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Evaluation of the Selfitis Behavior Scale Across Two Persian-Speaking Countries, Iran and Afghanistan: Advanced Psychometric Testing in a Large-Scale Sample

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Abstract

Selfitis—which started off as a hoax but has now been investigated empirically—has been defined as the obsessive–compulsive desire to take photos of oneself and post them on social media. Furthermore, a scale to assess selfitis, the Selfitis Behavior Scale (SBS), has been developed. This study applied advanced psychometric testing methods, including confirmatory factor analysis (utilizing classical test theory) and the Rasch model (utilizing modern test theory), to examine the psychometric properties among Persian speakers (in Iran and Afghanistan). The participants (3163 Iranians and 1100 Afghanistani) completed an online survey posted on *Instagram* pages. The SBS showed promising properties, including satisfactory reliability (e.g., internal consistency and test–retest reliability), excellent construct validity (e.g., good fit in the CFA and Rasch models), and acceptable measurement invariance across Iranian and Afghan samples. Consequently, the SBS is a valid and reliable instrument for assessing selfitis among Persian-speaking samples.

Keywords Social media use · *Instagram* use · Selfie-taking · Selfitis · Selfitis Behavior Scale

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Modern online activities, such as using social media and internet gaming, have become part of daily lives for most teenagers and young adults (Lin et al. 2017a). Acknowledging the negative psychosocial effect of addiction to such internet-relevant activities among a small minority, the latest (fifth) edition of the *Diagnostic and Statistical Manual of Mental Disorders* (i.e., DSM-5) recognized Internet Gaming Disorder (IGD) as a tentative disorder (American Psychiatric Association 2013). Similar to IGD, other behaviors related to internet use, such as excessive social media use and habitual selfie-taking, have also become potential problems for a small number of individuals' psychological well being (Chen et al. 2019; Leung et al. 2019; Yam et al. 2019). Given the rise of well-known social media platforms (e.g., *Facebook*, *Twitter*, *Instagram*), there has been a growing interest of research investigating problematic social media use and social media addiction in the contemporary literature on behavioral addiction (Alimoradi et al. 2019; Montag et al. 2015, 2017). However, unlike social media use, selfie-taking is rarely discussed in the current literature although posting selfies is a very common-place activity on social media platforms (e.g., uploading selfies to sites such as *Facebook* and *Instagram*).

Selfitis appears to be another candidate within the scope of internet-related behaviors and has been defined as "the obsessive compulsive desire to take photos of one's self and post them on social media" (Griffiths and Balakrishnan 2018; p. 4). Like other online activities, selfie-taking is a self-oriented action that allows users to establish their individuality and self-importance (Balakrishnan and Griffiths 2018). In addition to merely taking photographs, the uploading of selfies among adolescents and young adults also involves editing of the color and changing backgrounds, management of the social media platform, and interaction with other users on the same platform discussing the uploaded selfies (Balakrishnan and Griffiths 2018).

Although some scholars have claimed that the obsessive taking of selfies can be an addiction (Kaur and Vig 2016; Kela et al. 2017; Shah 2015; Singh and Lippmann 2017) and that selfitis might be more common among those with a "selfie addiction" (Griffiths and Balakrishnan 2018), little empirical research has been carried out. To date, only a few studies, mainly in Asia, have examined the negative impacts of habitual selfie-taking on psychological and physical health (Dokur et al. 2018; Pantic et al. 2017). Such studies have concluded that selfie addiction is most associated with narcissism, self-centered behavior, low self-esteem, loneliness, and depression (Pantic et al. 2017). However, these studies did not use any psychometric instruments to assess selfie behavior.

Research and awareness of selfitis remain limited, and there are no large-scale epidemiological studies examining the potential negative effects of selfie-taking. The lack of proper definition criteria (and the fact that selfitis began as a hoax) has made study-to-study comparison difficult (Balakrishnan and Griffiths 2018). Given the lack of appropriate instrumentation, Balakrishnan and Griffiths (2018) developed the Selfitis Behavior Scale (SBS) among the population of Indian university students. However, no follow-up studies have examined the psychometric properties of the SBS apart from the original psychometric evaluation study by Balakrishnan and Griffiths. More specifically, after using focus groups to identify the underlying variables of selfitis, Balakrishnan and Griffiths (2018) only carried out basic psychometric testing to evaluate the reliability and validity of the SBS (e.g., exploratory factor analysis and internal consistency). Because the evidence of psychometric properties should be accumulated for each specific instrument among different populations (Lin et al. 2017b; Lin et al. 2019a), the SBS needs further investigation in a population other than Indians. Additionally, the investigations should apply advance psychometric testing methods (e.g., confirmatory factor analysis [CFA]).

The purpose of the present study was to apply advance psychometric testing methods, including CFA (utilizing classical test theory) and the Rasch model (utilizing modern test theory; Lin et al. 2019b), to examine the psychometric properties among Persian speakers. More specifically, participants from two countries (Iran and Afghanistan), whose official language is Persian, were recruited to understand whether the SBS is valid in both countries. Furthermore, the psychometric testing in the present study examined whether the SBS (after ensuring its reliability and validity) is interpreted similarly between Iranian and Afghanistani individuals.

Methods

Participants and Procedure

The target participants were *Instagram* users from Iran and Afghanistan. More specifically, a call for participation was conducted using an online survey with free advertisements posted on popular Persian *Instagram* pages. The online survey was administered using Qualtrics. The final sample comprised 4263 participants (Iranian = 3163 and Afghanistani = 1100). Prior to completing the survey, potential participants were directed to the welcome page containing information about the purpose of the research. Those participants who agreed to participate were asked to sign an informed consent form online. Eligibility criteria included that participants had to be 18 years or older and have an *Instagram* account. These participants were provided with a possibility to participate in a movie ticket draw, as compensation for their participation. The study procedure was approved by the ethics committee of the research team's university.

Translation Process

After obtaining formal permission from the SBS developers, international guidelines regarding cross-cultural adaptation were used to translate the SBS into Persian (Beaton et al. 2000). Several steps were carried out in the translation process. In the first step, two bilingual translators whose mother tongue was the Persian language translated the English SBS into Persian. In the next step, the same two bilingual translators and the corresponding author of the present paper compared the translated versions and resolved discrepancies. Then, an interim Persian version was synthesized. In the third step, two bilingual translators who are native English speaker and were not aware of the original SBS independently translated the interim Persian version back to English. After the two back translations were completed, an expert committee (comprising a psychologist, psychiatrist, sociologist, psychometrician, and nurse) reviewed all translated versions and produced a pre-final version. The pre-final version was then piloted on 51 individuals (28 women and 23 men with mean age of 21.64 ± 5.81 years). A cognitive interview was also conducted to test the feasibility and understanding of the items.

Instruments

Selfitis Behavior Scale The SBS is a newly developed instrument to assess the subdomains of selfitis. In the original study, after carrying out focus group interviews with 225 Indian

university students, six domains were identified, which are as follows: environment enhancement, social competition, attention seeking, mood modification, self-confidence, and subjective conformity (Balakrishnan and Griffiths 2018). Following this, an exploratory factor analysis utilizing 400 Indian students was applied to examine the SBS structure. The SBS comprises 20 items that are rated using a five-point Likert scale (1 = *strongly agree* and 5 = *strongly disagree*), where a higher score indicates higher levels of selfitis behavior. The six embedded domains in the 20 items include four items concerning environment enhancement and social competition and three items each in the remaining four domains. The internal consistencies of the six SBS domains in the original study were all acceptable ($\alpha = 0.752$ to 0.838; Balakrishnan and Griffiths 2018).

Bergen Social Media Addiction Scale The Bergen Social Media Addiction Scale (BSMAS) (Andreassen et al. 2016), which was adapted from the Bergen Facebook Addiction Scale (Andreassen et al. 2012), assesses the risk of addiction to different types of social media. The BSMAS comprises six items embedded within a single construct, the structure of which has been verified by CFA (Lin et al. 2017a). In addition, the Persian BSMAS has high internal consistency ($\alpha = 0.86$) and promising concurrent validity (Lin et al. 2017a). The six BSMAS items are rated using a five-point Likert scale from 1 (*very rarely*) to 5 (*very often*), and a higher score on the BSMAS indicates that an individual is more at risk of addiction to social media.

Hospital Anxiety and Depression Scale The Hospital Anxiety and Depression Scale (HADS), a frequently used self-report tool, comprises 14 items in two domains—seven items for anxiety and seven items for depression. All the HADS items are rated on a four-point Likert scale ranging from 0 to 3, and higher scores indicate higher levels of anxiety or depression. The psychometric properties of the Persian HADS have been supported by the CFA and Rasch model testing. The two-factor structure has been verified by the CFA, and the unidimensionality of each factor has been observed in Rasch analysis (Lin and Pakpour 2017).

Demographic Information Sheet A demographic information sheet was included in the survey and asked questions relating to age, gender, cigarette smoking status, weekly hours spent on *Instagram*, weekly hours spent on smartphone, number of selfies taken per day, number of selfie postings per day, and number of *Instagram* followers.

Data Analysis

The participant characteristics across Iranian and Afghanistani were first analyzed using descriptive statistics (mean and SD for continuous data; frequency and percentage for categorical data) and inferential statistics (independent t tests for continuous data; χ^2 tests for categorical data). Robust psychometric testing was then applied to examine both item and scale properties of the SBS. More specifically, two types of psychometric testing theory (i.e., classical test theory and Rasch analysis) were simultaneously used.

In classical test theory, the present study tested internal consistency using McDonald's ω with a value > 0.7 indicating acceptable; corrected item-total correlation with a value > 0.4 indicating acceptable; test–retest reliability using intraclass correlation coefficient (ICC) with a value > 0.4 indicating acceptable; average variance extracted with a value > 0.5 indicating

acceptable; composite reliability with a value > 0.6 indicating acceptable; and inter-correlations among the six SBS domains with a value > 0.5 indicating adequate. Moreover, confirmatory factor analysis (CFA) with weighted least square and adjusted mean and variance (WLSMV) estimation was used to test the six-factor structure of the SBS. The following CFA fit indices indicate acceptable data-model fit: a non-significant χ^2 test; a comparative fit index (CFI) and a Tucker–Lewis index (TLI) > 0.9; a root mean square error of approximation (RMSEA) and a standardized root mean square residual (SRMR) < 0.08 (McDonald and Ho 2002).

In Rasch analysis, the present study reported item difficulty; information-weighted fit statistic (infit) mean square (MnSq) and outlier-sensitive fit statistic (outfit) MnSq; item and person separation reliability; item and person separation index; and differential item functioning (DIF) contrast across country. Moreover, the recommended values were between 0.5 and 1.5 for infit and outfit MnSq; greater than 0.7 for item and person separation reliability; larger than 2 for item and person separation index; and less than 0.5 for DIF contrast (Lin et al. 2018a).

After ensuring the SBS factorial structure and construct validity, multi-group CFA was performed to test the measurement invariance of the SBS factorial structure across country (i.e., Iranian vs. Afghanistani) and gender (i.e., male vs. female). Three nested models (configural model; factor-loading constrained model; and factor-loading and item-intercept constrained model) were then constructed to examine the measurement invariance. More specifically, the factor-loading constrained model had all factor loadings equal across groups; the factor-loading and item-intercept constrained model all had factor loadings and item intercepts equal across groups. The measurement invariance was supported using the following indices: ΔCFI > − 0.01, ΔSRMR < 0.02, and ΔRMSEA < 0.015 (Chen 2007).

Finally, Pearson's correlation coefficients were used to identify associations between the SBS domains and relevant external criteria, including time spent on *Instagram*, time spent on smartphone, BSMAS score, number of selfies taken per day, anxiety, and depression.

Results

Table 1 presents the participant characteristics for both Iranian ($n = 3163$) and Afghanistani ($n = 1100$) participants. No significant differences were found in the two countries' participants in smoking status ($p = 0.20$) or time spent on *Instagram* ($p = 0.078$). Significant differences between the two countries' participants were found in age ($M \pm SD = 20.78$ years ± 4.82 for Iranian and 22.03 years ± 6.36 for Afghanistani; $p < 0.001$; effect size [ES] = 0.22), gender (1246 [39.3%] males for Iranian and 389 males [35.4%] for Afghanistani; $p = 0.02$; ES = 0.04), time spent on smartphone ($M \pm SD = 6.01$ h a day ± 2.62 for Iranian and 5.72 h a day ± 2.91 for Afghanistani; $p = 0.002$; ES = 0.10), number of selfies taken per day ($M \pm SD = 2.09 \pm 1.28$ for Iranian and 1.89 ± 1.04 for Afghanistani; $p < 0.001$; ES = 0.17), number of selfie postings per day ($M \pm SD = 0.78 \pm 0.43$ for Iranian and 0.36 ± 0.26 for Afghanistani; $p < 0.001$; ES = 1.18), and number of *Instagram* followers ($M \pm S = 936.97 \pm 148.14$ for Iranian and 534.38 ± 123.09 for Afghanistani; $p < 0.001$; ES = 2.96).

Tables 2 and 3 demonstrate that the item properties of the SBS items were all satisfactory. More specifically, from the classical test theory perspective, all the SBS items had adequate factor loadings (0.62 to 0.87 for Iranian; 0.52 to 0.78 for Afghanistani) and acceptable item-total correlations (0.55 to 0.88 for Iranian; 0.44 to 0.79 for Afghanistani). From the Rasch

Table 1 Participant characteristics of samples in Iran and Afghanistan and differences between the two samples

	Iran (n = 3163)	Afghanistan (n = 1100)	t or χ^2 (p value)	Effect size[a]
Age (years); $M \pm SD$	20.78 ± 4.82	22.03 ± 6.36	6.79 (< 0.001)	0.22
Gender (male); n (%)	1246 (39.3)	389 (35.4)	5.44 (0.02)	0.04
Current smoker (no); n (%)	2311 (72.4)	826 (74.3)	1.62 (0.20)	0.02
Time on *Instagram* (hours/week); $M \pm SD$	4.95 ± 2.46	4.81 ± 1.60	1.76 (0.078)	0.07
Time on smartphone (hours/week); $M \pm SD$	6.01 ± 2.62	5.72 ± 2.91	3.07 (0.002)	0.10
Number of selfies taken per day; $M \pm SD$	2.09 ± 1.28	1.89 ± 1.04	4.67 (< 0.001)	0.17
Number of postings per day; $M \pm SD$	0.78 ± 0.43	0.36 ± 0.26	30.51 (< 0.001)	1.18
Number of followers on participants' *Instagram* page; $M \pm SD$	936.97 ± 148.14	534.38 ± 123.09	80.94 (< 0.001)	2.96

[a] Cohen's d (0.2 = small; 0.5 = medium; 0.8 = large) is used to assess the effect sizes of age, time on smartphone, time on social media, and time on gaming; Cramer's V (0.1 = small; 0.3 = medium; 0.5 = large) is used to assess the effect sizes of gender and current smoker

model perspective, all the SBS items fit in their embedded constructs (infit MnSq = 0.84 to 1.21 for Iranian and 0.83 to 1.23 for Afghanistani; outfit MnSq = 0.85 to 1.18 for Iranian and 0.83 to 1.20 for Afghanistani) and displayed no substantial DIF across Iranian and Afghanistani (DIF contrast = − 0.33 to 0.34).

The psychometric properties of the SBS were further supported in its domains. From the classical test theory perspective, the CFA results showed that all the fit indices were acceptable, except for the significant χ^2 test (χ^2 [df] = 2145.42 [155] for Iranian and 795.97 [155] for Afghanistani; $p < 0.001$): for Iranian, CFI = 0.930, TLI = 0.914, RMSEA (90% CI) = 0.063 (0.061, 0.066), SRMR = 0.047, and WRMR = 0.691; for Afghanistani, CFI = 0.936, TLI = 0.921, RMSEA (90% CI) = 0.061 (0.057, 0.065), SRMR = 0.049, and WRMR = 0.682. Additionally, the average variance extract, composite reliability, internal consistency using McDonald's ω, and test–retest reliability using ICC were all satisfactory in both Iranian and Afghanistani participants (Table 4). Also, the inter-correlations among SBS subscales were significant and moderate (r = 0.56 to 0.78 for Iranian and 0.53 to 0.78 for Afghanistani; Table 5). From the Rasch model perspective, item separation reliability was higher than 0.9; item separation index was greater than 5; person separation reliability was larger than 0.7; and person separation index was above 2 for all the SBS domains (Table 4).

After ensuring the six-factor SBS structure, multigroup CFA examined whether the six-factor structure was equivalent across country and gender. The fit indices of the multigroup CFA supported the measurement invariance of SBS across Iranian and Afghanistani (ΔCFI < 0.002; ΔSRMR and ΔRMSEA < − 0.001) and across males and females (ΔCFI < 0.001, ΔSRMR < 0.002 and ΔRMSEA < − 0.001; Table 6). Additionally, the SBS domain scores were significantly correlated with external criteria, including time on *Instagram* (r = 0.173 to 0.401), time on smartphone (r = 0.161 to 0.381), BSMAS score (r = 0.139 to 0.290), number of selfies taken per day (r = 0.162 to 0.361), anxiety (r = 0.175 to 0.344), and depression (r = 0.153 to 0.347; Table 7).

Discussion

To the best of the present authors' knowledge, this is the first methodological study to use both classical and modern test theories to examine the psychometric properties of the Selfitis

Table 2 Item properties calculated using classical test theory in the Selfitis Behavior Scale (SBS) across Iranian and Afghan participants

	Iran			Afghanistan		
	M (SD)	Loading	Item-total correlation	M (SD)	Loading	Item-total correlation
1: Taking selfies gives me a good feeling to better enjoy my environment	3.75 (0.93)	0.76	0.68	3.04 (1.01)	0.77	0.73
2: Sharing my selfies creates healthy competition with my friends and colleagues	3.77 (1.19)	0.79	0.71	2.33 (0.76)	0.79	0.71
3: I gain enormous attention by sharing my selfies on social media	3.35 (0.92)	0.65	0.56	2.23 (0.52)	0.55	0.46
4: I am able to reduce my stress level by taking selfies	3.65 (1.18)	0.81	0.75	1.93 (0.90)	0.82	0.76
5: I feel confident when I take a selfie	2.51 (1.02)	0.62	0.54	2.70 (0.77)	0.63	0.53
6: I gain more acceptance among my peer group when I take selfie and share it on social media	2.26 (1.06)	0.66	0.64	2.42 (0.95)	0.67	0.44
7: I am able to express myself more in my environment through selfies	3.22 (0.92)	0.66	0.53	1.93 (0.88)	0.76	0.59
8: Taking different selfie poses helps increase my social status	3.33 (1.20)	0.73	0.68	2.10 (0.87)	0.74	0.68
9: I feel more popular when I post my selfies on social media	3.18 (1.10)	0.70	0.52	2.08 (0.93)	0.78	0.62
10: Taking more selfies improves my mood and makes me feel happy	3.68 (1.13)	0.87	0.78	2.42 (1.11)	0.88	0.79
11: I become more positive about myself when I take selfies	2.72 (0.98)	0.81	0.68	2.70 (1.02)	0.82	0.68
12: I become a strong member of my peer group through selfie postings.	2.63 (1.04)	0.82	0.60	2.04 (0.86)	0.82	0.56
13: Taking selfies provides better memories about the occasion and the experience	3.19 (0.82)	0.68	0.59	2.11 (0.88)	0.68	0.54
14: I post frequent selfies to get more 'likes' and comments on social media	3.46 (1.24)	0.77	0.69	2.01 (0.92)	0.68	0.69
15: By posting selfies, I expect my friends to appraise me	2.90 (1.05)	0.78	0.65	2.42 (1.11)	0.80	0.65
16: Taking selfies instantly modifies my mood	3.69 (1.23)	0.84	0.76	2.33 (0.74)	0.84	0.76
I7: I take more selfies and look at them privately to increase my confidence	2.69 (0.97)	0.82	0.68	2.36 (1.04)	0.83	0.68
I8: When I do not take selfies, I feel detached from my peer group	2.55 (0.98)	0.62	0.59	1.83 (0.90)	0.67	0.56
19: I take selfies as trophies for future memories	3.53 (1.08)	0.76	0.58	2.45 (0.64)	0.67	0.56
20: I use photo editing tools to enhance my selfie to look better than others	3.32 (1.21)	0.80	0.74	2.49 (1.09)	0.82	0.74

Behavior Scale (SBS). In general, the SBS showed promising properties, including satisfactory reliability (e.g., internal consistency and test–retest reliability), excellent construct validity (e.g., good fit in the CFA and Rasch models), and acceptable measurement invariance and DIF across Iran and Afghanistan. With strong and satisfactory properties, results demonstrate that the Persian SBS is a valid and reliable instrument to assess selfie behaviors in the two Persian-

Table 3 Item properties calculated using Rasch model in the Selfitis Behavior Scale (SBS) across Iranian and Afghan participants

	Iran			Afghanistan			DIF
	Infit MnSq	Outfit MnSq	Difficulty	Infit MnSq	Outfit MnSq	Difficulty	Across country
1: Taking selfies gives me a good feeling to better enjoy my environment	0.93	0.95	0.46	0.93	0.97	0.42	0.05
2: Sharing my selfies creates healthy competition with my friends and colleagues	0.99	1.02	−0.68	1.0	1.03	−0.64	−0.04
3: I gain enormous attention by sharing my selfies on social media	1.09	1.09	−0.49	1.09	1.09	−0.48	−0.01
4: I am able to reduce my stress level by taking selfies	1.06	1.03	0.05	1.03	0.99	0.05	0.00
5: I feel confident when I take a selfie	0.99	1.02	−0.68	1.10	1.18	−0.41	−0.27
6: I gain more acceptance among my peer group when I take selfie and share it on social media	1.21	1.18	0.56	1.23	1.20	0.52	0.04
7: I am able to express myself more in my environment through selfies	1.15	1.06	−0.91	1.14	1.05	−0.89	−0.02
8: Taking different selfie poses helps increase my social status	1.04	1.01	0.35	1.03	1.0	0.34	0.01
9: I feel more popular when I post my selfies on social media	0.94	0.91	−0.09	0.94	0.91	0.07	−0.16
10: Taking more selfies improves my mood and makes me feel happy	0.88	0.89	−0.05	0.88	0.89	−0.06	0.01
11: I become more positive about myself when I take selfies	1.04	1.01	−0.35	0.84	0.83	−0.23	−0.12
12: I become a strong member of my peer group through selfie postings.	0.91	0.91	−0.36	0.90	0.91	−0.31	0.05
13: Taking selfies provides better memories about the occasion and the experience	1.05	1.04	0.99	1.05	1.03	1.01	−0.02
14: I post frequent selfies to get more 'likes' and comments on social media	1.06	1.03	0.03	1.07	1.03	0.04	−0.01
15: By posting selfies, I expect my friends to appraise me	0.94	0.95	0.57	0.94	0.96	0.55	0.02
16: Taking selfies instantly modifies my mood	1.02	1.01	0.01	1.05	1.04	0.02	−0.01
I7: I take more selfies and look at them privately to increase my confidence	1.06	1.03	0.03	0.83	0.84	0.19	−0.16
I8: When I do not take selfies, I feel detached from my peer group	0.85	0.86	−0.20	0.84	0.84	−0.22	0.02
19: I take selfies as trophies for future memories	0.92	0.92	−0.54	0.92	0.92	−0.53	−0.01
20: I use photo editing tools to enhance my selfie to look better than others	0.84	0.85	0.31	0.83	0.83	0.26	0.05

DIF, differential item functioning

speaking countries. With the inclusion of Iranian and Afghanistani people, Persian-speaking countries have a large population (approximately 110 million people are native Persian speakers; Lin et al. 2019c), which indicates the importance of carrying out psychometric testing in the present study. More specifically, the Persian SBS can be used widely and can provide information concerning selfitis for healthcare providers to consider timely and early intervention for those who perceive their selfitis to be problematic.

Table 4 Psychometric properties of the Selfitis Behavior Scale in scale-level across Iranian and Afghan participants

	Iran ($n = 3163$)/Afghanistan ($n = 1100$)					
	Environmental enhancement	Social competition	Attention seeking	Mood modification	Self-confidence	Subjective conformity
Classical test theory						
Average variance extract	0.51/0.52	0.60/0.58	0.51/0.52	0.71/0.72	0.57/0.59	0.50/0.52
Composite reliability	0.81/0.81	0.86/0.84	0.75/0.76	0.88/0.88	0.80/0.81	0.75/0.77
McDonald's ω	0.92/0.79	0.88/0.86	0.72/0.71	0.91/0.92	0.84/0.88	0.76/0.75
Test–retest reliability[a]	0.83/0.77	0.80/0.76	0.79/0.76	0.76/0.74	0.84/0.75	0.80/0.79
Rasch model						
Item separation reliability	1.00/1.00	1.00/0.99	1.00/0.99	0.95/0.90	0.99/0.96	0.99/0.98
Item separation index	25.39/15.00	15.44/8.50	16.30/9.45	10.74/8.10	8.83/5.00	13.95/7.70
Person separation reliability	0.78/0.77	0.82/0.81	0.77/0.75	0.83/0.84	0.75/0.74	0.75/0.74
Person separation index	2.46/2.57	2.16/2.09	2.42/2.14	2.32/2.27	2.67/2.15	2.35/2.32

[a] Using intraclass correlation coefficient; $n = 2891$ for Iran participants and 3857 for Afghanistan participants

Given the only previous psychometric testing was in the original study among Indian university students (i.e., Balakrishnan and Griffiths 2018), the present study can only compare its results to those of that study. The findings across the two studies are in agreement although the testing methods were not identical. More specifically, Balakrishnan and Griffiths (2018) reported the six-factor structure for the SBS using exploratory factor analysis, whereas the present study confirmed the six-factor structure for the SBS using CFA. In addition, Balakrishnan and Griffiths reported satisfactory internal consistency using the traditional Cronbach's α (range between 0.752 and 0.838), and the present study also observed acceptable internal consistency using a more advanced method (i.e., McDonald's ω with range between 0.71 and 0.92).

The present study also demonstrated strong psychometric properties of the SBS that were not examined by Balakrishnan and Griffiths (2018). The important properties that should be highlighted include the Rasch findings and the measurement invariance. In the Rasch findings, the results suggested that the SBS items are all reliable and valid regardless of the sample

Table 5 Inter-correlation of subscales on the Selfitis Behavior Scale

	1	2	3	4	5	6
1. Environmental enhancement	1	0.58**	0.53**	0.66**	0.60**	0.56**
2. Social competition	0.64**	1	0.75**	0.63**	0.53**	0.75**
3. Attention seeking	0.56**	0.78**	1	0.56**	0.51**	0.73**
4. Mood modification	0.61**	0.73**	0.60**	1	0.78**	0.63**
5. Self-confidence	0.66**	0.64**	0.61**	0.76**	1	0.53**
6. Subjective conformity	0.66**	0.76**	0.62**	0.73**	0.62**	1

Values in the upper triangular matrix are correlations for Afghan participants; values in the lower triangular matrix are correlations for Iranian participants

** p values < 0.01

Table 6 Measurement invariance across country and across gender on Selfitis Behavior Scale through confirmatory factor analysis

Model and comparisons	Fit statistics							
	χ^2 (df)	$\Delta\chi^2$ (Δdf)	CFI	ΔCFI	SRMR	ΔSRMR	RMSEA	ΔRMSEA
Country								
M1: Configural	2941.41 (310)*		0.932		0.047		0.044	
M2: Plus all loadings constrained	2944.18 (330)*		0.932		0.046		0.043	
M3: Plus all intercepts constrained	2947.03 (350)*		0.934		0.044		0.041	
M2 – M1		2.77 (20)		0.000		– 0.001		– 0.001
M3 – M2		2.85 (20)		0.002		– 0.002		– 0.002
Gender								
M1: Configural	3049.42 (310)*		0.928		0.048		0.046	
M2: Plus all loadings constrained	3068.80 (330)*		0.929		0.047		0.044	
M3: Plus all intercepts constrained	3094.39 (350)*		0.930		0.049		0.043	
M2 – M1		19.38 (20)		0.001		– 0.001		– 0.002
M3 – M2		25.59 (20)		– 0.009		0.002		– 0.001

*$p < 0.05$

M1, model 1, a configural model; M2, model 2, a model based on M1 with all factor loadings constrained being equal across groups; M2P, model 2 with partial invariance, a model based on M2 with some factor loadings relaxed across groups; M3, mode 3

CFI, comparative fit index; SRMR, standardized root mean square residual; RMSEA, root mean square error of approximation

Table 7 Correlations between Selfitis Behavior Scale subscales and external criteria

	r (p value)						
	Time on *Instagram*	Time on smartphone	BSMAS	Selfies taken[a]	Selfies taken[b]	Anxiety[c]	Depression[c]
Environmental enhancement	0.399 (<0.001)	0.381 (<0.001)	0.271 (<0.001)	0.220 (<0.001)	0.199 (<0.001)	0.279 (0.001)	0.218 (0.001)
Social competition	0.203 (<0.001)	0.173 (<0.001)	0.139 (<0.001)	0.218 (<0.001)	0.203 (<0.001)	0.231 (<0.001)	0.347 (<0.001)
Attention seeking	0.401 (<0.001)	0.161 (0.010)	0.218 (<0.001)	0.194 (0.010)	0.237 (<0.001)	0.344 (<0.001)	0.219 (<0.001)
Mood modification	0.184 (0.019)	0.247 (0.001)	0.210 (0.007)	0.361 (<0.001)	0.301 (<0.001)	0.299 (<0.001)	0.193 (0.013)
Self-confidence	0.173 (0.016)	0.218 (<0.001)	0.290 (<0.001)	0.162 (0.027)	0.245 (<0.001)	0.175 (0.018)	0.153 (0.034)
Subjective conformity	0.256 (<0.001)	0.203 (<0.001)	0.247 (<0.001)	0.171 (0.011)	0.152 (0.031)	0.194 (0.007)	0.154 (0.034)

[a] Number of selfies taken per day

[b] Number of selfie posts per day

[c] Measured using Hospital Anxiety and Depression Scale

BSMAS, Bergen Social Media Addiction Scale

characteristics. That is, the good properties of the SBS are not influenced by the samples (aka being sample free). Also, the DIF findings in Rasch models demonstrated the appropriateness to compare the SBS item scores between Iranian and Afghanistani samples (Lin et al. 2018b). In the measurement invariance findings, the results suggested that the SBS structure is confirmed and equivalent across Iranian and Afghanistani individuals. In other words, the SBS structure is not influenced by the different subcultures between Iran and Afghanistan. Therefore, the SBS total scores can be used to compare the difference between Iranian and Afghanistani samples (Lin et al. 2012; Pakpour et al. 2019).

Correlations between several external criteria and the SBS were found to be weak to moderate in the present study. The possible explanation of the weak to moderate correlations is that there are no gold standards to assess selfitis. Therefore, only related measures can be used to examine the concurrent validity to the SBS. For example, the BSMAS (Andreassen et al. 2016; Lin et al. 2017a) captures the general risk of being addicted to social media. Given that selfie behaviors are frequently carried out in social media (e.g., uploading a selfie to social media), the SBS may have some overlap and association with the BSMAS. However, the association might not be strong because social media use and selfie-taking are actually different behaviors. Similarly, some degrees of association were found between the SBS and psychological distress because some individuals' selfitis behavior may impair their psychological health (Dokur et al. 2018; Pantic et al. 2017).

The strengths of this study include the large sample size (4236 participants), the use of several valid instruments, and the robust psychometric testing methods (including classical and modern test theories). With the aforementioned strengths, the findings of SBS highly support its use to assess selfitis, the newly defined internet-related behavior. However, there are some limitations in the present study. First, the data collection was done using an online survey. Therefore, the real identity of the participants cannot be identified and the possibility that an individual completed the survey two or more times cannot be eliminated. Also, whether participants faked their demographic information cannot be easily spotted. Second, followed by the first limitation, the survey comprised self-report data only. Thus, major biases in self-reports, such as recall bias and social desirability bias, are potential limitations to the present study's findings. Third, although the present study used various external criteria to examine the concurrent validity of the SBS, no gold standard is presently available to verify the underlying concept of the selfitis.

In conclusion, the present study showed the six-factor structure of the Persian SBS in a large sample of Iranian and Afghanistani people. The Persian SBS demonstrated robust and promising psychometric properties utilizing analyses based on both classical test theory and modern test theory. Moreover, the measurement invariance supported the Persian SBS structure and no Persian SBS items displayed DIF. Based on the aforementioned results, healthcare providers and professionals can trust the SBS scores and easily use the summated SBS item scores to compare the level of selfitis between Iranian and Afghanistani people.

Compliance with Ethical Standards

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