

Social media addiction profiles and their antecedents using latent profile analysis: The contribution of social anxiety, gender, and age

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ABSTRACT

The prevalence of social media addiction has increased with the intensive use of technologically-mediated communication in everyday life. Most studies on social media addiction are based on the variable-centered approach with very few taking a person-centered approach. Since only one previous study has investigated the profiles of social media addiction based on a psychopathological model, it is important to bring a complementary view by exploring psychosocial traits associated with the different levels of maladaptive social media use, as well as antecedents of these profiles in terms of sociodemographic variables. To fill this gap, the present study explored social media addiction profiles based on a psychosocial model. The profile indicators were social media addiction, need to belong, anxious attachment, and social media intensity use (SMIU). Data were collected from 705 participants (61% females, age range 18–54 years, $M_{age} = 30.2$ years). Latent profile analysis (LPA) showed three distinct profiles: ‘low risk of addiction’ (61.3%), ‘moderate risk of addiction’ (29.6%), and ‘high risk of addiction’ (9.1%). Social anxiety, gender, and age were antecedents of the profiles. These results based on mixture modeling approach are meaningful to the field, bringing a complementary view to the previous findings obtained in a psychopathological framework. The findings could aid practitioners in the development of targeting at-risk social media users, namely social anxious young adult females with an unmet need to belong and anxious attachment, and designing programs to help them to develop rewarding social relationships and healthy social media use.

1. Introduction

In the context of the widespread technology-mediated communication, habitual social media use is a way of being, especially among young people (Kuss & Griffiths, 2017). Beyond its inherent advantages, it has been observed that a minority of users are at-risk of developing maladaptive use (i.e., symptoms specific to behavioral addictions; Griffiths, 2005). Excessive but healthy use refers to when social media (SM) use is an important aspect in the individual’s life but without any psychosocial impairment in their life.

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Maladaptive use refers to dysfunctional behavior, because the individual is unable to find inner resources to stop repetitive and time-consuming behaviors in order to be involved in other activities (e.g., job, academic studies, and interactions with partner, colleagues, and friends). The category “other disorder due to addictive behavior” was introduced in the fifth edition of the American Psychiatric Association’s (APA, 2013) *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5). This new category includes internet gaming addiction and gambling addiction, with other candidates that may be included in future editions, such as shopping addiction, pornography addiction, exercise addiction, and social media addiction.

2. Theoretical background

2.1. Addiction to social media – Operationalization and distinguishing between healthy and maladaptive social media use

To have research data relevant to clinicians, both in identifying individuals belonging to this minority and in creating tailored treatment approaches, it is first necessary to operationalize the concept of maladaptive use of social media. The biopsychosocial model of addictive behavior, including six criteria (Griffiths, 2005) that are clinically relevant to identify such dysfunctional behavior, is well-known in the literature. In addition, Griffiths (2009) pointed out how to distinguish between excessive but healthy use and maladaptive use, by taking into account (i) the presence of all the six addiction criteria (conflict, salience, withdrawal, tolerance, relapse and mood modification); (ii) the impairment of psychological and relational life, and (iii) stability of the problematic behavior (i.e., not transient). In other words, time spent online is not an indicator of maladaptive use of social media (Griffiths et al., 2014).

Indicators of addiction to social media include poor self-regulation of time spent on social media or the lack of control by an individual in relation to their social media use, social media use being used to regulate negative mood, obsessive thinking patterns, social media use having a negative impact on social and professional life, and relapse (Griffiths, 2010). Without strict criteria, there can be an over-pathologization of everyday behaviors (Kuss & Griffiths, 2011) leading to an overestimation the prevalence of potentially social media addictive use. Frequent and excessive non-problematic use of social media is clearly not an addiction. In order not to over-pathologize everyday behaviors, scholars have highlighted clinical and epidemiological cut-offs in screening instruments for addictive use of social media. Although there are such thresholds for psychometric instruments in the literature, there is still not enough empirical support to consider social media addiction (SMA) as a distinct nosological entity. It is still debatable if problematic SM use can be included in the other disorders category mentioned in the *International Classification of Diseases* (ICD-11; World Health Organization, 2019) and the DSM-5; APA, 2013), where addictions to gambling and gaming were included.

Recently, three meta-level criteria for the analysis of other disorders due to addictive behaviors were proposed in the literature (Brand et al., 2020) to clearly delineate healthy but excessive use from nosological condition: (i) the presentation of clinical relevance (Criterion 1); (ii) a theoretical embedding (Criterion 2); and (iii) a better understanding of underlying mechanisms (Criterion 3). These authors highlighted extensive empirical research is needed on problematic use of social media to satisfy the aforementioned clinical criteria and to consider it a distinct nosological entity. For now, it has the status of potential mental health disorder due to addictive behavior. They also added that underlying neurobiological processes and psychological mechanisms have been well investigated in gambling and gaming disorder but less researched among other behaviors that have the potential to become addictive (i.e., social media use, pornography use, and shopping).

2.2. Social media addiction, psychosocial correlates, and comorbid mental health problems

There are mixed positions on the impact of social media use in the literature. More specifically, it has been emphasized that (i) the intensive use of SM can have a salutogenic role in stress management (Billieux et al., 2017; Kardefelt-Winther, 2014), and (ii) active use is associated with the maintenance of well-being (Lee et al., 2018) and the extension of social capital (Pang, 2022). Based on the gratification theory (Huang et al., 2014), Raza et al. (2022) reported a positive relationship between intensive use of Facebook and online prosocial behavior. However, other scholars have drawn attention to the negative effects or impairment of mental functioning (Casale et al., 2018; Frost & Rickwood, 2017; Marino, et al., 2018). It has also been noted that there is a significant association between introversion, neuroticism, and low conscientiousness and higher problematic Facebook use (Marino et al., 2016). There is empirical support in literature based on the variable-centered approach for the relationship between personality traits and social media addiction. Research has shown that the negative relationship between empathy (i.e., empathic concern and perspective taking) on the one hand, and social media addiction on the other, is negatively moderated by extroversion (Dalvi-Esfahani et al., 2021). In other words, introverted and non-empathic users have a higher risk of developing social media addiction.

According to Griffiths (2005), the negative consequences of the intensive use of social media include similar patterns of substance-related addictions (i.e., the six aforementioned criteria). Results obtained by neuroscientists have highlighted that maladaptive use of social media is characterized by poor inhibitory control (Dieter et al., 2017) and attentional bias (Nikolaidou et al., 2019). Other comorbidities have also been reported in the literature concerning SMA including depression (Best et al., 2014; Cheng et al., 2022; Hoare et al., 2016; McCrae et al., 2017), anxiety (Casale & Fioravanti, 2015; Lee-Won et al., 2015), and stress (Keles et al., 2020; Marino et al., 2017). In addition, studies examining problematic social media use have reported various predictors including depression and loneliness (Ho, 2022), social anxiety (Ali et al., 2022), poor subjective well-being (Marttila et al., 2021), dark triad traits (Monacis et al., 2020), attachment style (Monacis et al., 2017), narcissism (Andreassen et al., 2017), need to belong (Stănculescu & Griffiths, 2021), and ‘selfitis’ (i.e., obsessive selfie-taking; Lin et al., 2020). Analysis of the relationship between selfitis and social media addiction (Monacis et al., 2021) showed that there is a positive association between self-alienation and social media addiction, while the tendency to accept external influence and authenticity helped reduce the risk of addictive behavior. In addition, Pang (2021)

highlighted the moderating role of affective factors such as attitude and satisfaction in the relationship between perceived hedonic and utilitarian values, and electronic word-of-mouth engagement.

2.3. Social media addiction, gender, and age

It is also important to note that there is no agreement among studies in terms of the association between SMA and sociodemographic variables. For example, some findings have indicated that young people (Andreassen et al., 2013; Shensa et al., 2017; Turel & Serenko, 2012) and females (Andreassen et al., 2012; Kircaburun & Griffiths, 2018) are more vulnerable to problematic SM use, whereas others have not shown any relationship (Koc & Gulyagci, 2013; Tang et al., 2016), or reported that older users (Floros & Siomos, 2013), and males (Çam & Isbulan, 2012) are more prone to problematic SM use.

3. Motivation of the present study and hypotheses development

The theoretical framework of the present study was based on two major explanatory models of SMA (Sun et al., 2020): (i) the motivational model, namely the gratification theory (Huang et al., 2014), incorporating the I-PACE (Interaction of Person-Affect-Cognition-Execution) model (Brand et al., 2019) that highlight psychosocial characteristics associated with SMA, characteristics that gratify various needs or lead to compensation of deficits; and (ii) the dispositional model, and more specifically attachment theory (Bowlby, 1982). Studies based on gratification theory (Huang et al., 2014) have shown that one of the reasons for SMA is insufficient satisfaction of the sociopsychological need to belong. Individuals who have high need to belong in terms of desire, but no satisfaction may end up using SM excessively. This pattern emerges in order to compensate (using online social ties) what is missing in reality (i.e., feelings of acceptance and being integrated in a social group). Through the lens of attachment theory, it has been well-established in the literature that there is a positive association between anxious attachment and SMA (Chiara D'Arienzo et al., 2019; Demircioglu & Goncu Kose, 2020; Flynn et al., 2018; Monacis et al., 2017; Worsley et al., 2018) due to an excessive need for closeness and approval from others and extreme fear of rejection by others. Starting from these theoretical models, the present study extends the body of research on SMA by using latent profile analysis (LPA; whose superiority over the variable-centered approach has been emphasized by Li et al., 2017). A variable-centered approach is vague when taking for granted the homogeneity of the sampled participants. More specifically, it assumes the individuals within the sample all belong to a unique profile with no differentiation between possible latent subgroups. A person-centered approach shows individual differences that occur through patterns, that is, profile membership. Latent subgroups of individuals have distinctive combinations of features, based on complex interactions among all the indicators at all possible levels of each indicator. As mentioned above, since most research on SMA is based on the variable-centered approach and there is only one study that analyzed SMA profiles starting from a psychopathological model, the current study fills this gap in the literature and aims to explore how data is clustered starting from indicators such as SMA, social media intensity use (SMIU), anxious attachment, and need to belong.

Considering the previous studies that highlighted the psychological correlates of SMA, as well the existence of three profiles with levels from low to high addictive behavior, the first hypothesis was that there would be two (but possibly more) user profiles when including the variables of SMA, SMIU, anxious attachment, and need to belong: low risk, medium risk, and high risk of addictive behavior (H_1). Based on the empirical support in the literature for the relationship between social anxiety and SMA, the second hypothesis was that social anxiety would be the antecedent of SMA profiles (H_2). Finally, previous studies have yielded mixed findings in terms of sociodemographic variables. However, some of them have highlighted young users (Andreassen et al., 2013; Shensa et al., 2017; Turel & Serenko, 2012) and females (Andreassen et al., 2012; Kircaburun & Griffiths, 2018) as being more prone to SMA, therefore it was hypothesized that females would have a higher risk than males of SMA (H_3), and that younger people would be at higher risk than older people of SMA (H_4).

4. Methods

4.1. Participants, procedure, and ethics

A total of 705 participants (61% females), aged between 18 and 54 years ($M_{age} = 30.24$ years, $SD = 9.15$) were included in the study. The participants were all from Romania. The sampling method was based on the snowballing technique. Invitations to participate were disseminated on e-mail, *WhatsApp*, and social networking sites campaigns, and asking individuals to pass on the link in their online group networks. Participants had to complete an online survey which took approximately 15–20 min to complete. The scales included in the survey were the adapted Romanian versions. Those for which there were no Romanian versions in the literature were translated utilizing the forward–backward translation procedure, following the methodological recommendations made by Sousa and Rojjanasrirat (2011). In such cases, the construct validity was assessed and confirmed as being psychometrically robust. All participants gave their informed consent prior to completing the survey. The objectives of the study were highlighted on the first page of the survey. If participants wanted to quit the survey, they were allowed to do so without having to justify their decision. The confidentiality and anonymity of the participants were guaranteed. In order to detect those who gave random answers, two attention check questions were included in the questionnaire. Three participants were excluded for this reason. A total of 728 individuals started the survey with 705 completing all items (attrition rate of 3.15%). The ethical standards of the Human Experimentation Committee were the basis of all procedures used, in accordance with the principles of the 1975 Helsinki Declaration, and later revisions. Research approval was obtained by the first author from their university ethics committee (Reg. No. CEC: 046/10.01.2020).

4.2. Measures

Sociodemographic variables. Questions relating to age, gender, and level of education were the main socio-demographic variables included in the survey.

Bergen Social Media Addiction Scale (BSMAS). The six-item BSMAS (Andreassen et al., 2016; Romanian version: Stănculescu, 2022) is a six-item scale used to assess the risk of SMA. The BSMAS was designed based on Griffiths' (2005) six aforementioned core characteristics of addiction. Items (e.g., "Felt an urge to use social media more and more?") are rated on a five-point scale from 1 (very rarely) to 5 (very often). Several cutoff scores have been proposed in the literature. The developers of the BSMAS initially proposed a cutoff of 18 among a largescale study of Norwegian adults and a nationally representative study among older-aged Hungarian adolescents proposed a cut-off of 19 (Bányai et al., 2017). A Chinese study proposed a score of 23 among a general population but also suggested a score of 24 among a Chinese clinical population (Luo et al., 2021). Future cross-cultural studies are needed to provide further empirical evidence as to which cut-off scores are the most accurate in distinguishing problematic from non-problematic SM use. It should also be noted that a study on the heterogeneity of the BSMAS recently appeared in the literature (Cheng et al., 2022). This showed that the polythetic scoring scheme was superior to monothetic scheme in terms of its ability to differentiate between clinical and nonclinical users. The monothetic scheme involves the endorsement of all criteria for a clinical diagnosis. The polythetic scheme supposes that more than half of the listed criteria should be endorsed for making a clinical diagnosis. The current research used the polythetic scheme and cutoff (i.e., 19) proposed by Bányai et al (2017). The BSMAS had good psychometric properties in the present study in terms of construct validity and internal consistency (McDonald's $\omega = 0.84$, 95% confidence interval (CI) [82–86]). The adapted Romanian version (Stănculescu, 2022) has robust psychometric properties. Confirmatory factor analysis (CFA) showed good model fit to the data: $\chi^2 = 38.07$, $df = 9$, $p < .001$, comparative fit index (CFI) = 0.98, Tucker-Lewis index (TLI) = 0.96, root mean square of approximation (RMSEA) = 0.06, 90% CI [0.04-0.09], and standardized root mean square residual (SRMR) = 0.02.

Social Media Intensity Use Scale (SMIUS). The six-item SMIUS was adapted from the Facebook Intensity Scale (Ellison et al., 2007) by substituting references to 'Facebook' with 'social media' and was used to assess the level to which SM use is integral to individuals' daily activities. Items (e.g., "Social media has become part of my daily routine") are rated a five-point scale from 1 (strongly disagree) to 5 (strongly agree). Higher scores on the SMIUS indicate greater SMIU. In the present study, the SMIUS had good psychometric properties in terms of internal consistency (McDonald's $\omega = 0.77$, 95% CI [75–79]) and construct validity. CFA showed good model fit to the data: $\chi^2 = 16.39$, $df = 5$, $p < .01$, CFI = 0.98, TLI = 0.96, RMSEA = 0.06, 90% CI [0.04-0.07], SRMR = 0.04.

Interaction Anxiousness Scale (IAS). The 15-item IAS (Leary & Kowalski, 1993) was used to assess dispositional social anxiety. Items (e.g., "I seldom feel anxious in social situations") are rated on a five-point scale from 1 (not at all characteristic of me) to 5 (extremely characteristic of me). Four of the 15 items (i.e., those positively worded) were reverse scored. A total score is obtained by summing all 15 items. Higher scores on the IAS indicate greater levels of social anxiety. In the present study, the IAS had good psychometric properties in terms of internal consistency (McDonald's $\omega = 0.87$, 95% CI [86–89]) and construct validity. CFA showed good model fit to the data: $\chi^2 = 322.17$, $df = 90$, $p < .01$, CFI = 0.92, TLI = 0.90, RMSEA = 0.06, 90% CI [0.05-0.07], SRMR = 0.04.

Anxious Attachment Style Subscale (AASS). The AASS of the Revised Adult Attachment Scale (RAAS) (Collins, 1996) was used to assess anxious adult attachment style. The six-item anxious attachment subscale (e.g., "When I show my feelings for others, I am afraid they will not feel the same about me") assesses the level of concern individuals have about being rejected or unloved. Subscale items are assessed on a five-point scale ranging from 1 (not at all characteristic of me) to 5 (very characteristic of me). The higher the total score on the AASS, the higher the level of anxiety attachment. In the present study, the measure of anxious attachment style had good psychometric properties in terms of internal consistency (McDonald's $\omega = 0.75$, 95% CI [73–78]) and construct validity. CFA showed good model fit to the data: $\chi^2 = 10.62$, $df = 9$, $p = .30$, CFI = 0.99, TLI = 0.99, RMSEA = 0.02, 90% CI [0.00-0.04], SRMR = 0.01.

Need to Belong Scale (NBS). The 10-item NBS (Leary et al., 2013) was used to assess individuals' desire in forming and maintaining strong social relationships. Items (e.g., "I seldom worry about whether other people care about me") are rated on a five-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores on the NBS indicate the need to belong is greater. In the present study, the NBS had good psychometric properties in terms of internal consistency (McDonald's $\omega = 0.77$, 95% CI [75–78]) and construct validity. CFA showed good model fit to the data: $\chi^2 = 103.67$, $df = 35$, $p < .01$, CFI = 0.91, TLI = 0.90, RMSEA = 0.06, 90% CI [0.04-0.07], SRMR = 0.04.

4.3. Data analysis

Data analysis was performed using Mplus 8.8 software (Muthén & Muthén, 2022). The statistical analysis comprised (i) descriptive statistics of the participants' characteristics and construct validity of the measures, (ii) LPA of SMA, and (iii) multinomial logistic regression. LPA was carried out to identify sets of latent profiles using as continuous indicator variables (i.e., SMA, need to belong, anxious attachment, and SMIU). Monte Carlo analysis was run in Mplus to evaluate statistical power to better identify the correct number of latent profiles. The robust maximum likelihood (RML) estimation method was applied because it produces robust standard errors in managing data that are non-normally distributed. Models with two to four classes were considered. Three categories of techniques recommended by Tein et al. (2013) were used to evaluate statistical power to identify the correct model and number of profiles: (i) information-theoretic methods such as the Akaike information criterion (AIC), Bayesian information criterion, and sample

size adjusted BIC (SSA-BIC); (ii) likelihood ratio (LR) statistical tests including the: log likelihood (LL), adjusted Lu-Mendell-Rubin likelihood ratio (aLMR) test, and bootstrap likelihood ratio test (BLRT); and (iii) entropy-based criterion (R^2). Lower AIC, BIC, and SSA-BIC values indicate better model fit (Morin et al., 2016). A statistically significant BLRT test result ($p < .05$) indicates that the model with k classes better fits the model than with one latent class less (i.e., $k-1$ classes) (Peel & McLachlan, 2000). Higher values for entropy (i.e., > 0.80) provide supporting evidence that profile classification of individuals in the model is realized with minimal uncertainty (Tein et al., 2013). The predictive role of social anxiety, gender, and age on profile membership was testified using multinomial logistic regression based on the R3STEP procedure in Mplus.

5. Results

5.1. Descriptive statistics

The participants' sociodemographic characteristics and SMA distribution depending on the cut-off recommended in literature (Bányai et al., 2017) are shown in Appendix. Central tendency, skewness, and kurtosis of research variables are shown in Table 1. Univariate normality was obtained (as shown in Table 1) for all the research variables, except for the skewness highlighted in the case of SMA.

5.2. Latent profile analysis of SMA

Fit statistics from the LPA models with the two- to four-profile solutions are shown in Table 2. As can be seen, up to the three-profile solution there was a gradual improvement, but then the four-profile solution decreased the classification quality. Although some of the fit indicators, (i.e., AIC, BIC, and SSQ-BIC) had lowest values for the four-profile solution, the entropy was lower than value obtained in the case of the three-profile solution. The best log likelihood value was not replicated for the four-profile model. Consequently, the results confirmed H_1 because they lent support for the three-profile solution was the model that best fit the present study's data. Additionally, in the three-profile model, the average latent profile probabilities for the most likely profile were: 0.94, 0.89, and 0.95. All were well above the cutoff (>0.80) recommended by Watson et al. (1995) and higher than those obtained for the four-profile solution.

5.3. Three-profile model of social media addiction

The best fitting model to the data, namely the three-profile model of SM use is depicted in Fig. 1, taking into account within-profile item means obtained for each indicator of profile membership, that is, SMA, SMIU, anxious attachment, and need to belong. Overall item parameter estimates, respectively within-profile item means for three-profile model are shown in Table 3.

As can be seen, the first profile labelled 'low risk of addiction' (61.3% of participants) and comprised very low levels of SMA and anxious attachment, low SMIU, and moderate need to belong. These results were significantly less than those obtained in all other profiles. The second profile labelled 'moderate risk of addiction' (29.6% of participants) and comprised moderate levels of SMA and SMIU, low anxious attachment, and high need to belong. The third profile labelled 'high risk of addiction' (9.1% of participants) and comprised high levels of SMA, SMIU, and need to belong, and moderate anxious attachment. These results showed a simultaneously increased pattern of all profile's indicators except for need to belong, which registered a moderate level, as in the previous profile. In addition, the results showed that those participants in the high-risk profile of addiction had a mean score on the BSMAS of 23.09. In the case of profile of moderate risk of SMA, a mean score of 16 was obtained.

Results of the robust test of equality of means (as shown in Table 4) showed that all Welch coefficients were statistically significant. A post hoc one-way ANOVA showed statistically significant differences between profiles in the case of all indicators, the only exception being in the case of need to belong in the second and third profiles ('moderate risk of addiction' and 'high risk of addiction'). In other words, in both profiles the participants had similar scores indicating a high level of unmet need to belong.

5.4. Antecedents of latent profiles

Having the 'low risk of addiction' profile as the reference group, it was noticed that there was a significant tendency to increase social anxiety in the second and third profile groups. In other words, social anxiety had a significant contribution to both the 'moderate

Table 1
Descriptive statistics of the research variables (mean, *SD*, skewness, kurtosis).

Variable	Mean	<i>SD</i>	Min	Max	Skewness (Std. error of skewness)	Kurtosis (Std. error of kurtosis)
SMA	11.17	5.47	6	30	1.198(0.092)	0.909(0.184)
SMIU	13.89	4.71	6	30	0.137(0.092)	-0.600(0.184)
Social anxiety	43.85	11.68	15	75	-0.106(0.092)	-0.514(0.184)
Anxious attachment	8.93	3.77	6	30	0.558(0.092)	-0.296(0.184)
Need to belong	31.31	7.27	10	50	-0.222(0.092)	-0.183(0.184)

Abbreviations: SMA: social media addiction; SMIU; social media intensity use;

Table 2
Model fit information for latent profile analysis.

No. of profiles	Free parameters	LL	AIC	BIC	SSA-BIC	R ²	aLMR	BLRT
2	16	-2704.76	16837.18	16896.44	16855.16	0.81	431.99(0.001)	0.001
3	18	-2588.96	16629.28	16711.33	16654.18	0.86	211.44(0.001)	0.001
4	23	-2561.22	16547.59	16652.42	16579.39	0.84	88.98(0.028)	0.025

Note: bold indicates best fitted model. LL = log likelihood; AIC = Akaike information criterion; BIC = Bayesian information criterion; SSA-BIC = sample size adjusted BIC; R² = entropy; aLMR = adjusted Lu-Mendell-Rubin likelihood ratio test; BLRT = bootstrapped likelihood ratio test.

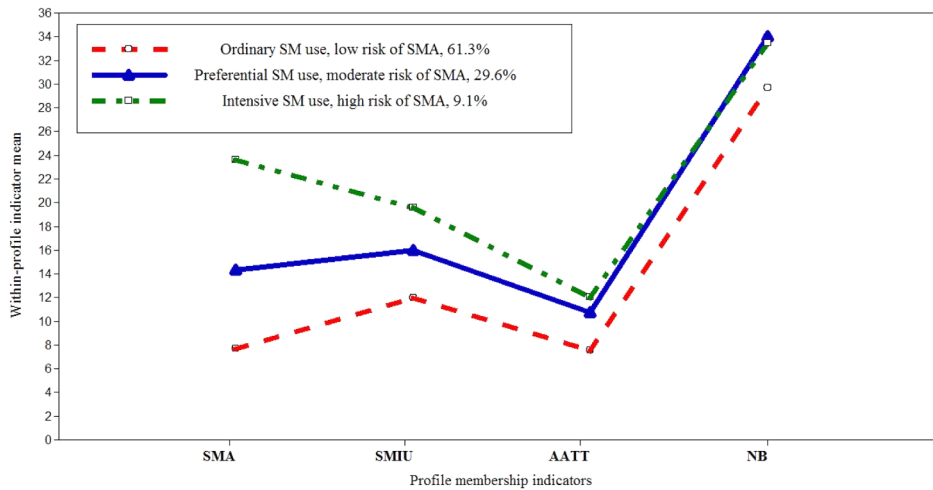


Fig. 1. Parameter estimates for the three-profile model of risk of SMA and within-profile item means (abbreviations: SMA – social media addiction; SMIU – social media intensity use; AATT – anxious attachment; NB – need to belong).

Table 3
Parameter estimates for three-profile model.

	Profile 1	Profile 2	Profile 3
Profile prevalence	n = 432	n = 209	n = 64
Profile indicators	Within-profile meansStandard error (SE)		
SMA	7.69 (0.14)	14.34 (0.44)	23.56 (0.58)
Need to belong	29.64 (0.40)	34.01 (0.42)	33.42 (0.86)
Anxious attachment	7.55 (0.18)	10.73 (0.28)	13.01 (0.58)
SMIU	11.95 (0.24)	16.01 (0.27)	19.59 (0.61)

Abbreviations: SMA (social media addiction); SMIU (social media intensity use).

risk of addiction’ and ‘high risk of addiction’ profile group membership. Therefore, H₂ was confirmed. As highlighted in Table 5, the odds ratio (OR) for social anxiety increased in the second and third profiles compared to the reference profile and reached the threshold of statistical significance. In terms of sociodemographic variables, the results showed that gender and age had significant contribution (OR > 1, p < .01) confirming both H₃ and H₄. By computing the prevalence according to gender in the third profile (i.e., ‘high risk of addiction’), it was found that females had a higher frequency than males: 10.4% females (n = 45) and 6.9% males (n = 19 men).

6. Discussion

The present study explored different social media use profiles including various psychosocial indicators. The findings are supported by extant theory. More specifically, H₁ was confirmed because different profiles emerged, from low risk SMA to high risk SMA. More specifically, the first profile included regular SM users, with low scores on SMA, anxious attachment, and moderate unmet need to belong. The second profile included preferential SM users with moderate risk of developing SMA. They differed from those included in the first profile in terms of higher SMIU, anxious attachment, albeit to a small but significant extent, as well as in terms of higher unmet need to belong. The fact that the second profile included those who use SM preferentially but who have only a moderate risk of SMA is a pattern consistent with previous studies have shown that prolonged and/or intense use *per se* does not necessarily equate to

Table 4

Robust test of equality of means and multiple comparisons between indicators of profile membership (mean difference, 95% confidence interval).

Profile's indicator	Robust Test of Equality of Means Welch	df	Sig	Multiple comparisons between indicators of profile membership								
				1 & 2			1 & 3			2 & 3		
				Mean diff (I-J)	95% CI		Mean diff (I-J)	95% CI		Mean diff (I-J)	95% CI	
					Lower bound	Upper bound		Lower bound	Upper bound		Lower bound	Upper bound
SMA	1380.77	2	0.001	-6.91***	-7.35	-6.49	-16.05***	-16.69	-15.42	-9.14***	-9.65	-8.43
Need to belong	34.71	2	0.001	-4.35***	-5.74	-2.97	-3.88***	-5.93	-1.83	0.47	-1.82	2.77
Anxious attachment	93.71	2	0.001	-3.31***	-3.98	-2.66	-4.63***	-5.61	-3.66	-1.31***	-2.41	-0.22
SMIU	144.21	2	0.001	-4.01***	-4.79	-3.22	-7.73***	-8.90	-6.58	-3.73***	-5.03	-2.43

*** $p < .001$;**Table 5**

Effects of predictors on membership in latent profiles of SMA. Odds ratios (OR), 95% confidence interval for the effects of work-related stress on TB profile membership.

SMA profile	Odds ratio (OR)	LL2.5%	UU2.5%
Reference profile: <i>Ordinary SM use, low risk of addiction</i>			
<i>Preferential SM use, moderate risk of addiction</i>			
Social anxiety	1.06**	1.04	1.09
Gender	1.32**	1.03	1.89
Age	1.41**	1.27	1.75
<i>Intensive SM use, high risk of addiction</i>			
Social anxiety	1.16**	1.07	1.35
Gender	1.97***	1.12	3.82
Age	1.74***	1.35	2.03

LL - lower limit of the confidence interval, UL - upper limit.

** $p < .01$; *** $p < .001$.

problematic behavior or addictive symptomatology (Griffiths, 2010; Kuss & Griffiths, 2017).

In addition (as noted in the Introduction), it is well accepted in the literature that individuals who excessively use SM may not present with all the behavioral addiction criteria mandatory to consider a behavior as problematic (Griffiths, 2013). The last profile ('high risk of addiction') was differentiated from the first two profiles by high SMIU, SMA, and moderate anxious attachment. It should be noted that the level of need to belong was significantly different only from the first profile ('low risk of addiction') but not from the second profile ('moderate risk of addiction'). In fact, in the latter two profiles, a high level of unmet need to belong was also found. This is not surprising, given how important this deep need is to be accepted by a social group and to be a member of a social network.

The results here align with prior studies (e.g., Casale et al., 2018; Chae et al., 2018) which conceptualized SMA in terms of a compensatory mechanism for feelings of emptiness caused by the unmet social needs in real life. In other words, the present study showed that along with intensive SM use, the presence of high SMA scores, as well as unmet anxious attachment, and anxious attachment style represents a significantly different profile from those who use occasionally and intensely use SM, but with lower SMA scores and anxious attachment. These findings are supported by previous research that highlighted the importance of predisposing risk factors (e.g., personality traits) resulting in potentially addictive behavior (Brand et al., 2019; Wegmann & Brand, 2019).

Regarding the antecedents of the SMA profiles, the results confirmed H₂ because social anxiety was a significant predictor. These findings parallel previous studies that have shown that this type of anxiety being associated with maladaptive use of SM (Lee-Won et al., 2015). Those individuals who do not feel confident enough that they have necessary social skills to initiate and maintain interpersonal relationships, have a greater tendency to take refuge in the space of online communication. In addition, according to the theory of gratification (Huang et al., 2014), socially anxious individuals feel less inhibited when they communicate online, therefore experiencing some desired compensation, but obviously not a solution to their difficulties in initiating and maintaining offline relationships.

Within the antecedents of the SMA profiles there were also the sociodemographic variables (i.e., gender and age) confirming both H₃ and H₄. As aforementioned, using gender and age as covariates was theoretical justified, taking into account that there is still debate as to whether young people and females are more prone to developing SMA. However, the findings here are in line with the results of a recent meta-analysis examining gender-related differences in SMA (Su et al., 2020) which concluded that females are more likely to exhibit SMA than males. Related to the age variable, the results concurred with previous studies highlighting that SMA is prevalent among young people (Griffiths et al., 2014; Monacis et al., 2017). These 'digital natives' (and sometimes referred to as 'screenagers') (Griffiths, 2010) often use technology-based communication, including SM, in order to develop relationships, expand their social capital (Allen et al., 2014), and meet romantic partners (Stănculescu & Griffiths, 2021). In brief, the LPA findings showed that those

with the highest risk were socially anxious young females who intensively use SM, characterized by moderate anxious attachment, and high unmet need to belong.

7. Theoretical contributions

The present study has various strengths. First, it expands the extant body of research based on mixture modeling or person-centered approach on SMA, which offers the possibility of identifying various latent subgroups, as well as meaningful differences between them. More specifically, the present study explored the distinct SMA emerging profiles using such indicators as: (i) behaviors (social media intensive use [SMIU] and SMA), (ii) a dispositional trait (anxious attachment), and (iii) sociopsychological need (need to belong). Additionally, in the present study, the profiles were supported by extant theory, therefore satisfying the *meta*-level criterion on theoretical embedding of SMA research, mentioned in the literature (Brand et al., 2020). As far as the present authors are aware, very few studies examining SMA using LPA have been conducted to date. More specifically, there are only three studies that have analyzed SMA profiling using indicators such as each item of the Bergen Social Media Addiction Scale (BSMAS) (Andreassen et al., 2016) in order to (i) highlight the cut-off for problematic or addictive use of social media on the BSMAS (Bányai et al, 2017; Luo et al, 2021) and (ii) investigate the heterogeneity of prevalence of SMA using various classification schemes (monothetic vs. polythetic) (Cheng et al., 2022).

Second, the present study brings a complementary view to the previous findings obtained utilizing a psychopathology model (Cerniglia et al., 2019). Moreover, this previous study (i.e., Cerniglia et al., 2019) is the only one that has explored the SMA profiles alongside internet addiction based on a psychopathological model in a normative sample of adolescents. The results indicated three profiles. The first profile comprised low levels of psychopathological symptoms (PPSs) and high levels (non-clinical) of SMA, internet gaming disorder (IGD) and impulsivity. The second profile comprised moderate levels of PPSs and high levels of SMA, IGD, and impulsivity. The third profile comprised high levels of PPSs and high levels of SMA, IGD, and impulsivity. In the study by Cheng et al. (2022) three SMA profiles (i.e., high risk, at-risk, and low risk of SMA) were obtained in both a UK sample and a USA sample). In line with these aforementioned studies, the LPA in the present study identified three latent subgroups of individuals with distinctive combinations of indicators (i.e., SMA, need to belong, anxious attachment, and SMIU). These were 'low risk of addiction', 'moderate risk of addiction', and 'high risk of addiction'.

Third, the present study investigated antecedents of SMA profiles comprising social anxiety, based on prior research showing the association between SMA and social anxiety (Andreassen et al., 2016; Cerniglia et al, 2019; Lee-Won et al., 2015). These studies highlighted the psychological mechanisms that explain the difficulties in initiating and maintaining face-to-face interactions of those with social anxiety. More specifically, it concerns individuals' tendency to compensate for their social deficits by being involved more frequently and intensely in the use of social media networks. The negative impact is materialized by the increased vulnerability to SMA due to intensive use and in a compensatory manner. As aforementioned, these previous studies were conducted utilizing a variable-centered approach, not taking into account heterogeneity of data, namely the differences between latent subgroups in data. Therefore, it appeared valuable to verify if social anxiety significantly contributed to the profile membership. More specifically, the present study investigated if various combinations of SMA and SMIU, as well as anxious attachment and need to belong had social anxiety as an antecedent.

Fourth, the antecedents of latent profiles in terms of sociodemographic variables, such as gender and age, were analyzed, given that previous studies have yielded mixed findings in terms of sociodemographic variables. The findings here showed that the prevalence of young adult females was significantly higher than young adult males in the high risk of addiction profile. It was necessary to analyze these antecedents, taking into consideration the lack of convergence in the literature in terms of the relationship between gender, age, and increased risk of SMA.

8. Practical implications

Among the main findings of the study were that key predictors of social media addiction were social anxiety, being young, and being female. Given these findings, the practical implications of the present study suggest that targeted prevention programs and treatment interventions are needed among these groups. For instance, educational awareness campaigns highlighting the potential downsides of excessive social media use could be implemented within social media environments given that these are spaces frequented by young females. Practitioners also need to be aware that young women are a vulnerable group in relation to problematic social media use. The present study also indicated that those at higher risk of becoming addicted to social media have a predominantly anxious style of attachment, social anxiety, and unmet need to belong. Therefore, intervention programs should focus on ways to identify and treat these difficulties. The deficit in social skills that in turn contribute to the onset of social anxiety as well as the style of anxiety attachment can be effectively treated by using cognitive behavioral therapy, rational-emotional trapping, and group therapy. In other words, it is desirable to consider that the risk of addictive use of social media is also explained by the need to belong. This is why specialists must help addictive users to be aware of the factors that are perceived by them as fundamental to satisfying this need and also to develop strategies through which to integrate into different groups (i.e., coping strategies for dealing with social stress experienced by social anxiously people).

9. Limitations and future research directions

As well as these strengths, the present study has some limitations. For example, the analysis of the causal links between the

investigated variables was not possible due to the study's cross-sectional design. Consequently, future longitudinal studies are needed as they would provide a clearer indication of the direction of the relationships explored in the present study in relation to developmental etiology. Moreover, the generalization of the results was hindered by the use of convenience sampling. Future studies should therefore try to use more nationally representative samples. Additionally, desirability and recall biases are a source of distortion in self-reported data. The sample also had a gender imbalance (i.e., the proportion of females was higher than males) which may have impacted the study's findings. Finally, no data were collected using diagnostic measures (such as a DSM-5 structured clinical interview). Future research directions could include the investigation of other antecedents of SMA profiles in terms of HEXACO personality traits, and psychological capital, as well outcomes related to hedonic well-being and eudaimonic well-being. It has not yet been elucidated whether intensive social media use based on gratification needs could contribute to the well-being improvement.

Overall, the study expands the empirical literature on the psychological processes of sustaining maladaptive SM use. More specifically, the study offers a theoretically sound model that explores the aspects involved in differences between low, medium, and high risk of addiction among users. In addition, the present study showed that social anxiety, gender, and age were important antecedents of SMA profiles. More specifically, being social anxious and a young female were much more likely to comprise the high-risk SMA profile in order to compensate their unmet need to belong and insecurities related to anxious attachment. These findings are theoretically justified and meaningful to the field, as well for the practitioners. They could contribute to the development of targeting at-risk SM users and designing programs to promote their social skills, and meeting their need to belong in offline relationships so that they can use SM more healthily.

Ethical Approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of University's Research Ethics Board and with the 1975 Helsinki Declaration.

Informed Consent

Informed consent was obtained from all participants.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on reasonable request to the first author.

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