or stops me from using phone, I develop anger and frustration towards them.	0	1	2	3
7	Immediately after waking up, I pick up my phone first to surf the internet, social media or play video games.	0	1	2	3
8	My bedtime is delayed due to phone usage.	0	1	2	3
9	Using phones affects my education / work.	0	1	2	3
10	I prefer to spend time on mobile phone rather than with my family members	0	1	2	3

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