

## ADAPTATION OF THE BERGEN INSTAGRAM ADDICTION SCALE IN ARGENTINA: CALIBRATION WITH ITEM RESPONSE THEORY

Cite this Accepted Manuscript (AM) as: Accepted Manuscript (AM) version of Facundo Abal, Pablo, Sánchez González, Juan Franco, Horacio Attorresi and Félix, ADAPTATION OF THE BERGEN INSTAGRAM ADDICTION SCALE IN ARGENTINA: CALIBRATION WITH ITEM RESPONSE THEORY, Current Psychology <https://doi.org/10.1007/s12144-023-04257-1>

This AM is a PDF file of the manuscript accepted for publication after peer review, when applicable, but does not reflect post-acceptance improvements, or any corrections. Use of this AM is subject to the publisher's embargo period and AM terms of use. Under no circumstances may this AM be shared or distributed under a Creative Commons or other form of open access license, nor may it be reformatted or enhanced, whether by the Author or third parties. See here for Springer Nature's terms of use for AM versions of subscription articles:

<https://www.springernature.com/gp/open-research/policies/accepted-manuscript-terms>

The Version of Record of this article, as published and maintained by the publisher, is available online at: <https://doi.org/10.1007/s12144-023-04257-1>. The Version of Record is the version of the article after copy-editing and typesetting, and connected to open research data, open protocols, and open code where available. Any supplementary information can be found on the journal website, connected to the Version of Record.

## ADAPTATION OF THE BERGEN INSTAGRAM ADDICTION SCALE IN ARGENTINA: CALIBRATION WITH ITEM RESPONSE THEORY

**Abstract:** The items of the Bergen Facebook Addiction Scale were adapted to study the construct in Instagram users. This construct is defined as the tendency to be overly concerned about Instagram, spending so much time and effort on this platform to the point of harming other activities in the individual's life, interpersonal relationships and psychological well-being. Different Item Response Theory (IRT) models were applied for polytomous items in order to determine which one best explains the responses of those evaluated. The six items were translated into Spanish and evaluated by an expert jury. A total of 754 Instagram users from the Buenos Aires Metropolitan Area took part in the study (65.8% women). An Exploratory Factor Analysis was performed to verify the unidimensional assumption and the assumption of local independence was corroborated. The results referring to the models fit data allow us to provide evidence that the Grades Response Model (GRM) presents the most adequate parametric structure to shape the subject's responses. All items were adjusted to GRM. Parameters  $a$  ranged from 2.02 to 3.45 (Mean = 2.69; SD = 0.49). Parameters  $b$  were located within the expected range (-3 to 3) with a minimum  $\theta$  of -0.51 and a maximum of 2.74. The Ordinal Alpha and Omega were elevated. The Information Function shows a maximum value of 14.26 around a  $\theta$  of 1.2. This function shows a negative asymmetry, indicating that the scale is more accurate for measuring high levels of the trait. In conclusion, the reported evidence indicates that the scale satisfies the psychometric quality criteria for the measurement of Instagram addiction.

**Key-words:** Social Networking Sites, Behavioral Addiction, Instagram, Item Response Theory, Psychometry, Psychological Assessment.

## Introduction

Research on the individuals' motivations to participate in Social Networking Sites (SNS) and the implications of their use remain contradictory actually (Huang, 2017; Lee, 2020; Valkenburg, 2022; Wilson et al., 2012). While some studies associate the use of SNS with positive aspects such as well-being or happiness (e.g. Phu et al., 2019; Sen et al., 2022), others, in contrast, point out that the inadequate use of SNS could set up social and health problem that is necessary to prevent and to attend (Andreassen, 2015; Hussain et al., 2020; Liu et al., 2019; Marino et al., 2018; Reer et al., 2019; Wirtz, et al., 2021).

In recent years, the social network Instagram began to stand out for its growing use rapidly. It is estimated that 18.7% (1.28 billion) of the world's population is an Instagram user and that number increased by 21% last year alone (Kemp, 2022). It is considered that users connect to Instagram, on average, 11.6 hours per month and 99% have constant access availability through their mobile devices. Instagram has the capacity to attract a similar proportion of attention from women (49.3%) and men (50.7%) in adults population, particularly young adults between 18 and 34 ages (61.9%), being the most interested (Statista, 2022).

Despite its popularity, numerous research acknowledges that prolonged Instagram use is associated with adverse psychological consequences. Instagram is also considered the worst social network for people's mental health and well-being, surpassing Youtube, Snapchat, Facebook and Twitter (Royal Society For Public Health, 2017). Following this line the evidence suggest that the excessive Instagram use is related to increased negative social comparison and may lead to feelings of inadequacy, low self-esteem, negative body image and eating disorders (Faelens et al., 2021; Lup et al., 2015, Rogowska & Libera, 2022). In addition, other authors found evidence for an association between frequency of Instagram use and depression and anxiety symptoms, stress, low life satisfaction, shyness, social isolation and loneliness (Donnelly & Kuss, 2016; Foroughi et al., 2022; Keyte et al., 2021; Ponnusamy et al., 2020; Sanz-Blas, et al., 2019; Sherlock & Wagstaff, 2018).

There is no complete consensus on the conceptual and operational definitions to describe the individual's unhealthy relationship with Instagram and other SNS (Marino et al., 2018; Varona et al., 2022). Even so, the prevailing view calls for theoretical framing the use of Instagram as a behavioral addiction (Kircaburun & Griffiths, 2018; Foroughi et al., 2022; Zarenti et al., 2021). According to Griffiths (2005) behavioral addictions share six central components with chemical addictions: a) salience, b) tolerance, c) mood modification, d) conflict, e) withdrawal and f) relapse. In this regard, Instagram addiction is defined as the tendency to be overly concerned with SNS, spending so much time and effort on them to the point of impairing other activities in the subject's life, interpersonal relationships and psychological well-being (Andreassen, 2015).

Instagram addiction is the result of repetitive behaviors that in their early stages can be pleasurable. The users may experience gratification through posting photos and videos on Instagram, receiving likes and comments on photos shared and gaining followers. Their excessive and persistent executions of this behavior can generate psychological dependence and individual loss of control. Individuals begin to give priority to the use of Instagram and to spend more and more time online to maintain gratification levels, favoring the appearance of negative emotions and a decrease in academic or work performance (Cataldo et al., 2022; Foroughi et al., 2022; Kircaburun & Griffiths, 2019; Kircaburun et al., 2019).

The relationship between Instagram addiction and personality has aroused great interest in specialists in the area. Specifically the trait Neuroticism and its disadaptive variant Negative Affectivity, has been documented in different studies, which place these traits as possible factor in the development and maintenance of Instagram addiction (e.g. Balta et al., 2020; Ershad & Aghajani, 2017). According to the Five Factor Model, Neuroticism is a normal personality trait that describes the disposition to experience negative emotions such as anger, sadness, fear, and guilt (McCrae & Costa, 2010). Negative Affectivity is extreme pole of Neuroticism (American Psychiatric Association [APA], 2013a) and involves tendencies to experience negative emotions with pathological intensity. The

predictive capacity of addiction to the SNS that Neuroticism has shown has led researchers to propose its implementation in the field of prevention (Kircaburun & Griffiths, 2018; Marciano et al., 2020).

Despite these advances, the clinical status of Instagram addiction is controversial because the current DSM-5 version (APA, 2013a) has rejected to include a specific diagnostic category for Internet addiction, and consequently, for SNS due to evidence not being sufficiently collected to qualify these behaviors as disorders (Marino et al., 2018). Nevertheless, the 11th revision of the International Classification of Diseases (ICD-11; World Health Organization, 2019) includes the category of other specified disorders due to addictive behaviors (code 6C5Y). Although this category could be used if the professional considers that Instagram is the main source of their patient's psychological suffering, they should be cautious given the poor validity evidence reported to date (Brand et al., 2020). Faced with this situation, it becomes imperative to obtain valid and reliable measurements for a better understanding of the phenomenon.

### **Measuring Instagram Addiction: progress and challenges**

The construction of instruments that evaluate Instagram Addiction or others SNS addiction faces substantial challenges due to the novelty and lack of consensus in conceptual definitions (Andreassen, 2015). A current debate refers to the level of specificity of the delimitation of problematic behaviors in SNS addiction (Griffiths, 2022). Some authors prefer a more generic assessment and to look at a more globally Internet or social network behavior. This approach is beneficial for analyzing potential predisposing factors and correlates of overall SNS (Balcerowska et al., 2022) or Internet (Guedes et al., 2016).

One problem is that users' motivations for internet is becoming more varied (e.g. gaming, pornography, buying/shopping). Furthermore, logging on to each of the platforms may not be consistent, leading to the need for inquire in more detail on online behaviors (Kuss & Griffiths, 2017). For instance, it is more likely to express negative emotions on Facebook than on Instagram (Waterloo et al., 2018). Compared to other SNS, Instagram focuses more on image-based content than

Facebook or Twitter. As a result, the intermediate processes for determining normal Instagram use and Instagram addiction might also vary across different SNS (Faelens et al., 2021). As a matter of fact, the level of specificity has led to assess a one specific SNS addiction (Caci et al., 2014; Kircaburun & Griffiths, 2018; Soraci et al., 2022). Even the addictive potential of micro-behaviors (for example, sharing numerous selfies) has been studied given that a particular social network offers multiple possible activities for users (Monacis et al., 2020). As can be seen, the complexity of the phenomenon requires a set of measures that allow the analysis of different levels of specificity.

In this scenario, a family of Bergen Addiction Scales (Andreassen, 2015) emerged to assess SNS addiction generic or to specific platforms, achieving global significance (e.g. Monacis et al., 2017; Vallejos-Flores et al., 2018; Dias et al., 2018). The Bergen Facebook Addiction Scales (BFAS) was the first (Andreassen et al., 2012) and from them the Bergen Social Media Addiction Scale (BSMAS, Andreassen et al., 2016) and the Bergen Instagram Addiction Scale (BIAS, Monteiro et al., 2020) were elaborated. Although Andreassen et al. (2016) equates *social media* to *SNS* in the operational definition of the BSMAS, more recently it has been concluded that, based on the distinction made by Kuss and Griffiths (2017), it is more appropriate to use the expression SNS addiction (Balcerowska et al., 2022).

All Bergen Addiction Scales were based on the components of addiction described by Griffiths (2005) and were constructed with the purpose of quickly and efficiently identifying subjects at risk of suffering each type of behavioral addictions. The scales include the same six items, but the wording only modifies the expressions *Facebook*, *social media* or *Instagram* according to the objective pursued by each researcher. The highest scores on these scales represent high frequencies of appearance of the six diagnostic criteria defined by the Griffiths model according to the self-report of individuals.

Specifically, different researchers around the world have been interested in BIAS, observing evidence of validity and reliability in Italian (Ballarotto et al.,

2021) Turkish (Yurdagül et al., 2021), Polish (Rogowska & Libera, 2022), Peruvian (Chavez-Santamaria et al., 2021) and Brazilian (Monteiro et al., 2020) adaptations. In general terms, the researches converge in replicating the unidimensional structure of the BIAS for both adolescent and adult samples and obtained optimal internal consistency coefficients. Regarding the evidence of validity based on the relationship with other variables, positive associations with psychopathological symptoms (Monteiro et al., 2020; Yurdagül et al., 2021) and negative associations with life satisfaction (Chavez-Santamaria et al., 2021; Rogowska & Libera, 2022) were found. In turn, Chávez-Santamaría et al. (2021) provided evidence of discriminant validity between the BIAS and the BFAS, supporting the strategy of analyzing the behavior of users of both platforms separately.

The validations of the BIAS adaptations were carried out mostly within the framework of the Classical Theory of Tests (CTT). For several years now, Psychometrics has been going through a period of transition towards Item Response Theory (IRT) methodologies for assessing the validity of measurement scales (Thomas, 2019). At the moment, IRT advances have scarce applications in the BFAS (Primi et al., 2021) and BSMAS (Naher et al., 2022; Stănculescu, 2022). Only Montero et al. (2021) used a polytomous IRT model to analyze the BIAS items, but the interpretation of these results has limitations because adequate evidence of model fit is not provided. The calibration of the items of these scales using IRT models allows a more detailed item analysis to examine their psychometric quality. IRT offers tools for to know the probability that an examinee with a trait level will respond to a particular category of item, improving analyzes of measurement error and to examine the precision of test using local reliability relates to an specific score. Moreover, the invariance of item parameters calibrated from the same population is useful property for detection of differential items functioning (Baker & Kim, 2017).

### **The current study**

Based on the above, the growth of Instagram users in the last few years, added to the harmful potential of this platform has propitiated that the BIAS scale

occupies a preferential place in the assessment of SNS addiction. In view of the fact that research associated with this SNS is an area of vacancy in Argentina and, given the high recognition of the Bergen Addiction Scale, this paper proposes to adapt the items to measure Instagram addiction.

On the basis of previous research, the following hypotheses were formulated:

H1) Local adaptation of BIAS will have one-dimensional structure to guarantee the modeling using IRT and will have robustness evidences of reliability.

H2) The BIAS items will show adequate psychometric properties when analyzed with IRT tools in the Argentine sample.

H3) Since the BIAS is an instrument that measures addiction to a specific platform, its scores will have a medium correlation with scales that assess addiction to SNS with a generic approach.

H4) The scores estimated from BIAS will be significantly associated personality traits linked to the tendency to experience negative emotions.

It is essential to carry out increasingly rigorous studies that show greater precision in the construction of test that allow an objective analysis of the extent and severity of the negative consequences of inappropriate use of both SNS as general, as well as specific platforms like Instagram.

## **Method**

### **Participants**

A total of 754 Instagram users from the Buenos Aires Metropolitan Area took part in the study, 65.8% of whom identified themselves as women and the remaining 34.2% as men. Subjects were selected through a non-probability convenience sampling. The participant's mean age was 33.88 years (SD = 12.39, Min = 18, Max = 77). In terms of educational attainment, 60.4% at least completed secondary level while 35% had a higher education degree.

### **Instruments**

#### ***Socio-demographic questionnaire***



In order to collect data such as gender, age, work situation, marital status and different social networks' frequency of use an ad-hoc questionnaire was constructed.

### ***Bergen Instagram Addiction Scale (BIAS)***

The items of the Bergen Facebook Addiction Scale (BFAS, Andreassen et al., 2012) were adapted to study the construct in Instagram users. The word *Facebook* was replaced by *Instagram*, just as several authors did recently (e.g. Ballarotto et al., 2021; Chavez-Santamaria et al., 2021; Monteiro et al., 2020; Rogowska et al., 2022; Yurdagül et al., 2021). The original scale studies, from six items, the central aspects associated with the risk of presenting addictive behaviors when using Facebook. In addition, the decision to use this scale is based on the fact that it was made available by the authors for free use in research. The questionnaire is headed by an initial question (*How often during the last year...*) that refers the subject to self-assess the appearance of addiction symptoms to the social network during the last 12 months. It uses a five-choice Likert response scale (*Never, Rarely, Occasionally, Frequently, and Very Often*).

### ***The Social Network Addiction Questionnaire (SNAQ, Mayaute & Salas-Blas, 2014)***

The scale is composed of 24 items with a five-point answer format (from *Never* to *Always*). The authors based themselves on indicators of substance addiction from the fourth version of the DSM, replacing the concept of substance with that of social networks. According to these criteria, they collected items from instruments that assess Internet and social network addictions. The instrument has got validity evidence about its three-dimensional internal structure and an Item Response Theory (IRT) psychometric analysis. In the present study the following ordinal alpha values were obtained for each sub-dimension: a) Obsession,  $\alpha = .90$ , 95% CI [.89, .91], b) Lack of personal control,  $\alpha = .72$ , 95% CI [.69, .75] and c) Excessive use,  $\alpha = .88$ , 95% CI [.87, .89].

### ***Neuroticism Item Bank (NIB, Author, Author & Author, xxxx)***

Forty-two items were selected from an IRT-modeled bank that operationalizes the facets of the Neuroticism dimension according to the McCrae and Costa's (2010) model. Neuroticism describes the tendency to feel negative emotions frequently and intensely. It consists of six facets: Anxiety, Hostility, Depression, Self-Consciousness, Impulsivity and Vulnerability. Those items that showed the ability to discriminate satisfactorily in a wide range of measured traits were chosen. As for the response format, it is a four-point Likert scale (*Disagree*, *Slightly disagree*, *Slightly agree* and *Agree*). Ordinal coefficient alphas calculated on the current sample show acceptable values ranging from  $\alpha = .65$ , 95% CI [.61, .70] (Vulnerability) to  $\alpha = .78$ , 95% CI [.75, .81] (Anxiety). In addition, the total scale obtained a high value of ordinal alpha (.91, 95% CI [.90, .92]).

***Negative Affectivity Personality Inventory for DSM5 (NA-PID-5, APA, 2013b)***

Twenty-one items were drawn out belonging to Negative Affectivity and its facets (Anxiousness, Emotional Lability, and Separation Insecurity), which are free of charge and were adapted to the local environment by Fernández Liporace and Castro Solano (2015). Negative Affectivity, as a pathological variant of Neuroticism, is characterized by even more intense experiences of a wide range of negative emotions, including self-injurious behaviors and interpersonal ties with strong dependence. Based on the current sample, ordinal coefficient alphas were calculated, reporting a minimum value of  $\alpha = .82$ , 95% CI [.80, .84] (Emotional Lability).

**Procedure**

The instruments were administered through a printed protocol and these were individually self-completed under the supervision of a professional, in a quiet well-lighted place. The protocol included a first phase in which participants were informed in writing of their right to take part in the research and its objectives. In addition, the participants were advised that the data provided would remain confidential and that there would be no testing results. Finally, the consent of each participant was requested and the questionnaires were administered. This protocol

and the research design were approved by the ethics committee of the Research Institute of the School of Psychology of the University of Buenos Aires.

## **Data analysis**

### ***Linguistic and conceptual adaptation***

We worked from the original English version of the BFAS by replacing the word Facebook with Instagram. Two bilingual experts were invited to translate the instructions and the items into Spanish. Then two other independent bilingual experts made the back translation of the versions created by the first translators. The successive translations were compared by a panel of psychometric experts, who reviewed the divergences and chose the terms that were most similar to those used locally. This way, a Spanish version was achieved that has both linguistic and conceptual equivalence.

Afterwards, the items that make up the scale were blind peer-reviewed by five expert judges who evaluated (using a graded three-category scale) to what extent the statement was consistent with the construct's operational definition. The level of agreement among experts was analyzed by using the lower limit of the Aiken's  $V$  confidence interval of  $\geq .60$  for a level of confidence of 90% as an acceptance criterion. A pilot study ( $n=32$ ) was also carried out with the aim of adjusting formal aspects and providing evidence of face validity.

### ***Applying Item Response Theory (IRT)***

Considering the Likert-type response format of the items, it was proceeded to test the application of different models of graded polytomous response in order to determine which one best explains the responses of those evaluated. The four most used models in the context of typical performance tests were compared: a) Graded Response Model (GRM), Reduced Graded Response Model (RGRM), Partial Credit Model (PCM) and Generalized Partial Credit Model (GPCM).

Previously, using Factor 9.2 (Lorenzo-Seva&Ferrando, 2013) an Exploratory Factor Analysis (EFA) was performed to verify the unidimensional assumption, as shared by all the applied models. The parameters were estimated by the methods of Weighted Least Squares Mean and Variance Adjusted on the basis of the

polychoric correlation matrix. The optimal implementation of Horn's parallel analysis was applied for factor extraction, and it was studied the closeness to unidimensionality using the ECV (Explained Common Variance) and MIREAL (Mean of Item Residual Absolute Loadings) indices as recommended by Ferrando and Lorenzo-Seva (2018). Exploratory Structural Equation Modeling was used complementary to compare model-data fit indexes to a 1-factor model, a 2-factor model, and a 3-factor models. In addition, the statistic  $\chi^2_{LD}$  was used to corroborate the item's local dependency for each of the models analyzed. Values from  $\chi^2_{LD} < 10$  allow us to presume this assumption.

The application of the models was done by operating the IRTPRO software version 4.2 (Cai et al., 2017). In order to analyze and compare the goodness of fit of IRT models, the Likelihood Ratio Test (LRT) was applied to determine whether significant changes in the logarithmic likelihood of the hierarchical-nested models (i.e., comparisons between RGRM and GRM and between PCM and GPCM). Furthermore, the Akaike's Information Criterion (AIC) and the Bayesian Information Criterion (BIC) were calculated for each model. The  $M_2$  statistic was also obtained although given the sensitivity of this statistic to small data misfit it was also necessary to report the RMSEA. Similar to the interpretation criteria defined for the structural equation models the RMSEA must adopt values equal to or less than .05 as evidence of a satisfactory fit. Once the most appropriate IRT model was selected, the interpretation of the psychometric properties of the items was carried out. The differential item functioning regarding gender was also studied using the modified Wald test (Cai et al., 2017).

### ***Relations with other variables***

As a way to obtain evidence of concurrent validity, the correlations of the  $\theta$  estimated for each subject in the BIAS with the domains and facets measured with both the NIB and the NA-PID-5 were studied. Likewise, the BIAS was correlated with all SNAQ dimensions.

### ***Reliability studies***

To estimate reliability based on internal consistency, the Alpha and Omega coefficients were applied. Both indicators and their respective 95% confidence intervals (bootstrap technique) were calculated using the R Studio (R Core Team, 2020) `scaleReliability` function belonging to `userfriendlyscience` package (Peters, 2014). Additionally, local measures of reliability were analyzed through the Test Information Function (TIF).

## Results

### Expert judgement and pilot test

All six items were positively rated by the judges when considering congruence with the operational definition. The Aiken's V values regarding expert agreement ranged from .90, 90%IC [0.65, .97] to 1, 90%IC [0.79,1]. During the pilot test, no difficulties were detected in understanding the content of the items or in the administration's instructions that would justify any wording adjustment.

### Application of IRT

#### *Assumptions of unidimensionality and local independence*

To verify the unidimensionality assumption, the feasibility of the factorial study was previously guaranteed (KMO = .89; Bartlett Test ( $\chi^2 = 3128.5$ ;  $df = 15$ ;  $p < 0.001$ ). The optimal implementation of Horn's parallel analysis suggested the extraction of a single factor explaining 71% of the variance. On the same line, the values of ECV= 0.92 and MIREAL = 0.20 suggest that data can be treated as essentially unidimensional. This implies that the dominant factor identified has considerable weight in regard to the common variance and, furthermore, the presence of a potentially relevant residual factor is ruled out (Ferrando & Lorenzo-Seva, 2018). Factorial weights were high, ranging from .72 to .85. The comparison of goodness of fit indices obtained to test a 1-factor model (RMSEA = .053, RMSR = .0191, GFI = .999, AGFI = .998, NNFI = .993, CFI = .998), a 2-factor model (RMSEA = .076, RMSR = .0428, GFI = .997, AGFI = .995, NNFI = .986, CFI = .992), and a 3-factor model (RMSEA = .100, RMSR = .0036, GFI = .853, AGFI = .852, NNFI = .853, CFI = .949) provided evidence in favor of the unidimensionality

of the construct too. Indeed, the 1-factor model showed the lowest RMSEA and RMSR and the highest GFI, AGFI, NNFI and CFI.

As for the items' local dependency, the minimum and maximum values recorded in the  $\chi^2_{LD}$  of each model can be seen in Table 1. As can be seen, the RGRM, PCM and GPCM record violations of this assumption in at least one of the pair of items, it will be assumed according to the criteria of Reise and Rodriguez (2016) that there exists local dependence of the items when values  $\chi^2_{LD} > 10$  are observed. Only for the GRM, favorable results were obtained ( $\chi^2_{LD}$  less than 10), corroborating that the items are locally independent when applying this model.

### ***IRT Model Fitting Comparison***

As shown in Table 1, the  $M_2$  statistic of all models lead to reject the fit ( $p < .0001$ ); however, the RMSEA values  $\leq .05$  evidence a satisfactory fit. The LRT results from the comparison of nested models show that the general models (GPCM and GRM) a better fitting than their respective restricted models (PCM and RGRM), so it is convenient that the item slope parameters will be freely estimated. The LRT allows us to conclude that the changes in the likelihood logarithms observed between the two partial credit models ( $\chi^2_{\Delta}(5) = 116.99$ ,  $p < .001$ ) and between the two graded response models ( $\chi^2_{\Delta}(5) = 27.98$ ,  $p < .001$ ) are statistically significant. If you compare the BIC, AIC and  $M_2$  recorded for the calibrated models, the GRM shows the lowest values and is, therefore, considered the best model.

In conclusion, the integration of the results referring to the models fit data allows us to provide evidence that the GRM presents the most adequate parametric structure to shape the subjects' BIAS responses. In addition, the rest of the models have registered violations of the assumption of local independence. This would imply the need to eliminate some items and, consequently, the content validity would be affected.

*Table 1. IRT Model Fitting Comparison BIAS-BA and IRT Models*

Model	$\chi^2_{LD}Mi$	$\chi^2_{LD}Ma$	$M_2$	$df$	$p$	RMSE	-2lnL	AIC	BIC
-------	-----------------	-----------------	-------	------	-----	------	-------	-----	-----

	n	x		value	A				
GRM	0.3	7.8	491.7 4	23 4	.000 1	.04	8357.0 5	8417.0 5	8550.6 0
RGR M	0.5	11.2	514.0 0	23 9	.000 1	.04	8385.0 3	8435.0 3	8555.7 4
GPC M	1.0	11.9	664.6 1	23 4	.000 1	.05	8433.2 3	8493.2 3	8631.9 1
PCM	1.9	13.6	634.8 4	23 9	.000 1	.05	8474.0 4	8524.0 4	8639.6 1

*Note.* BIAS-BA = Bergen Instagram Addiction Scale - Buenos Aires; IRT = Item Response Theory;  $M_2 = M_2$  statistic;  $df$  = degrees of freedom; RMSEA = Root Mean Square Error of Approximation;  $-2\ln L$  = log likelihood; AIC = Akaike's Information Criterion; BIC = Bayesian Information Criterion; GRM = Graded Response Model; RGRM= MRG with equal restriction in the  $a$  parameter; GPCM = Generalized Partial Credit Model; PCM = Partial Credit Model.

### ***Graded Response Model Item Functioning***

The GRM calibration process involved the estimation of one item-slope parameter and four threshold parameters ( $b_1, b_2, b_3$  and  $b_4$ ) for each of the items. Table 2. shows the GRM parameter values and their respective error estimations for the six items that make up the scale. Since the items have a five-category-Likert-type-response format, the  $b_1$  parameter should be understood as a threshold value (measured in the trait scale) that separates the Never category from the higher categories (*Rarely, Occasionally, Frequently, and Very Frequently*). This parameter indicates the minimum necessary trait value required by an individual to have a probability equal to or greater than .50 of answering the key option Rarely or a higher one. In a similar way, the rest of the  $b$  parameters are interpreted for the same item, considering a cumulative segmentation of the polytomous response. For example, the parameter  $b_1$  of item 1 is located at -0.52 and indicates the level of trait that the subject must overcome in order to have a

greater chance of choosing the option Never instead of choosing the category Rarely or a higher one.

*Table 2. BIAS GRM Item Parameters and the study of Differential Item Functioning*

Items	Parameters					Wald Test		
	<i>a(se)</i>	<i>b<sub>1</sub>(se)</i>	<i>b<sub>2</sub>(se)</i>	<i>b<sub>3</sub>(se)</i>	<i>b<sub>4</sub>(se)</i>	$\chi^2$	<i>d</i>	<i>p</i>
1. Spent a lot of time thinking about Instagram or planned use of Instagram?/¿Pasaste mucho tiempo pendiente de Instagram o planeando usar Instagram?	2.93(0.22)	-0.52(0.06)	0.09(0.05)	0.70(0.06)	1.43(0.08)	0.45	4	.96
2. Felt an urge to use Instagram more and more?/¿Sentiste la necesidad de usar Instagram más y más?	3.45(0.28)	0.06(0.05)	0.62(0.05)	1.11(0.06)	1.86(0.10)	1.77	4	.79
3. Used Instagram in order to forget about personal	2.02(0.16)	0.46(0.06)	1.02(0.07)	1.67(0.11)	2.39(0.16)	5.22	4	.27



problems?/¿Usaste

Instagram para  
olvidarte de  
problemas  
personales?

4. Tried to cut down 2.48(0. 0.61(0. 1.10(0. 1.62(0. 2.15(0. 0. 4 .9  
on the use of 21) 06) 07) 10) 14) 1 9

Instagram without  
success?/¿Trataste  
de disminuir el uso  
de Instagram sin  
éxito?

5. Become restless 2.81(0. 0.59(0. 1.18(0. 1.75(0. 2.32(0. 3. 4 .4  
or troubled if you 24) 05) 07) 10) 15) 4 9

have been  
prohibited from  
using

Instagram?/¿Te

pusiste inquieto o  
preocupado si no  
podías acceder a tu  
cuenta de  
Instagram?

6. Used Instagram 2.46(0. 1.13(0. 1.63(0. 2.03(0. 2.74(0. 3. 4 .5  
so much that it has 24) 07) 10) 13) 21) 1 5

had a negative  
impact on your  
job/studies?/¿Usaste

tanto Instagram que  
 tuvo un impacto  
 negativo en tu  
 trabajo/estudios?

---

In regard to the  $b$  parameters values, it was found that they were located within the expected range (-3 to 3), with the minimum being a value of -0.52 ( $b_1$  Item 1) and the maximum a value of 2.74 ( $b_4$  Item 6). In general terms, it is observed that the BIAS items show a better performance when measuring high trait levels of Instagram addiction. As it is possible to appreciate, the components of addiction seem to be associated to different levels of the trait. While item 1 on salience is located at a medium level of the trait, item 6, which refers to the conflict component, is located at a high level of the trait.

The  $a$  parameters showed a mean of 2.69 ( $SD = 0.49$ ) and the distance of each item threshold value was optimal, which would indicate that the scale has a high capacity for discrimination in general terms. The discrimination parameter with the highest value ( $a = 3.45$ ) coincides with item 2 and the lowest value ( $a = 2.02$ ) belongs to item 3.

Table 2 also reports the study of gender DIF. All items presented statistics  $\chi^2$  of the Wald test as not significant ( $p > .05$ ). In conclusion, women and men did not present statistical differences in the estimated parameters for both groups.

### **Relation with other variables**

The association between the BIAS and the total SNAQ score was significant and with moderate intensity ( $r = .577$ ,  $p < .001$ ). Moderate correlations were also found between the BIAS and the Obsession ( $r = .517$ ,  $p < .0001$ ), Lack of control ( $r = .536$ ,  $p < .0001$ ) and Excessive use ( $r = .531$ ,  $p < .0001$ ) SNAQ dimensions.

Table 3 shows the relationship of Instagram addiction to normal and pathological personality variables linked to the tendency to experience negative emotions. These correlations were found to be significant with Neuroticism and, in

particular, with its Anxiety and Impulsivity facets. When studying the pathological traits, the association of BIAS with Negative Affect was modest, standing out in particular, the correlation with the facet of Emotional Lability.

*Table3. Associations between BIAS and Personality Variables*

	<i>Neuroticism</i>						<i>NegativeAffectivity</i>				
	<i>Anx.</i>	<i>Hos.</i>	<i>Dep.</i>	<i>Sel.</i>	<i>Imp.</i>	<i>Vul.</i>	<i>Total</i>	<i>Em. Lab.</i>	<i>Anxs</i>	<i>Sep. Ins.</i>	<i>Total</i>
<i>BIA S</i>	<i>.260*</i>	<i>.208*</i>	<i>.277*</i>	<i>.181*</i>	<i>.272*</i>	<i>.206*</i>	<i>.283*</i>	<i>.279*</i>	<i>.220*</i>	<i>.183*</i>	<i>.295*</i>
	*	*	*	*	*	*	*	*	*	*	*

*Note. BIAS = Bergen Instagram Addiction Scale; N = Neuroticism; Anx. = Anxiety; Hos. = Hostility; Imp. = Impulsivity; Sel. = Self-consciousness; Vul. = Vulnerability; Dep. = Depression; NA = Negative Affectivity; Em. Lab = Emotional Lability; Anxs. = Anxiousness; Sep. Ins. = Separation Insecurity.*

*\*\* p < .001*

### **Reliability analysis**

Ordinal Alpha and an Ordinal Omegacoefficients of .92, 95% CI [0.91, 0.93] were recorded. On the other hand, in the framework of IRT, a marginal reliability of .81 was obtained. All these indicators were optimal, showing a high reliability in global terms.

Figure 1 shows the Test Information Function (TIF) and the measurement error. The TIF has a negative asymmetry, which indicates that the scale is more accurate in measuring high levels of the trait. The information reaches a maximum value of 14.26 around a  $\theta$  of 1.2. On the other hand, the standard estimation error registered a minimum value of 0.26, around the same trait level.

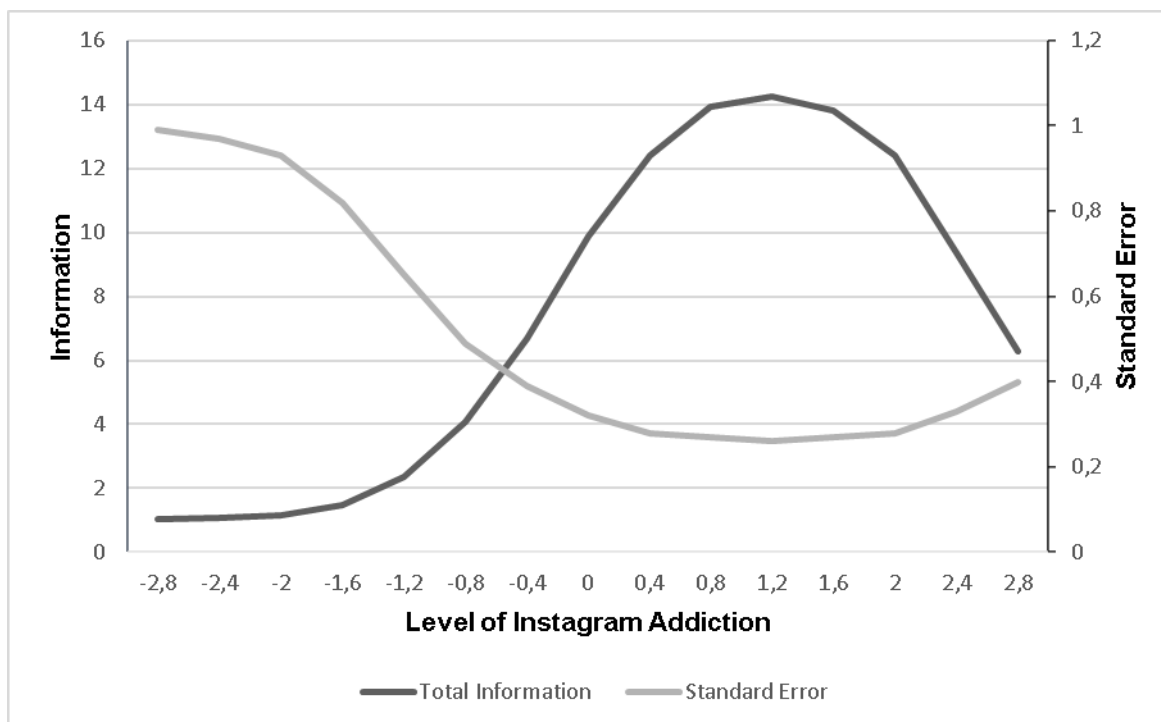


Figure 1. Test information function and Standard Error curves.

### Discussion

The relations that individuals establish with a SNS like Instagram is a complex phenomenon and difficult to analyze. In this regard, it is very important to have better tools at hand for the evaluation of problematic behaviors related to this phenomenon. A better operationalization of the construct allows to deepen its theoretical development and to advance in the study of the potential consequences of the problematic use of SNS. The development of an instrument to measure these behaviors provides empirical information that could help clarify the existing discussion regarding the scope of the construct. Reaching a complete and agreed upon definition of the construct not only allows optimizing the quality of the measurement but also contributes to the consolidation and improvement of the theory.

This study provides evidence of face and content validity that supports the linguistic and conceptual adaptation of the Bergen Facebook Addiction Scale (BFAS) for studying Instagram addiction (BIAS) in Argentinean population. Individuals with high scores on BIAS: a) are constantly thinking about the next

time they use this platform (salience), b) feels the need to increase the time they stay connected (tolerance), c) uses Instagram to control their emotions (mood modification), d) fails in his attempts to reduce the time spent using Instagram (relapse), e) experiences negative emotions when the person cannot connect to Instagram (withdrawal) and f) refers to conflicts with other activities (conflict). In contrast, individuals with low scores stated that these six diagnostic criteria were presented infrequently during the last year.

As other researchers have proposed regarding Facebook (Andreassen et al., 2012; Atroszko et al., 2018) and Social Media Addiction (Stănculescu, 2022), the evidence collected indicates that the Instagram Addiction construct responds to a unidimensional structure (H1). This result provides evidence of validity based on the scale's internal structure and it is in line with those reported in the different BIAS adaptations (Ballarotto et al., 2021; Chavez-Santamaria et al., 2021; Monteiro et al., 2020; Yurdagül et al., 2021). In turn, evidence is provided to show the stability of the theoretical model of behavioral addiction proposed by Griffiths (2005) and highlighting that the diagnostic criteria configure a one-dimensional structure regardless of the behavior that is the object of addiction.

The IRT model analysis of the BIAS scale and, in particular, the GRM, offers a detailed understanding of the relationship between the content of each of the six items (addiction component) and the construct, allowing to examine the response options' discriminative capacity at different levels of the trait (H2). In addition, the six items that make up the instrument were shown to be free of gender differential functioning, demonstrating that they yield invariant scores for males and females. Since it has the lowest discrimination capacity, the mood modification criterion was the least informative for the latent construct compared to the other components. Nevertheless, all the parameters turned out to be very high discriminative if they are interpreted according to the guidelines of Baker and Kim (2017). The salience criterion registered at the lowest threshold parameters, which implies that even with medium levels of addiction, the person perceives that the use of Instagram is one of the most important activities in their lives. Instead,

higher levels of addiction were associated with the tendency to express that the use of Instagram frequently causes conflicts with other activities (the conflict component). Only subjects more than one standard deviation above the trait mean ( $b_1 = 1.13$ ) were more likely to choose category *Rarely* (or a higher one) over *Never* on item 6. The comparison of the threshold parameters of items 1 and 6 also allows us to affirm that the salience criterion, in general terms, is a component with a higher probability of appearing than the conflict criterion.

It is worth highlighting some results obtained in terms of evidence of the instrument's validity based on the connection with other variables. Conforming to the expectations, a strong association was found with the SNAQ and its dimensions. Both instruments evaluate problematic behaviors related to the use of social networks although, unlike the BIAS that analyzes exclusively the use of Instagram, the SNAQ evaluates the construct in a general way without specifying a platform (H3).

Likewise, the relationships found between the BIAS and the Neuroticism and Negative Affectivity dimensions were also in accordance with what is theoretically expected (H4). In particular, Neuroticism is the normal personality trait most frequently associated with Facebook (Kanat-Maymon et al., 2018) and to Instagram addiction (Ershad & Aghajani, 2017; Zarenti et al., 2021). Various findings linked to Facebook indicate that Neuroticism contributes to the development and maintenance of addiction (Biolcati et al., 2018; Toma, 2018). In this sense, the authors argue that individuals with high levels of neuroticism tend to use networks passively (Rozgonjuk et al., 2019), entering more frequently and for longer periods of time (Caci et al., 2014). Insofar as these behaviors probably function as a means to regulate emotions (Marino, et al., 2018) or to run control over information circulating about oneself and one's environment (Moore & McElroy, 2012). Nevertheless, further research on these behaviors on the Instagram social network would be necessary since this type of study is scarce (Balta, et al., 2020; Kircaburun & Griffiths, 2018).

Similar to other investigations (Chavez-Santamaria et al., 2021; Monteiro et al., 2020; Rogowska & Libera, 2022) the scale's internal consistency is high from all the obtained global indicators. However, the result derived from the TIF analysis indicates that the scale is more accurate in discriminating individuals with high levels of the trait(H1). In contrast, the measurement error increases considerably at trait's lower levels. This coincides with the BIAS construction objectives, which seek to detect individuals with high levels of Instagram addiction.

With respect to the present study's limitations, the need to establish a cut-off score is recognized, which will facilitate the detection of individuals with clinically significant levels of Instagram addiction. Andreassen et al. (2012) based their evaluation criteria of other behavioral addictions to propose tentative cut-off points on the original Facebook Addiction scale: a) a liberal approach (three or more points on at least four of the six items) and b) a conservative approach (three or more points on each of the six items). Nevertheless, these criteria were not subjected to studies of diagnostic's sensitivity and specificity. In their study of Chinese adolescents, Luo et al. (2021) used ROC analyzes to determine that 24 is the best BSMAS cut-off score based on clinical diagnostic gold standards. This finding is methodologically interesting, but this cut-off point could be reached without the six components of the theoretical model of behavioral addiction being manifested, a requirement that was highlighted by Griffiths (2017).

Future studies will focus on finding evidence to agree and validate establish a cut-off. Nonetheless, the latter is complex because there are no agreed diagnostic criteria for classifying SNS addictions. The information derived from the measurement of this domain could help clarify the criteria that make it possible to systematize the classification. It is necessary to continue with techniques validation that measure the relation of people with Instagram to identify, intervene and prevent its potential pathological use. At the same time, considering that the BIAS is based on the BFAS, it is also possible to analyze the similarities and differences in the problematic behaviors that could arise due to the effect of using





<http://www.psychiatry.org/practice/dsm/dsm5/online-assessment-measures#Personality>

Andreassen, C. S. (2015). Online Social Network Site Addiction: A Comprehensive Review. *Current Addiction Reports*, 2(2), 175-184. <https://doi.org/10.1007/s40429-015-0056-9>.

Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorder: A large-scale cross-sectional study. *Psychology of Addictive Behaviors*, 30, 252-262. <https://doi.org/10.1037/adb0000160>.

Andreassen, C. S., Torsheim, T., Brunborg, G. S., & Pallesen, S. (2012). Development of a Facebook Addiction Scale. *Psychological Reports*, 110(2), 501-517. <https://doi.org/10.2466/02.09.18>.

Atroszko, P. A., Balcerowska, J. M., Bereznowski, P., Biernatowska, A., Pallesen, S., & Schou Andreassen, C. (2018). Facebook addiction among Polish undergraduate students: Validity of measurement and relationship with personality and well-being. *Computers in Human Behavior*, 85, 329-338. <https://doi.org/10.1016/j.chb.2018.04.001>.

Baker, F. B., & Kim, S. H. (2017). The basics of item response theory using R. Springer.

Balcerowska, J. M., Bereznowski, P., Biernatowska, A., Atroszko, P. A., Pallesen, S., & Andreassen, C. S. (2022). Is it meaningful to distinguish between Facebook addiction and social networking sites addiction? Psychometric analysis of Facebook addiction and social networking sites addiction scales. *Current Psychology*, 1-14. <https://doi.org/10.1007/s12144-020-00625-3>.

Ballarotto, G., Volpi, B., & Tambelli, R. (2021). Adolescent attachment to parents and peers and the use of Instagram: The mediation role of psychopathological risk. *International journal of environmental research and public health*, 18(8), 3965. <https://doi.org/10.3390/ijerph18083965>.

- Balta, S., Emirtekin, E., Kircaburun, K., & Griffiths, M. D. (2020). Neuroticism, trait fear of missing out, and phubbing: The mediating role of state fear of missing out and problematic Instagram use. *International Journal of Mental Health and Addiction, 18*(3), 628-639. <https://doi.org/10.1007/s11469-018-9959-8>.
- Biolcati, R., Mancini, G., Pupi, V., & Mugheddu, V. (2018). Facebook Addiction: Onset Predictors. *Journal of clinical medicine, 7*(6), 118. <https://doi.org/10.3390/jcm7060118>.
- Brand, M., Rumpf, H., Demetrovics, Z., Müller, A., Stark, R., King, D. L., Goudriaan, A. E., Mann, K., Trotzke, P., Fineberg, N. A., Chamberlain, S. R., Kraus, S. W., Wegmann, E., Billieux, J., & Potenza, M. N. (2022). Which conditions should be considered as disorders in the International Classification of Diseases (ICD-11) designation of “other specified disorders due to addictive behaviors”?, *Journal of Behavioral Addictions, 11* (2), 150-159. <https://doi.org/10.1556/2006.2020.00035>
- Caci, B., Cardaci, M., Tabacchi, M. E., & Scrima, F. (2014). Personality variables as predictors of Facebook Usage. *Psychological reports, 114*(2), 528-539. <https://doi.org/10.2466/21.09.PR0.114k23w6>.
- Cai, L., Thissen, D., & Du Toit, S. (2017). *IRTPRO users guide* [Computer software]. Lincolnwood, IL: Scientific Software International.
- Cataldo, I., Billieux, J., Esposito, G., & Corazza, O. (2022). Assessing problematic use of social media: where do we stand and what can be improved?. *Current Opinion in Behavioral Sciences, 45*, 101145. <https://doi.org/10.1016/j.cobeha.2022.101145>.
- Chavez-Santamaria, A., & Vallejos-Flores, M. A. (2021). Diseño y validez de la Escala de Adicción a Instagram de Bergen (BIAS) en adultos peruanos [Design and validity of the Bergen Instagram Addiction Scale (BIAS) in Peruvian adults]. *Propósitos y Representaciones, 9*(1), e973-e973. <https://doi.org/10.20511/pyr2021.v9n1.973>.

- Dias, P. C., Cadime, I., del Castillo-López, Á. G., García-Castillo, F., & del Castillo, J. A. G. (2018). Uso abusivo de Facebook entre universitarios portugueses: contribución a la adaptación de la Bergen Facebook [Excessive Facebook use among portuguese university students: Contributes of the adaptation of the Bergen Facebook Addiction]. *Health and Addictions, 18*(1), 131-139.
- Donnelly, E., & Kuss, D.J. (2016). Depression among users of social networking sites (SNSs): The role of SNS addiction and increased usage. *J. Addict. Prev. Med. 1*(2), 107. Recovered from <http://irep.ntu.ac.uk/id/eprint/29245>.
- Ershad, Z. S., & Aghajani, T. (2017). Prediction of Instagram social network addiction based on the personality, alexithymia and attachment Styles. *Sociological Studies of Youth, 8*(26), 21-34.
- Faelens, L., Hoorelbeke, K., Cambier, R., van Put, J., Van de Putte, E., De Raedt, R., & Koster, E. H. W. (2021). The relationship between Instagram use and indicators of mental health: A systematic review. *Computers in Human Behavior Reports, 4*, 100121. <https://doi.org/10.1016/j.chbr.2021.100121>.
- Fernández Liporace, M. L., & Castro Solano, A. (2015). Personality Inventory for DSM5. Adult Form. Argentinean Version. *Unpublished manuscript*.
- Ferrando, P. J., & Lorenzo-Seva U. (2018). Assessing the quality and appropriateness of factor solutions and factor score estimates in exploratory item factor analysis. *Educational and Psychological Measurement, 78*, 762-780. <https://doi.org/10.1177/0013164417719308>.
- Foroughi, B., Griffiths, M.D., Iranmanesh, M. et al. Associations Between Instagram Addiction, Academic Performance, Social Anxiety, Depression, and Life Satisfaction Among University Students. *Int J Ment Health Addiction 20*, 2221-2242 (2022). <https://doi.org/10.1007/s11469-021-00510-5>
- Griffiths, M. D. (2005). A 'components' model of addiction within a biopsychosocial framework. *Journal of Substance Use, 10*(4), 191-197. <https://doi.org/10.1080/14659890500114359>.

- Griffiths, M. D. (2022). Disorders due to addictive behaviors: Further issues, debates, and controversies. *Journal of Behavioral Addictions, 11* (2), 180-185. <https://doi.org/10.1556/2006.2022.00025>
- Griffiths, M. D. (2017). Behavioural addiction and substance addiction should be defined by their similarities not their dissimilarities. *Addiction, 112*, 1718-1720. <http://doi.org/10.1111/add.13828>.
- Guedes, E., Sancassiani, F., Giovani Carta, M., Campos, C., Machado, S. Spear King, A. L. et al. (2016). Internet Addiction and Excessive Social Networks Use: What About Facebook? *ClinPractEpidemiolMent Health, 12*, 43-48. <https://doi.org/10.2174/1745017901612010043>.
- Huang, C. (2017). Time spent on social network sites and psychological well-being: A meta-analysis. *Cyberpsychology, Behavior, and Social Networking, 20*(6), 346-354. <https://doi.org/10.1089/cyber.2016.0758>.
- Hussain Z, Wegmann E, Yang H and Montag C (2020) Social Networks Use Disorder and Associations With Depression and Anxiety Symptoms: A Systematic Review of Recent Research in China. *Front. Psychol.* 11:211. doi: 10.3389/fpsyg.2020.00211
- Kanat-Maymon, Y., Almog, L., Cohen, R., &Amichai-Hamburger, Y. (2018). Contingent self-worth and Facebook addiction. *Computers in Human Behavior, 88*, 227-235.<https://doi.org/10.1016/j.chb.2018.07.011>.
- Kemp, S. (2022). *Digital 2022: Another year of bumper growth*. Recovered from <https://wearesocial.com/uk/blog/2022/01/digital-2022-another-year-of-bumper-growth-2/>
- Keyte, R., Mullis, L., Egan, H., Hussain, M. Cook, A. &Mantzios, M. (2021) Self-Compassion and Instagram Use Is Explained by the Relation to Anxiety, Depression, and Stress. *J. technol. behav.* 6, 436-441. <https://doi.org/10.1007/s41347-020-00186-z>
- Kircaburun, K. & Griffiths, M. (2018). Instagram addiction and the Big Five of personality: The mediating role of self-liking. *Journal of Behavioral Addictions, 7*(1).<https://doi.org/10.1556/2006.7.2018.15>.

- Kircaburun, K., & Griffiths, M. D. (2019). Problematic Instagram Use: The Role of Perceived Feeling of Presence and Escapism. *International Journal of Mental Health and Addiction*, *17*, 909-921. <https://doi.org/10.1007/s11469-018-9895-7>
- Kircaburun, K., Kokkinoos, C., Demetrovics, Z., Kiraly, O., Griffiths, M., & Colak, T. (2019). Problematic social media use: Results from a large-scale nationally representative adolescent sample. *PloS One*, *12*(1), 891-908. <https://doi.org/e0169839>.
- Kuss, D. J & Griffiths, M. D. (2017). Social Networking Sites and Addiction: Ten Lessons Learned. *Int. J. Environ. Res. Public Health*, *14*(3), 311-325. <https://doi.org/10.3390/ijerph14030311>.
- Lee, J. K. (2020). The effects of social comparison orientation on psychological well-being in social networking sites: Serial mediation of perceived social support and self-esteem. *Current Psychology*, 1-13. <https://doi.org/10.1007/s12144-020-01114-3>.
- Liu, D., Baumeister, R. F., Yang, C. & Hu, B. (2019). Digital Communication Media Use and Psychological Well-Being: A Meta-Analysis. *Journal of Computer-Mediated Communication*, *24* (5), 259-273. <https://doi.org/10.1093/jcmc/zmz013>
- Lorenzo-Seva, U., & Ferrando, P.J. (2013). FACTOR 9.2 A Comprehensive Program for Fitting Exploratory and Semiconfirmatory Factor Analysis and IRT Models [Computer software]. *Applied Psychological Measurement*, *37*(6), 497-498. <https://doi.org/10.1177/0146621613487794>.
- Luo, T., Qin, L., Cheng, L., Wang, S., Zhu, Z., Xu, J., Chen, H., Liu, Q., Hu, M., Tong, J., Hao, W., & Liao, Y. (2021). Determination the cut-off point for the Bergen social media addiction (BSMAS): Diagnostic contribution of the six criteria of the components model of addiction for social media disorder. *Journal of Behavioral Addictions*, *10*(2), 281-290. <https://doi.org/10.1556/2006.2021.00025>

- Lup, K., Trub, L., & Rosenthal, L. (2015) Instagram #Instasad?: exploring associations among Instagram use, depressive symptoms, negative social comparison, and strangers followed. *Cyberpsychology, Behavior, and Social Networking*, 18(5), 247-252. <https://doi.org/10.1089/cyber.2014.0560>.
- Marciano, L., Camerini, A. L., & Schulz, P. J. (2020). Neuroticism in the digital age: A meta-analysis. *Computers in Human Behavior Reports*, 2, 100026. <https://doi.org/10.1016/j.chbr.2020.100026>.
- Marino, C., Gini, G., Vieno, A., & Spada, M. M. (2018). A Comprehensive Meta-Analysis on Problematic Facebook Use. *Computers in Human Behavior*, 83(1), 262-277. <https://doi.org/10.1016/j.chb.2018.02.009>.
- Mayaute, M., & Salas Blas, E. (2014). Construcción y validación del cuestionario de adicción a redes sociales (ARS). [Construction and validation of the questionnaire of social networking addiction (SNA)]. *Liberabit*, 20(1), 73-91.
- McCrae, R. R., & Costa P. T., Jr. (2010). *NEO Inventories professional manual*. Odessa, FL: Psychological Assessment Resources.
- Monacis, L., de Palo, V., Griffiths, M. D., & Sinatra, M. (2017). Social networking addiction, attachment style, and validation of the Italian version of the Bergen Social Media Addiction Scale. *Journal of Behavioral Addictions*, 6(2), 178-186. <https://doi.org/10.1556/2006.6.2017.023>.
- Monacis, L. , Griffiths, M.D. , Limone, P. , Sinatra, M. , & Servidio, R. (2020). Selfitis behavior: Assessing the Italian version of the scale and its mediating role in the relationship of dark traits with social media addiction. *International Journal of Environmental Research and Public Health*, 17, 5738. <https://doi.org/10.3390/ijerph17165738>.
- Monteiro, R. P., Monteiro, T. M. C., Cassaro, A. C. D. B., Lima, M. E. B. D., Souza, N. K. V. D., Ribeiro, T. M. S., & Arantes, T. P. (2020). Instaddiction: Psychometric Properties of the Bergen Instagram Addiction Scale. *Avances en Psicología Latinoamericana*, 38(3), 136-147. <https://doi.org/10.12804/revistas.urosario.edu.co/apl/a.8132> .

- Moore, K., & McElroy, J. C. (2012). The influence of personality on Facebook usage, wall postings, and regret. *Computers in Human Behavior, 28*(1), 267-274. <https://doi.org/10.1016/j.chb.2011.09.009>.
- Naher, L., Hiramoni, F. A., Alam, N., & Ahmed, O. (2021). Psychometric assessment of the Bangla version of the Bergen Social Media Addiction Scale. *Heliyon, 8*(7), e09929. <https://doi.org/10.1016/j.heliyon.2022.e09929>.
- Peters, G.-J. Y. (2014). The alpha and the omega of scale reliability and validity: Why and how to abandon Cronbach's alpha and the route towards more comprehensive assessment of scale quality. *European Health Psychologist, 16*(2), 56-69. <https://doi.org/10.31234/osf.io/h47fv>.
- Phu, B., & Gow, A. J. (2019). Facebook use and its association with subjective happiness and loneliness. *Computers in Human Behavior, 92*, 151-159. <https://doi.org/10.1016/j.chb.2018.11.020>.
- Ponnusamy, S., Iranmanesh, M., Foroughi, B., & Hyun, S. S. (2020). Drivers and outcomes of Instagram Addiction: Psychological well-being as moderator. *Computers in Human Behavior, 107*, 106294. <https://doi.org/10.1016/j.chb.2020.106294>.
- Primi, C., Fioravanti, G., Casale, S., & Donati, M. A. (2021). Measuring problematic Facebook use among adolescents and young adults with the Bergen Facebook Addiction Scale: a psychometric analysis by applying item response theory. *International Journal of Environmental Research and Public Health, 18*(6), 2979. <https://doi.org/10.3390/ijerph18062979>
- R Core Team (2020). *R: A language and environment for statistical computing* [Computer software manual]. Vienna, Austria. Available from <http://www.R-project.org/>
- Reer, F., Tang, W. Y., & Quandt, T. (2019). Psychosocial well-being and social media engagement: The mediating roles of social comparison orientation and fear of missing out. *New Media & Society, 21*(7), 1486-1505. <https://doi.org/10.1177/1461444818823719>.

- Reise, S. P. & Rodriguez, A. (2016). Item response theory and the measurement of psychiatric constructs: some empirical and conceptual issues and challenges. *Psychol Med*, 46(10), 2025 - 2039. <https://doi.org/10.1017/S0033291716000520>.
- Rogowska, A. M., & Libera, P. (2022). Life Satisfaction and Instagram Addiction among University Students during the COVID-19 Pandemic: The Bidirectional Mediating Role of Loneliness. *International Journal of Environmental Research and Public Health*, 19(14), 8414. <https://doi.org/10.3390/ijerph19148414>.
- Royal Society For Public Health. (2017). *Status Of Mind. Social media and young people's mental health and wellbeing*. Recovered from <https://www.rsph.org.uk/uploads/assets/uploaded/d125b27c-0b62-41c5-a2c0155a8887cd01.pdf>.
- Rozgonjuk, D., Ryan, T., Kuljus, J., Täht, K., & Scott, G. (2019). Social comparison orientation mediates the relationship between neuroticism and passive Facebook use. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, 13(1), <https://doi.org/10.5817/CP2019-1-2>.
- Sanz-Blas, S., Buzova, D. and Miquel-Romero, M.J. (2019), "From Instagram overuse to instastress and emotional fatigue: the mediation of addiction", *Spanish Journal of Marketing - ESIC*, 23 (2), 143-161. <https://doi.org/10.1108/SJME-12-2018-0059>
- Sen, K., Prybutok, G. & Prybutok, V. (2022). The use of digital technology for social wellbeing reduces social isolation in older adults: A systematic review. *SSM - Population Health*, 17, 101020. <https://doi.org/10.1016/j.ssmph.2021.101020>.
- Sherlock, M., & Wagstaff, D. L. (2019). Exploring the relationship between frequency of Instagram use, exposure to idealized images, and psychological well-being in women. *Psychology of Popular Media Culture*, 8(4), 482-490. <https://doi.org/10.1037/ppm0000182>



- Soraci, P., Lo Destro, C., Pisanti, R., Melchiori, F.M., Scali, L., Ferrari, A., Cimaglia, R., Spagna, S., Guaitoli, E., Bernardo, C. D., Grieco, D., D'arcangelo, A., Abbatuccolo, L. & Griffiths, M. D. (2022). Italian validation of the Instagram Addiction Scale and association with psychological distress, social media addiction, smartphone addiction, and internet use disorder. *Journal of Concurrent Disorders*. <https://doi.org/10.54127/WZVO6947>
- Stănculescu, E. The Bergen Social Media Addiction Scale Validity in a Romanian Sample Using Item Response Theory and Network Analysis. *Int J Ment Health Addiction* (2022). <https://doi.org/10.1007/s11469-021-00732-7>
- Statista (2022). Instagram: distribution of global audiences 2022. En *Statista -The Statistics Portal*. Recovered on 12 May 2022 from: <https://www.statista.com/statistics/248769/age-distribution-of-worldwide-instagram-users/>
- Thomas, M. L. (2019). Advances in applications of item response theory to clinical assessment. *Psychological Assessment*, *31*(12), 1442-1455. <https://doi.org/10.1037/pas0000597>
- Throuvala, M. A., Griffiths, M. D., Rennoldson, M., & Kuss, D. J. (2019). Motivational processes and dysfunctional mechanisms of social media use among adolescents: A qualitative focus group study. *Computers in Human Behavior*. <https://doi.org/10.1016/j.chb.2018.12.012>.
- Toma, C. M. (2018). Living on a Virtual Planet. Predictors of Facebook Addiction. *Romanian Journal of Cognitive Behavioral Therapy and Hypnosis*, *5*(1-2), 1-11.
- Valkenburg, P. M. (2022). Social media use and well-being: What we know and what we need to know. *Current Opinion in Psychology*, *45*, 101294. <https://doi.org/10.1016/j.copsy.2021.12.006>.
- Vallejos-Flores, M. Á., Copez-Lonzoy, A., & Capa-Luque, W. (2018). ¿Hay alguien en línea?: Validez y fiabilidad de la versión en español de la Bergen Facebook Addiction Scale (BFAS) en universitarios [Is there anyone online?:

- Validity and reliability of the spanish version of the bergenfacebook addiction scale (BFAS) in university students]. *Health y Addictions/Salud y Drogas*, 18(2). 175-183. <https://doi.org/10.21134/haaj.v18i2.394>.
- Varona, M. N., Muela, A., & Machimbarrena, J.M. (2022). Problematic use or addiction? A scoping review on conceptual and operational definitions of negative social networking sites use in adolescents, *Addictive Behaviors*, 134, 107400, <https://doi.org/10.1016/j.addbeh.2022.107400>.
- Waterloo, S. F., Baumgartner, S. E., Peter, J., & Valkenburg, P. M. (2018). Norms of online expressions of emotion: Comparing Facebook, Twitter, Instagram, and WhatsApp. *New Media y Society*, 20(5), 1813-1831. <https://doi.org/10.1177/1461444817707349>.
- Wilson, R. E., Gosling, S. D., & Graham, L. T. (2012). A Review of Facebook Research in the Social Sciences. *Perspectives on Psychological Science*, 7(3), 203-220. <https://doi.org/10.1177/1745691612442904>.
- Wirtz, D., Tucker, A., Briggs, C. & Schoemann, A. M. (2021). How and Why Social Media Affect Subjective Well-Being: Multi-Site Use and Social Comparison as Predictors of Change Across Time. *J Happiness Stud*, 22, 1673-1691. <https://doi.org/10.1007/s10902-020-00291-z>
- World Health Organization (2019). *International statistical classification of diseases and related health problems* (11th ed.). <https://icd.who.int/browse11/l-m/es>.
- Yurdagül, C., Kircaburun, K., Emirtekin, E., Wang, P., & Griffiths, M. D. (2021). Psychopathological Consequences Related to Problematic Instagram Use Among Adolescents: The Mediating Role of Body Image Dissatisfaction and Moderating Role of Gender. *International Journal of Mental Health and Addiction*, 19, 1385-1397. <https://doi.org/10.1007/s11469-019-00071-8>
- Zarenti, M., Bacopoulou, F., Michou, M., Kokka, I., Vlachakis, D., Chrousos, G., & Darviri, C. (2021). Validation of the Instagram Addiction Scale in Greek Youth. *EMBnet.journal*, 26(1), e973. <https://doi.org/10.14806/ej.26.1.973>

## ADAPTATION OF THE BERGEN INSTAGRAM ADDICTION SCALE IN ARGENTINA: CALIBRATION WITH ITEM RESPONSE THEORY

**Authors:** Abal, Facundo Juan Pablo<sup>1, 2</sup>; Sánchez González, Juan Franco<sup>1</sup>; Attorresi, Horacio Félix<sup>1</sup>

<sup>1</sup>: Universidad de Buenos Aires, Instituto de Investigaciones de la Facultad de Psicología, Buenos Aires, Argentina.

<sup>2</sup>: Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Buenos Aires, Argentina.

**Abstract:** The items of the Bergen Facebook Addiction Scale (Andreassen et al., 2012) were adapted to study the construct in Instagram users. This construct is defined as the tendency to be overly concerned about Instagram, spending so much time and effort on this platform to the point of harming other activities in the individual's life, interpersonal relationships and psychological well-being. Different Item Response Theory (IRT) models was applied for polytomous items in order to determine which one best explains the responses of those evaluated. The six items were translated into Spanish and evaluated by an expert jury. A total of 754 Instagram users from the Buenos Aires Metropolitan Area took part in the study (65.8% women). An Exploratory Factor Analysis was performed to verify the unidimensional assumption and the assumption of local independence was corroborated. The results referring to the models fit data allows us to provide evidence that the Grades Response Model (GRM) presents the most adequate parametric structure to shape the subject's responses. All items were adjusted to GRM. Parameters  $a$  ranged from 2.02 to 3.45 (Mean= 2.69; SD=0.49). Parameters  $b$  were located within the expected range (-3 to 3) with a minimum  $\theta$  of -0.51 and a maximum of 2.74. The Ordinal Alpha and Omega were elevated. The Information Function shows a maximum value of 14.26 around a  $\theta$  of 1.2. This function shows a negative asymmetry, indicating that the scale is more accurate for measuring high levels of the trait.

**Key-words:** Social Networking Sites, Behavioral Addiction, Instagram, Item Response Theory, Psychometry, Psychological Assessment.

Abal, Facundo Juan Pablo:

ORCID: <http://orcid.org/0000-0001-7023-5380>

E-mail: [fabal@psi.uba.ar](mailto:fabal@psi.uba.ar)/ [afjp79@gmail.com](mailto:afjp79@gmail.com)

Sánchez González, Juan Franco:

ORCID: <https://orcid.org/0000-0003-1993-4981>

E-mail: [juansanchez@psi.uba.ar](mailto:juansanchez@psi.uba.ar)/ [juansanchez31.31@gmail.com](mailto:juansanchez31.31@gmail.com)

Attorresi, Horacio Félix:

ORCID: <http://orcid.org/0000-0002-3027-1069>

### Statements and Declarations

#### Declarations

The authors have no competing interests to declare that are relevant to the content of this article. The authors work for the Universidad de Buenos Aires. This study was funded by the Universidad de Buenos, UBACyT Project (UBACyT2018 20020170100200BA and UBACyT 2020 20020190200156BA).

#### Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki. The questionnaire and methodology for this study was approved by the Commission

for the Evaluation of Responsible Behaviour in Research of the Faculty of Psychology of the Universidad de Buenos Aires.

**Consent to participate**

Informed consent was obtained from all individual participants included in the study.

**Data availability**

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Accepted manuscript