

Relationship Between the Constructs of Problematic Internet Use and Facebook Addiction

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Abstract: Background: Since the first description on Problematic Internet Use (PIU), several other descriptions of additive behaviors related to the Internet have appeared in the scientific literature. However, there are always questions about being the same construct. Aim: This study aimed to examine the discriminant validity and overlap between the constructs PIU and Facebook Addiction (FA). Methods: For this, 356 undergraduate students from the health area were interviewed, of which 271 (75.4%) were female, with a mean age of 19.47 years (± 2.32 years). A socio-demographic characterization questionnaire and habits of use of internet and social networks and the Portuguese (Brazil) versions of the Online Cognition Scale (OCS-BR), Internet Addiction Test (IAT-BR) and BFAS -BR) were applied. The discriminant validity between the PIU and FA constructs was verified through the Modeling of Structural Equations (MSE). Results: We found the factorial model presented satisfactory adjustment quality $\chi^2/df = 4$, GFI = 0.93, CFI = 0.94 and RMSEA = 0.09 and correlation between constructs was equal to 0.88. Average extracted variances (AVE) – AVE_{PIU} and AVE_{FA} – were smaller than the squared correlation between the two constructs, indicating that there is no evidence of discriminant validity between PIU and FA constructs. Conclusion: the results support the hypothesis that Problematic Internet Use and Facebook Addiction are the same theoretical latent construct, that is, they are part of the same clinical entity and that there must be a second order factor, Technological Dependency.

Keywords: Addictive Behavior, Psychometrics, Cross-cultural Comparison, Validation Studies

1. Introduction

Problematic internet use (PIU) has been described in the scientific literature since the mid-1990s. Since then the number of studies has increased exponentially. A bibliometric analysis of technological dependencies revealed that 85.3% of articles published between 1996 and 2005 were about PIU compared to video and smartphone addiction [1].

Prevalence data of PIU showed rates between 0.3% and 37.9%. Highest rates are observed in Asian countries [2], which already consider the PIU as a public health problem.

The variation in the prevalence rate can be explained by the wide variety of instruments used in the studies. Between 1996 and 2013 more than 45 scales were developed for PIU screening [3].

Parallel to the PIU, another phenomenon related to the Internet has gained prominence between psychologists, psychiatrists and specialized scientific journals: Facebook Addiction (FA) [4, 5].

This is a recent phenomenon and its first descriptions happened in 2010. FA can be defined as the failure to regulate/moderate the excessive use of this social network,

despite the possible negative consequences [6]. Some symptoms common to PIU have been related to FA: preference for online interactions, mood modification, negative consequences, deficiency in self regulation [7], salience, decreased impulse control, abstinence [8] and tolerance [9].

Despite the clinical and neurobiological similarities between PIU and FA, there is a question in the literature: are they two distinct nosological entities or are they the same phenomenon? Those who advocate that they are the same phenomenon believe that the internet itself is the essential component for various online activities such as: browsing information; interaction in online chat rooms and social networks [10]. Therefore, it is valid to conclude that it would not be possible to engage in these functionalities without the internet. On the other hand, those who think that PIU and FA are distinct phenomena argue that the main feature of social networks is communication and that individuals who prefer to communicate through online environments have an increased risk of experiencing the negative consequences related to excessive use of the Facebook [11, 12]. Already the internet would allow other potentially additive features that go beyond communication, such as shopping, pornography and online games. Therefore, they may be considered as distinct disorders that would require specific diagnostic and therapeutic approaches for each phenomenon.

Similarly, Királi *et al.* [13] investigated whether PIU and Problematic Online Gaming (POG) would be distinct clinical phenomena or not. The study data supported the notion that POG may be a conceptually different behavior of PIU.

Despite the increase in the number of studies conducted in this area, relatively little is known about the relationship between PIU and FA. Besides the theoretical considerations, it is necessary to examine the need for differentiation between these two phenomena at the practical and empirical level. In summary, are PIU and FA two distinct conceptual and nosological entities? Consequently, the objective of the present study was to examine the discriminant validity and overlap between the constructs "Problematic Internet Use" and "Facebook Addition".

2. Methods

A total of 382 undergraduate students from the Health Sciences (Medicine, Nursing, Dentistry, Biological Sciences and Physical Education) courses at the Institute of Biological Sciences (ICB) of the University of Pernambuco (UPE) participated in the study. Twenty-three subjects were excluded from the study due to inadequate completion of the data collection instruments and three because they did not have a Facebook profile. At the end of the study was a sample of 356 individuals, comprising 271 (75.4%) women, with a mean age of 19.47 years ($SD = 2.32$ years).

Four instruments were used for the data collection: a questionnaire of demographic characterization and habits of Internet use; the Portuguese (Brazil) versions of the Online Cognition Scale (OCS-BR) [14], the Bergen Facebook

Addiction Test (BFAS-BR) [15] and the Internet Addiction Test [16].

The questionnaire of socio-demographic characterization and habits of Internet use was composed of questions about sex, age, course, income, marital status, internet access and weekly connection time.

The OCS consists of a self-enforcing instrument composed of 36 items and answered on a Likert scale, with a score of one (strongly disagree) to seven points (strongly agree). The score ranges from 36 to 252 points and is directly related to the PIU levels [17].

The BFAS was developed by Andreassen *et al.* with the purpose of measuring the FA [18]. It consists of a self-applicable instrument, answered on a Likert scale ranging from 1 (very rarely) to 5 (very often). The score ranges from 18 to 90 points. The items of the instrument are grouped in the six dimensions of the additions, proposed by Griffiths [5].

The IAT was developed by the American psychologist Kimberly Young, and later had its psychometric properties studied by Widianto and McMurran [19]. It consists of an auto-applicable instrument with 20 questions answered on a Likert scale ranging from 0 (never) to 5 (always), the score can range from 0 to 100 points.

2.1. Procedures

Data collection took place during the class period in the year 2013, between April and June, according to authorization provided by the institution and teachers. The instruments were applied after a brief orientation on completing and signing the Informed Consent Term (ICT). The instruments were then distributed, which were applied collectively.

2.2. Data Analysis

In order to reach the objective of this study, we used the structural equation modeling (SEM) to verify the discriminant validity between two or more theoretical latent constructs.

Before the SEM, the presence of multivariate outliers and the assumption of univariate and multivariate normality were verified. These were analyzed through the quotient between Mahalanobis Square Distance (D^2) and Degrees of Freedom (df). Outliers were individuals with a ratio ≥ 319 . Univariate and multivariate normalities were performed using the asymmetry (Sk) and kurtosis (Ku) coefficients, and it was considered a violation of the normality assumption of $|Sk| \geq 3$ and $|Ku| \geq 10$ [20, 21]. The maximum likelihood method was used to estimate the adjustment quality of the model.

Quality adjustment measures were used to verify the adjustment of the model. These, in order to be considered acceptable, should have the following values: $X^2/df < 5$; Goodness of Fit Index (GFI): [0, 8; 1]; Comparative Fit Index (CFI): [0, 8; 1]; Root Mean Square Error of Approximation (RMSEA): $< 0, 10$ [21, 22].

The discriminant validity is verified when the average variance extracted (AVE) of each construct is greater than or

equal to the square of the correlation (ρ^2) between them [20, 23].

Correlations between the BFAS-BR, OCS-BR and IAT-BR scales were also verified to reinforce the evidence of discriminant validity among the constructs. In this case, the discriminant validity becomes problematic when the correlations are > 0.7 [24].

Descriptive, bivariate and reliability analyzes were performed using IBM SPSS version 20 and SEM used the SPSS AMOS version 20.

3. Results

The SEM is realized considering the validates factorial models for OCS-BR and BFAS-BR. There were no violations of the assumptions of uni and multivariate normality nor the presence of multivariate outliers.

The model (Figure 1) presented satisfactory adjustment quality $\chi^2/df = 4$, GFI = 0.93, CFI = 0.94 and RMSEA = 0.09. The correlation between the constructs was equal to 0.88. The average extracted variances for the constructs were: $AVE_{PIU} = 0.58$ and $AVE_{FA} = 0.44$.

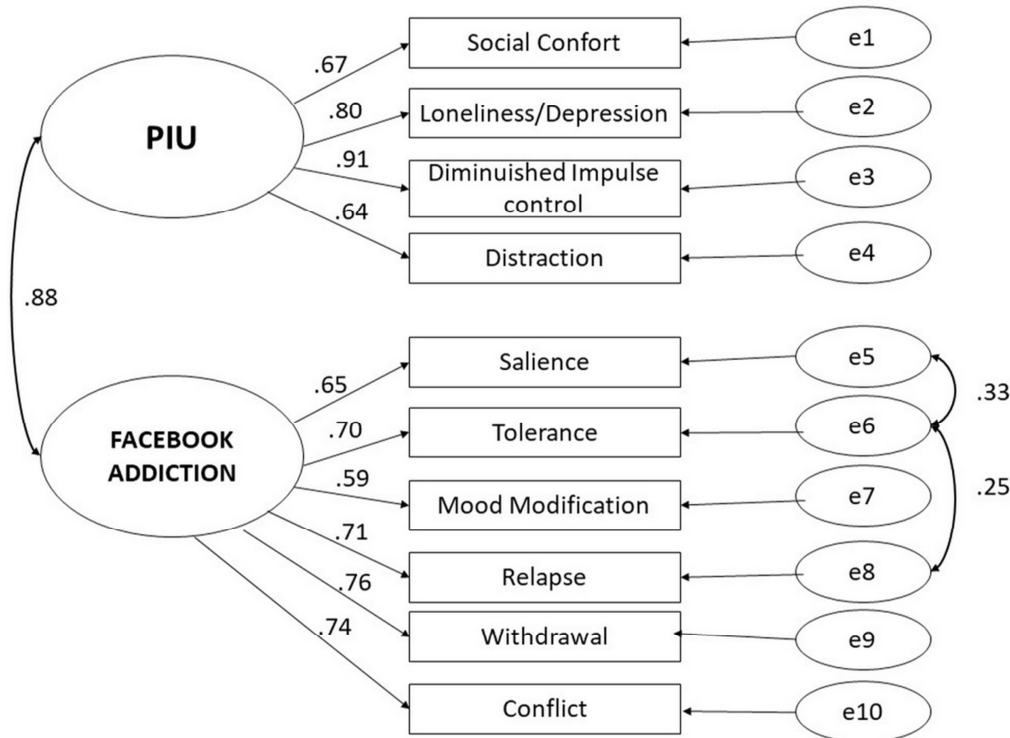


Figure 1. Factorial model to study of the discriminant validity between PIU and FA.

AVE_{PIU} and AVE_{FA} were smaller than the ρ^2 ($\rho^2 = 0.77$), indicating that there is no evidence of discriminant validity between PIU and FA constructs.

The correlations between the three instruments that measure PIU (IAT and OCS) and FA (BFAS) (Table 1) were all higher than 0.7 ($P \leq 0.001$), revealing problems regarding the discriminant validity between them, showing that the instruments measure approximately the same construct.

Table 1. Correlation (ρ) between IAT, BFAS and OCS.

	IAT	BFAS	OCS
IAT	1	0.735*	0.746*
BFAS	0.735*	1	0.707
OCS	0.746*	0.707*	1

*Correlation is significant at the level of 0.01 (two-tailed).

Considering the results, it is possible to infer that the constructs do not seem to be absolutely independent. Therefore, the data does not support the notion that PIU and FA are distinct nosological entities.

4. Discussion

The results suggest that there is no evidence of discriminant validity among the constructs studied, indicating a possible overlap between PIU and FA.

Proposed model presented factorial and convergent validity, since the adjustment indices were acceptable and the factor loads were higher than 0.5 and statistically significant ($p < 0.001$), respectively. This reinforces that the specification of the manifest variables of the constructs is correct [21], in addition to sharing a high proportion of common variance [22].

The results indicated that there is no evidence of discriminant validity between PIU and FA constructs, that is, there are no guarantees that the constructs are truly different from each other [22], in the sample studied. Another study searched to verify the discriminant validity between PIU and POG; the findings revealed that these are distinct nosological entities [13]. The comparison between these results raises the question about why PIU and FA are considered the same

construct and PIU and POG are different constructs?

Facebook is an internet site with specific characteristics that allow for social networking and communication. By this characteristic, FA would constitute a generalized PIU form, in which the focus of the additive behavior would be on the social aspect of the internet [3, 17, 25]. In this way, individuals with generalized PIU, whether addicted to chats, emails or social networks, always need the internet to express additive behaviors. There would be no PIU and FA without the internet. Therefore, it becomes difficult for the user to distinguish between PIU and FA. So, it is possible to think that Facebook addicts would also be internet addicts. However, the inverse of this premise must be better studied.

On the other hand, individuals with POG would have a specific PIU²⁵, in which individuals would become addicted to specific content on the internet, for example, games, sex, shopping, among others. In this case, users could become addicted to these behaviors even in the absence of the internet. The internet would function only as a medium for them to express previous addictive behavior or not. Therefore, it would be plausible to consider the distinction between the constructs, on the one hand PIU and on the other the constructs purchases, sex or games.

Another result worth mentioning is the correlation between PIU and FA constructs ($\rho = 0.88$). From the point of view of SEM, this may reveal the presence of a second-order construct that aggregates both constructs. From this it is prudent to consider the existence of a construct (generalized PIU) that gathers around itself the additive disorders related to the communicational functionalities of the internet: Social Networks, WhatsApp, Instagram, among others, and don't think that each functionality constitutes a disorder isolated, unique and independent.

From the psychometric point of view, it is possible to think of instruments that combine PIU and FA on the same construct, being able to extend this thought to all the other functionalities that allow the social interaction in the internet. Considering our results, it would not be prudent to develop several scales to evaluate the addition to the various communication features of the internet, such as WhatsApp, Instagram, Facebook, Smartphone, Social networks in general, since there were no evidences in our study that these are entities clinics other than PIU.

Another result that deserves to be highlighted is the correlation between the instruments. Correlations between the BFAS, IAT and OCS scales above 0.7 suggest that they measure approximately the same construct [26]. It was expected that the correlations between BFAS and the SCO would be smaller, because they were psychometric instruments with different explanatory theories. OCS is derived from the Behavioral Cognitive Theory for PIU and the BFAS from the theory of additive disorders. Moreover, the correlation between BFAS and IAT that is derived from the same theory also showed a correlation higher than 0.7, this reinforces the understanding that regardless of the theoretical model behind the instrument, all are approximately measuring the same construct.

Despite the potentialities of the study, some limitations should be considered: small size sample selected in a non-probabilistic way; sample composed of students, which limits the generalization of the findings to the general population; the psychometric weaknesses of IAT to assess Addiction Internet and self-reported data that can lead to bias. Therefore, we suggest that studies with a similar objective be replicated in representative samples of the population and correcting the limitations presented herein.

5. Conclusion

The results of the present study suggest that FA appears to be conceptually the same theoretical latent construct of the PIU. The findings also point to the existence of a second order construct/factor that groups FA and PIU over the same psychometric domain. The data support that PIU and FA should not be considered as separate clinical entities. Therefore, classifying FA as a disorder other than PIU leads to a cascading effect of creating diverse diagnostic criteria, measuring instruments, and differentiated treatments for each potentially additive functionality of the Internet. The division of PIU into several sub-disturbances impedes global understanding of the phenomenon. Therefore, we recommend that the potentially additive functionalities related to the social and communication aspects of the internet be considered on a single construct: generalized PIU.

6. Recommendations

Further studies on the various additive behaviors and problematic use of the internet need to be done in a standardized way so that we can have more clarification about other additive behaviors on the Internet.

Author Contributions

H. R. S. Silva and D. X. Silveira participated in the design, design, analysis and interpretation of data, writing of the article and final approval of the version to be published. K. C. N. Areco, M. M. Barros and P. V. M. Galvão contributed to the analysis and interpretation of data, critical review of the intellectual content and final approval of the version to be published. M. Fidalgo collaborated in the conception and design, critical review relevant of the intellectual content and final approval of the version to be published. All authors were responsible for all aspects of the work in ensuring the accuracy and integrity of any part of the work.

Conflict of Interest Statement

The authors declare that they have no competing interests.

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