



Psychometric Properties of the Bergen Social Media Addiction Scale in Korean Young Adults

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Objective The aim of this study was to examine the psychometric properties of the Bergen Social Media Addiction Scale (BSMAS) in Korean young adults.

Methods A total of 401 Korean university students (mean age \pm SD, 21.9 \pm 1.8 years; female, 72.8%) participated in the study. They completed the Korean version of BSMAS, the Social Network Site Addiction Proneness Scale (SAPS), and the Social Network Site Use Motives Scale. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted in half-split samples to assess the construct validity of the BSMAS. Internal consistency, test-retest reliability, and convergent validity were examined.

Results Both EFA and CFA supported a unidimensional model of the BSMAS. Indices of test-retest reliability at a 3-week interval ($r=0.75$) and internal consistency (Cronbach's $\alpha=0.86$) of the BSMAS were acceptable and convergent validity between the BSMAS and the SAPS ($r=0.86$) was satisfactory.

Conclusion The results of this study suggest that the BSMAS is an effective tool for screening social network site (SNS) addiction in Korean young adults and is a psychometrically sound measure that can be used in future Korean research on SNS addiction.

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Keywords Social network site addiction; Bergen Social Media Addiction Scale; Reliability; Validity; Korea.

INTRODUCTION

Social network site (SNS) has been used by people who want to extend occupational, social, and academic off-line networks to the online network.¹ The number of social media users continues to increase, with more than 3.6 billion people using SNS worldwide in 2020.² While SNS has a positive function that allows users to communicate and share information, it can also lead to compulsive use or addictive behaviors.³⁻⁵

SNS addiction is one of the behavioral addiction which is defined as "being overly concerned about SNS, to be driven by a strong motivation to log on to or use SNS, and to devote so much time and effort to SNS that it impairs other social activities, studies/job, interpersonal relationships, and/or psycho-

logical health and well-being."³ Problematic SNS use has been observed to be linked to poor mental health^{6,7} and psychopathological symptoms such as depression,^{8,9} problematic alcohol drinking,¹⁰ and social anxiety.¹¹⁻¹³ Previous studies suggested that SNS addiction may result in negative consequences in life. For example, Facebook dependence or excessive usage negatively affected sleep quality, mental health, self-esteem, and academic performance.¹⁴⁻¹⁶

Previous studies reported that SNS addiction is prevalent in many countries, with 36.9% in India,¹⁷ 29.5% in Singapore college students,¹⁸ 8.6% in Peru university students,¹⁶ 4.5% of Hungarian adolescents.¹⁹ In Korea, 65.9% of the population used the SNS in 2020²⁰ and a survey conducted to 500 Facebook users showed that 20.6% were dependent on Facebook.²¹ The widespread use of SNS among Koreans indicates that an objective evaluation of SNS dependence is important for the prevention and intervention of SNS addiction. Several self-reported questionnaires have been developed to evaluate the SNS dependence among Koreans by integrating items of existing scales such as Facebook and internet addiction scales²² or by creating items based on a specific psychological model.²³ However, such measures have limitations in that their validi-

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ty and reliability have not been comprehensively tested. In addition, those scales have the weakness of being difficult to use in cross-cultural studies because they are not yet used in other countries. Further studies are needed to test the psychometric properties of widely used measures of SNS addiction for research and clinical use in Korean samples.

The Bergen Social Media Addiction Scale (BSMAS) is a self-reported questionnaire consisting of six items.²⁴ The BSMAS has been used in several recent studies because of its simplicity, suitability for large-scale studies, widespread international acceptance, and sound rationale.²⁵⁻²⁸ The BSMAS was made by modifying the items of the well-validated Bergen Facebook Addiction Scale (BFAS) that was developed to measure Facebook addiction.²⁹ The BSMAS consisted of the same items as the BFAS except that the term “Facebook” was changed into “social media.” Each BSMAS item reflects six features of addiction proposed in Griffiths’s³⁰ components model of addiction. According to Griffiths,³⁰ all addictive behaviors have common features, i.e., salience, mood modification, tolerance, withdrawal, conflict, and relapse. Salience means that addictive activities are considered to be the most important thing in an individual’s life. Mood modification involves addictive activities to modify one’s mood state. Tolerance refers to the process of increasing addictive activity to achieve the desired effects and withdrawal refers to psychological and/or physical responses resulting from reduction or cessation of addictive behaviors. Conflict involves experiencing various conflicting states in the person’s life due to preoccupation with addictive activity. Relapse refers to a tendency to recur addictive behaviors after discontinuation of addictive behaviors. The BSMAS has been found to have appropriate psychometric properties with unidimensional factor structure in Hong Kong and Taiwan university students,^{26,28} Hungarian adolescents,¹⁹ Iranian adolescents,³¹ and Italian sample.³²

The current study aimed to test the validity and reliability of the BSMAS in Korean young adults. It is expected that validation of this scale would help professionals easily and briefly screen for SNS addiction and would enable cross-cultural research on SNS addiction in Korean. It was hypothesized that: 1) the Korean version of the BSMAS would have a unidimensional structure; 2) the BSMAS would be internally consistent and good test-retest reliability at 3 weeks interval; and 3) the BSMAS would be positively and significantly correlated with the scales assessing SNS addiction proneness and SNS use motives with respect to convergent validity.

METHODS

Participants and procedure

A total of 401 university students were recruited from classes

in the psychology department of a university in Daegu, South Korea, using the convenient sampling method. Data were collected from November 2020 to July 2021 with the assistance of an instructor of the classes. A hyperlink for the survey was provided to the target students. Participants signed an informed consent form online prior to evaluation and completed the self-report questionnaires online. The mean age±SD of participants was 21.9±1.8 years (ranged from 19 to 29) and females composed 72.8%. A hyperlink for the retest survey was given to all participants who completed the questionnaires in the first survey. In the retest, the participants were asked to submit informed consent online and complete questionnaires 3 weeks after the first survey. Thirty-six participants completed the retest questionnaires, and 30 who responded 21±3 days after the first administration were included in the analysis. Their mean age±SD was 21.8±2.3 years with 73.3% of females. This study was approved by the Institutional Review Board (IRB) of Kyonggi University, South Korea (IRB No. KGU-20200818-HR-055-02).

Measurements

The Bergen Social Media Addiction Scale

The BSMAS was developed by Andreassen and his colleagues and consists of six items, each representing core elements of addiction (i.e., salience, tolerance, mood modification, conflict, withdrawal, and relapse).²⁴ Participants rate these items using a five-point Likert scale, where 1=very rarely and 5=very often. The higher total score reflects higher dependence on SNS. The linguistic equivalence of the BSMAS was evaluated using a standard forward-backward translation procedure by a clinical psychologist.

The Social Network Site Addiction Proneness Scale

The Social Network Site Addiction Proneness Scale (SAPS) developed by Jung and Kim²² in Korean, is used to assess SNS addiction proneness. The SAPS was made by modifying the items of existing scales that evaluate smartphone, internet, and Facebook addiction and was validated in 331 Korean university students.²² This scale consists of 24 items and four factors. The four factors are tolerance and preoccupation, avoidance of negative emotions, daily life disturbance and loss of control, and virtual life orientation and withdrawal. The participants responded to each item with a rating on a five-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The internal consistency coefficient of the SAPS was 0.92.²²

The Social Network Site Use Motives Scale

The Social Network Site Use Motives Scale (SUMS) developed by Shin and Lim,³³ is used to measure SNS use motives.

The SUMS consists of 30 items, each representing one of six subscales: information, enhancement, social, conformity, pastime, and coping motive. Respondents are asked if they use SNS for the reason specified in each item on a five-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree). In a Korean sample, the SUMS had a four-factor structure consisting of information-enhancement, pastime, social-conformity, and coping motives.³³

Statistical analysis

Data analysis was performed using SPSS 25 (IBM Corp., Armonk, NY, USA) and Mplus 7.0. Cronbach’s alpha and item-total correlations were employed to measure the internal consistency of the scale. The value of Cronbach’s alpha greater than 0.7 and the value of item-total correlations greater than 0.4 were considered reliable.³⁴ To examine the factor structure of the BSMAS, the dataset was divided in half. Half of the data was used for exploratory factor analysis (EFA) and the other half for confirmatory factor analysis (CFA). The EFA was conducted by applying the principal-axis factoring method. The number of factors was determined by Kaiser’s criterion³⁵ (i.e., if eigenvalues above 1) and the Scree plot. Multivariate normality in the dataset for the CFA was estimated by Mardia’s multivariate skewness and kurtosis tests.³⁶ The CFA analysis

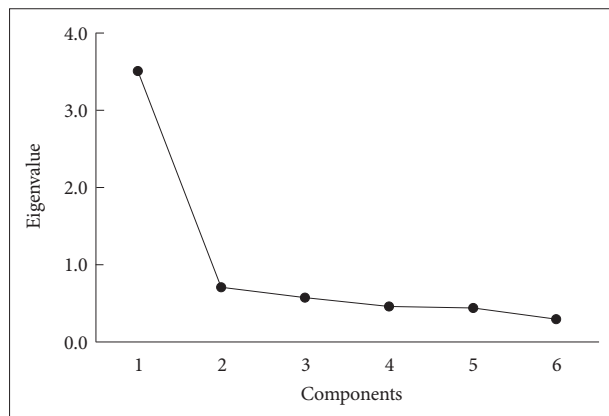


Figure 1. Scree plot for the exploratory factor analysis of the Bergen Social Media Addiction Scale.

was performed using the maximum likelihood robust (MLR) estimation. The Comparative Fit Index (CFI), the Tucker–Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA) were used to evaluate the goodness of fit of the CFA models. TLI and CFI values greater than 0.90 and RMSEA values below 0.08 were considered as a reasonable fit.³⁷ The Pearson correlation analysis was conducted to examine the test-retest reliability and the relationship between the BSMAS and other scales. A paired t-test was performed to investigate whether the BSMAS total score at the retest, measured 3 weeks after the first assessment, was statistically different from the total score at the baseline.

RESULTS

Exploratory factor analysis

The first half of the dataset (n=200; mean age±SD, 21.67±17.80; female, 75.5%) was selected for the EFA. The EFA analysis showed that only one factor had an eigenvalue of 1.00 or higher (3.53). Further analysis using the scree plot showed that a single factor could be extracted (Figure 1 and Table 1).

Confirmatory factor analysis

The results of the EFA in this study and previous research indicated a unidimensional factor structure for the BSMAS. The CFA was performed to evaluate the fit indices of the unidimensional model for the second half of the dataset (n=201; mean age±SD, 22.20±17.80; female, 70.1%). Mardia’s multivariate normality test was statistically significant for both skewness and kurtosis (p<0.001), suggesting that the data were not normally distributed. Thus, the MLR estimation, which is robust to non-normality, was used for the CFA. The analysis showed that the overall fit of the unidimensional model was acceptable (CFI=0.974; TLI=0.956; RMSEA=0.077) (Table 2 and Figure 2).

Internal consistency and test-retest reliability

An internal consistency test was acceptable with a Cronbach’s alpha of 0.86, exceeding the recommended threshold level of

Table 1. Item properties, factor loadings, and internal consistency of BSMAS

| Item no. | Item description | Mean (SD) | Factor loading of EFA | Item-total correlation |
|----------|-------------------|-------------|-----------------------|------------------------|
| 1 | Salience | 2.63 (1.26) | 0.770 | 0.680 |
| 2 | Tolerance | 2.44 (1.19) | 0.768 | 0.733 |
| 6 | Conflict | 2.49 (1.18) | 0.744 | 0.664 |
| 4 | Relapse | 2.17 (1.12) | 0.711 | 0.702 |
| 3 | Mood modification | 2.40 (1.20) | 0.657 | 0.608 |
| 5 | Withdrawal | 1.74 (0.99) | 0.612 | 0.564 |

EFA, exploratory factor analysis; BSMAS, Bergen Social Media Addiction Scale; SD, standard deviation

0.70. Item-total correlations ranged from 0.564 to 0.733 which met accepted standards of 0.40 (Table 1). The test-retest reliability for the BSMAS total score was acceptable, with Pearson's correlation coefficient of 0.75 at the mean days of the interval of 21.9±1.9. The paired t-test displayed the BSMAS total score was significantly lower at the retest (mean±SD=12.90±5.74) than the baseline (15.03±5.86).

Convergent validity

Table 3 shows the correlation coefficients between the BSMAS, the SAPS, and the four subscales of the SUMS. The BSMAS had significant positive relation with the SAPS ($r=0.86, p<0.001$) and four factors of the SUMS ($r=0.39-0.57, p<0.001$), indi-

cating good convergent validity of the BSMAS.

DISCUSSION

The current study was conducted to assess the psychometric properties of the BSMAS in Korean young adults. It was found that the Korean version of BSMAS had a single factor structure, good convergent validity, and acceptable reliability including internal consistency and test-retest reliability in Korean university students. These results indicate that the total score of BSMAS can be used reliably to screen for SNS addiction in Korean young adults. More than 70% of Korean young people aged 15–29 used SNS in 2017, which is higher than other age groups.³⁸ As the BSMAS easily measures the level of SNS addiction based on six items that reflect the core characteristics of addiction, the scale can be used for the initial evaluation of SNS dependence among Korean young adults.

In the present study, the BSMAS was found to have a single factor structure. All items of the BSMAS significantly loaded on the hypothesized single factor. This result supports the proposed latent structure in the development of the BSMAS and is consistent with the previous observation that showed the unidimensional factor of the BSMAS.^{19,26,31,32} Regarding test-retest reliability at a 3-week interval, the correlation coefficient was found to be acceptable, while a significant statistical difference was found between the first and retest scores of the BSMAS, indicating a significantly lower score in the retest. One plausible explanation for the lower score in the retest administration might be that the retest was conducted closer to the final exam in the college.

The Korean version of the BSMAS was found to be strongly related to SNS addiction proneness and moderately to SNS use motives, indicating good convergent validity of the scale. In addition, the analysis revealed that the coping motive was more strongly associated with the BSMAS than other motives. This is consistent with the findings of a prior study showing that the coping motive had a stronger correlation with the Facebook

Table 2. Goodness-of-fit indices of confirmatory factor analysis

| Model | χ^2 | df | TLI | CFI | RMSEA (90% CI) |
|------------|----------|----|-------|-------|---------------------|
| One factor | 19.756 | 9 | 0.956 | 0.974 | 0.077 (0.029–0.124) |

TLI, Tucker-Lewis Index; CFI, Comparative Fit Index; RMSEA, Root Mean Square Error of Approximation; CI, confidence interval

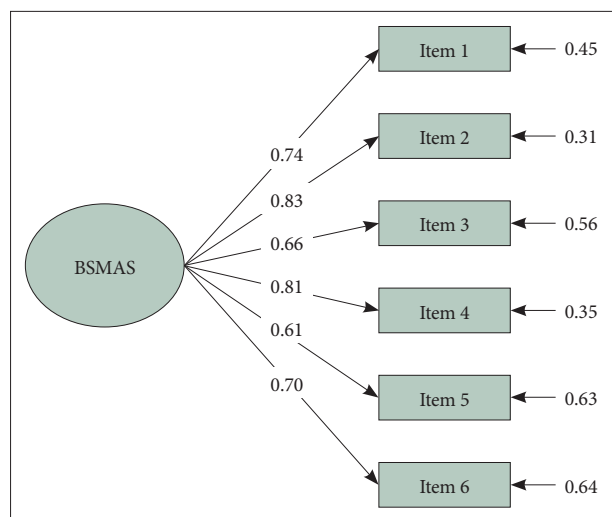


Figure 2. Path diagram for the single factor model of the BSMAS. BSMAS, Bergen Social Media Addiction Scale.

Table 3. Correlations and descriptive statistics among measured variables

| Variable | BSMAS | SAPS | SUMS IE | SUMS SC | SUMS PT | SUMS CO |
|----------|-------|-------|---------|---------|---------|---------|
| SAPS | 0.86* | - | | | | |
| SUMS IE | 0.55* | 0.64* | - | | | |
| SUMS SC | 0.39* | 0.52* | 0.47* | - | | |
| SUMS PT | 0.52* | 0.58* | 0.71* | 0.33* | - | |
| SUMS CO | 0.57* | 0.71* | 0.56* | 0.39* | 0.54* | - |
| Mean | 13.88 | 45.02 | 32.71 | 22.40 | 17.09 | 10.84 |
| SD | 5.36 | 13.30 | 7.16 | 8.25 | 4.48 | 4.97 |

* $p<0.001$. BSMAS, Bergen Social Media Addiction Scale; SAPS, Social Network Site Addiction Proneness Scale; SUMS, Social Network Site Use Motive Scale; IE, information-enhancement motive; SC, social-conformity motive; PT, pastime motive; CO, coping motive; SD, standard deviation

addiction than enhancement, social, and conformity motives in American university students.²⁵ The coping motive has been observed to be strongly associated with internet addiction^{39,40} and to be one of the strongest predictors of drinking addiction.⁴¹ The present and previous results suggest that those who use SNS as a coping strategy for negative emotions may be more vulnerable to SNS addiction than those who use SNS with enhancement or social/relational motives.

This study has several limitations. First, the participants were sampled based on a convenience sampling strategy, so a more representative sample of the population is needed to generalize the findings. The sample of this study was college students, and about 73% of the participants were women. Future research is needed to investigate the psychometric properties of BSMAS across age groups and gender. Secondly, this study relied on the use of a self-report methodology. The data is not free from social desirability and recall biases. The relationship between the BSMAS and the other variables could be inflated by common method variance. Future studies are needed to validate the BSMAS using the objective rating method rather than the self-report method. Thirdly, the study was not conducted in a clinical setting. Caution should be taken when applying these findings to SNS addicts. Further research is needed in clinical samples. Finally, this study did not investigate whether the BSMAS was time-invariant over a longer period. A previous study showed that the BSMAS was time-invariant across 3 months, which may be one of the important psychometric properties of the BSMAS.⁴² Future studies are needed to investigate whether the Korean version of BSMAS is time-invariant over a longer time.

Nevertheless, this study provided initial support for using the BSMAS as a reliable and valid measure of SNS addiction in Korean young adults. The use of this easy-to-use scale with good psychometric properties allows mental health professionals to screen for SNS addiction and helps researchers conduct studies related to SNS addiction in Korea. Given that recent studies have suggested that coronavirus disease (COVID-19)-related worries or fears may be associated with problematic Internet or smartphone use in elementary school-aged children,^{43,44} the BSMAS can be useful as an assessment tool for SNS addiction in the COVID-19 pandemic situation. Future studies are needed to demonstrate the usefulness of the scale for various age groups and SNS addicts in Korean people.

Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

Conflicts of Interest

The author has no potential conflicts of interest to disclose.

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