# Developing of Facebook AddictionScaleforTurkishAdolescents

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**Abstract-**This study intends to develop a scale to determine the facebook addiction levels of adolescents. A data set obtained from 364 high school students was used in order to study the factor construct of the scale through Exploratory Factor Analysis (EFA) and it was observed with the analysis that 9 items were removed from the scale and the remaining 25 items were collected under 3 factors. Confirmatory Factor Analysis (CFA) was applied to the data set obtained from 536 students from a similar high school group in order to confirm the construct that was determined by the exploratory factor analysis and it was found that the construct revealed by EFA and thus created dimensions were statistically confirmed and that the convergence validity criteria including values like composite reliability and average variance extracted were statistically satisfactory. It was observed that the coefficients on the whole of the scale and on each factor were satisfactory. In conclusion, Cronbach's alpha internal consistency coefficients and values obtained as a result of EFA and CFA demonstrated that the scale had a reliable and valid measurement results to define the facebook addiction level.

*Keywords-*Facebook Addiction, Scale Development, Factor Analysis, Convergence Validity,

## I. INTRODUCTION

Social networks are the most favourite applications of the Internet world that is in constant development. Easier access to the Internet and thus widespread use of it played an important role in the increase in usage frequency of the social networks. Social networks are platforms that are open to all individuals and one of the most effective instruments with a role in the change and development of human relations while they are used by a great mass throughout the world without age restriction [1] [2].There are many social network websites within the world of the Internet. Facebook is one of the most popular websites. Facebook was launched in February 2004 and it is the second most visited website in the world according to the Alexa statistics. As of August 2014, there are 968 million people daily logging in Facebook as stated in the report released by Facebook in the second quarter of 2015[3]. A study in the United States showed that 71% of the American adolescents at the age of 13-17 use Facebook and that it is the most popular social media platform among the adolescents in the United States [4].

These numbers reveal the mass significance of Facebook. With the messaging possibilities offered to its members, Facebook provides its members with opportunity to be in interaction with each other and to maintain this interaction thus helping them socialize which in turn increases the use of Facebook[5].Facebook has a great role in the transformation of the construct of the social relations of today. It doesn't only change the basic construct of social relations, but also offers individuals opportunities like self-presentation, file sharing, acquiring new friends and maintaining existing friendships [6] [7] [8]. On the other hand, uncontrolled use of Facebook may cause unignorable damages on individuals. The most significant damages include attention deficit, anxiety, narcism, reduction of face-to-face communication and addiction [9] [10] [11] [12] [13] [14]. Adolescents who spend excessive time at Facebook showed depression symptoms while they are away from Facebook. This condition is defined as "Facebook Depression" [15] [16] [17] [18]. Facebook addiction is believed to be the biggest damage of Facebook on indiviudals

In the literature, addictions are defined according to the DSM criteria (Diagnostic and Statistical Manual of Mental Disorder). DSM-5 introduced a new definition to the concept of addiction. The DSM-5 expanded the previously recognized concept of "Substance Abuse and Addiction" and changed it as "Substance Use and Addictive Disorders". Following this change, the approach that substance addiction syndromes are "behaviour" syndromes that don't only depend on substance was officially adopted in DSM.This way, not only substance addition, but also compulsive behaviours which do or don't accompany substance addiction (pathologic gambling habit, sex addiction, internet addition etc.) are also included in the same categorical classification. That is, DSM-V

(Diagnostic and Statistical Manual of Mental Disorder V) doesn't contain "internet addiction" under a separate topic. In DSM-V lists, "internet game problem" is defined as a topic worth studying. According to DSM-V, internet assumes the role of a means in the path to addicition[20] [21].

Since facebook addiction and internet addiction are clinically highly related with each other[22], internet addiction can be defined as the problem of spending excessive time online on computer[23]. Facebook addiction is recognized as special form of internet addiction. There is no consensus among the researchers on the diagnosis criteria of internet addiction and thus of facebook addiction. There are still different approaches on internet addiction. Looking at the literature, the most frequent diagnosis criteria on internet addiction are those created by Young[24] and Goldberg[25]. Young and Goldberg created respectively 8 and 7 criteria on internet addiction. Young[24] is the first researcher publishing diagnosis criteria on internet addiction. According to Young, internet addiction and gambling addiction share similar qualities and individuals with internet addiction demonstrate symptoms of various impulse control disorders.

"Facebook Addiction Scale for Adolescents" created under this study consists of 4 subscales. These are deprivation, control difficulty, dysfunctioning and social isolation. Internet addiction diagnosis criteria set by Young[24], Goldberg[25], Griffiths[26], Shapira et al. [27], Ko et al.[28] played important role in determining these four subscales. Researchers used the criteria of DSM-V (American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders) when determining the diagnosis criteria on internet addiction [20].

When we looked at the literature to review the researches on facebook addiction, several studies were found including those on internet addiction [29] [30] [31] [32] [33] [34].

Günüç[35] developed "Internet Addiction Scale" consisting of 35 items and four sub dimensions. According to the results of the exploratory factor analysisin the study, Cronbach's alpha value which is the reliability coefficient for internal consistency with respect to the measurement result of the scale was found to be .94; Cronbach's alpha reliability coefficients on the measurement results of the four sub factors of the scale were found to be between .79 and .87; the load values on four sub factors of the scale were found to vary between .38 and .64.According to the results of confirmatory factor analysis, total explored variance on the four sub factors of the scale was found to be 47,463%. Andreassen et al.[36] developed "Facebook Addiction Scale" consisting of 18 items and six sub scales. Cronbach's alpha reliability coefficient for internal consistency of the measurement result with respect to exploratory factor analysis in order to develop the scale was .83; test-retest reliability using a time period of 3 weeks was .82. Model fit indices on the measurement result for the confirmatory factor analysis were observed to be sufficient like the other statistics (RMSEA = .046, CFI = .99).

Negative effects of Facebook particularly on adolescents formed a significant ground to carry out this study. Adolescence is a period of growth and development covering the ages between 10-19 of the individuals [37]. The study gives importance to determine the demographical variables that are believed to influence facebook use of the adolescents or to be influenced by it, to the need to reveal more clearly the possible negative effects of facebook on the academic achievement and social relations of adolescents, and to the fact that adolescents spend a major part of their time at facebook. In addition, this study was conducted to develop a scale with valid and reliable measurement results taking into consideration the fact that there is insufficient number of studies in the literature revealing the facebook addiction levels of addiction.

## II. METHOD

### Study Group

When determining the study group of this study, it was first aimed to reach adolescent students. Within this scope, the population of the study consisted of 1170 students studying at the Anadolu High School. 1170 students were reached by random sampling. 47,52 % of the students participating in the study are girls (n=552) and 52,48% are boys (n=614). Scale scores of 17 students were not included in the analysis due to incomplete and wrong filling. The study group is believed to be large enough as the requirement of having a number of individuals which is 10 times of the items, as determined by Tavşancıl [38].

Reliability and validity works of the scale were done by the data obtained from 1170 students in total who participated in the study. The factory construct of the study was determined through 364 students from various Anatolian high schools by using the exploratory factor analysis (EFA) method. After that, the responses from 536 students from different Anatolian high schools in different regions were used to present evidenceon validity through the confirmatory factor analysis (CFA) method.

### Data Collection Means

Relevant literature was carefully reviewed in order to determine 4 basic dimensions that need to be included in the literature regarding the facebook addiction of individuals. "DSM-V Addiction Criteria" were taken as basis in creating the items of the scale. The study also used "Personal Information Form" consisting of demographical qualities and that is believed to affect the facebook addiction level of adolescents.

A question pool of 34 items were created for the dimensions of the scale, namely deprivation, control difficulty, dysfunctioning and social isolation. The pool included 7 items in the poverty dimension, 11 items in the control difficulty dimension, 7 items in the dysfunctioningdimension and 9 items in the social isolation dimension. Required arrangements were made for each dimension to make sure that items reflect the relevant dimension in the best manner by taking proportional weights.

3 experts of psychological counselling and guidance and 2 experts of measurement and assessment/psychometristswere designated within the study and they expressed their opinion on each item upon which it was decided correct and then use the 4 items with similar meanings. The items in the scale were reviewed by a language expert [39]. A draft scale was created by drafting and incorporating into the scale an instruction on the purpose of preparing scale in the study and on the way of scoring.

### Data Analysis

Exploratory factor analysis was used to study the factor construct which was believed to exist upon the result of the relevant literature review within the scope of the validity work of the "Facebook Addiction Scale for Adolescents" developed in the study.Confirmatory factor analysis was used in order to determine whether the measurement model defining the factor construct obtained in the analysis was compatible with the data. Cronbach's alpha internal consistency coefficient was determined for each sub dimension and for all of the scale within the scope of the reliability work of the scale. In addition, convergence validity work including values like composite reliability and average variance extracted was carried out in order to determine the construct validity of the scale.

It was intended to study the model data compliance and to test the relations which were believed to exist between variables by using the confirmatory factor analysis [40] [41]. In addition, evidence were presented on the reliability of scale by determining Cronbach's alpha

coefficients for each sub dimension determined by exploratory factor analysis (EFA).

While it is necessary to provide large sampling and multi variable normality assumption in structural equivalence models, the Partial Least Squares Path Analysis (PLSPA) represents a strong approach against the restraints of these assumptions [42]. This method allows studying with a data set with large amount of variables and less amount of observation [43]. Validity evaluation of the reflective measurement model among the models in the PLSPA path analysis was based on convergence and discriminant validity [44]. Researches need to study the Average Variances Extracted value for the convergence validity. Fornell and Larcker[45] suggest that this value should be 0,50 and more. This value shows that latent variable explains more than half of its own indicator variance [46]. The study also obtained item reliability and construct reliability for each item for the convergence validity.

## III. FINDINGS

This section of this study includes findings on exploratory factor analysis, confirmatory factor analysis, convergence validity and reliability coefficients.

### Exploratory factor analysis

Factor analysis was conducted in order to be able to dimension the scale by determining the factor loads and to test the scope validity of the "Facebook Addiction Scale for Adolescents" developed for high school students. Kaiser-Meyer-Olkin (KMO) coefficient andBarlettSphericity value were calculated in order to determine the compliance of data with factor analysis. After the analysis, KMO value was determined to be 0,958 and Barlett test results were found to be significant ($\chi^2$=12340,185; sd=561, p=.000). It was concluded according to these results that factory analysis could be conducted to the 34-item scale.

The study first included the basic components analysis and Varimax rotation technique was used in order to determine whether the scale has single dimension or not. At this stage, the items with item loadless than .30 and overlapping items with loads of different dimensions were determined. It was determined that the factor load values of all items in the scale were higher than .30 but it was decided to remove 9 items from the scale as they had high load values with multiple dimension [42] [47]. Experts were asked to study the item pool in order to maintain the scope validity because of the 9 items removed from the scale. The experts argued that the scope validity wouldn't be affected by the fact that total 9 items were removed including 1 item from the deprivation dimension, 5 items

from the control difficulty dimension, 1 item from the dysfunctioning dimension and 2 items from the social isolation dimension.

As a result of these processes, it was determined that the remaining 25 items were gathered under 3 factors. It was determined that the load values of items in the scale for each factor varied between .774 and .488. Table 1 shows the factor load values for 25 items after exploratory factor analysis as well as resulting factors.

Table 1

*Factor Analysis Result of the Scale – Rotated Component Matrix*

| Items | | Statements | Common Variance | F1 | F2 | F3 |
|---|---|---|---|---|---|---|
| F1: Dysfunctioning& Control | F24 | I ignore my responsibilities as I spend too much time on Facebook. | .609 | .774 | | |
| | F21 | I spend less time with the people around me as I use Facebook. | .636 | .746 | | |
| | F20 | I cannot find time for other social activities as I spend too much time on Facebook. | .568 | .745 | | |
| | F22 | My performance and attention in classroom are affected by Facebook. | .608 | .733 | | |
| | F13 | I cancel other works I need to do to spend more time on Facebook. | .618 | .627 | | |
| | F11 | I ignore my studies/homeworks as I spend too much time on Facebook. | .483 | .622 | | |
| | F18 | Facebook always occurs to mind even when I don't use it. | .625 | .608 | | |
| | F19 | I have problems with the people around me because I spend time on Facebook. | .577 | .607 | | |
| | F16 | I cannot turn Facebook off any time I want. | .502 | .568 | | |
| | F15 | I don't turn Facebook off even other people call me. | .536 | .548 | | |
| | F17 | I don't notice my physical needs (feel hungry, feel thirsty, go to toilet) when I spend time on Facebook. | .459 | .508 | | |
| | F23 | People think I spend too much time on Facebook. | .415 | .488 | | |
| F2: Social Isolation | F27 | I prefer to meet real friends on Facebook instead of out somewhere. | .519 | | .808 | |
| | F32 | I prefer to meet real friends on Facebook instead of out somewhere. | .639 | | .780 | |
| | F26 | I prefer Facebook friendship to real life friendship. | .468 | | .663 | |
| | F28 | I acquired new friends on Facebook. | .479 | | .616 | |
| | F31 | I have difficulty in face to face communication as I use Facebook. | .608 | | .601 | |
| | F29 | Facebook is my best friend. | .593 | | .587 | |
| | F30 | Life without Facebook is meaningless for me. | .568 | | .522 | |
| F3: Deprivation | F2 | I take comfort when I log into Facebook when I am tense and restless. | .564 | | | .761 |
| | F3 | I become happy when I log into Facebook. | .550 | | | .757 |
| | F4 | I think of and become impatient to log into Facebook when I am not on Facebook. | .661 | | | .735 |
| | F6 | I get angry when someone pushes me to log off Facebook. | .473 | | | .656 |
| | F1 | I get nervous when I cannot log into Facebook when I want to. | .491 | | | .653 |
| | F5 | I take comfort when I log into Facebook when I am tense and restless. | .455 | | | .616 |
| | | **Eigenvalue** | | 14,35 | 2,30 | 1,49 |
| | | **Explained variance** | | 42,23 | 6,77 | 4,39 |

As seen in Table 1, it was decided that the scale consisted of 3 factors when we consider the point which has an eigenvalue bigger than 1 and the point reaching a plateau in the scree plot according to the results of exploratory factor analysis results for this data set. Although the relevant literature describes dysfunctioning and control difficulty as two dimensions, it was decided that these two dimensions are perceived as a single dimension and cannot be distinguished in our country. Accordingly, the first dimension consists of 12 items with a factor load varying between .77 and .49, second dimension consists of 7 items with a factor load varying between .81 and .52 and third dimension consists of 6 items with a factor load varying between .76 and .62. According to these results, it was determined that the 3-factor structure is explained by 53,39% in total including total variances of 42,23%, 6,77% and 4,39% for each.  In scale development and adaptation works, Kline[47] emphasized that this value should be minimum 40% while Henson and Roberts[48] stated that it should be 52% and above.

*Confirmatory Factor Analysis*

After determining that the factor structure of the first stage was reliable in the second stage, it was decided to apply confirmatory factor analysis to provide evidence to the structure validity of the scale. Before switching to confirmatory factor analysis, it was studied whether the data set meets premises. As the loss value is below the critical 5%, values were assigned by the average method instead of those values [40] It was decided that data meets the univariate normality and linearity assumptions and that they should be removed from the data set by considering the Mahalanobis distance values of 17 people who have the tendency of ruining the multivariate normality. Upon studying the multicollinearity problem, it was observed that there was no problem of multicollinearity as the condition index (CI) was less than 30 and the variance increase factor (VIF) values were less than 10 [49] Upon CFA, it was determined that the construct of EFA was confirmed and thus created dimensions were statistically confirmed. Table 2 includes the goodness of fit results of the measurement model obtained by CFA.

Table 2

*Results on the Three-Dimensional Measurement Model set by CFA*

| Model | $\chi^2$ | $\chi^2$ / sd | NFI | NNFI | CFI | RMSEA |
|---|---|---|---|---|---|---|
| Three-factor construct | 747.83 | 2,75 | .91 | .93 | .96 | .049 |
| Criteria | | $\leq 5$ | $\geq .90$ | $\geq .90$ | $\geq .95$ | $\leq .08$ |

*NFI: NormedFit Index, NNFI: Non-normed Fit Index, CFI: Comperative Fit Index, RMSEA: RootMeanSquareError of Approximation*

Table 2 shows that all fit indices are acceptable according to the CFA results and that the items in the scale conformed to the model set by three-dimensional construct [41] [50]. Table 3 shows the t values and reliability coefficients of the items.

Table 3

*Confirmatory Factor Analysis Results of Items*

| Item No | Factor Load | t value | Error variance |
|---|---|---|---|
| F24 | 0.85 | 24.11 | 0.27 |
| F21 | 0.81 | 22.40 | 0.34 |
| F20 | 0.85 | 223.98 | 0.28 |
| F22 | 0.83 | 23.10 | 0.31 |
| F13 | 0.84 | 23.38 | 0.30 |
| F11 | 0.76 | 20.44 | 0.42 |
| F18 | 0.80 | 21.86 | 0.36 |
| F19 | 0.82 | 22.86 | 0.32 |
| F16 | 0.81 | 22.34 | 0.34 |
| F15 | 0.79 | 21.44 | 0.38 |
| F17 | 0.79 | 22.34 | 0.38 |
| F23 | 0.80 | 21.78 | 0.36 |
| F27 | 0.84 | 23.42 | 0.30 |
| F32 | 0.83 | 22.97 | 0.31 |
| F26 | 0.81 | 22.32 | 0.34 |
| F28 | 0.61 | 15.22 | 0.62 |
| F31 | 0.84 | 23.57 | 0.29 |
| F29 | 0.87 | 24.69 | 0.25 |
| F30 | 0.85 | 24.01 | 0.27 |
| F2 | 0.79 | 21.02 | 0.38 |
| F3 | 0.44 | 10.12 | 0.81 |
| F4 | 0.85 | 23.52 | 0.28 |
| F6 | 0.72 | 18.10 | 0.48 |
| F1 | 0.82 | 22.29 | 0.33 |
| F5 | 0.82 | 22.09 | 0.33 |

As shown in Table 3, t values of all items are significant and reliability values of all items other than item 3 are over .50.

### *Convergence Validity*

Convergence validity is a method used to test construct validity [50]. The study examined the item reliability, construct reliability and AVE values suggested by Fornell and Larcker[45] to review the convergence validity. The fact that the reliability value of items is at least 0.50 and that the t value is significant are considered as evidence for convergence validity [52].

Although Cronbach's alpha coefficient is a popular coefficient on reliability[53] [54], it is recommended to use the composite reliability value. It is stated that the acceptable value for CR is 0.70 and above. Table 4 includes the AVE and CR values calculated for each subscale regarding the convergence validity and the correlation squares showing relations between sub dimensions.

Table 4
*Relations between Composite Reliability, Average Variance Extracted and Relations between Factors*

|  | CR | AVE | IB&KG | SI |
|---|---|---|---|---|
| Dysfunctioning& Control Difficulty (IB&KG) | 0.95 | 0.65 | – |  |
| Social İsolation (SI) | 0.93 | 0.64 | 0.55 | – |
| Deprivation (YK) | 0.89 | 0.57 | 0.66 | 0.59 |

Table 4 shows that the AVE values are between 0.57 and 0.65, CR values are between 0.89 and 0.95. These values show that the scale has convergence validity [45]. In addition, squares of correlation coefficients between factors were examined for discriminant validity and it was determined according to the results that the scale has a good construct validity.

### *Reliability Analysis*

Table 5 shows the reliability coefficients of all of the scale and each factor

Table 5
*Results of Reliability Analysis on Scale*

| Factors | Number of Items | Cronbach's Alpha (α) |
|---|---|---|
| Dysfunctioning& Control Difficulty | 12 | .814 |
| Social İsolation | 7 | .749 |
| Deprivation | 6 | .801 |
| Whole Scale | 25 | .948 |

Table 5 shows that the reliability coefficients for internal consistency is .81 for the first factor, .75 for the second factor and .80 for the third factor. Internal consistency coefficient for all of the scale was found to be .95. According to these values, the scale is believed to be a reliable measurement tool to determine the facebook addiction.

### IV. RESULTS AND DISCUSSION

First a pool of 34 items was created and items were re-organized after expert view in this study which was done to determine the addiction level of high school students on facebook which is one of the most popular social sharing websites. Upon the exploratory factor analysis of the scale which is believed to basically have a four-factor construct, it was determined that it has a three-factor construct and consists of 25 items. The study also provided evidence on the validity of the scale by supporting the factor construct by the confirmatory factor analysis. The internal consistency coefficient for the reliability of the scale was calculated to be 0.814 for dysfunctioning-control difficulty, .0749 for social isolation, .801 for deprivation and .0948 for all of the scale. Values obtained as a result of the exploratory and confirmatory factor analyses and values on the reliability of the scale showed that the scale had valid and reliable measurement results with respect to determining the facebook addiction level.

When we look at the literature, several scales were found with respect to facebook addiction. These are the "Internet Addiction Scale" developed by Young [24]as adapted to Turkish by Bayraktar[55], facebook addiction scale developed by Andreassen et al. [30] as adapted to Turkish by Akın et al. [56]. Validity and reliability studies were done by both Bayraktar[55] and Akın et al. [56]for the scales which are adaptation works. Koç and Gülyağcı [9] developed a "Facebook Addiction" scale in their study to examine the role of psychological health, demographic and usage characteristics in determining the facebook addiction of college students and this scale was applied to a study group at the age of 18-30. This scale takes place in 8 dimensions (cognitive salience, behavioural salience, conflict with other activities, euphoria, loss of control, withdrawal, relapse, reinstatement) while each sub dimension was measured by a single item where the scale consists of 8 items that are graded by five point likert scale. It was determined that scale items were prepared on the basis of 8 criteria of Young [24]to determine internet addiction. In addition, the fact that the age range of the

study group to whom the scale was applied was between 18 to 30 is an indicator that the study group doesn't consist of adolescents only.

It can be argued that "The Facebook Addiction Scale for Adolescents" that was developed for this study is the first scale that was scientifically created to measure the facebook addiction level of adolescents (taking the Turkish culture/norm/adolescent age range into consideration). The fact that the Facebook Addiction Scale for Adolescents developed with this study was applied to a study group in the age range of 14 to 18 and DSM-V criteria was taken into consideration has great importance for the significance of the scale in the literature. The scale is important to inform the researchers on facebook addiction[12] [21] [51] which is rapidly spreading particularly among adolescents and to reveal the causes of facebook addiction. It is believed that this scale can be used as a measurement tool with valid and reliable measurement results in order to apply particularly in education environment and thus to determine the level of facebook addiction and to organize and design learning environments. However, as the attitudes and behaviours of individuals may change during the course of time, one should always consider that all scales cannot always exhibit a construct with valid and reliable measurement results. The sampling in this study comprised high school students and the validity and reliability of the measurement results of the Facebook Addiction Scale for Adolescents were obtained for the sampling of the study. It is recommended to conduct validity and reliability studies for different measurement results of the scale by creating samplings consisting of different age groups.

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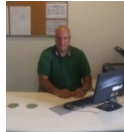
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