Psychometric properties of the Social Network Addiction Questionnaire (SNAQ) for undergraduates

Propiedades psicométricas del cuestionario de adicción a las redes sociales (ARS) a población universitaria

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Abstract:

Social network addiction in young people has been extensively studied and associated with multiple factors. Among the scales designed to measure this, the 24-item version of the Social Network Addiction Questionnaire (SNAQ) is one of the most widely used. This study analyses the psychometric properties of the Spanish version adapted to undergraduates. The content and construct validity of the scale was explored using the Rasch model and a confirmatory factor analysis. The data categorisation structure, construct dimensionality, model fit, subject and item reliability, Wright Map structure, and differential item functioning (DIF) were specifically analysed. 1,809 students from 24 Spanish universities participated. The results indicate that the SNAQ presents good reliability and dimensionality, and a good model fit; however, elements in need of improvement are appreciated mainly in the proposed Likert scale, in the development of new items that measure the extremes of addiction to social network sites and in the wording of one item. With respect to factor analysis, three factors were obtained that

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coincide with the original construct. With the improvements that have been observed through validation, the questionnaire could confidently be used to measure the construct in the university population. The instrument fills an important gap in the identification of addictive behaviours in the use of social networks, which could lead to a subsequent intervention involving undergraduates.

Keywords: social networks, addiction, Rasch model, undergraduates, Spain.

Resumen:

Las conductas adictivas hacia las redes sociales en jóvenes han sido ampliamente estudiadas y relacionadas con múltiples factores. Entre las escalas diseñadas para su medición, la versión de 24 ítems del cuestionario de adicción a redes sociales (ARS) es una de las más utilizadas. En este estudio, se analizaron las propiedades psicométricas de la versión española adaptada al alumnado universitario. Se exploró la validez del contenido y del constructo de la escala a través del modelo de Rasch y un análisis factorial confirmatorio. Se analizó específicamente la estructura de categorización de datos, la dimensionalidad del constructo, el ajuste del modelo, la fiabilidad de los sujetos e ítems, la estructura del Mapa de Wright y el funcionamiento diferencial del ítem. Participaron 1809 estudiantes de 24 universidades españolas. Los resultados indican que la ARS presenta buena fiabilidad, dimensionalidad y un buen ajuste del modelo, sin embargo, se aprecian elementos de mejora principalmente en la escala Likert propuesta, en la elaboración de nuevos ítems que midan los extremos de la adicción a las redes sociales y en la redacción de un ítem. Con respecto al análisis factorial confirmatorio, se obtuvieron tres factores que coinciden con el constructo original. Con las mejoras que se han observado a través de la validación se podría utilizar el cuestionario con garantías de medición del constructo en estudiantado universitario. El instrumento cubre un vacío importante en la identificación de conductas adictivas en el uso de las redes sociales, que podría propiciar una posterior intervención con el alumnado universitario.

Descriptores: redes sociales, adicción, modelo Rasch, alumnado universitario, España.

1. Introduction

Social network sites (SNS) have become popular in recent years as a result of people searching for information and having the ability to share it interactively (Kong et al., 2021). This has produced an increase in research that examines the use of SNS in young people (Pertegal-Vega et al., 2019), by analysing the effect of this use on undergraduates' lifestyle habits (Austin-McCain, 2017), the fear of missing out (FOMO, Buglass et al., 2017) or their academic use (Gómez et al., 2012). Numerous studies have focused on exploring the effects of problematic use of SNS among young people (Baker and Algorta, 2016; Banjanin et al., 2015; Seabrook et al., 2016).

Some studies have analysed young people's excessive use of SNS as an impulse

control disorder, considering it to be a behavioural addiction (Fioravanti et al., 2012). According to Suárez-Perdomo et al. (2022), university students present different profiles of SNS addiction, related to academic procrastination; the greater the addiction, the worse the procrastination. Other authors have focused their attention on discovering the prevalence rate of addiction in adolescents (Jacobsen & Forste, 2011). SNS addiction has also been linked to social life, with the conclusion that this addiction increases the incidence of disorders such as depression, stress and anxiety (Azizi et al., 2019).

In the university setting, conditions relating to emotional problems have been identified as having the same pattern as in other addictions: the person generally becomes an addict to the behaviour as a relief from negative feelings, or as an escape or control mechanism (Balakrishnan & Shamim, 2013; Busalim et al., 2019). Other associated, relational problems include the fact that people who demonstrate SNS addiction are more concerned about friendships online than those offline (Çam & Isbulan, 2012). This addiction, moreover, produces unease, anguish, anxiety and symptoms of depression which may lead to isolation from the social environment (Kuss & Griffiths, 2017). SNS addiction has also been linked to health problems, as their excessive use may cause sleep disorders (Fossum et al., 2014), as well as encouraging a sedentary lifestyle involving a lack of exercise, rest and recovery which could lead to problems related to psychological and physiological deterioration over time (Andreassen, 2015; Xanidis & Brignell, 2016).

Considering that students with an addiction to SNS spend more time online than performing other types of activities, one of the most-studied repercussions is the effect on academic achievement. To this effect, it is expected that students with addictive behaviours involving SNS will show lower academic achievement (Andreassen, 2015). However, Mushtaq and Benraghda (2018) evaluated the positive and negative effects of SNS in academic achievement and observed that undergraduates view SNS as useful tools for the performance of academic achievement activities. Likewise, different studies (e.g., Arquero & Romero-Frías, 2013; O'Keeffe & Clarke-Pearson, 2011) have demonstrated the potential of SNS when they are used for educational purposes.

According to Cao et al. (2018) the excessive use of SNS does not automatically determine addiction. For this reason, it is deemed necessary to have sensitive instruments that can accurately identify whether or not a person shows SNS addiction. In this sense, Andreassen (2015) enumerated a set of instruments to detect SNS addiction, focusing particularly on the addiction to Facebook. Table 1 briefly presents the instruments identified.

The literature also includes the Social Network Addiction Questionnaire (SNAQ) (ARS, Escurra & Salas, 2014), based on the DSM-IV-TR by the American Psychiatric Association (APA, 2008), which does not recognise psychological addictions as disorders. The authors' objective was to diagnose SNS addictions as harmful to students' education.

TABLE 1. Measurement instruments for social network addiction.

Instrument	Authors (year)	Items	Characteristics
Bergen Facebook Addiction Scale (BFAS)	Andreassen et al. (2014)	6	Analyses addiction to Facebook, using the following criteria for addiction: salience, mood modification, conflict, withdrawal, tolerance and relapse. It is scored on a five-point scale (1 very rarely, 5 very often).
Facebook Dependence Questionnaire (FDQ	Wolniczak et al. (2013)	8	Measures dependence on Facebook. The set of items is based on a scale of internet addiction and measures self-control, satisfaction, time spent and efforts to reduce this, concerns, anxiety and other activities/issues related to Facebook. Dichotomous nominal response system (Yes/No).
Social Networking Website Scale (SNWAS)	Turel & Serenko (2012)	5	Based on the Computer Engagement/Addiction Scale by Charlton and Danforth (2007). The items are scored on a seven-point scale (1 completely disagree, 7 completely agree).
Addictive Tendencies Scale (ATS	Wilson et al. (2010)	3	Based on general addiction theory and research into excessive use of texting and instant messaging. Composed of three basic criteria: salience, loss of control and withdrawal. The items are all scored on a seven-point scale (1 completely disagree, 7 completely agree).

To do so, they used a panel of experts in clinical, educational and psychometric psychology for the drafting, comprehension and clarity of the definitions and coherence of the items in order to reach a clear diagnosis of possible addiction. The first step was the substitution of the concept of substance for that of SNS. The instrument was subdivided into three dimensions:

1. *Obsession with social network sites*. Conceptually this covers mental engagement with SNS, through constantly thinking, even fantasising, about being online, demonstrating anxiety and worry about lack of access.

2. *Lack of self-control in the use of social networks*. Concern about lack of self-control over SNS use with the resulting neglect of academic tasks and studies.

3. *Excessive use of social networks*. Difficulty in controlling the use of SNS, demonstrating overuse

and overexposure, which indicates the impossibility of exercising self-control when using these networks and being incapable of reducing the time spent on social network sites.

This instrument contains elements that can contribute to the analysis and diagnosis of SNS addiction in university students, favouring the evaluation of its consequences for academic success. In view of the foregoing, the objective of this study is to validate the Spanish version of the SNA ("ARS") Questionnaire (Escurra & Salas, 2014). Thus, the intention is to obtain an instrument with defined psychometric indicators of construct validity according to the parameters provided by the Rasch model. The purpose is to enable its use to confidently obtain accurate measurements of addictive behaviour relating to social networking among undergraduates.

2. Method

2.1. Participants

1,809 Spanish undergraduates participated from 24 Spanish universities, of which 1,316 (72.7%) were female, 465 (25.7%) male and 28 (1.5%) non-binary. According to their autonomous region in Spain, 32.6% were from the Canary Islands, 17.9% from Andalusia, 14% from Madrid, 8.6% from the Basque Country, 7.4% from Castilla and León, 7.2% from Catalonia, 7.1% from Galicia, 4.1% from Asturias, with under 1% from the regions of La Rioja, Cantabria, Aragón and Extremadura. The average age of the participants was 21.7 years old (SD = 5.62), with ages ranging from 17 to 70 years old. 27.8% were in their first year, 30% in their second, 21.3% in their third, 17% in their fourth and 3.9% in their fifth year, the latter studying degrees in faculties such as Sciences, Health Sciences or Fine Arts. Purposive sampling was conducted, focusing principally on two criteria: 1) access to institutional e-mail accounts belonging to departments attached to universities and 2) representation in the sample of all the autonomous regions in Spain.

2.2. Instrument

The SNA questionnaire (Escurra & Salas, 2014), adapted to the university population, contains 24 items divided into three factors. The first factor collects information about obsession with SNS (10 items; $\omega = .90$), the second factor about the lack of self-control in SNS use (6 items; $\omega = .87$) and the third factor about excessive SNS use (8 items; $\omega = .87$). Table 2 shows the items that comprise the scale ($\omega = .95$).

The item response options are presented on a five-category Likert scale (where 1 is completely disagree and 5 is completely agree) According to the publication by Escurra & Salas (2014), the SNA exceeds the critical values that have been scientifically established for reliability indices (α). We therefore analysed the RMSEA, NNFI, TLI, GFI, NFI, AGFI and CFI values, adjusted to fit the indices recommended by the scientific community.

TABLE 2. Items on the SNA scale.

Items	Code
I feel a great need to stay connected to social networks.	A01
I need to spend an increasing amount of time on my social networking.	A02
The amount of time that I used to spend online on social network sites is no longer enough, I need more.	A03
As soon as I wake up, I connect to social network sites.	A04
I do not know what to do when I disconnect from social network sites.	A05
I get in a bad mood when I cannot connect to social network sites.	A06
I feel anxious when I cannot connect to social network sites.	A07
Going on social network sites and using them gives me with a feeling of relief, I relax.	A08
When I go on social networks I lose track of time.	A09
I generally spend more time on social network sites than I originally intended to.	A10
I think about what might be happening on social networks.	A11
I think about controlling my activity as regards connecting to social networks.	A12
I can disconnect from social networking for several days.	A13
I try unsuccessfully to control my habits concerning prolonged and intense use of social network sites.	A14
Even when I am involved in other activities, I cannot stop thinking about what is happening on social networks.	A15
I spend a lot of time during the day going in and out of social network sites.	A16
I spend a long time on social network sites.	A17
I keep an eye on the notifications that social network sites send me on my phone or computer.	A18
I neglect my friends or family as a result of social networking.	A19
I neglect my tasks and studies as a result of social networking.	A20
Although I am in class, I secretly go on social network sites.	A21
My partner, friends or family have drawn my attention to the time and energy I dedicate to things on social network sites.	A22
When I am in class and not online on social networks, I feel bored.	A23
I think the intensity and frequency with which I go on and use social networking is a problem.	A24

2.3. Procedure

Firstly, the Comité de Ética de la Investigación y de Bienestar Animal (*Committee on Ethics in Research and Animal Well-Being*) at the Universidad de La Laguna approved the questionnaire as being suitable (CEIBA2021-0464). Secondly, we contacted departmental administration teams at different universities by institutional e-mail, requesting that the text attached be distributed to all the teaching staff. Likewise, using the snowball technique, we asked the teachers to share an introductory text providing information about the purpose of the study and a link to the questionnaire to be completed, through their Virtual Classrooms. To ensure that ethical procedures were followed, informed consent was sought and anonymity was guaranteed, in accordance with Organic Law 3/2018, of 5 December, on Personal Data Protection and Guarantee of Digital Rights.

2.4. Statistical analyses

To analyse the psychometric properties of the SNA questionnaire, we used the Rasch Andrich Rating Scale Model by Andrich (1988), by means of the statistical package Winsteps 3.90.0 by Linacre (2015). Analysis was conducted on the data categorisation structure, psychometric dimensionality, fitting the data to the model (validity) and reliability. In addition to the statistical analysis, we used the following tools: the Wright Map and differential item functioning (DIF) on several variables (gender, age, autonomous region and academic year).

To assess the effectiveness of the response categories, the data categorisation structure should satisfy the following conditions for it to be considered as correctly calibrating the categories (Oreja-Rodríguez, 2015; Azpilicueta et al., 2019): (1) there should be at least 10 observations per response category to set stable threshold values; (2) the mean measures and thresholds should increase progressively as the variable increases on the scale of measurement; (3) the OUTFIT values should be below 2, as a value greater than 2 indicates that the category offers more misinformation than information; (4) the measures obtained should increase in value.

Regarding the construct dimensionality, this was verified by conducting a Principal Components Analysis of Residuals (PCAR) of the items. The dimensionality was calculated by establishing an expectation of probability depending on the difficulty of each item and the ability of each person (Bond and Fox, 2012). Linacre (2009) suggests that the recommended value of the gross variance explained by the measures should be ≥50% and the gross variance explained by the items should be over four times the unexplained variance in the first contrast.

The reliability of the scale was calculated by means of the parameters established between the subjects and the items, which were interpreted using Cronbach's alpha, with the range of measurement being between 0 and 1. An acceptable minimum value is .70 (Sekaran, 2000). Another indicator of reliability is the separation measure,

which indicates the number of levels in standard error units, into which the sample of items and persons can be grouped. In Rasch (1980), the reliability index for separation (subjects and items) is equivalent to the KR-20 coefficient for dichotomous items or to the Cronbach's alpha coefficient in polytomous scales (Oreja-Rodríguez, 2015). For the separation and reliability indices, the items are considered to be sufficiently separated into difficulty levels to allow the sense and meaning of the latent variable to be reproduced (Wright and Stone, 2003). On one hand, the "person" separation index enables us to determine the ability of the instrument to separate persons along the variable measured. On the other hand, the "item" separation index allows us to determine the strata relating to features that the items can distinguish. The greater the separation, the better the instrument will separate person ability and item difficulty (Wright, 2002).

The Wright Map for combined measurement enables us to observe the position on the continuum of both persons and items graphically. Furthermore, differential item functioning (DIF) enables the identification of bias in item interpretation. A significant contrast between two groups of persons is one which presents a difference of >.50 logits with $p \leq .05$ when a two-tailed Welch's test of statistical significance is calculated (García-Álvarez, 2015). Finally, the results of the Confirmatory Factor Analysis were $\chi 2\ (1808, 227) = 5493.823$ ($p < 0.001$), RMSEA = .113, CFI = .86 and TLI = .85.

3. Results

3.1. Analysis of the data categorisation structure

The scale presents more than 10 observations per category. The mean measures and thresholds (calibration) increase monotonically. The OUTFIT index in all categories is close to 1. Furthermore, it can be observed that the measures obtained increase in value. The combined results enable us to determine optimal categorisation in the response categories established (Table 3).

In this case, the distance between the thresholds was not greater that the 1 logit established for a five-category Likert scale.

TABLE 3. Summary of the five-category structure.

Response category	Observed count	Mean measure	Outfit MNSQ	Thresholds (calibration)	Means
1	14875	-1.48	1.17	None	(-2.16)
2	9841	-.74	.97	-.71	-.84
3	7680	-.25	.83	-.29	-.03
4	6520	.20	.93	.13	.82
5	4312	.64	1.31	.87	(2.24)

3.2. Psychometric dimensionality

Following the analysis of the psychometric dimensionality, from the unexplained gross variance in the first contrast it was observed that this can provide information regarding dimensionality. Using PCAR, we were able to conclude that the test only measures one dimension, as a second dimension would need to have the strength of at least two items to be above the noise level (Table 4).

TABLE 4. Variance of standardised residuals.

	Value	Empirical	Modelled
Total gross variance	48.0266	100.0%	100.0%
Gross variance explained by the measures	24.0266	**50.0%**	51.1%
Gross variance explained by the persons	6.3106	**13.1%**	13.4%
Gross variance explained by the items	17.7161	**36.9%**	37.7%
Unexplained gross variance (total)	24.0000	**50.0%**	48.9%
Unexplained gross variance in 1st contrast	**2.5097**	5.2%	–
Unexplained gross variance in 2nd contrast	2.0595	4.3%	–
Unexplained gross variance in 3rd contrast	1.8496	3.9%	–
Unexplained gross variance in 4th contrast	1.6157	3.4%	–
Unexplained gross variance in 5th contrast	1.4760	3.1%	–

The data in Table 4 show the empirical and modelled values. The data obtained enable the verification of optimal dimensionality, as they present a gross variance explained by the measures of ≥50% and a gross variance explained by the items (36.9%) of over four times the unexplained variance in the first contrast. Additionally, the eigenvalue of the unexplained gross variance in the first contrast is 2.5097, close to 2.

The PCAR process (applied to the residuals) decomposes the correlation matrix to find components (or latent factors) with which the items may have a strong correlation (factor loading). After finding the first component, the attenuated correlation in each combination has a minimum value of .829 points, indicating a correlation between the items and enabling the measurement of the latent variable. The detailed analysis of the standardised residuals in the first contrast reflects an item with a factor loading of over .50 (A06 =.53).

3.3. Model fit (validity)

The results indicate a good fit to the model for items and persons according to the INFIT and OUTFIT values found

(between .5 and 1.5). The items outside the MNSQ (mean square) fit range are considered to be overestimated (very predictable) or underestimated (erratic). Following the analysis of the INFIT and OUTFIT indices (Table 5), it can be observed that, with the exception of A13, the items present values that are within the permitted range (.5 and 1.5). In contrast item A13 presents misfit values in the INFIT and OUTFIT indices (2.98 and 4.43 respectively) (Table 5).

TABLE 5. Estimates of INFIT and OUTFIT.

Item	Total score	Measure	Standard error	INFIT MNSQ	OUTFIT MNSQ	PTMEA values
A13	5765	-.79	.02	2.98	4.43	-.24
A18	5087	-.45	.02	1.22	1.24	.52
A12	5868	-.84	.02	1.21	1.22	.60
A21	4957	-.38	.02	1.14	1.16	.54
A22	3177	.70	.03	1.10	.98	.54
A04	6122	-.98	.02	1.06	1.08	.60
A19	2711	1.15	.03	1.04	.89	.52
A23	3758	.29	.03	1.03	1.00	.56
A09	6141	-.99	.02	.98	1.02	.59
A11	3603	.39	.03	1.02	1.01	.57
A14	4334	-.04	.02	.90	1.00	.62
A05	3127	.73	.03	.99	.89	.56
A08	4136	.06	.02	.93	.98	.55
A07	2967	.89	.03	.95	.82	.57
A06	2893	.95	.03	.92	.88	.54
A15	2673	1.19	.03	.91	.80	.56
A02	3695	.33	.03	.82	.88	.56
A10	6260	-1.05	.02	.83	.87	.66
A03	3138	.74	.03	.85	.80	.56
A20	4322	-.04	.02	.82	.80	.65
A24	4567	-.18	.02	.75	.71	.72
A01	5081	-.43	.02	.63	.69	.65
A16	5434	-.62	.02	.61	.62	.72
A17	5422	-.62	.02	.58	.59	.72
Mean	4384.9	.00	.03	1.01	1.06	
P.SD	1178.8	.71	.00	.44	.72	

We also examined the correlation between the measures in order to perform a diagnosis regarding possible incorrect data coding or errors in items. With the exception of A13, the correlation between the item measures demonstrates positive values. Item A13 presents a negative value (-.24), which indicates incongruence or errors in the data coding.

3.4. Reliability

For this questionnaire the indices of separation (26.13) and reliability (1) for the items were considered to be optimal. Similarly, the indices of separation (2.75) and reliability (.88) for the persons also proved to be satisfactory. To interpret these indices, for persons an index of >2 for separation and .80 for reliability were considered to be acceptable and for items >3 for separation and .90 for reliability (Linacre, 2018). The measurement error of the 24 items was .03 (Table 5).

3.5. Structure of Wright Map

Graph 1 shows the structure of the Wright Map, which reflects the distribution of persons (left-hand side) and items (right-hand side) together.

Graph 1 allows us to analyse the distribution of persons and items and their influence on the effectiveness of the questionnaire. The persons have a normal distribution, which is frequent behaviour. The items present a restricted distribution in a narrow range where there is clustering of items some cases. Items A15 and A19 show the lowest level of addiction (they discriminate the highest levels of addiction) and items A09 and A10 the highest (they discriminate the lowest levels of addiction).

In a joint analysis of persons and items, Graph 1 shows, at the top and bottom (left-hand side), extreme values at the person feature level, with very distant values in comparison to the item distribution (right-hand side). Equally, it can be observed that the latent feature level demonstrated by the persons tends to be lower than that scored by the items; the mean person measure (M on left-hand side) is lower than the mean item measure (M on right-hand side).

3.6. Differential item functioning (DIF)

We also analysed the differential item functioning (DIF) to compare the general validity of the items in different groups. The DIF analysis was conducted on the grouping variables “gender”, “autonomous region”, “age” and “academic year”, with “gender” proving to be the variable showing differential functioning. Table 6 presents the items that function differentially compared to participant gender, with items A11, A18 and A20 having particular significance (Table 6).

A positive DIF effect size indicates that the item is more difficult for the reference subject than for the comparison subject. In contrast, a negative DIF effect size indicates that the item is easier for the reference subject compared to the other. In terms of addiction, the results indicate that items A11 and A18

appear less frequently among males than among non-binary people. In turn, item A20 appears more frequently among females than among non-binary people. In general, the differential item functioning can be classified at a moderate level.

GRAPH 1. Wright item-person map for addiction to social network sites.

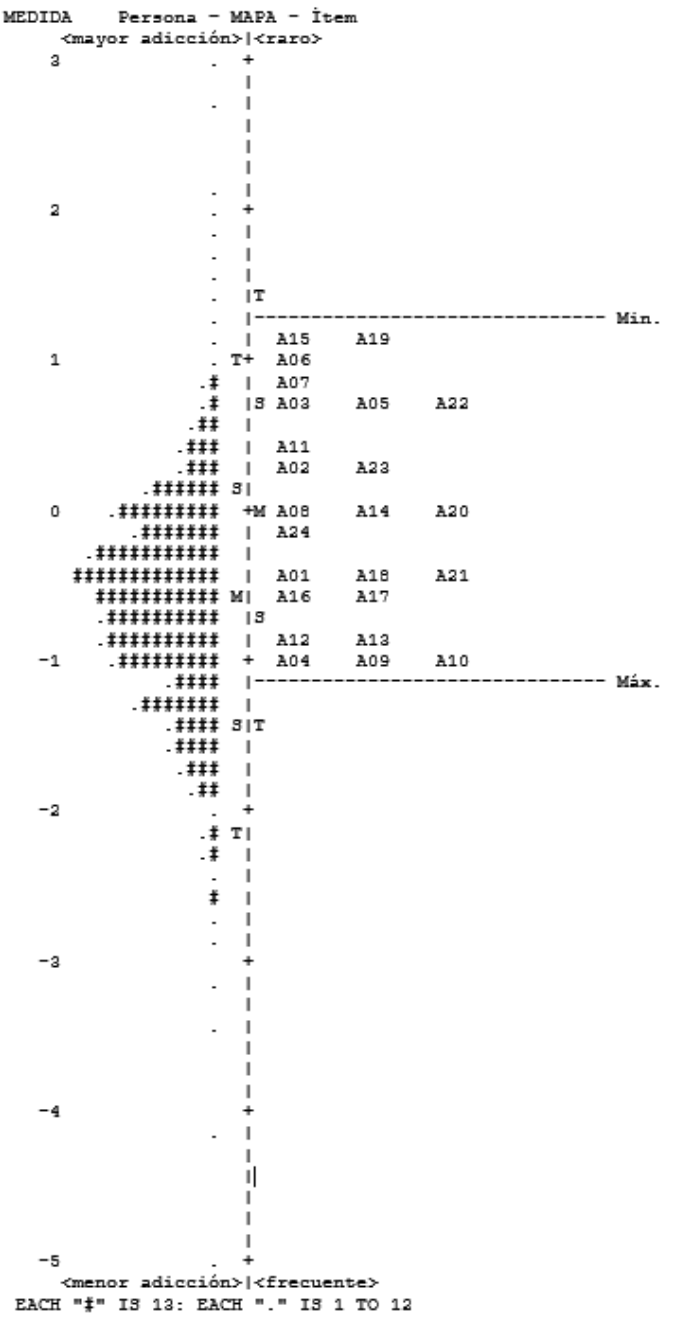

TABLE 6. Items with differential functioning (DIF).

Gender	Measure DIF	Gender	Measure DIF	DIF size	Prob. Rasch-Welch	DIF in favour of gender	Item
Male	.29	Non-binary	.81	-.52	.0265	Male	A11
Male	-.48	Non-binary	.05	-.52	.0131	Male	A18
Female	.00	Non-binary	-.59	.59	.0050	Non-binary	A20
Non-binary	.81	Male	.29	.52	.0265	Male	A11
Non-binary	.05	Male	-.48	.52	.0131	Male	A18
Non-binary	-.59	Female	.00	-.59	.0050	N	A20

3.7. Confirmatory factor analysis

Lastly, we conducted a confirmatory factor analysis, after eliminating item 13 as a result of the previous analysis. A three-factor CFA was performed, based on the estimation of the STDYX standardisation of the model with a significance of p≤ .001. Table 7 shows each of the items and factor weightings belonging to the corresponding factors.

TABLE 7. Factor weightings corresponding to the items according to the factor they belong to.

Item	Factor weighting
Factor 1. Obsession with social network sites	
A02	0.711
A03	0.737
A05	0.705
A06	0.769
A07	0.793
A15	0.762
A19	0.683
A22	0.676
A23	0.685
Factor 2. Lack of self-control in the use of SNS	
A04	0.645
A11	0.680
A12	0.681
A14	0.730
A20	0.738
A24	0.865

Factor 3. Excessive use of SNS.	
A01	0.740
A08	0.608
A09	0.636
A10	0.729
A16	0.817
A17	0.827
A18	0.537
A21	0.578

4. Discussion

The objective of this study was to analyse the psychometric properties of the Social Network Addiction Questionnaire (SNA; Escurra and Salas, 2014) by applying the Rasch model. This model enables us to, as indicated by Zamora-Araya et al. (2018) improve the study and the interpretation of attitude scales, as long as the estimated person and item values are on the same scale of latent units; this provides a joint measurement that can be used for interpretations referring to the criterion in terms of qualitative descriptions of the respondent. Furthermore, the interpretation of the Rasch model scores is not based on group rules, but rather it can be based on the item content and the processes in which the person has a high or low response probability, meaning that this feature of the model has great diagnostic power (Zamora-Araya et al., 2018).

In the analysis of the data categorisation structure, the distance between the thresholds of each category should establish that each step defines a different feature in the variable (Azpilicueta et al., 2019). According to Linacre (2002), the distance between thresholds diminishes as the number of response categories rises, so he therefore recommends that polytomous items should advance at least 1 logit for a five-category scale but no more than 5 logits to avoid wide gaps in the variable. The results of this analysis show that the distance between the thresholds in each category did not exceed 1 logit, which suggests that the test could be extended to a seven-category Likert scale with the purpose of increasing the level of measurement.

Likewise, optimal psychometric indicators of dimensionality were obtained. The results showed an eigenvalue for the unexplained gross variance in the first contrast that was slighter higher than recommended, but a statistical analysis of the data set allowed us to conclude that this was a small disturbance in the data (Linacre, 2018) lacking the sufficient strength to be considered as a second dimension.

In the validity analysis, the results confirmed, in general, that the basic

psychometric requirements of the Rasch model have been met, as recommended by Linacre (2015, 2018), which proves the construct validity of the test and good functioning for each of the items. Nevertheless, as regards the fit of the data to the model, both in the MNSQ fit and the correlation analysis, a bad fit was detected in item 13. After revising item 13, a grammatical connotation was observed in the question that was different to the rest, in that the positive connotation of the item under examination differs from the negative connotations of the remaining 23 questions. This observation suggested that we should modify question 13 grammatically.

In relation to reliability, the indices for separation and reliability located on the scale are optimal.

As for the Wright Map, the analysis provided information about the person-item distribution. Firstly, a narrow distribution was observed for the items across the range of measurement. Secondly, we detected item clustering in some of the measure levels. Lastly, a lack of measurement was observed for the persons with extreme values, both at the top and bottom. Concerning the information as a whole, this leads to the suggestions that the test could benefit from the incorporation of items based on new issues concerning addiction that allow a greater level of addiction to be measured.

The results of the statistical analyses allow us to determine that the items in the factors established, with the exception of item 13, adequately cover the spectrum of the construct under evaluation. The same does not occur with the results of the joint analysis, where an abnormal distribution of the items analysed was observed.

Generally, and with the focus on the parameters demonstrated in the Rasch model, the psychometric indicators obtained prove the validity of the construct and suggest, apart from the recommendations, that the instrument can be confidently used to measure behaviours of addiction to SNS among undergraduates. Likewise, the confirmatory factor analysis identifies three factors, as did the original instrument (Escurra and Salas, 2014). Although, in this case, by eliminating item 13, in which a discordant element was identified. This instrument intends to fill a significant gap in the evaluation of problematic undergraduate behaviours that may be favouring SNS addiction (Liu and Ma, 2020). Having an instrument that is sensitive to these behaviours is of vital importance, as most instruments require greater validation (Andreassen, 2015). For this reason, the corrections made to the SNA using the values obtained by the Rasch model will enable effective identification of patterns of obsessive or excessive undergraduate behaviour relating to lack of self-control in the use of SNS, which will be of assistance in subsequent psycho-pedagogical interventions involving these students.

5. Conclusions

1. The test could be expanded to a seven-category Likert scale.

2. The Social Network Addiction Questionnaire (in its version in Spanish) should correct item 13.

3. The Social Network Addiction questionnaire should incorporate items based on new addictive behaviours to enable a greater level of addiction to be measured.

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