Journal of Pedagogical Research
Volume 6, Issue 4, 2022
https://doi.org/10.33902/JPR.202215485

Research Article

Developing the fear of missing out (FoMO) scale for university students: The validity and reliability study

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The purpose of this study is to develop a valid and reliable measurement tool to determine the level of fear of missing out (FoMO) for university students. There are many studies aiming to determine the FoMO levels of adolescents, youth and university students. However, a new scale was needed since the scales used in these studies were the adapted versions, and involved cultural differences that may lead to prejudice. 21-item pool was generated for the draft scale and applied to 343 university students. The exploratory factor analysis and parallel analysis carried out on the data, and a two-dimensional structure was formed (KMO= 0.89, Bartlett sphericity test= 0.00< 0.05). The variance explained by two factors together is 50.86%. A confirmatory factor analysis was conducted on a new data composed of 283 university students. The results showed that FoMO Scale is valid and reliable at a good level (χ^2/df = 2.12, CFI= 0.95, RMSEA= 0.06, Cronbach's alpha= 0.88). There was a moderate correlation between the factors (r= 0.48). The FoMO Scale; consists of 17 items in total, of which private factor has 9 items and the social factor has 8 items. The scale is basically worthwhile and unique in that it is theoretically inclusive and includes different concepts (regret of decision making etc.) and emotions (feel lost, feel deeply lonely, feel an inner guilt, eat one's heart out, and feel embarrassed) that define FoMO. The scale could be used by researchers as an efficient instrument to measure the FoMO levels of youth, as well as enabling the individuals to recognize the FoMO and go into action. Additionally, validity and reliability studies could be carried out by applying the scale at different education levels.

Keywords: Fear of missing out; FoMO; University students; Scale development

Article History: Submitted 22 May 2022; Revised 24 July 2022; Published online 3 August 2022

1. Introduction

Fear of missing out (FoMO) is the feeling of irritability, anxiety, and inadequacy that an individual feels when he/she misses out satisfying and beneficial developments and opportunities. The term was first used academically by Herman (2000) in line with consumption and marketing action. Accordingly, the success of brands with limited production depends on the increase in the variety of products that consumers can choose. When consumers feel that they cannot consume all of the options, they are likely to fear the risk of missing out any kind of desirable opportunities and rush to consume products in the market, especially those in limited numbers. According to Herman (2019, as cited in Zhang et al., 2020), FoMO is a fearful attitude of not being able to exhaust

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How to cite: Mazlum, M. M. & Atalay, A. (2022). Developing the fear of missing out (FoMO) scale for university students: The validity and reliability study. *Journal of Pedagogical Research, 6*(4), 20-34. https://doi.org/10.33902/JPR.202215485

available opportunities as well as the fear of missing out the potential joy of achieving it. According to Hodkinson (2019), the youth market is developing tools that take advantage of this fear and the inner indecision conveyed by young people.

In the field of psychology, FoMO, which is defined as the fear and anxiety that individuals would feel from not being in touch with the experiences in their large social circles, has found a wide application area especially in terms of examining the use of social media (Tandon et al., 2021). According to Hetz et al. (2015), FoMO is the fear that others have something that individual himself does not have, or that others experience what the individual himself want to experience. According to Riordan et al. (2015), FoMO is an unsettling and often all-consuming feeling which exists in "friends or others who are having satisfying experiences in the absence of individual". According to another definition, FoMO is when an individual feels that he/she is not a part of something happening in social networks (Gil et al., 2015). According to a definition related to the use of social media, FoMO is individuals' strong desire to stay online and follow what their virtual environment is doing, with the thought that others have more satisfying experiences than themselves (Alt, 2015). According to Abel et al. (2016), FoMO, which is characterized by feelings of anxiety, irritability and inadequacy, tends to worsen when individuals log in their social media accounts.

To explain FoMO with a simple example (Milyavskaya et al., 2018); consider a college freshman living with peers for the first time in his/her life, on Friday evening, as everyone is getting ready to go out, this student decides to work on his term paper, which he has to finish by Monday. By the end of the day, this student will probably not have finished the entire assignment. Moreover, even with an excellent willpower and determination to work, the work experience will likely be negatively affected by thinking about peers having a good time outside. That's what this student will think about missing out a potentially exciting experience. This emotion is called FoMO. FoMO is more common in students who find the lessons boring and check social media every hour, especially during the lecture (Yalçın Çinar, 2017), and especially when they work later in the day and week (Milyavskaya et al., 2018).

1.1. Social media use and FOMO

An individual's anxiety about missing out socially and individually satisfying experiences that others would have (Tandon et al., 2021) is characterized by a desire to stay connected what others are doing (Przybylski et al., 2013). In fact, desire to be socially connected, and to be a part of satisfying experiences is a basic human need present from infancy and is not limited to social media use. However, as social media is permanently accessible via portable devices, the options for connecting with acquaintances as well as sharing and having satisfying experiences have increased significantly (Fuster et al., 2017). According to studies, nomophobia (fear of losing mobile phone connection) (Gezgin et al., 2018) and problematic smart phone use (Elhai et al., 2016; Göksun, 2019) are associated with FoMO.

Social media, the most distinctive feature of which is to provide information sharing and information circulation in the internet environment without space and time limitations, triggers interpersonal communication by offering a versatile interaction environment (Diker & Taşdelen, 2017). While FoMO is not unique to social media users, individuals experiencing this fear may feel compelled to check social media more often to follow their friends' plans and activities. High-frequent use of social media, on the other hand, can trigger or increase the current insufficiency due to the individual's increased awareness of the numerous interaction possibilities (Fuster et al., 2017).

For this reason, it is intelligible that a great majority of studies on FoMO are related with the issues such as social media use/addiction (e.g. Adıgüzel, 2018; Alabri, 2022; Blanchnio & Przepiorka, 2018; Bloeman & Coninck, 2020; Lai, et al., 2016; Yalçın Çınar, 2017). In this study, which aims to develop a valid and reliable FoMO Scale, information about social media use has been examined as independent variable.

1.2. Theoretical Framework

It is thought that FoMO dates back to rational choice theory. According to the rational choice theory, all actions are basically rational and people consider the possible cost and benefit of any action before deciding what to do. The basic motivation in human behavior is that she/he can obtain the highest level of benefit for herself/himself. Therefore, people will have a hard time to make a choice among many options. When they have to make a choice, they may feel remorse about the options not chosen (Scott, 2000, p. 126). According to Milyavskaya et al. (2018), an individual experiencing FoMO may experience this feeling despite believing that she/he has made the best choice available. More clearly, even if individuals make choices that make themselves happy, they may have a deeper sense of curiosity and anxiety about the paths they did not choose.

Another concept establishing the framework for the FoMO is self-determination theory. This theory differentiates motivation in terms of being autonomous or controlled. This theory emphasizes the internal processes behind the manifestation of human behavior and personality in a social context. The research that led to the self-determination theory began with experiments examining the effects of extrinsic rewards on intrinsic motivation (Deci & Ryan, 2012, p. 416). Again, instead of the arguments that motivation may be the key source which enables students to achieve educational goals; in self-determination theory studies, it has been revealed that students especially benefit from autonomous motivation tools (intrinsic motivation, defined regulations, etc.) (Reeve, 2002, p. 185). Alt's (2015) research revealed that the level of social media use by unmotivated or extrinsically motivated students is higher than that of intrinsically motivated students in the same class. The study also confirmed that FOMO acts as a mediator in explaining the relationship between social media use and motivation.

In terms of self-determination theory, resilience and self-regulation of person are based on satisfying three basic psychological necessities. The first is competence, which is the capacity to act effectively in the universe. The second is autonomy, which is to make one's own way and take personal initiative. The third is relatedness, which means closeness or commitment to others. Deficiencies in satisfying the needs which require to be proactive, create an uncertainty. Individuals whose psychological needs are not adequately satisfied tend to use social media, which is seen as a tool to communicate, to develop social competence, and to deepen social ties. FoMO has mediator role in explaining the link between the use of social media and deficiencies in psychological needs (Przybylski et al., 2013).

Studies show that people with self-construal dependency tend to experience more FoMO (Dogan, 2019); and that individuals who feel a higher level of FoMO and need for approval in the use social media are more frequently to stay up to date in real time via the time-independent social network (Lai et al., 2016). Thus, individuals with higher levels of FoMO pay more attention to the moods of others who are engaged in positive social interactions, and seek approval from others. This leads to an increased use of social media, which can support a potential addiction. Research by Beyens et al. (2016) also shows that FoMO has a significant impact on adolescents' use of social media and their psychological well-being.

Adolescents and young people are particularly investigated in FoMO studies (e.g. Alt, 2015; Beyens et al., 2016; Göksun, 2019; Oberst et al., 2017; Riordan et al., 2015; Swan & Kendal, 2016; Tayiz, 2018), since there are few clear guidelines on how to make meaningful life choices for young people and the regret of decision making is more pronounced in the youth (Schwartz, 2000). According to the research results by Baker et al. (2016), almost three-quarters of young adults feel anxious when they encounter with the risk of missing out what their peers and friends are doing.

Studies reveal that there is a direct (Abel et al., 2016; Baker et al., 2016; Bloeman & Cominck, 2020; Koçak & Traş, 2021) or indirect (Alt, 2015; Dhir et al., 2018; Oberst et al., 2017) positive relationship between FoMO and negative social media habits such as social media addiction. Moreover, FoMO triggers compulsive social media use, which in turn significantly triggers social media fatigue (the tendency to withdraw from social media after too many social media sites,

friends, followers, and too much time spent online keeping those links), resulting in anxiety disorder and depression (Dhir et al., 2018).

Different research findings show that FoMO is associated with physical symptoms such as stress, fatigue and decreasing sleep (Milyavskaya et al., 2018), attention deficit and hyperactivity (Yalçin Çinar, 2017), more depressive symptoms and less conscious attention (Baker et al., 2016), and high level of alcohol consumption and its negative consequences (Riordan et al., 2015). FoMO contribute to negative mood or suppressed emotions (Wortham, 2011). According to Bloeman and Coninck's (2020) research, FoMO is significantly influenced by family structure and parenting style. Being a member of a broken family and fathers' parenting style triggers FoMO; a high-quality relationship between parents reduces FOMO.

1.3. The Necessity of FoMO Scale Development

FoMO, as an empirical research topic, was first discussed in the field of psychology by Przybylski et al. (2013) in a study in which they aimed to determine the fears and anxieties of individuals from not being connected with the experiences in their large social circles. The scale developed in the aforementioned study led to the empirical research of FoMO by a large audience (e.g. Alt, 2015; Baker et al., 2016; Blackwell et al., 2017; Dhir et al., 2018; Gökler et al., 2016; Perrone, 2017; Sindermann et al., 2021), and to its adaptation to many languages. The developed 10-item scale measures the level of people's fear of missing out on rewarding experiences, activities and discourse styles. Mentioned scale was adapted to Turkish by Gökler et al. (2016).

Another scale aiming to measure the level of FoMO was developed by Zhang et al., (2020) who argued that FoMO could result from threats to the private self and public (social) self. According to the authors, while the social self is about how the person wants to be perceived by others; the private self is about missing out on experiences that can develop or maintain one's own private identity. In another extraordinary study, Riordan et al. (2020) prepared a single-item scale (FoMO short form, [FoMOsf]) to determine the FoMO level and compared the results with those obtained from the scale developed by Przybylski et al. (2013). In this one-item scale, participants were asked to rate the question "Do you experience FoMO (the fear of missing out)?" between 1 and 5 point. In conclusion, it was suggested that the single-item FoMOsf Scale can be used when researchers' time is short and non-traditional assessment approaches are to be used.

According to the Online Fomo Inventory (ON-FoMO) developed by Sette et al. (2020), FoMO consists of four features: Need to belong, need for popularity, anxiety and addiction. The FoMO Scale developed by Ma et al., (2021) with the claim of being sensitive to Chinese culture has four factors as well: Missing motivation (motivation leading FoMO), missing cognition (inner motion leading FoMO), missing emotion (anxiety caused by FoMO), and missing behaviors (one's movement to join activities and keep up with others).

Exisiting FoMO Scales (Ma et al., 2021; Przybylski et al., 2013; Riordan et al., 2020; Sette et al., 2020; Zhang et al., 2020) measure the level of anxiety, sadness and regret that an individual reflects when she/he miss out an event, agenda or opportunity. However, there was a need to develop a new scale since the scales used in existing studies were the adapted versions, and involved cultural differences that may lead to prejudice. In addition, it was concluded that the aforementioned scales do not consider some critical theoretical information. For example, the issue of regret of decision making and feelings such as lostness and loneliness are not included in the scales as required. The aim of this study is to develop a valid and reliable measurement tool that represents a theoretically inclusive structure to determine the FoMO levels of university students. In this regard, the following research questions are raised:

RQ 1) How is the factor structure of FoMO Scale?

RQ 2) How is the validity and reliability of FoMO Scale?

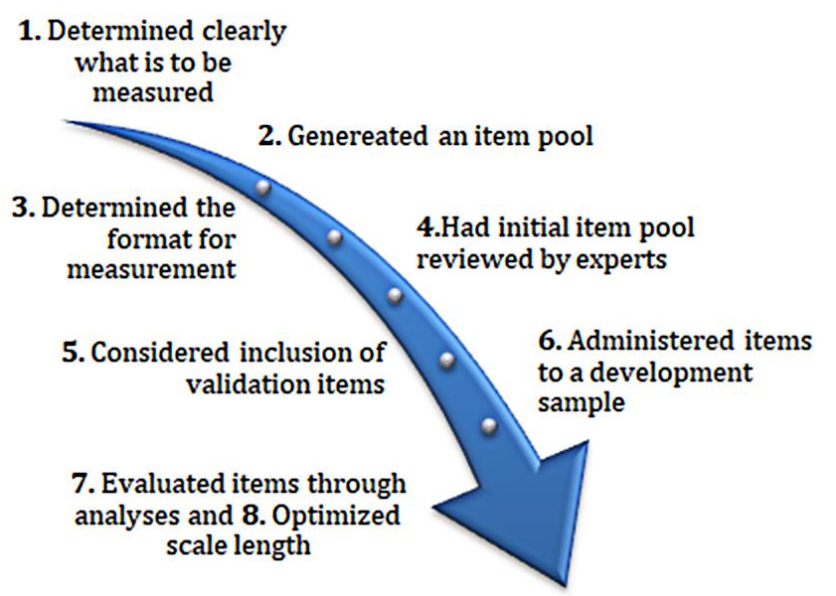
2. Methodology

In order to develop a valid and reliable measurement tool in the study; factor analysis, parallel analysis and path analysis were carried out on the data obtained from university students.

2.1. Development of Scale

Eight steps were taken to develop the FoMO Scale. These steps are proposed by DeVellis (2017) as guidelines for scale development were followed separately by researchers (see Figure 1). First, an extensive literature review was conducted to assess most of scales on fear of missing out (FoMO). Researchers realized that most of them do not contain some theoretical knowledge such as regretting for decision making, feeling lost and loneliness which are considered critical. After all; it was decided to develop a valid and reliable measurement instrument that measures comprehensively. Second, 21 items were pooled by researchers based on literature and scales exist. We avoided exceptionally length and double-barreled items. Items were not also worded negatively. The item pool was ensured to be a rich source that is relevant to the content of interest. We decided a Likert format for scaling that had five response options which were completely disagree (1), disagree (2), neither agree nor disagree (3), agree (4) and completely agree (5). An expert panel (comprising four colleagues that are expert on psychology, educational science and native language teaching) evaluated the items and 4 items were deleted due to little clarity and conciseness. 17 items were sent out to a small group comprising 5 university students and asked to write down what they understood while reading the items.

Figure 1
The steps of the scale development (DeVellis, 2017)



The researchers checked the accuracy and correctitude the target meaning of items by this way. So we could ensure how relevant we think each item is to what we intend to measure. The results showed all the students got what was meant to be understood. 17-item scale was gotten ready for pilot test on 57 undergraduate students (27 female, 25 male) and for initial assessment it was agreed all the scale items were completely understood by respondents (mean= 3.71, SD=1.07). After the evaluation of scale, it was not made further chances on the scale and 17-item scale was employed for explanatory factor analysis (EFA) and parallel analysis (PA).

2.2. Participants and Procedure

The target population was a public university in Turkey. The criterion for inclusion was having at least one social media account. Informed consent was obtained from whole the participants

electronically before asked for filling out the scale and all the forms were obtained via Google form document. 343 participants were included for EFA and PA. To verify the scale structure confirmatory factor analysis (Path Analysis) was employed and 283 participants were included. Gorsuch (1983, as cited in Mundfrom et al., 2005) stated that the minimum number of participants for factor analysis should be 100; therefore, it was decided that the number of participants was sufficient. To analyze the data, IBM SPSS 23.0 was used to conduct AFA, PA and all the descriptive analysis. Path analysis was conducted using LISRELL 8.80 Ink.

2.3. Data Analysis

The data collected was undergone item analysis to test the normality. Missing data analysis and outliers were conducted. In addition, Mahalanobis distances were examined to determine multivariate outliers. It was checked whether the quantitative variables were within the possible limits with descriptive statistics (such as mode-median-arithmetic mean, kurtosis-skewness coefficients). Regarding the distribution of the scores of the scale items, it was observed that the mean-mode-median values ($Mean = 51.10;\ Mode = 53.00;\ Median = 52.00$) were close to each other, and the skewness and kurtosis coefficients (-0.233 and -0.077) were between -1 and +1. In addition, graphical analyzes were checked through histogram, scatter diagram, box-plot, and stem and leaf plot. Finally 5 inputs were deleted and no multicollinearity problem was detected. First of all, the suitability of the data for factor analysis was examined with Kaiser-Meyer-Olkin (KMO) test and Bartlett's sphericity test.

To determine the number of factors, eigenvalues of possible factors, the contribution of eigenvalues to the total variance explained and Scree Plot were examined. In addition, it was controlled whether there was an item which factor loading value was below 0.41. Besides, PA by Brian O'Connor was conducted to determine the number of factors; to check if it was compatible with the EFA results. The reliability of the (whole) scale and the factors obtained after EFA and PA was examined with the Cronbach's alpha coefficient.

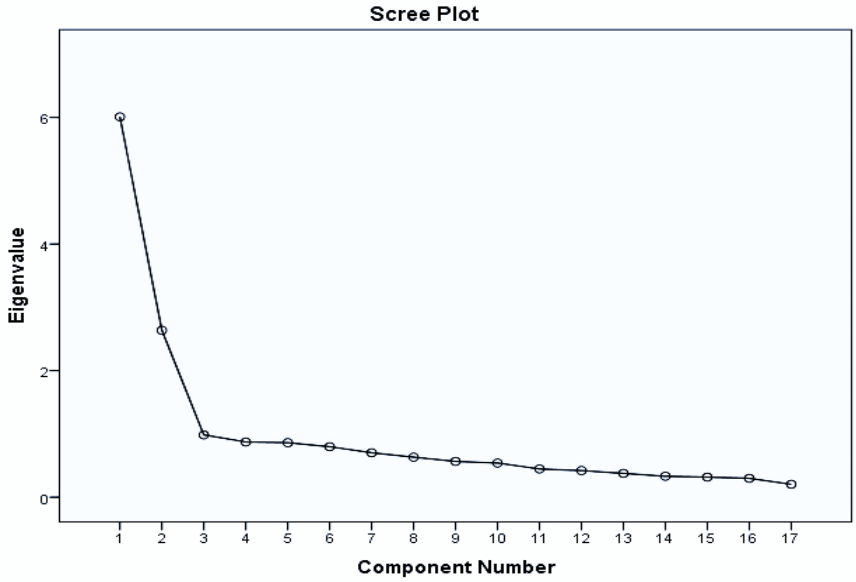
At this stage, principal component analysis and varimax rotation method, which are the most preferred analysis and rotation methods of all time, were used. Varimax rotation was chosen because the simple structure is clear and it aims to minimize the complexity of the factors by maximizing the variance of the loadings within factors (Tabachnick & Fidell, 2013). In addition, it was determined that varimax rotation, in a practical way, explained the total variance at the highest rate (50.86%) among other rotation methods.

It was aimed to obtain evidence for construct validity with CFA, which was carried out to determine whether the structure described by EFA and PA exhibited a similar structure on another group.17-item scale was applied to a new group and the data was obtained from 283 participants. The hypothesis that the scale consists of two factors was tested through CFA and some goodness of fit were examined to determine the validity of the model.

3. Results

It was decided that the sample was suitable for the related analyzes (KMO=0.89) and that the data set had a multivariate normal distribution and was suitable for factoring (Bartlett sphericity test= $0.00 < .05$). According to principal components analysis, it is observed that the scale form consists of 2 factors with an eigenvalue greater than 1. Factor loading values vary between .45 and .80, and no binary item was detected. In addition scree plot indicated a structure of two-factors (see Figure 2).

Figure 2
The scree plot of data: The evidence of two-factor structure



PA was conducted to compare the factor numbers obtained from EFA ant test their consistency. The eigenvalues and thus the factor numbers determined by the PA and EFA are included in Table 1.

Table 1
Eigenvalues and factor numbers determined by parallel analysis and EFA

Eigenvalue	*Factor 1*	*Factor 2*	*Factor 3*	*Factor 4*
Principal Component Analysis (PCA)	6.010	2.637	.984	.873
Parallel Analysis	1.448	1.361	1.286	1.231

It is realized that the PA method points to a two-factor structure. Because, from the second factor, the eigenvalues produced in parallel with the principal component analysis are higher than the eigenvalues of the basic data set. This is the point at which the number of significant factors was decided. The factors were expressed as private and social factors in accordance with the content. The proposed structure explains above 50% which is recommended by Gefen and Straub (2005) who states that AVE should be 50% or more (AVE=50.86). The reliability of the scales was tested with the Cronbach's alpha reliability coefficient (0.88) and it is generally considered sufficient if the calculated reliability coefficient is above 0.70 (Çokluk et al., 2014; Tabachnick & Fidell, 2013).

To obtain evidence of validity and confirm the structure developed by EFA and PA, CFA was conducted on a new data composed of 283 respondents. Convergent validity was investigated through factor loadings and significance coefficients (t-values) which indicate their significance (see Table 2).

The t values indicate the significance levels of the rates of the latent variables' explaining the observed variables. Similarly factor loading explain the power of item on the factor. Factor loadings vary between .80 and .45, and t values are between 15.19 and 7.83. The t values of the items are above 1.96 and the model is significant at the .01 level. Considering the error variances of the observed variables, it is not observed high standardized error variance; all the error variance are 0.78 and below (see Figure 3). The fit indices of the tested model and the evaluation criteria accepted for these indices are evaluated (see Table 3).

Table 2
Eigenvalues and factor numbers determined by parallel analysis and EFA

Items	*Factor Loadings*	*t-Value*	*Eigenvalues*	*AVE*	*Cronbach Alpha*
s10	0.80	15.19			
s11	0.78	14.73			
s14	0.78	12.51			
s16	0.73	12.20	6.010	35.35	.87
s15	0.72	10.10			
s12	0.72	14.46			
s13	0.70	11.88			
s17	0.45	7.83			
p6	0.76	15.18			
p8	0.75	14.51			
p7	0.73	14.77			
p2	0.70	9.63			
p1	0.67	10.04	2.637	15.51	.84
p4	0.65	9.71			
p9	0.58	9.11			
p3	0.54	8.27			
p5	0.49	8.88			
Total				50.86	.88

Table 3
Model fit indices

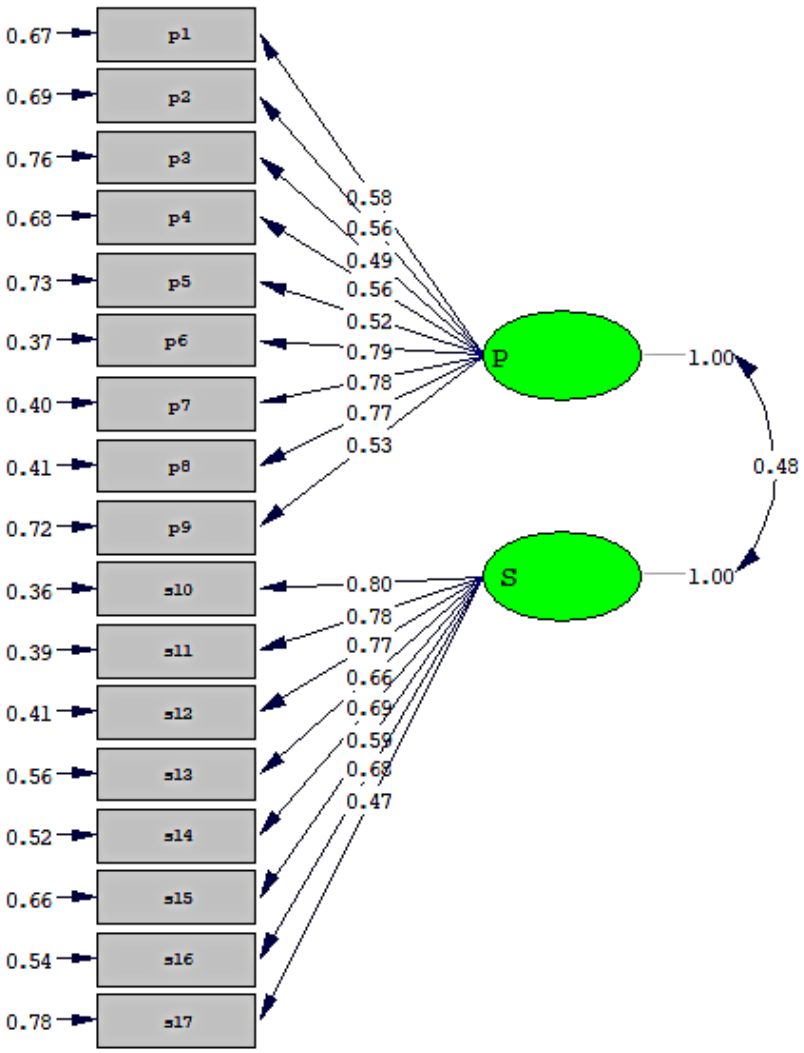
Fit Indices	*Good fit*	*Acceptable fit*	*The model values*
χ^2/df	$.00 \leq \chi^2/sd \leq 2.00$	$2.00 < \chi^2/sd \leq 3.00$	2.12
p value	$.05 < p \leq 1.00$	$.01 \leq p \leq .05$	0.00
RMSEA	$.00 \leq RMSEA \leq .05$	$.05 < RMSEA \leq .08$	0.06
NFI	$.95 \leq NFI \leq 1.00$	$.90 \leq NFI < .95$	0.95
CFI	$.97 \leq CFI \leq 1.00$	$.95 \leq CFI < .97$	0.95
IFI	$.95 \leq IFI \leq 1.00$	$.90 \leq AGFI < .95$	0.97
GFI	$.95 \leq GFI \leq 1.00$	$.85 \leq GFI < .95$	0.97
SRMR	$.00 \leq SRMR \leq .05$	$.05 < SRMR \leq .10$	0.05

Note. Adapted from *Hu and Bentler, (1999); Schermelleh-Engel et al., (2003); Seçer, (2013) and Tabachnick and Fidell, (2013).*

Chi-square and RMSEA values are the most noticeable values in a CFA. The value obtained by dividing the chi-square (246.08) to the df (116) is expected to be less than 3. In general, a RMSEA of less than 0.08 indicates a good level of fit. These two values satisfy the condition as a result of the analysis. In the CFA, each observed variable (item) had high factor loadings under its own latent variable (factor) ($p < 0.01$).

Considering the obtained fit indices, it is obvious that the results are within the acceptable or good fit range. As a result, when the fit indices, t-statistics and standardized error coefficients are taken as the basis for the evaluation of the model, the model structure with 17-item and two-factor is confirmed by the data. The CFA findings support the EFA and PA findings, and demonstrate that the two-factor model is valid.

Figure 3
The path model and standardized values (p: private, s: social)



4. Discussion

In this study, the EFA of FoMO Scale evidenced that the statistical results were consistent with the theoretical hypothesis, and the contribution rate of the two factors (private and social) to the total variance was 50.86%. Besides that the CFA findings support the EFA and PA findings, and demonstrate that two-factor model is valid. The rate of explanation of FoMO by two factors in Zhang et al. (2020) was 61.45%, while Ma et al. (2021) found that the rate of explanation by four factors was 65.22%. In the FOMO Scale which Gökler et al. (2016) adapted from Przybylski et al. (2013), the explained variance was calculated as 39.4%.

The results of this study revealed that Cronbach's alpha reliability coefficients were 0.84, 0.87, and 0.88 for private factor, social factor, and the whole scale, respectively. According to the research by Zhang et al. (2020), Cronbach's alpha value for the private factor was 0.86, for the social factor 0.92, and for the overall factor was 0.94. The reliability values of the four-factor model developed by Ma et al. (2021) vary between 0.73 and 0.79. In the four-factor scale developed by Sette et al. (2020), the reliability of the factors varies between 0.73 and 0.85, and the reliability coefficient for the whole scale is 0.92. The reliability coefficient of the scale developed by Przybylski et al. (2013) is 0.87. Cronbach's alpha reliability coefficient of the FOMO Scale which Gökler et al. (2016) adapted from Przybylski et al. (2013) is 0.81. The scale developed in this study achieves similar statistical values with existing scales.

In line with Zhang et al.'s (2010) research, this study supports the two-factor structure of the FoMO. The majority of the studies on FoMO (Gökler et al., 2016; Koçak & Traş, 2021; Ma et al., 2021; Przybylski et al., 2013; Sette et al., 2020; Song et al., 2017; Swan & Kendall, 2016) have focused on the social (self) aspect of FoMO, regardless of whether it is represented conceptually or not. However, one may also feel FoMO by experiencing on the private self. The private self usually appears when contemplating, daydreaming, or pondering on oneself. Private-self may under threat when one misses an experience that will improve or preserve his private identity (Zhang et al., 2020).

The scale developed in this study also includes the feelings of regret, dissatisfaction, fear, anxiety, sadness and left behind, arising from the private-self, independently of the existence of social groups or the perception of how the individual seems to others when he/she misses an event/opportunity. On the private aspect of FoMO, fear occurs in relation to the individual himself; the factor that triggers fear in the social aspect is related to the individual's perception of his/her social environment. The developed scale reflects an inclusive content in this respect. The basic and distinctive features of the existing measurement instruments for FoMO (including this study) are given in Table 4.

The scale developed by Przybylski et al. (2013), which is the most commonly referred in the educational studies (e.g. Alabri, 2022; Alt, 2015; Baker et al., 2016; Blackwell et al., 2017; Bloeman & Connick, 2020; Dhir et al., 2018; Gezgin et al., 2018; Gökler et al., 2016; Oberst et al., 2017; Perrone, 2017; Sindermann et al., 2021), differs in that it refers to participants between the ages of 18-62. The scale developed by Sette et al. (2020), which refers to adults between the ages of 18-63, differs from this scale developed for university students. In addition, in this scale, FoMO is not restricted with social media use, unlike some scales in the literature (Sette et al., 2020; Song et al., 2017). This study presents a measurement tool appropriate for Turkish culture as well as being intended for undergraduates.

In this study, the item pool was desired to be prepared quite concisely although it is not like the study (1 item FoMO Scale) of Riordan et al. (2020). Therefore, unlike other scales in the literature (32 items in Przybylski et al., 2013; 26 items in Zhang et al.,2020; 46 items in Sette et al., 2020), 21 items were included to the item pool in this study (final set of the FoMO Scale was 17 items – see Appendix). Riordan et al. (2020) suggested the single-item FoMO Scale, which they developed claiming of overcoming the limitations of long measurement instruments, and stated that this scale would not be used instead of a FoMO Scale that reflects the real structure, and that long FoMO scales should be used if there is enough time and the context is appropriate. The 17-item and two-factor FoMO Scale which was developed in this study is extended and sufficient enough to reflect the theoretical structure; and offers a traditional instrument for researchers who do not have enough time.

Except for the study of Zhang et al. (2020), the aforementioned scales do not represent the feeling of regret. The feeling of regret on the relevant scale was represented with the item "I feel regretful of missing the event/opportunity" below the private factor. In this study, regret of decision making was also represented. The regret of decision making emerges prominently in youths because there are few clear guidelines on how to make meaningful life choices (Schwartz, 2000). The one who desires to get the maximum benefit for oneself will have difficulty in choosing among many options; when he has to make a choice, he will feel regret about the options declined (Scott, 2000, p. 126). The regret of decision making, based on rational choice theory and characterized by FoMO (Milyavskaya et al., 2018), was represented by the item "When I decide on one of the attractive opportunities, I regret not choosing the others" on this scale.

Feeling anxious is frequently used on scales to describe FoMO. This feeling is represented by the item of "I get anxious when I don't know what my friends are up to" on the scale of Przybylski et al. (2013), by the items of "I feel anxious when I do not experience events/opportunities" and "I feel anxious because I know something important or fun must happen when I miss events

Table 4
Measuring instruments developed for FoMO and the current study

Author & year	*Tool*	*Items & factors*	*Study group & region*	*Distinctive/ outstanding feature*
Przybylski et al. (2013)	FoMO Scale (5-point Likert)	10 items, 1 factor	USA, 1013 participants age between 18 to 62	First tool, most commonly referred
Zhang et al. (2020)	FoMO Scale (7-point Likert)	9 items, 2 factors (Personel FoMO [5], Social FoMO [4])	USA, undergraduate students, 392 (EFA), 386 (CFA)	Consider personal FoMO
Riordan et al. (2020)	FoMO Scale (5-point Likert)	1 item	New Zealand, 198, 330 and 90 undergraduate students	Shortest and effective tool
Sette et al. (2020)	ON-FoMO Inventory (4-point Likert)	20 items, 4 factors need to belong, need to popularity, anxiety, addiction (5 items each)	Brazil, 405 community adults aged from 18 to 63.	Designed for assesment of modern (online) FoMO
Ma et al. (2021)	FoMO Scale (5-point Likert)	15 items, 4 factors (missing motivation [4], missing cognition [3], missing emotion [4], missing behaviors [4])	China, 486 college students for EFA, 345 undergraduate students for CFA	Cultural sensibility (China)
Current Study	FoMO Scale (5-point Likert)	17 items, 2 factors (private [9 items], social [8 items])	Turkey, university students, 343 (EFA), 283 (CFA)	Theoretical inclusivity Cultural sensibility

opportunities" on the scale of Zhang et al. (2020), by the item of "I get anxious when my cell phone does not have internet signal" on the scale of Sette et al. (2020).

On the aforementioned scales, the feeling of sadness is represented by an item (I feel sad if I am not capable of participating in events due to constraints of other things) on the scale of Zhang et al. (2020); by two items (I get sad to learn from posts that my friends went to events and I wasn't invited; Often, I feel sad seeing on social networks that people are happier than I am) on the scale of Sette et al. (2020). The feeling of uneasy is represented by the item of "When I feel that my skills are not as good as others, I feel uneasy" on the scale of Ma et al. (2021). Another remarkable point on the scale of Ma et al. (2021) is that there are 2 items about feeling an emotion among the 15 items. Other items mostly expressed like "I want to know…; It's important for me…; I often follow/look at…"

Among the existing scales, the prominent/differentiating aspects of this study are; the absence of frequent expressions such as often and sometimes in the items, focusing on emotions rather than behaviors that represent FoMO, some emotions (feel lost, feel deeply lonely, feel an inner guilt, eat one's heart out, feel embarrassed) that have not been represented in the instruments developed until now, although they are mentioned in the literature. For example, the feeling inner guilt of an undergraduate who missed an event he was planning to attend; or a student's feeling embarrassment despite begging an invitation off for compelling reasons are unique emotions that represent FoMO. Similarly, a university student's feeling of being lost among many events; the feeling of eating his heart out when he thinks that his friends are having fun and enjoying without him, seems quite reasonable in terms of FoMO.

Sezgin and Karabacak (2019) stated that in order to eliminate or prevent FoMO, the one should switch into a state of joy of missing out (JoMO), which will overcome the anxiety caused by missing out. JoMO means that the individual is happier and more productive at current conditions. The first and most important step in controlling FoMO and switch into a state of pleasure is recognizing the feeling of FoMO. Identifying the factors that lead to FoMO and determining the level of FoMO pave the way for looking for a solution and making efforts to avoid it. According to Abel et al. (2016), a scale developed on FoMO at a basic level is a main tool for people to understand how they may make mistakes on decision making when they are afraid of missing an opportunity. This study, which offers a valid and reliable scale that comprehensively reflects the structure of FoMO, fulfill the function of recognizing the FoMO people experience and enabling them to take action.

5. Conclusion

In the study, an original, valid and reliable measurement tool was developed, which also takes into account the private self and social self, in order to determine the level of university students' fear of missing out. The FoMO Scale; consists of 17 items in total, of which private factor has 9 items and the social factor has 8 items. The scale is basically worthwhile and unique in that it is theoretically inclusive and includes different concepts (regret of decision making etc.) and emotions (feel lost, feel deeply lonely, feel an inner guilt, eat one's heart out, and feel embarrassed) that define FoMO. The scale we developed could be used by researchers as an efficient instrument to measure the FoMO levels of youth, as well as enabling the individual to recognize the FoMO experienced and go into action. Additionally, validity and reliability studies can be carried out by applying the scale at different education levels.

Acknowledgements: A part of this study was presented as an oral presentation at the I. International Congress on Excellence in Education.

Author contributions: All authors have sufficiently contributed to the study, and agreed with the results and conclusions.

Funding: No funding source is reported for this study.

Declaration of interest: No conflict of interest is declared by author.

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Appendix. Fear of Missing Out Scale (FoMO Scale)

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
1. I get anxious when I'm not aware of events/ opportunities.	(1)	(2)	(3)	(4)	(5)
2. I feel sad for myself when I miss events/ opportunities.	(1)	(2)	(3)	(4)	(5)
3. I feel lost when there are too many events.	(1)	(2)	(3)	(4)	(5)
4. I feel uneasy when I do not notice the opportunities I could take advantage of.	(1)	(2)	(3)	(4)	(5)
5. When I decide on one of the attractive opportunities, I regret not choosing the others.	(1)	(2)	(3)	(4)	(5)
6. I feel obsessed when I miss events/ opportunities.	(1)	(2)	(3)	(4)	(5)
7. I feel 'left behind' when I miss events/ opportunities.	(1)	(2)	(3)	(4)	(5)
8. I feel regretful when I miss events/ opportunities.	(1)	(2)	(3)	(4)	(5)
9. I feel an inner guilt when I miss a social event I was planning to attend.	(1)	(2)	(3)	(4)	(5)
10. I feel deeply lonely when my friends attend a social event without me.	(1)	(2)	(3)	(4)	(5)
11. I feel ignored/ forgotten by my friends when I miss a social event.	(1)	(2)	(3)	(4)	(5)
12. I get anxious when I cannot keep up with my friends' plans and what they are doing.	(1)	(2)	(3)	(4)	(5)
13. I get curious when I do not keep informed about the conversations between my friends.	(1)	(2)	(3)	(4)	(5)
14. I eat my heart out when I think of my friends having a great time without me.	(1)	(2)	(3)	(4)	(5)
15. It gets on my nerves when my friends share their experiences about a social event that I couldn't attend.	(1)	(2)	(3)	(4)	(5)
16. I feel outcast from my social groups when I decline their invitation.	(1)	(2)	(3)	(4)	(5)
17. I feel embarrassed even if I decline an invitation due to compelling reasons.	(1)	(2)	(3)	(4)	(5)

Thank you for your participation