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Development of Social Media Addiction Test (SMAT17)

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Abstract

The aim of this study was to develop a test for assessing individuals' social media addiction; and conducting a reliability and validity study of this scale. Sample for this study was composed of 285 college students between the ages of 18 and 25. Reliability coefficients Cronbach's alpha value was .94 and Spearman Brown value was .91 for our sample. Exploratory factor analysis was conducted to assess construct validity, and confirmatory factor analysis was conducted to assess the validity of the resulted factor structure. 17 items was grouped under 4 factors. Reliability and validity analysis results were in the expected ranges.

Keywords: social media, addiction, scale, factor analysis

1. Introduction

Social Media could be defined as an environment that certain groups of people would gather using internet communication channels to share data, relationships, and content. Social Media applications appear as online forums, microblogs, social networks, wikis and web applications. Some of the most used social media tools are Facebook, Twitter, Instagram, Snapchat, WhatsApp, Google+, Wikipedia, LinkedIn, Reddit.

Considering the number of social media accounts is higher than the internet users; it could be argued that majority of the internet users in the world are also social media users. From the addiction perspective, it could be argued that while considering internet addiction social media addiction could be a big part of it. Internet addiction is composed of different addiction types such as game addiction, and social media addiction. Social media addiction is considered to be a sub part of internet addiction or a specific form of internet addiction (Wilson, 2015).

When we review the relevant literature, number of scales related to social media addiction raise such as internet addiction scales of Young (1998), Griffiths (1999), and Nichols and Nichi (2004) and Facebook addiction scale of Andreassen et.al (2012), and Facebook addiction scale of Arsland and Kirik (2013) and social media and technology scale of Jenkins-Guarnieri, Wright, and Johnson (2013).

There are a lot of web sites with the symptoms of internet addiction; however, there are very few internet addiction scales with social media coverage, and also very few academic papers. In this study, social media was considered with all of its applications and services. Scale was developed to include all types of social media tools. As a result, this study aims to develop a social media addiction scale, and provide reliability and validity analysis for the scale.

2. Methodology

Sample for the study was 285 college students (Gazi Osman Pasa University, College of Education, 2015-2016 spring semester) between the ages of 18 and 22. 51 % of the sample was female and 49 % was male. First, draft version of the scale was conducted on 285 students in a pilot study, and the scale was finalized after that. The final version of the 17 item scale (Social Media Addiction Test, SMAT17) includes four level Likert style items with the choices of *never, sometimes, often, and always*. Scale was evaluated in the range of 17 to 68 point range. If the participant had a point below 17 they would be considered *"individuals who do not experience any issues with social media usage*", participants with the points between 18 and 34 considered *"individuals who somewhat experience some issues with social media usage*", participants with the points between 35 and 51 considered *"individuals who experience issues with social media usage*", and participants with the points above 52 considered *"individuals who experience serious issues with social media usage*".

3. Results

3.1 Content Validity

Expert view was used to assess content validity of the scale. Item pool was sent to 10 experts with the review options of *"appropriate", "not appropriate"* and *"if not appropriate, your suggestions"*. Items with the 90 % rating of appropriate was included in the scale and suggestions for the changes was considered.

For construct validity of the scale, exploratory and confirmatory factor analysis was conducted. For the exploratory factor analysis, Principal Component Analysis and for the confirmatory factor analysis Maximum Likelihood Analysis methods, was used. For reliability, internal consistency statistic Cronbach's alpha was used. To assess if the data was appropriate for analysis, Kaiser-Meyer-Olkin (KMO) coefficient and Barlett Sphericity test was used (Tabachnick and Fidell, 2007).

3.2 Item Analysis

In order to interpret the factors better, Varimax rotation technique, which is the most accurate and most used one, was used (Ho, 2006). Eigenvealue 1 was used as cut-off point in order to determine the number of factors (Aşkar & Dönmez, 2005); and while items were analyzed corrected item correlations was used.

Means, standard deviations, item scale correlation coefficients, and top and bottom t scores for the items in the scale are provided in Table 1.

Table 1. Descriptive Item Statistics for the Social Media Addiction Scale

Item No	N	Mean	Standard Deviation	Total Item Correcaltion[1]	Discriminant *t* Value (Bottom 27%-Top27%)[2]	*p
1	285	1.640	0.2	0.460	10.165	0.00
2	285	1.567	0.2	0.570	7.344	0.00
3	285	1.826	0.1	0.421	11.766	0.00
4	285	1.765	0.2	0.568	10.995	0.00
5	285	1.564	0.2	0.622	12.321	0.00
6	285	1.798	0.3	0.584	9.544	0.00
7	285	1.763	0.1	0.432	9.878	0.00
8	285	1.743	0.2	0.645	12.434	0.00
9	285	2.785	0.2	0.576	13.545	0.00
10	285	1.544	0.0	0.689	11.231	0.00
11	285	1.688	0.3	0.465	12.898	0.00
12	285	1.580	0.0	0.532	12.656	0.00
13	285	2.233	0.3	0.654	13.986	0.00
14	285	2.544	0.5	0.565	13.5454	0.00
15	285	2.321	0.3	0.476	17.765	0.00
16	285	1.453	0.1	0.578	8.798	0.00
17	285	1.565	0.1	0.665	14.155	0.00

[1]n=285, [2]$n_1=n_{2=}$ 77 , *p<,01

As it can be seen on Table 1 mean values for the items range between 1.453 and 2.785. Also, standard deviations for the items range between .0 and .5.

Correlations between each item and total scale points are also provided in Table 1. These correlations range between .421 and .665; and all of these correlations were significant at the .01 level. It could be argued that all the items in the scale measure the same concept that the scale as a whole measures.

Participants scores, which were calculated by adding the points for all the items, was ordered from highest to lowest; and among the 285 participants the 77 participants with the lowest scores were defined as bottom 27% and the participants with the highest 77 scores were defined as top 27%. After making this definition, the mean scores of the top group was compared with the mean score of the bottom group, with independent samples t-test. T-test results were also provided in Table1. Participants' answers for all the items, show a statistically significant difference between the top and bottom groups ($p<.01$). This shows that, each item differentiates between the subject whom has the property intended to be measured by that item and who has not.

Scales statistics for this study was as follows: The skewness value coefficient was .454 and the kurtosis was .021. Based on these findings, it could be argued that the distribution was very close to normal. Total mean scores was 27.00; the median value was 18.00; the medium was 31.00; the standard deviation was 4.7; the variance was 22.09; and the range was 45.00. The lowest score in the group was 17 and the highest score was 68.

In order to establish the construct validity, two stage procedures were followed. First, exploratory factor analysis conducted with the data collected from the 285 participants. In second stage, confirmatory factor analysis was

conducted after necessary corrections were made. For factor analysis, 200 participants or participant/item ration equivalent to 10/1 is considered enough (Kline, 2005). Collected data was deemed to be appropriate for factor analysis.

3.3 Factor Analysis

Construct validity, refers to a test's ability to measure an abstract concept in an accurate manner, in the context of behavior that is wanted to be measured (Büyüköztürk, 2007; Fraenkel and Wallen, 2008; Büyüköztürk et, al. 2010). Factor analysis was conducted to assess the construct validity (Tabachnick and Fidell, 2007). Principal component analysis was conducted in order to establish the factor structure. Before the principal component analysis was conducted, Kaiser-Meyer Olkin (KMO) and Barlett test results was run, to establish whether the data was appropriate for principal component analysis. KMO coefficient, Barlett test results were significant ($p<.001$), it shows that it was appropriate for principal component analysis, deducing factors, and the sample size was enough (Field, 2005; Büyüköztürk, 2007).

Kaiser Meyer Olkin and Bartlett Sphericity test results conducted on the data collected from the pilot trial of the scale, demonstrate that the sample was appropriate. Kaiser-Meyer-Olkin value was .750, and this value could be considered a good value (Sharma, 1996; Tabacknick & Fidell, 2001). The Bartlett Sphericity Test result was $X^2_{285}= 2356,06$, $p<,001$. This is a proof for the data has multivariate normal distribution (Tabacknick & Fidell, 2001). These findings show that the data from the pilot could be used for factor analysis.

The data collected using the Social Media Addiction Scale with the 17 item was used to conduct a principal component factor analysis and Varimax rotation technique was used for rotation. As a result of this analysis four factors were found to have eigenvalues above 1. Also screen plot graph was reviewed for establishing factor numbers (Figure 1).

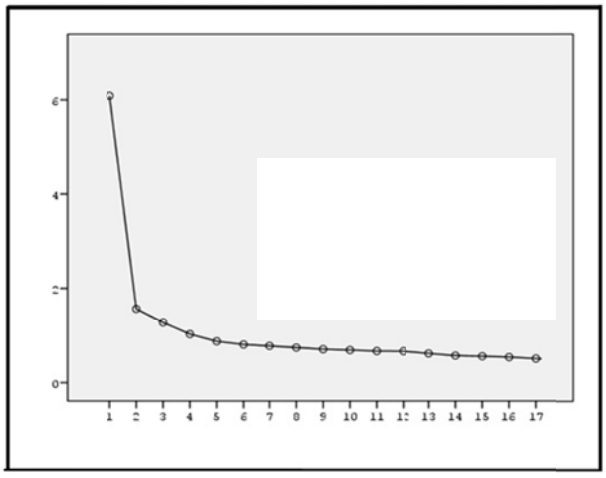

Figure 1. Social Media Addiction Scale Screen Plot Graph

As it can be seen on Figure 1, after the fourth factor, the graph becomes vertical. This means with the fifth factor and so on, their contribution to the variance is very close to each other. When the items in each factor was reviewed it was found that they were measuring similar attributes. After it was decided the scale should have four factors exploratory factor analysis was repeated for four factors and the results are on the Table 2.

Table 2 shows the four factors with the eigenvalues greater than 1 and their variances. The 17 item explains the 41.545% of the variance.

Table 2. Social Media Addiction Scale Loadings and Variance

Loadings			**Rotated Square Totals**			
Factor	**Loading**	**Explained Variance %**	**Total Variance (%)**	**Loading**	**Explained Variance %**	**Total Variance (%)**
1	4,387	25,768	25,768	2,65	16,122	16,122
2	1,320	6,268	32,036	2,434	15,123	31,245
3	1,075	5,324	37,36	1,079	7,344	4,565
4	1,185	4,185	41,545	2,212	2,956	41,545

Each factors' loadings were provided in Table 2. According to Kline (2005) factor loadings explain the factor items relationship with the factors. According to Tabacknick and Fidell (2001) each items loadings should be above .32. Also if loadings of an item is greater than .32 for more than one factor, they should have a difference greater than .10; otherwise they should be removed because of overlapping (Tabacknick and Fidell, 2001). When factor loadings were reviewed there were not any items with the loading below .32 acceptance level. Also there were not any overlapping items. Social Media Addiction Scale Items' loadings for each item is provided on Table 3.

Table 3. Item Loadings for the Social Media Addiction Scale

Item No	Factor 1	2	3	4
1	.778	.066	.213	.176
2	.588	.224	.212	.233
6	.492	.252	.243	.196
9	.465	.143	.234	.235
5	.255	.655	.165	.257
7	.176	.676	.265	.267
12	.256	.656	.278	.231
13	.243	.543	.245	.086
14	.112	.412	.234	.175
8	.234	.234	.987	.245
10	.223	.123	.787	.135
15	.243	.223	.764	.212
3	.2 32	.223	.364	.865
4	.244	.278	.334	.756
11	.133	.243	.234	.686
16	.256	.245	.223	.674
17	.254	.255	.278	.567

As a result of the factor analysis, items in the scale were grouped in four factors, each factors item loadings are provided in Table 5. Also item analysis related item total correlations are on this table. Exploratory factor analysis results and item total correlations for the Social Media Addiction Scale is provided on Table 4.

Table 4. Exploratory Factor Analysis Results for the Social Media Addiction Scale

Factor 1: Time			
Explained Variance 16,122 %			
Item No	**Item**	**Item Correlations**	**Total**
1	Would you rather prefer to spend time on social media rather than spending time with your friends?	0,460*	
2	Would you neglect your chores in order to spent time on social media?	0,570*	
6	Do you spent most of your day spending time on social media?	0,584*	
9	Could it be said that you spent more time than you should on social media?	0,576*	
Factor 2: Social Sharing			
Explained Variance : 15,123%			
Item No	**Item**	**Item Correlations**	**Total**
5	How often do you start a new friendship with other social media users?	0,622*	
7	Do you feel like you are getting away from your real life friends since you started using social media?	0,432*	
12	Do you prefer to spend time on social media rather than spending time with your real friends?	0,532*	
13	Do you prefer to spend time on social media rather than spending time on your hobbies?	0,654*	
14	Do you meet with the people you know from social media or do you have a tendency to meet with them?	0,565*	
Factor 3: Occupations			
Explained Variance : 7,344%			
Item No	**Item**	**Item Correlations**	**Total**
8	Do you think that social media use effect your job performance?	0,645*	
10	Do you need to check your social media account often while going through out your day?	0,689*	
15	Do you think that social media Addiction is a necessity for social life?	0,476*	
Factor 4:Health			
Explained Variance : 2,956 %			
Item No	**Item**	**Item Correlations**	**Total**
3	Do you have a defensive reaction for being questioned about your social media activities?	0,421*	
4	Does use of social media creates physical and emotional fatigue?	0,568*	
11	Would you have an anger episode if you were disturbed while using social media?	0,465*	
16	Dou have a task satisfaction feeling while using social media?	0,578*	
17	Do you feel like something is missing when you do not use social media?	0,665*	
Total	**Explained Variance: 41,545%**		

Table 3 and Table 4 show that factor 1 is composed of items 1, 2, 6, and 9. When items in the first factor were reviewed it was revealed that they were all related to spending time on social media, and for this reason first factor was named as *"Time"*. Time factor has four items with the item loadings between 0.460 and 0.584. This factor explains the 16.122% of the variance.

Table 3 and Table 4 show that factor 2 is composed of items 5, 7, 12, 13, and14. When items in the second factor were reviewed it was revealed that they were all related to social sharing, and for this reason first factor was named as *"Social Sharing"*. Social sharing factor has five items with the item loadings between 0.432 and 0.654. This factor explains the 15.123% of the variance.

Table 3 and 4 show that factor 3 is composed of items 8, 10, and15. When items in the third factor were reviewed it was revealed that they were all related to occupation, and for this reason first factor was named as *"Occupation"*. Occupation factor has three items with the item loadings between 0,476 and 0,689. This factor explains the 7,344% of the variance.

Table 3 and 4 show that factor 4 is composed of items 3, 4, 11, 16, and 17. When items in the fourth factor were reviewed it was revealed that they were all related to health, and for this reason first factor was named as *"Health"*. Health factor has five items with the item loadings between 0.421 and 0.665. This factor explains the 2,956% of the variance.

After establishing reliability and validity of a scale that measure a construct or concept it is necessary to describe the factor properties in a measurement instrument. (Büyüköztürk et. al., 2010). Properties of the factors in the scale are provided in Table 5. According to this items in the final form of the scale in each factor and correlation coefficients with the total scores from each factor in the range of 0.421 and 0.689 are in Table 5. These coefficients were significant at the level .01. These findings could be interpreted as the items in each factor measure the same concepts as it belongs to. Correlations between the factors if social media addiction scale are provided in Table5.

Table 5. Correlations between the factors of Social Media Addiction Scale

	1. Factor	2. Factor	3. Factor	4. Factor
1. Factor				
2. Factor	,625			
3. Factor	,538	,735		
4. Factor	,464	,547	,440	

As it can be seen in the table the correlations between the factors range between .440 and .735. Since correlations are in a medium level, it could be said that each factor measure a different aspect of the construct.

With exploratory factor analysis basic factors for the Social Media Addiction Scale was established. Confirmatory factor analysis was conducted to find whether determined factors and the items in these factors have an adequate relationship and how good the determined factor explains the intended construct. The path diagram for the conducted factor analysis is provided in Figure 2 and the goodness of fit indexes are provided in Table 6.

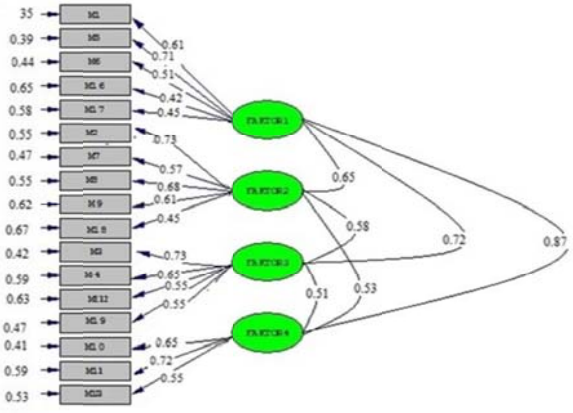

Figure 2. Path Diagram for the Confirmatory Factor Analysis of the Social Media Addiction Scale

When we look at the coefficients on Figure 2 all the observed variables represent the latent variable significantly at the level .01. This shows all the items represent their latent variable and they should be on the scale.

After parameter estimates for model fit, goodness of fit indexes for the overall model evaluation was reviewed. Goodness of fit indexes for the Social Media Addiction Scale are provided in Table 6.

Table 6. Confirmatory Factor Analysis's' Goodness of Fit Indexes for Social Media Addiction Scale

Goodness of Fit Indexes	Values
Degree of Freedom (sd)	384
Chi-Square (X^2)	1130,68 (p = 0.0)
X^2/sd	2,94
Root Mean Square Error of Approximation (RMSEA)	0,018
Comparative Fit index (CFI)	0,98
The Goodness of Fit Index (GFI)	0,93
The Adjusted Goodness Of Fit Index (AGFI)	0,86
The Root Mean Square (RMR)	0,038
Normed Fit Index (NFI)	0,95
Non-Normed Fit Index (NNFI)	0,97

Chi square is a goodness of fit index for testing whether the original variables covariant matrix is different from the suggested matrix. Calculated Chi-square values ratio to degree of freedom is very important. If this value is lower than 3 it suggest perfect fir and if it is lower than 5 it suggest medium fit (Kline, 2005). As it can be seen on Table 7 the Chi-square value for this study is 1130.68 and degree of freedom is 384. Calculated Chi-square value ratio to degree of freedom is 1130.68 / 384 = 2.94 and this suggests that original variables matrix fits to suggested matrix perfectly.

Root Mean Square Error of Approximation (RMSEA) is used to estimate population covariance in non-central X^2 distributions, and if this index is between 0 and .05 it shows perfect fir and if it is between .05 and .08 it shows a good fit (Brown, 2006; Sumer, 2000). As it can be seen on Table 7 the RMSEA value for this study is .018 and it shows a perfect fit.

The Root Mean Square (RMR) is an average of remaining covariance of estimated population covariant matrixes and sample covariant matrixes. RMR has values between 0 and 1 and if it has a value lower than .05 it suggests perfect fit and if it is smaller than .08 it suggests a good fit (Brown, 2006). As it can be seen in Table 7 the calculated RMR value for this study was .038 and it suggest a perfect fit.

Comparative Fit index (CFI) compares the covariant matrix of independent model (model that assumes no relationships between the hidden variables) and the covariant matrix of suggested structural equation model. The critical values for this index for good fit is between .97 and 1 and acceptable fit is between .95 and .97 (Tabachnick & Fidell, 2001). As it can been seen on Table 7 the calculated value for this study is .98 and it suggest a good fit.

The Goodness of Fit Index (GFI) shows how good the model measures the covariance matrix in the sample data and accepted as the explained sample variance by the model (Çokluk, Şekercioğlu & Büyüköztürk, 2010). GFI takes values between 0 and 1; and 1 indicates a perfect fit and 0 indicates no fit. If the GFI is between .95 and 1 it is accepted as perfect fit, and if it is between .90 and .95 it is accepted as good fit (Sümer, 2000). As it can bee seen on Table 7 the GFI for this study is .93 and it shows a good fit (Sümer, 2000; Tabachnick & Fidell, 2001).

The Adjusted Goodness of Fit Index (AGFI) is a goodness of fit index which was adjusted based on a degree of freedom. The critical values for this indicates a good fit between the values .90 and 1; and acceptable fit if the value is between .85 and .90. As it shown on Table 7 the AGFI for this study is .86 and it is shows an acceptable fit (Sümer, 2000; Tabachnick & Fidell, 2001).

Normed Fit Index (NFI) evaluates the model prediction by comparing the independent models X^2 value and factor models X^2 value. However in small samples NFI can give a lesser fit level than the actual level. In this cases NFI is recalculated including the degree of freedom and this is named as Non-Normed Fit Index (NNFI) (Tabachnick & Fidell, 2001). For these indexes critical values for good fit are between .90 and 1. As it can be seen on Table 7 the NFI and NNFI values for this study were .95 and .97 and these indicate a good fit.

When we look at the calculated values for this study and the critical values for these statistics most of the calculated values seem to be in the acceptable range for this study. As a whole the calculated values and the goodness of fit indexes demonstrate that the created model is fitting to the data. For this reason each factor is represented correctly by their items.

3.4 Findings Regarding the Social Media Addiction Scale's Reliability

In order to demonstrate that the scale was reliable. Cronbach's alpha reliability coefficient was calculated. Scales

Cronbach's alpha values for the first factor was 0.954; for the second factor was 0.934; for the third factor was 0.967; for the fourth factor was 0.930 and for the scale was 0.946. Spearman Brown value for the scale was 0.91. Guttmann Split-Half value was 0.89. All this statistics for each factor and for the whole scale were in acceptable range and it could be said that the scale has an internal consistency and reliability.

4. Discussion and Conclusion

It should be clear that Facebook is just one of the services of social media which is a platform that includes all the services. All the social media applications are based on social sharing (Audrey, Gerald and Tai, 2012). Facebook is a big part of social media but it isn't the whole. Social media companies are profit organizations, and creating scales with social media brand could be considered a populist approach in the name of science. When considering the social media tools, some of them are more visual and some of them are more text based, however in their core they are not very different from each other. Nobody would argue against the "TV addiction scale" however if the scale name is "IBM television Scale" the study's independence, accessibility, and generalizability would be compromised. Same situation is a real danger for the Facebook, Twitter, and similar internet addiction scales.

Social media addiction is a specific part of internet addiction. If the limits are well defined, the definitions and treatments would be clear, accordingly. Although, individual's internet addiction and social media addiction are intricate, it would be better to consider social media addiction as a separate addiction under the general internet addiction umbrella. For this reason, there is a need for separate scales, beside internet addiction scales.

Social Media Addiction Scale was composed of 17 items and four factors which were time, social sharing, occupation, and health. It could be said that it is a strong measurement tool to measure social media addiction which is a sub category of internet addiction. Determination and treatment of social media addiction of youth is an important topic. The Test could be used by the interested researchers for this purpose.

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