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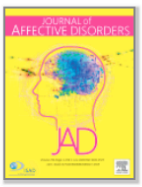

The Trait-State Fear of Missing Out Scale: Validity, Reliability, and Measurement Invariance in a Chinese Sample of University Students

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Abstract

Background: Research into the 'fear of missing out' (FoMO) has greatly increased in recent years. In Asia, many university students frequently use social networking sites (SNSs) via their smartphone. There has also been some studies examining problematic social media use, but there are few Chinese studies concerning FoMO. This may be partly due to the lack of standardized measurement tools for assessing FoMO. Therefore, the present study psychometrically validated the Chinese version of the Trait-State Fear of Missing Out Scale (T-SFoMOS-C) and tested its reliability, validity and measurement invariance among Chinese university students.

Methods: A total of 2,017 university students (aged 17 to 25 years) completed an online survey including the Chinese Trait-State Fear of missing Out Scale (T-SFoMOS-C), the Social Network Site Intensity Scale (SNSIS), and the International Positive and Negative Affect Scale short-form (I-PANAS-SF).

Results: Item analysis and exploratory factor analysis was carried out on the T-SFoMOS-C. Confirmatory factor analysis (χ^2 = 177.49, df = 50, p < .01; TLI = .959; CFI = .960; SRMR = .038; RMSEA = .050) and measurement invariance showed that the T-SFoMOS-C for university students had good construct validity among different groups. The internal consistency of the T-SFoMOS-C (.81), the test-retest reliability (.81), and the composite reliability of state-FoMO and trait-FoMO (.76 and .80) were also good. The T-SFoMOS-C was significantly correlated with the SNSIS (.40) and the Negative Affect (NA) (.26), respectively.

Conclusions: The T-SFoMOS-C is relatively reliable and valid among different groups, supporting its utility among Chinese university students.

Keywords: trait-state fear of missing out, reliability, validity, measurement invariance, Chinese university students, social media use, social networking sites

Introduction

Recently, the 'fear of missing out' (FoMO) has become more prevalent mainly due to 24/7 access to online activities such as social media use (Przybylski et al., 2013; Alt, 2017). According to a survey from the US and UK, three-quarters of adults (aged 18 to 34 years) said that they experienced FoMO (Vaughn and Mack, 2012). Another survey from the popular Chinese psychology website *Xinli001*, reported that 15.2% of respondents reported they had severe feelings of FoMO. One-thirds of respondents (32.6%) regularly checked social networking sites such as *Weibo* and *WeChat* to avoid missing out on the latest topics (Xinli001, 2016).

FoMO has been defined as "a pervasive apprehension that others might be having rewarding experiences from which one is absent" (Przybylski et al., 2013, p. 1841) and "a preoccupation of SNS users with being deprived of interaction while offline" (Alutaybi et al., 2019, p. 3758). FoMO is also considered a dispositional trait based on a relatively stable individual characteristic and important in the context of using internet-communication applications (Wegmann et al., 2017). Based on self-determination theory, the feelings of relatedness or connectedness with others is a legitimate psychological need that influences people's psychological health (Deci and Ryan, 1985). As a self-regulatory state, FoMO may arise from situational or long-term perception that individual needs are not being met (Przybylski et al., 2013). Moreover, FoMO is a state of anxiety created by a compulsive concern that an individual might miss an opportunity for social interaction or a novel experience. Overall, FoMO is a more complex phenomenon that

might reflect a specific cognition in term of the fear of missing out on something that occurs online as well as a specific personal predisposition.

In studies of FoMO, some risk factors have been examined such as personality traits (Tresnawati, 2016; Stead and Bibby, 2017; Alt and Boniel-Nissim, 2018; Blackwell et al., 2017) and psychological need satisfaction (Przybylski et al., 2013; Oberst et al., 2017; Alt, 2018; Beyens et al., 2016; Lai et al., 2016; Xie et al., 2018). In addition, FoMO has been associated with individuals' time spent using social media (Farahani et al., 2011; Buglass et al., 2017; Woods and Scott, 2016; Rosen, Carrier, and Cheever, 2013; Andreassen et al., 2016; Primack et al., 2017; Błachnio and Przepiórka, 2018). Consequently, more frequent and excessive experiences of FoMO have been associated with negative outcomes, including increasing negative affect, fatigue, stress, physical symptoms, and decreased sleep (Milyavskayai et al, 2018; Gezgin, 2018; Gezgin, 2018).

Some scholars argue that FoMO may serve as a mediator between personal characteristics, psychological needs, and wellbeing (general mood, and life satisfaction) as well as motivation factors and social media engagement (Przybylski et al., 2013; Alt, 2015; Alt, 2018). In addition, FoMO may impact academic motivation, walking safely, driving safely, and alcohol use (Alt, 2015; Appel et al., 2019; Riordan et al., 2015). Furthermore, FoMO has been shown to a predictor of SNS addiction, problematic internet use (PIU), smartphone addiction/problematic smartphone use (PSU), and *Facebook* addiction (Chotpitayasunondh and Douglas, 2016; Alt and Boniel-Nissim, 2018; Pontes, Taylor, and Stavropoulos, 2018; Elhai et al., 2016; Elhai et al., 2018; Elhai et al., 2020; Elhai et al.,

2020; Dempsey et al., 2019; Liu and Ma, 2018; Long et al., 2019; Swar and Hameed, 2017; Tunc-Aksan and Akbay, 2019; Wang et al., 2019).

Some studies have reported that FoMO is minimized by some forms of leisure activity (e.g., using SNSs, playing online videogames) and is independent of gender (Tomczyk and Selmanagic-Lizde, 2018). Przybylski (2013) demonstrated that young men had the highest levels of FoMO, but no gender differences among old people. However, some studies have reported females having a higher level of FoMO than males (Franchina et al., 2018; Stead and Bibby, 2017; Beyens et al., 2016). Therefore, further study is also needed to determine gender differences concerning FoMO.

Studies on FoMO have shown that there are relatively few validated FoMO scales currently available for researchers. Przybylski (2013) developed a self-report Fear of Missing Out Scale for assessing FoMO (i.e., FoMOS). The FoMOS comprises 10 items and assesses a unitary factor. The results of data analysis from different countries have shown that the FoMOS for adults and adolescents has a high reliability (>.83, for all) (Göokler et al., 2015; Buglass et al., 2017; Gil, Chamarro and Oberst, 2015; Oberst et al., 2017) and good validity (Elhai et al., 2018; Casale and Fioravanti, 2020). However, Al-Menayes (2016) reported that the structure of the Arabian version of FoMOS was inconsistent with the original FoMOS. Alt (2015) developed a new FoMOS comprising 10 items and three factors: social media engagement, news information engagement, and commercial information engagement. However, the lack of validity analysis decreases the likelihood of the scale being used more widely. Abri (2016) developed an alcohol-related FoMO Scale, comprising 10 items and three factors: sense of self, social interaction, and social anxiety.

More recently, the Trait-State Fear of missing Out Scale (T-SFoMOS) was developed based on the Przybylski's FoMOS (Wegmann et al., 2017). The T-SFoMOS is a 12-item and two-dimensional tool that assesses two FoMO traits (i.e., trait-FoMO and state-FoMO). The trait-FoMO represents the predisposition to develop state-FoMO and other internet-related cognitions. The state-FoMO represents a specific cognition, which acts as a mediating variable between an individual's core characteristics and internet-communication disorder (ICD) (Wegmann et al., 2017). Empirical study has shown that state-FoMO (but not trait-FoMO) is a predictor of ICD (Wegmann et al., 2017). However, Przybylski's single-factor FoMOS mainly assesses an individual's trait-FoMO. Therefore, the T-SFoMOS may be a more rounded and robust assessment tool for assessing FoMO. In China, a FoMO scale for university students is much needed. Therefore, the purposes of the present study were to (i) validate a Chinese version of the T-SFoMOS, and (ii) psychometrically test the reliability, validity, and measurement invariance of the T-SFoMOS-C among Chinese university students.

Methods

Participants

Convenience sampling was used in the present study. The original sample included 2,132 students from five universities and two colleges in four provinces of China (Jiangxi, Liaoning, Heilongjiang and Shaanxi). However, 115 students did not complete the online survey, leaving a sample of 2,017 participants (999 males, 1018 females). The response rate was 94.6%. Participant ages ranged from 17 to 25 years (M = 20.1 years; SD = 1.6).

To assess construct validity, the total sample of 2,017 was divided randomly into two groups. Item analysis and exploratory factor analysis (EFA) were conducted on one half of the sample (n=1009) and a confirmatory factor analysis (CFA) was conducted on the other (n=1008). Measurement invariance and reliability analysis were performed on the total sample (n=2,017). There were no significant differences in age (t = .62), gender (χ^2 = .18), or the total T-SFoMOS score (t = .12) between the two samples (all p-values > .05).

Measures

T-SFoMOS Translation

The Chinese version of T-SFoMOS translated from the original English version following standardized international guidelines (Beaton et al., 2000). Therefore, the initial draft was translated by two Chinese psychologists who were experts in understanding English, and two English professors without a psychology background who retranslated the draft into Chinese in order to examine whether the translation was close to the original T-SFoMOS in English. The logical validity of the Chinese T-SFoMOS was examined by another two psychologists. There was a general consensus of views from the six professors. Consequently, a 12-item two-factor Chinese T-SFoMOS was developed for further testing.

Trait-State Fear of Missing Out Scale (T-SFoMOS)

As noted earlier, the T-SFoMOS comprises 12 items assessing two domains: trait-FoMO (e.g., *"I fear others have more rewarding experiences than me"*) and state-FoMO (e.g., *"I fear not to be up-to-date in my social networking sites"*). Each item is responded to from 1 (*totally disagree*) to 5 (*totally agree*). Score are summed to create a FoMO score for every

participant. Higher scores represent higher levels of FoMO. The Cronbach's alpha value of the trait-FoMO and state-FoMO in the original validation study were .82 and .81, respectively. In the present study, using the Chinese T-SFoMOS, for the total scale was .84, for trait-FoMO was .78, and for state-FoMO was .81.

Social Network Site Intensity Scale (SNSIS)

The SNSIS was used to test the convergent validity of the T-SFoMOS-C. The instrument is based on the Facebook Intensity Scale (Ellison, Steinfield, and Lampe, 2007) and was translated into Chinese by Sun et al. (2016). The eight-item SNSIS contains two self-reported assessments of social media use behavior. First, two items were designed to assess the extent to which the participants actively engaged in SNS activities (e.g., *"In the past week, on average, approximately how many minutes per day have you spent on social networking sites?"*). The other six items assess individual attitude to SNS activities (e.g., *"Social networking is part of my everyday activity"*). Items are responded to from 1 (*totally disagree*) to 5 (*totally agree*). The Cronbach's alpha and McDonald's ω for the SNSIS in the present study were .74 and .80, respectively.

International Positive and Negative Affect Scale Short-Form (I-PANAS-SF)

The I-PANAS-SF was also used to examine the convergent validity of the T-SFoMOS-C. The 10-item I-PANAS-SF was developed based on the Positive and Negative Affect Schedule (PANAS) (Watson, Clark and Tellegen, 1988), which was translated into Chinese by Huang, Yang and Ji (2003). Each item is responded to from 1 (*not at all*) to 5 (*extremely*). The Cronbach's alphas of the negative affect (NA) and positive affect (PA) factors were .74 and .82, respectively in previous cross-culture research (Thompson,

2007). In the present study, the Cronbach's alpha and McDonald's ω of the I-PANAS-SF were.72 and .73, for NA were .83 and .81, as well as for PA were .71 and .75.

Procedure

From October 2019 to November 2019, five universities and two colleges in four provinces of China participated in order to obtain data from a wide university student sample. The first survey was conducted among two universities and one college in Jiangxi and Heilongjiang province from October 2019 to November 2019. The samples comprised 873 participants (505 males and 368 females). In November 2019, the survey was conducted in three other universities and another college from Jiangxi, Shaanxi, and Liaoning province. The samples comprised 1,259 participants (554 males and 705 females). In total, the sample comprised 2,132 university students (904 students from three comprehensive universities, 746 students from two medical universities, and 482 students from two technique colleges).

Participants were informed about the aim of the investigation and completed an online survey in order to gain course credit in normally scheduled classes. First, they provided general information concerning their age, gender, residential status, whether they owned a smartphone, as well as amount of time they used social media daily. They then completed a series of self-report psychometric scales including the Chinese T-SFoMOS, the Chinese SNSIS, and the Chinese I-PANAS-SF. Completion of all the scales took approximately 10 minutes. Of the 2,132 students who submitted responses to the questionnaires, 2,017 were valid and were used in the subsequent data analysis. A group

of 103 participants randomly sampled from the overall sample of 2,017 was used to evaluate test-retest reliability. The T-SFoMOS-C was administered twice to this sample, with two weeks between the first test and the second test.

Statistical analysis

Statistical analysis consisted of several steps involving (i) a descriptive analysis of socio-demographic characteristics and T-SFoMOS-C scores, (ii) assessment of skewness and kurtosis levels, (iii) item analysis, (iv) exploratory factor analysis (EFA), (v) confirmatory factor analysis (CFA), (vi) measurement invariance, and (vii) assessment of convergent validity and reliability. All data were analyzed using SPSS 20. Confirmatory factor analysis (CFA), measurement invariance, and composite reliability were performed using Mplus 7. Participants' socio-demographic characteristics were analyzed using descriptive statistics and frequency analysis. The difference on the T-SFoMOS-C scores was analyzed using a *t*-test and ANOVA (mean comparison). The data distribution was analyzed by skewness and kurtosis levels. Item analysis was performed by means and standard deviations, item-total correlation, and corrected item-total correlations. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (KMO, > .80) and Bartlett's test of sphericity ($p < .05$) were used to assess the suitability of the participants' data (Cerny and Kaiser, 1997). Exploratory factor analysis comprised an orderly simplification of interrelated measures (Suhr, 2005). Principal axis factoring and oblique rotation were applied (Corner, 2009). The two-factor model of T-SFoMOS-C was assessed using exploratory factor analysis (EFA) in Sample 1 (n=1009) using SPSS 20.

For the CFA, data-model fit was assessed by the comparative fit index (CFI, > .90), Tucker-Lewis Index (TLI, > .90), Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), standardized root mean square residual (SRMR, < .08), and root mean square error of approximation (RMSEA, < .06) (90% C.I.) (Hu and Bentler, 1999; Byrne, 2013). To further examine the changes in the model fitting index, measurement invariance was tested by ΔTLI (< .01) and ΔCFI (< .01) (Cheung and Rensvold, 2002; Meade, Johnson and Braddy, 2008). Convergent validity was test using SNSIS and I-PANAS-SF by Pearson's correlation. In the first survey, participants completed the T-SFoMOS-C, SNSIS and I-PANAS-SF, as well as sociodemographic characteristics. For the test-retest reliability, two weeks later, participants again completed the T-SFoMOS-C scale. The Cronbach's alpha and McDonald's ω were calculated using JASP (Jeffrey's Amazing Statistics Program). A value of ≥ .7 was considered acceptable for Cronbach's alpha (Santos, 1999).

Ethics

The study was approved by the institutional review board and Ethics Committee of Gannan Medical University. Ethical standards in the 2013 Declaration of Helsinki were followed. Each participant provided written informed consent after receiving a full explanation of the study's purpose and procedure.

Results

Socio-demographic characteristics and T-SFoMOS-C scores of the participants

As shown in Table 1, of the 2017 participants, 999 were male (49.5%; score = 28.16) and 1018 were female (50.5%; score = 29.3) with females scoring significantly higher than

males on the T-SFoMOS-C (t=3.48; p<.001). The number of students from university was 1535 (76.1%; score = 29.18) and from college was 482 (23.9%; score = 27.3) with university students scoring significantly higher than college students on the T-SFoMOS-C (t=4.96, p<.001). The number of students who lived in urban areas was 807 (40%; score = 29.19) and rural areas was 1210 (60%; score = 28.43) with those from urban areas scoring significantly higher than those from rural areas on the T-SFoMOS-C (t=2.32, p<.05). There were no significant differences among students from different grades or family structures. As for SNS usage, the average time was 4.5 hours every day, and the median was 2.1 hours.

Skewness and kurtosis levels

The skewness and kurtosis levels of the 12 items were almost all within the range between 1.0 and -1.0. The maximum and minimum values of skewness and kurtosis were 1.04, -.04, and .97, -1.14, respectively (Table 2). Maximum likelihood (ML) was robust when the maximum values of skewness and kurtosis were less than 2 and 7, respectively (West, Finch and Curran, 1995; Finney and DiStefano, 2006). Therefore, ML was adopted in the present study.

Item analysis

The item-total correlation test was performed to check if the 12 items of the T-SFoMOS were consistent with the behavior of FoMO. The results showed that all 12 items had good psychometric performance (≥ .3). Therefore, all 12 items were retained to conduct exploratory factor analysis.

Construct validity

Exploratory factor analysis

The KMO was .83 for the 12-item T-SFoMOS-C. Bartlett's test of sphericity was 4168.44 (p<.001). This result indicated that the T-SFoMOS-C had common factors and was appropriate for factor analysis. Next, exploratory factor analysis (EFA) was performed with the 12 items. All 12 items loaded on more than .3 and were consistent with the original T-SFoMOS factors. The results showed that 12 items and two factors were selected for inclusion in the T-SFoMOS-C, which were based on their loadings in the EFA (Sample 1) as well as the theoretical foundation. Item loading and factors of T-SFoMOS-C are shown in Table 3. The mean T-SFoMOS-C item score ranged from the lowest (1.77 [SD = .79] for "I fear not to be up-to-date in my social networking sites") to the highest (2.79 [SD = 1.12] for "When I miss out on a planned get-together it bothers me"). The mean scores of trait-FoMO and state-FoMO were 12.04 (SD = 3.83) and 16.70 (SD = 4.79), respectively. The average total scale score was 28.74 (SD = 7.37) (Table 2).

Confirmatory factor analysis

The 12 items and two-dimensional model fit well in Sample 2 (n=1008) (χ^2 = 198.507, df = 50, p < .01; TLI = .954; CFI = .965; SRMR = .039; RMSEA = .054) (Figure.1) and in the total sample (χ^2 = 300.802, df = 50, p < .01; TLI = .947; CFI = .960; SRMR = .038; RMSEA = .050) (Table 4).

Measurement invariance

Measurement invariance was performed including configural invariance, metric invariance, scalar invariance, and error variance invariance. Configural invariance was conducted across gender between the 999 males and 1018 females sample for the T-SFoMOS-C (Table 5). The result of configural invariance showed that TLI and CFI were .953 and .964 (χ^2 = 354.304, *df* = 100, SRMR = .041, RMSEA = .050) (N=2017) overall, .935 and .951 in the male sample (χ^2 = 256.834, *df* = 50, SRMR = .044, RMSEA = .064) (N=999), and .959 and .969 in the female sample (χ^2 = 177.489, *df* = 50, SRMR = .038, RMSEA = .050) (N=1018), respectively (Table 4). The results of metric invariance, scalar invariance, and error variance invariance on the total sample based on gender group showed that TLI and CFI were .953 and .964 (χ^2 = 354.304, *df* = 100, SRMR = .041, RMSEA = .050) , .952 and .963 (χ^2 = 363.280, *df* = 102, SRMR = .048, RMSEA = .050) , .950 and .956 (χ^2 = 422.208, *df* = 114, SRMR = .053, RMSEA = .052), respectively (Table 5). There was no significant difference across gender groups (ΔTLI < .01, Δ*CFI* < .01). This result indicated that the T-SFoMOS-C with two factors had good invariance in the gender aspects of configural, metric, scalar, and error variance.

In addition, configural invariance was conducted across education background between the 482 college students and 1535 university students for the T-SFoMOS-C (Table 5). The result of configural invariance showed that TLI and CFI were .952 and .964 (χ^2 = 342.893, *df* = 100, SRMR = .041, RMSEA = .049; N=2,017) overall, .940 and .955 in the college sample (χ^2 = 154.015, *df* = 50, SRMR = .041, RMSEA = .066; N=482), and .947 and .960 in the university sample (χ^2 = 288.924, *df* = 50, SRMR = .041, RMSEA = .056; N=1,535),

respectively (Table 4). The results of metric invariance, scalar invariance, and error variance invariance on the total sample based on education background showed that TLI and CFI were .952 and .964 (χ^2 = 342.893, *df* = 100, SRMR = .041, RMSEA = .049) , .952 and .963 (χ^2 = 348.637, *df* = 102, SRMR = .043, RMSEA = .049) , .957 and .963 (χ^2 = 360.880, *df* = 114, SRMR = .045, RMSEA = .046) , respectively (Table 5). There was no significant difference across education background groups (ΔTLI < .01, Δ*CFI* < .01). This result indicated that the T-SFoMOS-C with two factors had good invariance in the education background aspects of configural, metric, scalar, and error variance.

Convergent validity

Convergent validity was assessed using partial correlation analysis by controlling the level of gender and education background to compare the T-SFoMOS-C with the SNSIS and the PANAS (i.e., NA and PA). The correlation coefficients of the T-SFoMOS-C with the SNSIS, the NA, and the PA were .40, .26, and .03, respectively. The correlation coefficients of the trait-FoMO with the SNSIS, the NA, and the PA were .20, .29, and .03, respectively. Moreover, the correlation coefficients of the state-FoMO with the SNSIS, the NA, and the PA were .45, .16, and .07, respectively. As shown in Table 6, the T-SFoMOS-C was significantly (and closely) correlated with other established indicators of SNS use and negative emotion (e.g., the SNSIS and NA), providing high support for the convergent validity of the T-SFoMOS-C.

Reliability

Cronbach's alpha of the T-SFoMOS-C with 12 items was .81. Cronbach's alpha of state-FoMO and trait-FoMO were .77 and .79, respectively. Composite reliability of state-FoMO and trait-FoMO were .76 and .80, respectively. A total of 103 university students were randomly sampled from participants to assess test-retest reliability. T-SFoMOS-C question sequences were rearranged to reduce the memory error among Chinese university students. The two tests were conducted two weeks apart and were evaluated utilizing an intraclass correlation coefficient (ICC). Two-week test-retest reliability is often performed in research studies (Marsh, Barner, and Hocevar, 1985; Doty, Newhouse, and Azzalina, 1985). The two-week test-retest reliability of the T-SFoMOS-C was also .81, and state-FoMO and trait-FoMO were .79 and .80, respectively.

Discussion

The present study examined the factorial structure and reliability of the T-SFoMOS-C to psychometrically test a tool that assesses fear of missing out among Chinese university students. All Chinese university students participating in the study had a smartphone and used social media (e.g., *Weibo, WeChat,* and *Tencent QQ*). This finding is consistent with the "2018 China social media landscape" report by Kantarthat, which reported *WeChat* and *Weibo* were regarded as core social media platforms. *WeChat* has the largest number of users and has been fully integrated into the daily lives of many Chinese individuals (Kantar Media, 2018). A gender difference was found in total T-SFoMOS-C scores. Chinese female university students had higher FoMO scores, which is consistent with previous

findings (e.g., Franchina et al., 2018; Stead and Bibby, 2017; Beyens et al., 2016), but inconsistent with a few studies reporting young men have higher levels of FoMO (e.g., Vaughn and Mack, 2012; Przybylski et al., 2013). Kuss and Griffiths (2011) argued that relationship maintenance is the main motivator for all SNS use. Chinese female university students had higher FoMO scores, which may reflect that they prefer to maintain their interpersonal relationships via social media more than males (Ryan et al., 2014). Additionally, education background was also found to influence total T-SFoMOS-C scores. More specifically, Chinese university students had higher FoMO scores which may be due to their higher self-expectancy, stronger learning motivation, and higher dissatisfaction for social communication needs (Hong Cheng and Xiuhong Meng, 2012).

The original factor structure of the T-SFoMOS (i.e., 12 items with two factors [trait-FoMO and state-FoMO]) was also found in the T-SFoMOS-C. In the EFA, the 12-item T-SFoMOS, two-factor model of T-SFoMOS was tested. The results of the EFA showed that the two-factor model was consistent with the original T-SFoMOS and suitable on the fit estimator.

Due to the skewed distribution of the data, ML was chosen in the CFA. The one-order model of the 12-item T-SFoMOS-C obtained a series of good fit values, as it had in Wegmann et al.'s (2017) research. Previous research on trait-state FoMO scales has not shown measurement invariance. Therefore, measurement invariance was conducted to verify the two-factor structure of the T-SFoMOS-C. In the present study, measurement invariance suggested that construct validity of the T-SFoMOS-C was very high due to its configural invariance, metric invariance, scalar invariance, and error variance invariance in

relation to both gender and education background. Moreover, in the convergent validity analysis, the T-SFoMOS-C was significantly (and closely) correlated with the SNSIS and NA.

Therefore, the T-SFoMOS-C has high construct validity and convergent validity and can now be used among Chinese university students. The T-SFoMOS-C had also high reliability, similar to other FoMO assessment instruments (e.g., T-SFoMOS and FoMOS).

Although social media is especially attractive and is thought of as reducing the "cost of admission" for those who fear missing out, excessive social media use is unable to satisfy basic needs. Furthermore, a general sensitivity to FoMO could be triggered by need deficits (Przybylski et al., 2013). Moreover, previous work has also shown that FoMO is moderately associated with depression and anxiety severity (Elhai et al., 2018; Oberst et al., 2017; Wolniewicz et al., 2018) as well as psychological problems such as behavioral addictions)(Elhai et al., 2020; Oberst et al., 2017; Rozgonjuk et al., 2019; Sha et al., 2019; Wolniewicz et al., 2018; Wolniewicz et al., 2020).

The 12-item T-SFoMOS-C is able to assess FoMO and is an effective tool for assessing this among Chinese university students. Nevertheless, several limitations must be considered when interpreting these results. First, all data were self-report among a self-selected sample from a small number of universities, and is therefore subject to well-known biases (e.g., memory recall, social desirability), as well as suffering from a lack of generalizability to the total Chinese student population and the Chinese general population. Future studies should be carried out on more representative samples and use more objective methods to provide a more robust insight into level of FoMO. Second, further research is required to delve deeper into characteristics of trait-FoMO and state-

FoMO. Therefore, more studies are needed to evaluate the psychometric properties of this instrument in the general Chinese population and in other countries. It should also be noted that the translation process was carried out from English to Chinese. Given that the T-SFoMOS-C was originally developed in German, this may have caused some problems in relation to linguistic validity during the translation process. It should also be noted that there were significant correlations between T-SFoMOS-C and SNSIS, NA and PA, the coefficients are arguably relatively low and that significant levels may possibly be due the large sample size. Therefore, further replications are needed to conform whether such associations are genuine or a statistical artefact.

Overall, the results demonstrate the robust psychometric properties of the Chinese version of T-SFoMOS (i.e., T-SFoMOS-C). More specifically, the T-SFoMOS-C had high construct validity, good reliability, and demonstrable measurement invariance. Based on the findings, the T-SFoMOS-C is an appropriate psychometric instrument for assessing fear of missing out among Chinese university students.

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Availability of data and materials

The datasets supporting the conclusions of this paper are available from the corresponding author upon reasonable request.

Author Contributions

Conceptualization: SLM; Data curation: LL and ZMN; Formal analysis: LL and ZMN; Funding acquisition: LL and SLM; Investigation: LL and ZMN; Methodology: LL and SLM; Project administration: LL and SLM; Software: SLM; Writing - original draft: LL, ZMN and MDG; Writing - review & editing: MDG

Competing interests

There are no financial or non-financial competing interests. None of the research staff received incentives for recruiting participants or for any other purpose directly related to the study.

Consent for publication

Not applicable.

Ethics approval and consent to participate

This study was approved by the institutional review board and Ethics Committee of Gannan Medical University. The ethical standards in the 2013 Declaration of Helsinki were followed. Each participant provided written informed consent after receiving a full explanation of the study's purpose and procedure.

References

1. Al Abri, A. (2017). Where is the party tonight? The impact of fear of missing out on peer norms and alcohol expectancies and consumption among college students. Doctoral Dissertation: University of Connecticut, USA.
2. Al-Menayes, J. (2016). The fear of missing out scale: Validation of the Arabic version and correlation with social media addiction. *International Journal of Applied Psychology, 6*(2), 41–46.
3. Alt, D. (2015). College students' academic motivation, media engagement and fear of missing out. *Computers in Human Behavior, 49*, 111-119.
4. Alt, D. (2017). Students' social media engagement and fear of missing out (FoMO) in a diverse classroom. *Journal of Computing in Higher Educatio*n, 29(2), 388-410.
5. Alt, D. (2018). Students' wellbeing, fear of missing out, and social media engagement for leisure in higher education learning environments. *Current Psychology, 37*(1), 128-138.

6. Alt, D., & Boniel-Nissim, M. (2018). Using multidimensional scaling and PLS-SEM to assess the relationships between personality traits, problematic internet use, and fear of missing out. *Behavior & Information Technology, 37*(12), 1264-1276.
7. Alutaybi, A., Arden-Close, E., McAlaney, J., Stefanidis, A., Phalp, K., & Ali, R. (2019). How can social networks design trigger fear of missing out? In *2019 IEEE International Conference on Systems, Man and Cybernetics (SMC)* (pp. 3758-3765). Bari, Italy: IEEE.
8. Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study. *Psychology of Addictive Behaviors, 30*(2), 252–262.
9. Appel, M., Krisch, N., Stein, J. P., & Weber, S. (2019). Smartphone zombies! Pedestrians' distracted walking as a function of their fear of missing out. *Journal of Environmental Psychology, 63*, 130-133.
10. Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, *25*(24), 3186-3191.
11. Beyens, I., Frison, E., & Eggermont, S. (2016). "I don't want to miss a thing": Adolescents' fear of missing out and its relationship to adolescents' social needs, Facebook use, and Facebook related stress. *Computers in Human Behavior, 64*, 1-8.
12. Błachnio, A., & Przepiórka, A. (2018). Facebook intrusion, fear of missing out, narcissism, and life satisfaction: A cross-sectional study. *Psychiatry Research, 259*, 514-519.

13. Blackwell, D., Leaman, C., Tramposch, R., Osborne, C., & Liss, M. (2017). Extraversion, neuroticism, attachment style and fear of missing out as predictors of social media use and addiction. *Personality and Individual Differences, 116*, 69-72.
14. Buglass, S. L., Binder, J. F., Betts, L. R., & Underwood, J. D. M. (2017). Motivators of online vulnerability: The impact of social network site use and FOMO. *Computers in Human Behavior*, 66, 248-255.
15. Byrne BM. (2013). *Structural equation modeling with LISREL, PRELIS, and SIMPLIS: Basic concepts, applications, and programming.* New York: Psychology Press.
16. Casale, S., & Fioravanti, G. (2020). Factor structure and psychometric properties of the Italian version of the fear of missing out scale in emerging adults and adolescents. *Addictive Behaviors*, *102*, 106179.
17. Cerny, B. A., & Kaiser, H. F. (1977). A study of a measure of sampling adequacy for factor-analytic correlation matrices. *Multivariate Behavioral Research, 12*(1), 43-47.
18. Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*(2), 233-255.
19. Chotpitayasunondh, V., & Douglas, K. M. (2016). How "phubbing" becomes the norm: The antecedents and consequences of snubbing via smartphone. *Computers in Human Behavior, 63*, 9-18.
20. Corner S. (2009). Choosing the right type of rotation in PCA and EFA. *JALT Testing & Evaluation SIG Newsletter, 3*, 20-25.
21. Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour.* New York: Plenum.

22. Dempsey, A. E., O'Brien, K. D., Tiamiyu, M. F., & Elhai, J. D. (2019). Fear of missing out (FoMO) and rumination mediate relations between social anxiety and problematic Facebook use. *Addictive Behaviors Reports*, *9*, 100150.

23. Doty, R. L., Newhouse, M. G., & Azzalina, J. D. (1985). Internal consistency and short-term test-retest reliability of the University of Pennsylvania Smell Identification Test. *Chem Senses*, *10*(3), 297-300.

24. Elhai, J. D., Levine, J. C., Alghraibeh, A. M., Alafnan, A., Aldraiweesh, A., & Hall, B. J. (2018). Fear of missing out: Testing relationships with negative affectivity, online social engagement, and problematic smartphone use. *Computers in Human Behavior, 89*, 289-298.

25. Elhai, J. D., Levine, J. C., Dvorak, R. D., & Hall, B. J. (2016). Fear of missing out, need for touch, anxiety and depression are related to problematic smartphone use. *Computers in Human Behavior, 63*, 509-516.

26. Elhai, J. D., Yang, H., Fang, J., Bai, Y., & Hall, B. J. (2020). Depression and anxiety symptoms are related to problematic smartphone use severity in Chinese young adults: Fear of missing out as a mediator. *Addictive Behaviors, 101*, 105962.

27. Elhai, J. D., Yang, H., Rozgonjuk, D., & Montag, C. (2020). Using machine learning to model problematic smartphone use severity: the significant role of fear of missing out. *Addictive Behaviors, 103*, 106261.

28. Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication, 12*(4), 1143-1168.

29. Farahani, H. A., Kazemi, Z., Aghamohamadi, S., Bakhtiarvand, F., & Ansari, M. (2011). Examining mental health indices in students using Facebook in Iran. *Procedia-Social and Behavioral Sciences, 28*, 811–814.
30. Finney, S. J., & DiStefano, C. (2006). Non-normal and categorical data in structural equation modeling. *Structural Equation Modeling, 6*, 269-314.
31. Franchina, V., Vanden Abeele, M., Van Rooij, A. J., Lo Coco, G., & De Marez, L. (2018). Fear of missing out as a predictor of problematic social media use and phubbing behavior among Flemish adolescents. *International Journal of Environmental Research and Public Health, 15*(10), 2319.
32. Gezgin, D. M. (2018). Relationship among smartphone addiction, age, lack of sleep, fear of missing out and social networking sites use among high school students. *Cypriot Journal of Educational Sciences, 13*(2), 409-421.
33. Gezgin, D. M. (2018). Understanding Patterns for Smartphone Addiction: Age, Sleep Duration, Social Network Use and Fear of Missing Out. *Cypriot Journal of Educational Sciences, 13*(2), 166-177.
34. Gil, F., Chamarro, A., & Oberst, U. (2015). Addiction to online social networks: A question of “Fear of Missing Out”? *Journal of Behavioral Addiction, 4*(Suppl. 1), 1-51.
35. Gökler, M., Aydın, R., Ünal, E., & Metintaş, S. (2015). Determining validity and reliability of Turkish version of Fear of Missing Out Scale. *Anadolu Psikiyatri Dergisi, 17*, 52-59.

36. Hong Cheng, Xiuhong, Meng. (2012). Comparison of social support, coping style and life satisfaction between higher vocational and undergraduate college students. *Chinese Journal of School Health, 33*(11),1299-1303.

37. Hu Lt, Bentler PM. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 1*, 1-55.

38. Huang, L., Yang, T., & Li, Z. (2003). Applicability of the Positive and Negative Affect Scale in Chinese. *Chinese Mental Health Journal, 17*(1), 54-56.

39. Kantar Media, China, K. (2018). China social media landscape 2018. Retrieved February, 11, 2020, from: https://cn-en.kantar.com/

40. Kuss, D. J., & M.D. Griffiths. (2011). Excessive online social networking: Can adolescents become addicted to Facebook? *Education and Health, 29*(4), 68-71.

41. Lai, C., Altavilla, D., Ronconi, A., & Aceto, P. (2016). Fear of missing out (FOMO) is associated with activation of the right middle temporal gyrus during inclusion social cue. *Computers in Human Behavior, 61*, 516-521.

42. Liu, C., & Ma, J. (2018). Social support through online social networking sites and addiction among college students: The mediating roles of fear of missing out and problematic smartphone use. *Current Psychology, 37*, 1-8.

43. Long, J., Wang, P., Liu, S., & Lei, L. (2019). Materialism and adolescent problematic smartphone use: The mediating role of fear of missing out and the moderating role of narcissism. *Current Psychology, 38*, 1-9.

44. Marsh, H. W., Barnes, J., & Hocevar, D. (1985). Self-other agreement on multidimensional self-concept ratings: Factor analysis and multitrait-multimethod analysis. *Journal of Personality and Social Psychology*, *49*(5), 1360-1377.

45. Meade, A. W., Johnson, E. C., & Braddy, P. W. (2008). Power and sensitivity of alternative fit indices in tests of measurement invariance. *Journal of Applied Psychology, 93*(3), 568-592.

46. Milyavskaya, M., Saffran, M., Hope, N., & Koestner, R. (2018). Fear of missing out: prevalence, dynamics, and consequences of experiencing FOMO. *Motivation and Emotion*, *42*(5), 725-737.

47. Oberst, U., Wegmann, E., Stodt, B., Brand, M., & Chamarro, A. (2017). Negative consequences from heavy social networking in adolescents: The mediating role of fear of missing out. *Journal of Adolescence, 55*, 51-60.

48. Pontes, H. M., Taylor, M., & Stavropoulos, V. (2018). Beyond "Facebook addiction": The role of cognitive-related factors and psychiatric distress in social networking site addiction. *Cyberpsychology, Behavior, and Social Networking*, *21*(4), 240-247.

49. Primack, B. A., Shensa, A., Escobar-Viera, C. G., Barrett, E. L., Sidani, J. E., Colditz, J. B., & James, A. E. (2017). Use of multiple social media platforms and symptoms of depression and anxiety: A nationally-representative study among U.S. young adults. *Computers in Human Behavior, 69*, 1–9.

50. Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior, 29*(4), 1841-1848.

51. Riordan, B. C., Flett, J. A., Hunter, J. A., Scarf, D., & Conner, T. S. (2015). Fear of missing out (FoMO): The relationship between FoMO, alcohol use, and alcohol-related consequences in college students. *Annals of Neuroscience and Psychology*, *2*(7), 1-7.

52. Rosen, L. D., Carrier, M. L., & Cheever, N. A. (2013). Facebook and texting made me do it: Media-induced task-switching while studying. *Computers in Human Behavior, 29*(3), 948-958.

53. Rozgonjuk, D., Elhai, J. D., Ryan, T., & Scott, G. (2019). Fear of missing out is associated with disrupted activities from receiving smartphone notifications and surface learning in college students. *Computers & Education, 140*, 103590.

54. Ryan, T. , Chester, A. , Reece, J. , & Xenos, S. (2014). The uses and abuses of Facebook: a review of Facebook addiction. *Journal of Behavioral Addictions, 3*(3), 133-148.

55. Santos JRA. (1999). Cronbach's alpha: A tool for assessing the reliability of scales. *Journal of Extension. 2*, 1-5.

56. Servidio, R. (2019). Self-control and problematic smartphone use among Italian University students: The mediating role of the fear of missing out and of smartphone use patterns. *Current Psychology, 38*, 1-11.

57. Sha, P., Sariyska, R., Riedl, R., Lachmann, B., & Montag, C. (2019). Linking Internet communication and smartphone use disorder by taking a closer look at the Facebook and WhatsApp applications. *Addictive Behaviors Reports, 9*, 100148.

58. Stead, H., & Bibby, P. A. (2017). Personality, fear of missing out and problematic internet use and their relationship to subjective well-being. *Computers in Human Behavior, 76*, 534-540.

59. Suhr, D. D. (2005). Principal component analysis vs. exploratory factor analysis (paper 203-30). In *Proceedings of the thirtieth annual SAS® users group international conference* (Vol. 203, p. 30). Cary, NC: University of North Carolina.

60. Sun XJ, Lian SL, Niu GF, et al. (2016). Social network site use and depression in adolescents: Mediating of upward social comparison. *Chinese Journal of Clinical Psychology, 24*(1), 32-35.

61. Swar, B., & Hameed, T. (2017). Fear of missing out, social media engagement, smartphone addiction and distraction: Moderating role of self-help mobile apps-based interventions in the youth. *Biomedical Engineering Systems and Technologies, 5*, 139-146.

62. Thompson, E. R. (2007). Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). *Journal of Cross-Cultural Psychology, 38*(2), 227-242.

63. Tomczyk, Ł., & Selmanagic-Lizde, E. (2018). Fear of missing uut (FOMO) among youth in Bosnia and Herzegovina—Scale and selected mechanisms. *Children and Youth Services Review*, *88*, 541-549.

64. Tresnawati, F. R. (2016). Hubungan antara the big five personality traits dengan fear of missing out about social media pada mahasiswa. *Intuisi: Journal Ilmiah Psikologi, 8*(3), 179-185.

65. Tunc-Aksan, A., & Akbay, S. E. (2019). Smartphone addiction, fear of missing out, and perceived competence as predictors of social media addiction of adolescents. *European Journal of Educational Research, 8*(2), 559-566.

66. Vaughn, V., & Mack, A. M. (2012). Fear of missing out (FOMO). A report from JWT Inte lligence. New York: J. Walter Thompson Company.

67. Wang, J., Wang, P., Yang, X., et al. (2019). Fear of missing out and procrastination as mediators between sensation seeking and adolescent smartphone addiction. *International Journal of Mental Health and Addiction, 17*(4), 1049-1062.

68. Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063-1070.

69. Wegmann, E., Oberst, U., Stodt, B., & Brand, M. (2017). Online-specific fear of missing out and Internet-use expectancies contribute to symptoms of internet communication disorder. *Addictive Behaviors Reports, 5*, 33-42.

70. West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 56–75). Thousand Oaks, CA: Sage.

71. Wolniewicz, C. A., Rozgonjuk, D., & Elhai, J. D. (2020). Boredom proneness and fear of missing out mediate relations between depression and anxiety with problematic smartphone use. *Human Behavior and Emerging Technologies, 2*(1), 61-70.

72. Wolniewicz, C. A., Tiamiyu, M. F., Weeks, J. W., & Elhai, J. D. (2018). Problematic smartphone use and relations with negative affect, fear of missing out, and fear of negative and positive evaluation. *Psychiatry Research, 262*, 618-623.

73. Woods, H. C., & Scott, H. (2016). Sleepyteens: Social media use in adolescence is associated with poor sleep quality, anxiety, depression and low self-esteem. *Journal of Adolescence, 51*, 41–49.

74. Wortham, J. (2011). *Feel like a wallflower? Maybe it's your Facebook wall. The New York Times, April 10.* Retrieved February, 11, 2020, from http://www.nytimes.com/2011/04/10/business/10ping.html.

75. Xie, X., Wang, Y., Wang, P., Zhao, F., & Lei, L. (2018). Basic psychological needs satisfaction and fear of missing out: Friend support moderated the mediating effect of individual relative deprivation. *Psychiatry Research, 268*, 223-228.

76. Xinli001 (2016). *How to say goodbye to the fear of missing out*. Retrieved January, 27, 2020, from http://www.xinli001.com/info/100001714/

Table 1. Sociodemographic characteristics and T-SFoMOS-C scores (N = 2,017).

Variables		N (%) Mean±SD	T-SFoMOS-C Mean±SD	*p*
Owned a smartphone	Yes	2017(100%)		
	No	0		
Age		20.1±1.6		
Gender	Male	999 (49.5%)	28.16±7.64	.001
	Female	1018(50.5%)	29.30±7.06	
Students	University	1535(76.1%)	29.18±7.10	.001
	college	482(23.9%)	27.30±8.02	
Residential status	Urban	807(40.0%)	29.19±7.57	.024
	Rural	1210(60.0%)	28.43±7.23	
Grade	Freshman	1035(51.3%)	28.66±7.66	.949
	Sophomore	276(13.7%)	28.67±7.23	
	Junior	136(6.7%)	28.93±7.64	
	Senior	570(28.3%)	28.85±6.85	
Family structure	Parents	1086(89.5%)	28.72±7.41	.889
	A Parent	184(9.1%)	28.91±7.01	
	Other	27(1.3%)	28.22±7.46	
Time of SNS use (h)	Everyday	4.5±2.1		

Table 2. Mean scores (SD), corrected item-total correlation, and internal consistency (Cronbach's α) coefficients for items in subscales of the Revised Chinese Version of the Trait-State Fear of Missing Out Scale (T-SFoMOS-C) (n=1009)

item	M	SD	Skewness	Kurtosis	Corrected Item-total correlation	Alpha if item deleted
1	2.32	.98	.46	-.45	.57	.83
2	2.22	.97	.59	-.22	.58	.83
3	2.52	1.06	.23	-.89	.62	.83
4	2.20	1.02	.58	-.49	.64	.82
5	2.79	1.12	-.04	-1.14	.60	.83
6	2.74	1.11	.14	-1.06	.60	.83
7	1.91	.86	.81	.15	.62	.83
8	1.77	.79	1.04	.97	.63	.82
9	2.38	1.08	.45	-.78	.61	.83
10	2.62	1.09	.15	-1.01	.58	.83
11	2.69	1.05	.10	-.92	.60	.83
12	2.59	1.07	.14	-1.02	.60	.83

Note: The corrected item-total score correlation omitted the score of the item. The *α* coefficient was calculated with the score of the item deleted from the total score. The item-total correlation coefficients were all statistically significant at $p<.01$ level.

Notes: Overall Cronbach's alpha = .81; Scale M = 28.74, SD = 7.37; trait-FoMO M = 12.04, SD = 3.83; state-FoMO M = 16.70, SD = 4.79

Table 3. Factor loading of the T-SFoMOS-C in two factors by EFA (n=1009)

	State-FoMO item	Factor loading		Trait-FoMO item	Factor loading
7	It is important that I have a say about the latest issues in my online social networks (videos, images, posts, etc.)	.707	2	I fear my friends have more rewarding experiences than me	.860
10	When I have a good time it is important for me to share the details online (e.g. updating status)	.693	1	I fear others have more rewarding experiences than me	.849
8	I fear not to be up-to-date in my social networking sites	.683	3	I get worried when I find out my friends are having fun without me	.708
9	I continuously consult my smartphone, in order not to miss out on anything	.676	4	I get anxious when I don't know what my friends are up to	.706
12	When I go on vacations, I continue to keep tabs on what my friends are doing	.665	5	When I miss out on a planned get-together it bothers me	.536
6	I am continuously online in order not to miss out on anything	.662			
11	It is important that I understand the Internet-slang my friends use	.648			
	Eigenvalues	4.392		Eigenvalues	1.729
	percentage of variance (%)	36.596		percentage of variance (%)	14.411

Table 4. T-SFoMOS-C data-model fit of different samples in CFA

Model	χ^2	df	TLI	CFI	AIC	BIC	SRMR	RMSEA(90% CI)
Two factors CFA (n=1008)	198.507	50	.954	.965	30357.278	30553.907	.039	.054(.046, .062)
Total sample (n=2017)	300.802	50	.947	.960	60361.275	60585.650	.038	.050(.045, .055)
Male (n=999)	256.834	50	.935	.951	31062.984	31259.254	.044	.064(.057, .072)
Female (n=1018)	177.489	50	.959	.969	29903.238	30100.261	.038	.050(.042, .058)
College (n=482)	154.015	50	.940	.955	14540.460	14707.577	.041	.066(.054, .078)
University (n=1535)	288.924	50	.947	.960	46521.821	46735.273	.041	.056(.050, .062)

Table 5. T-SFoMOS-C data-model fit of different sample in measurement invariance

Model	χ^2	df	TLI	CFI	ΔTLI	ΔCFI	BIC	SRMR	RMSEA(90% CI)
Gender configural invariance (n=2017)	354.304	100	.953	.964	----	----	61414.971	.041	.050(.045, .056)
Gender weak invariance (n=2017)	354.304	100	.953	.964	.000	.000	61414.971	.041	.050(.045, .056)
Gender strong invariance (n=2017)	363.280	102	.952	.963	.001	.001	61409.377	.048	.050(.045, .056)
Gender Error variance Invariance (n=2017)	422.208	114	.950	.956	.002	.007	61391.075	.053	.052(.047, .057)
Education background configural Invariance (n=2017)	342.893	100	.952	.964	----	----	61511.030	.041	.049(.043, .055)
Education background weak Invariance (n=2017)	342.893	100	.952	.964	.000	.000	61511.030	.041	.049(.043, .055)
Education background strong Invariance (n=2017)	348.637	102	.952	.963	.000	.001	61501.785	.043	.049(.043, .055)
Education background error variance Invariance (n=2017)	360.880	114	.957	.963	.005	.000	61428.410	.045	.046(.041, .052)

Table 6. Correlations between the Chinese Version of the Trait-State Fear of Missing Out Scale (T-SFoMOS-C) subscale scores and other scales (N = 2017)

Factor	T-SFoMOS-C	SNSIS	NA	PA
Trait-FoMO	.80[a]	.20[a]	.29[a]	.03
State-FoMO	.87[a]	.45[a]	.16[a]	.07[b]
T-SFoMOS-C	1.0	.40[a]	.26[a]	.03

Note: SNSIS: Social Network Site Intensity Scale. NA: negative affect. PA: positive affect. [a] The correlation coefficients between T-SFoMOS-C subscales and other (SNSIS and NA) scales were all statistically significant at the $p<.001$ level. [b] The correlation coefficients between State-FoMO and PA was statistically significant at the $p<.05$ level

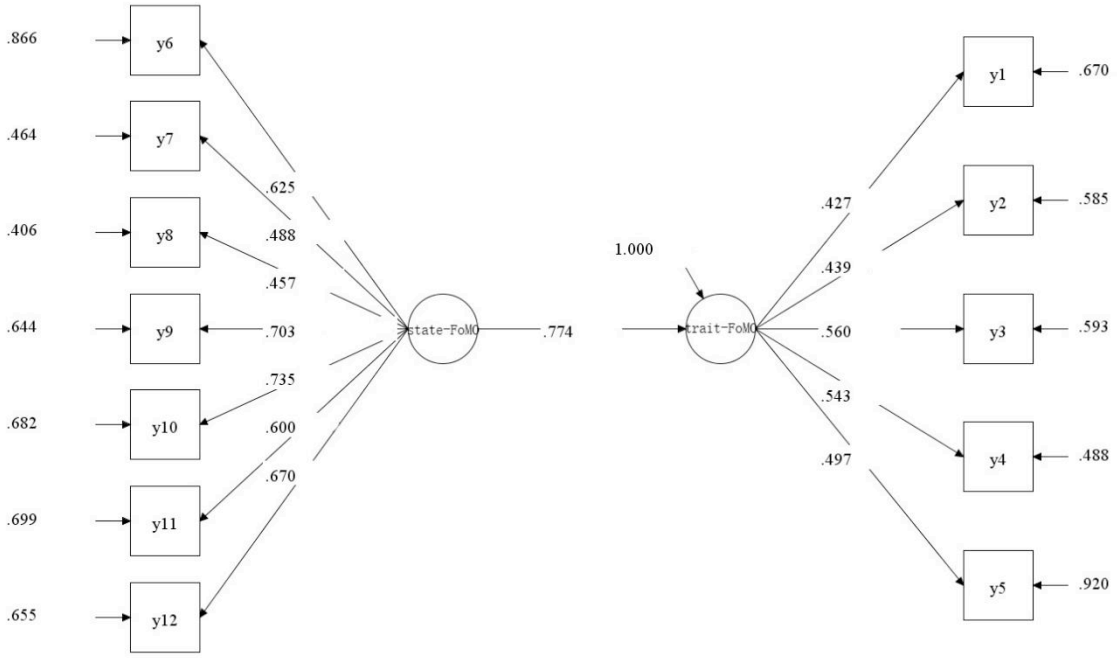

Figure.1 T-SFoMOS-C of the 12 items and two-dimensional model