

Journal of Emerging Trends in Social Sciences and Humanities

A Double-Blind, Peer-Reviewed, HEC recognized [Y-category](#) Research Journal

E-ISSN: [3006-7898](#) P-ISSN: [3006-788X](#)

Volume 3, Issue 3, 2026, 64-70



Assessing Internet Addiction at the University Level: A Confirmatory Factor Analysis of the Internet Addiction Scale in Higher Education in Pakistan

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Article Information

Received:

2026-06-03

Revised:

2026-07-05

Accepted:

2026-08-01

Keywords

Internet Addiction;
Validity; Reliability;
Confirmatory Factor
Analysis; Pakistan.

ABSTRACT

Nowadays, educational institutions are providing internet access to support higher education. Internet addiction is gradually becoming a part of students' behavior, as universities are providing continuous access to students. Increased internet addicts need a proper tool to measure internet addiction among university students. This research study is intended to observe the reliability and the validity of the Internet Addiction Scale. Confirmatory Factor Analysis and Cronbach's alpha are used for this. Both Confirmatory Factor Analysis and Cronbach's alpha are necessary to examine the value of the Chen Internet Addiction Scale (CIAS) to measure various aspects of internet addiction in the Universities of Pakistan. The objective of this research was to measure the construct validity of the Scale "Chen Internet Addiction Scale (CIAS)". This process was done by checking its three factors through Confirmatory Factor Analysis (CFA). The second objective was to calculate the reliability of the internal consistency of the Scale. Cronbach's alpha was recorded for this purpose. This research study was Quantitative. A survey of 251 students was conducted to collect information. This sample was selected from three departments of the Faculty of Arts and Social Sciences to respond to the research questionnaire. The confirmatory factor Analysis was conducted through Smart PLS software. The results indicated that the model was appropriate, reliable, and valid for advanced structural model analysis.



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Publisher: Institute for Educating Environmental Resilience and Governance

Introduction

The pervasive use of digital devices and widespread access to the internet has changed the concept of communication, entertainment, and work. No doubt these technological progresses have while these technological advancements have many benefits, but they are also causing issues like problematic internet use and addiction (Davis, 2001). Internet addiction (IA) is a situation in which a person is habituated to use internet, and it leaves harmful effects on that person's life (Nwufo et al., 2019). Internet addiction refers to a behavioral disorder produced by disproportionate and overwhelming use of the internet, which becomes the reason for disturbance in, work, relationships, daily life and overall well-being. Individuals who are internet addicts often face the issue of using the internet without control over their internet usage in spite of its negative results (Lee & Lim, 2021).

Excessive and continuous use of the internet means staying online for a long period, which not only creates restlessness but also neglect and delay of work. (Jojo & Sundaramoorthy, 2022). There is a relationship between academic failure and the amount of Internet use (Ozler & Polat, 2012). While living and surviving in an era of digital connectivity is necessary for performing daily life tasks, academic procrastination has become an emerging problem. Students connected to the internet to complete their academic tasks, easily drift towards cyberloafing and internet addiction (Cheng, Zhou, Guo, & Yang, 2020). The quick increase in the use of the internet for performing or completing educational tasks is making the situation worse. With growing internet penetration in Pakistan, particularly among youth enrolled in universities in urban centers such as Lahore, Karachi, and Islamabad, this issue has taken a more pronounced form.

The Chen Internet Addiction Scale (CIAS) is one of the most commonly used instruments to measure internet addiction. CIAS is a self-report questionnaire consisting of 26 items. It is intended to find out the degree of internet addiction. The (CIAS) scale intends to measure different aspects of internet use. These may be obsessive use, withdrawal signs, and related problems. This scale is designed to measure changes in symptom severity with the passage of time and is useful for

measuring treatment results (Chen, Weng, Su, Wu, Yang, 2003). CFA is a process that allows researchers to evaluate construct validity, factor structure, and model fit indices, ensuring that the instrument exactly measures the given construct (Brown, 2015). From the perspective of internet addiction, CFA is essential to verify whether the original factor structure of the CIAS is accurate to collect information in different cultural and educational settings. Current research on internet addiction in Pakistan has mostly depended on tools such as Young's Internet Addiction Test (IAT), with numerous studies exploring its pervasiveness and psychological correlates amongst university students (Ahmad et al., 2025; Rasheed et al., 2022). However, very limited attention has been given to other tools regarding internet addiction, such as the Chen Internet Addiction Scale (CIAS). Though CIAS has resilient psychometric properties and widespread use in Asian contexts, there are few empirical studies found based on the validation of the CIAS within the Pakistani population using Confirmatory Factor Analysis.

This gap indicated the need for cross-cultural validation of the CIAS in higher education settings in Pakistan. Therefore, aim of present research is to assess the psychometric properties of the Internet Addiction Scale among university students in Pakistan using Confirmatory Factor Analysis. Specifically, the study attempts to find the model fit and reliability of the scale. Through the provision of empirical evidence on the validity of the instrument, this research contributes to the existing literature on internet addiction and supports the development of evidence-based interventions in higher education.

Research Objectives

1. To find out the construct validity of the Scale "Chen Internet Addiction Scale" (CIAS) by confirming its factors through Confirmatory Factor Analysis (CFA).
2. To calculate the reliability of the internal consistency of the scale by using Cronbach's alpha among university students in Pakistan.

Literature Review

The fast extension of digital technologies has changed the higher education scenario internationally, as internet access is a necessary

component of academic life. However, this increased dependence has also added to the development of internet addiction (IA) as a behavioral concern among university students. Recent literature indicated internet addiction as an unnecessary or poorly controlled concern, urge, or behavior concerning internet use that leads to suffering and distress (Sondhi & Joshi, 2024).

University students are particularly feeling uneasy about selecting academic demands, social networking, and online entertainment. They are unable to understand the demands of flexible learning environments. A recent systematic review reported that internet addiction is prevalent among university students, ranging between 35% and 55% in many Asian countries, indicating a pervasive issue (Li et al., 2023). This growing occurrence indicated the importance of valid and reliable measurement tools for accurate assessment.

Internet addiction (IA) is also recognized as problematic internet use. It is getting attention as an important behavioral concern in higher education. Early, it is conceptualized by researchers as a failure to control the desire for internet usage. Young (2004) and Sondhi & Joshi (2024) also defined internet addiction as an individual's failure to control internet usage. This failure results in psychological, social, and academic problems. With increasing access to online platforms for academic and social purposes. University students are becoming internet addicts as access to the internet increases day by day.

Researchers are considering internet addiction as a multidimensional concept that is not a single unified factor. Rather, it consists of behavioral, cognitive, and emotional factors (Chen et al., 2003; Sondhi & Joshi, 2024). This multidimensional perspective is necessary for measurement and validation using confirmatory factor analysis (CFA).

Measurement of Internet Addiction

There is always a need for a valid and reliable tool to measure different aspects of understudy phenomena. This need becomes a reason for the development of a standardized tool. Chen internet addiction scale (CIAS) is one of the good scales to measure internet addiction. It is a different tool

regarding its conceptual structure and psychometric properties. CIAS (Chen et al., 2003) consists of 26 items to measure five aspects of internet addiction. These aspects are

The CIAS, developed by Chen et al. (2003), is a 26-item scale intended to measure five aspects: obsessive use, withdrawal symptoms, tolerance, interpersonal and health-related problems, and time management difficulties. This scale is gaining fame due to its strong multidimensional psychometric properties (Mak et al., 2014). Research revealed that the CIAS determines better reliability and classification accuracy in assessing internet addiction among university students (Zhang & Xin, 2013). These characteristics present it as suitable instrument for advanced statistical validation techniques such as CFA.

Internet Addiction Research in Pakistan

The research on internet addiction is an emerging area in Pakistan and it is very true for higher education. But mostly studies concentrate on studying related factors and aspects such as psychosocial aspects and addiction of social media instead of developing and validating a strong tool to study these constructs. For example, Quratulain et al. (2023) conducted a tool validation study of the Social Media Addiction Scale in Pakistan. The reliability of this tool is conformed through psychometric testing. Likewise, Razzaq and Dar (2020) developed and validated a scale to discover the psychosocial issues connected to internet pornography among university students. This sale aimed at identifying numerous fundamental factors through factor analysis.

In spite of all these efforts there is a gap in research literature regarding CFA-based validation of a comprehensive and strong internet addiction scale to find out current situation and back ground factors regarding internet addiction in Pakistani universities. This gap indicated the need for validation and evaluation of psychometric properties internet addiction tool in local cultural context.

Research Methodology

Sample

The current research study was quantitative in nature in which data were collected from 251

participants from three departments in the Faculty of Arts and Social Sciences, Government College University, Faisalabad. Participants filled information on CIAS.

Table 1: Sample Distribution by Department

	Frequency	%
English literature	85	33.4
institute of art and design	82	34.3
mass communication	84	33.3
Total	251	100

Figure 1: Confirmatory Factor Analysis (Factor Loading)

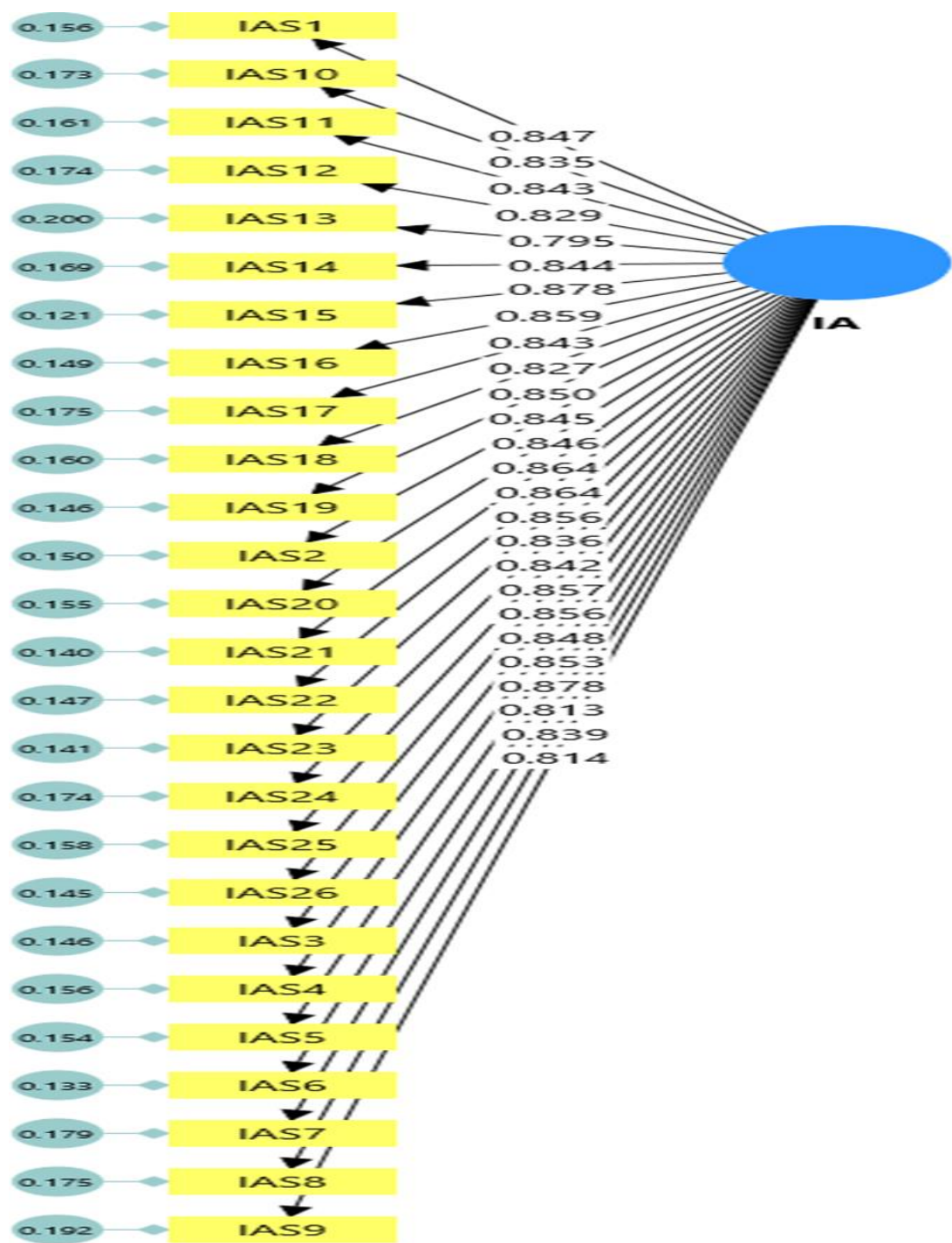


Table 2: *Factor Loading Values of Internet Addiction Scale*

	IA
IAS1	0.847
IAS10	0.835
IAS11	0.843
IAS12	0.829
IAS13	0.795
IAS14	0.844
IAS15	0.878
IAS16	0.859
IAS17	0.843
IAS18	0.827
IAS19	0.850
IAS2	0.845
IAS20	0.846
IAS21	0.864
IAS22	0.864
IAS23	0.856
IAS24	0.836
IAS25	0.842
IAS26	0.857
IAS3	0.856
IAS4	0.848
IAS5	0.853
IAS6	0.878
IAS7	0.813
IAS8	0.839
IAS9	0.814

Factor Loadings of Internet Addiction Scale (IAS)

The confirmatory factor analysis (CFA) was run to find out the factor structure of internet addiction scale (CIAS). The standardized factor loadings for all 26 items range from 0.975 to 0.878. This indicated that there is a strong item contribution to the latent construct of internet addiction.

All 26 items exceeded the normally suggested cut point of 0.70 for factor loadings. The result

revealed a good indicator reliability. The highest loading was observed for items IAS15 ($\lambda = 0.878$) and IAS6 ($\lambda = 0.878$). This indicated that items, IAS6 and IAS15 are the strongest indicators of the construct. The lowest loading was recorded for IAS13 ($\lambda = 0.795$), and it is also in acceptable range.

The overall results are conforming to strong convergent validity of the scale (CIAS) as all items significantly load onto the intended latent

factor. The measurement model retained all 26 items and no item was removed. Moreover, the reliability of high factor loadings across all items revealed that the Internet Addiction Scale shows a unidimensional structure in the current research.

Table 3: Reliability Analysis of the Scale

	Cronbach's alpha (standardized)	Cronbach's alpha (unstandardized)	Composite reliability (rho_c)	Average variance extracted (AVE)
IA	0.985	0.985	0.985	0.714

Reliability and Convergent Validity of Internet Addiction Scale

Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) was examined to conform the reliability and convergent validity of the Internet Addiction (IA) scale. An excellent internal consistency and strong convergent validity was conformed in results.

Especially, the Cronbach's alpha values were 0.985, substantially higher than the recommended point of 0.70 for both standardized and unstandardized estimates, this revealed a very high level of internal consistency regarding items of scale. Similarly, the composite reliability (CR) value also confirms the reliability of construct as it was 0.985, exceeding the recommended point of 0.70. The average variance extracted (AVE) was 0.714, which exceeds the recommended minimum value of 0.50. More than 71% of the variance in the perceived variables is explained by the given construct, thereby confirming strong convergent validity.

In general, these findings show that the Internet Addiction Scale has excellent reliability and

This result supports the theoretical assumption that internet addiction can be successfully measured as a single latent construct within the framework of higher education.

satisfactory convergent validity; it is a strong instrument for measuring internet addiction among university students.

Discussion

The present study's findings indicated that the research tool is valid and reliable. These findings are in accordance with the original scales' findings developed by Chen in 2003 and revalidated in 2018. The present study is also aligned with the results of the scale validation study conducted by Mak et al. (2014). Cheng and li (2014) revealed that this scale is reliable to be used across the population. Kuss et al. (2021) also found that CIAS can measure different aspects of internet addiction. Overall, these findings revealed that CIAS is one of the most psychometrically comprehensive instruments to measure internet addiction.

Recommendations

Future researchers should continue with assessing psychometric properties of Chen internet addiction scale (CIAS) in different cultural, educational and demographic context using advanced scale validation approaches.

Conflict of Interest

The authors showed no conflict of interest.

Funding

The authors did not mention any funding for this research.

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