Title: Beyond 'Facebook addiction': The role of cognitive-related factors and psychiatric distress in social networking site addiction[1][2]

Abstract

The use of social networking sites (SNSs) is rapidly increasing as billions of individuals use SNS platforms regularly to communicate with other users, follow the news and play browser games. Given the widespread use of SNS platforms, investigating the potential predictors of addictive SNS use beyond Facebook use has become paramount given that most studies were focused on 'Facebook addiction'. In the present study, a total of 511 English-speaking SNS users (58.1% young adults aged 20-35 years; 64.6% female) were recruited online and asked to complete a battery of standardized psychometric tools assessing participants' sociodemographic characteristics, SNS preferences and patterns of use, SNS addiction, preference for online social interaction (POSI), maladaptive cognitions, Fear of Missing Out (FoMo), dysfunctional emotion regulation, and general psychiatric distress. Overall, about 4.9% (n = 25) of all participants could be classed as having a high SNS addiction risk profile. Moreover, the results further indicated that FoMo (β = .38), maladaptive cognitions (β = .25), and psychiatric distress (β = .12) significantly predicted SNS addiction (i.e., $p < .0001$) and accounted for about 61% of the total variance in SNS addiction, with FoMo providing the strongest predictive contribution over and above the effects of sociodemographic variables and patterns of SNS use. The implications of the present findings were discussed in light of extant literature on behavioral addictions and Facebook addiction and further considerations were provided regarding the potential clinical implications for cognitive-based psychological treatment approaches to SNS addiction.

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Introduction

Social networking sites (SNSs) are web-based services that allow individuals to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, and view and traverse their list of connections and those made by others within the system.[1] SNS use has grown exponentially worldwide over the last decade. In the United States, just up to 5% of the American adult population used at least one SNS platform in 2005 while in 2011 that share increased to 50%, and today 69% of all Americans use some type of SNS platform, representing a nearly tenfold increase in the past decade.[2, 3] Similarly, the use of SNS rose from 45% in 2011 to 66% in 2017 in Great Britain.[4]

Judicious SNS use as part of a healthy 'digital diet' can result in many positive outcomes such as increased perceived social support, low levels of stress, less physical illness, greater job satisfaction, and increased psychological wellbeing.[5-8] However, a growing body of literature suggests that several negative psychosocial impacts can occur to a minority of SNS users due to uncontrolled and dysregulated use.[9-14] Even though SNS addiction is not currently officially recognized as a mental health disorder, research has linked SNS addiction to a wide-range of psychiatric symptoms and negative outcomes such as binge drinking,[15] phubbing,[16] depression and social anxiety,[17] and poor psychological functioning.[18] Recent epidemiological studies using representative samples reported prevalence rates of SNS addiction around 4.5% in Hungarian adolescents,[19] 4.1% of male and 3.6% of female adolescents in Germany,[20] and 2.9% in the general Belgian population.[21]

At the conceptual level, previous research suggested that SNS addiction can be conceptualized as an addictive behavior as it reflects key components of addiction similarly to other addictive disorders.[22, 23] These key components refer to the psychosocial experience of a wide range of phenomena related to cognitive and behavioral salience, mood modification, tolerance, conflict and relapse.[24] Although researchers have extensively used the behavioral

addiction conceptual framework to define excessive and potentially pathological use of technology, recent controversies about the way behavioral addictions are traditionally conceptualized have emerged in the literature with several scholars showing a clear disagreement with this approach, further suggesting possible overpathologization of everyday life behaviors.[25, 26] This debate as to how best define excessive and potentially pathological behaviors toward technology use has been particularly prolific in the emerging field of 'Internet Gaming Disorder',[27-29] with some of its implications also being relevant to the discussion of potential SNS addiction and its potential controversial status.[30]

Based on recent empirical developments, the present study will investigate the role of key factors contributing to SNS addiction that have not been addressed by existing research parsimoniously and/or have been examined exclusively in relation to Facebook use. Given the widespread and continuous growth regarding the number of SNS users worldwide, understanding potential factors contributing to broad SNS addiction is paramount. This is particularly relevant given that a large number of studies have been conducted on Facebook addiction rather than general SNS addiction, this approach is in line with scholarly recommendations suggesting that SNS addiction should be framed as an overarching behavior detached of a particular SNS platform (e.g., Facebook).[31]

In this context, Fear of Missing Out (FoMo) has recently emerged as a key correlate of SNS addiction.[32-34] FoMo refers to a pervasive apprehension that others might be living rewarding experiences from which one is absent, further highlighting a desire to stay continually connected with what others are doing.[35] Preference for Online Social Interaction (POSI) and maladaptive cognitions have also been established as correlates of SNS addiction,[9, 36, 37] and these two factors are also included within the cognitive-behavioral model of pathological Internet use.[38] In broad terms, POSI is defined as beliefs that one is safer, more efficacious, confident, and comfortable with online interpersonal interactions and relationship

than with traditional face-to-face social activities[39] while maladaptive cognitions refer to cognitive biases that individuals form toward themselves and the world after they start using the Internet.[38] Furthermore, emotion regulation is another important factor implicated in addictive behaviors,[40, 41] and its role in SNS addiction is yet to be established. Emotion regulation has been conceptualized as processes whereby individuals modulate their emotions consciously and nonconsciously to appropriately respond to environmental demands.[41] Moreover, psychiatric distress has also been linked to emotional regulation as some disorders (e.g., depression and anxiety) can be viewed as the result of difficulties in regulating emotions.[41] In a similar vein, psychiatric distress has also been established as a correlate of SNS addiction across several studies focusing on Facebook use.[42-46]

Based on the aforementioned rationale, the aim of the present study is to empirically investigate the interplay between key psychosocial determinants and broad SNS addiction. Thus, this study will examine which factors are mostly relevant in terms of predicting SNS addiction when accounting for potential demographic and intensity of SNSs use effects. Although the terminology adopted by researchers to describe addictive use of SNSs is generally heterogenous, the present study will use the term "SNS addiction" for the sake of simplicity.

Methods

Participants and procedures

A total of 532 English-speaking SNS users were recruited via opportunity sampling from online SNSs (e.g., Facebook, Twitter, LinkedIn) from June to August 2016. All participants provided informed consent to participate in the study and ethical approval was granted by the research team's university ethics committee. With regards to participants' age groups, 13.3% (n = 68) were adolescents (16-19 years), 58.1% young adults (20-35 years), and 28.6% were adults (36 years or more). Moreover, 64.6% (n = 330) of all participants were female and 59.1% (n = 302) reported being in a relationship. In terms of technology and SNS

use, 99.2% (n = 507) reported having an Internet-enabled gadget (iPod, iPad, smartphone) and Facebook was the most used SNS (i.e., 98.8%, n = 505), followed by Instagram (i.e., 72.4%, n = 370). The least used SNS was Tumblr (i.e., 14.1%, n = 72). Finally, about 4.9% (n = 25) of all participants presented high SNS addiction risk. Further information about participants' preferences and patterns of SNS use is provided in Table 1.

[Please insert Table 1. about here]

Measures

Sociodemographic, SNS preferences and patterns of use. The survey included questions regarding participants' age, gender, and relationship status. Data were also collected on participants' most used SNSs, number of SNSs used, daily SNS use, weekly SNS use, and 12-month prevalence of self-reported problems due to SNS use (yes/no).

SNS addiction was assessed with the Bergen Social Media Addiction Scale[23] which includes six items related to key components of addiction (i.e., salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse). All items are answered using a 5-point scale (1: never to 5: always), with higher scores indicating greater levels of SNS addiction. Participants were classed as high SNS addiction risk based on previously suggested strict monothetic cutoff approach (i.e., scoring 4 or above on all six items).[13, 22] This scale showed excellent internal reliability in the present study (α = .86).

POSI. This construct was assessed with a subscale from the Generalized Problematic Internet Use Scale–2.[39] This subscale includes three items that are rated on a 7-point scale (1: strongly disagree to 7: strongly agree), with higher scores indicating higher POSI. This scale showed excellent internal reliability in the present study (α = .92).

Maladaptive cognitions toward SNS use was assessed with the English version of the Chinese Maladaptive Cognitions Scale.[37] This scale includes twelve items that are responded to on a 5-point scale (1: totally disagree to 5: totally agree), with higher scores indicating greater levels of maladaptive cognitions toward SNS use. Examples of maladaptive cognitions include:

"*I always feel embarrassed when talking with others unless I talk through social media*" and "*I can get to know a person better on social media than in person*". This scale showed excellent internal reliability in the present study (α = .93).

FoMo was assessed with the ten items developed by see Przybylski and colleagues.[35] All items are rated on a 5-point scale (1: not at all true of me to 5: extremely true of me) and greater scores indicate higher levels of FoMo. This scale showed excellent internal reliability in the present study (α = .91).

Dysfunctional emotion regulation was assessed with the Difficulties in Emotion Regulation Scale–Short Form.[47] This measure consists of a total of eighteen items rated on a 5-point scale (1: almost never to 5: almost always), with higher scores suggesting greater levels of dysfunctional emotion regulation. This construct can be divided into six subdimensions pertaining to specific forms of emotion regulation, such as strategies, non-acceptance, impulse, goals, awareness, and clarity. In the present study, dysfunctional emotion regulation was assessed as a global construct. This scale showed excellent internal reliability in the present study (α = .92).

Psychiatric distress was assessed with the Symptom Checklist–6.[48] This scale utilizes six items to assess psychiatric distress related to symptoms of depression, anxiety, and psychoticism using two items for each subscale. All items can be rated on 5-point scale (1: definitely not true of me to 5: definitely true of me), and higher scores indicate higher levels of psychiatric distress. In the present study psychiatric distress was assessed as a global construct, and the scale showed excellent internal reliability in the present study (α = .90).

Statistical analysis and data analytic strategy

Statistical analyses included (i) descriptive analysis of the main sample's characteristics, preferences and patterns of SNS use, (ii) correlational analysis of the main variables of the study, (iii) independent sample *t*-tests to ascertain the profile of high SNS

addiction risk participants, and a (iv) a stepwise multiple linear regression analysis to investigate whether key psychosocial and health-related variables (POSI, maladaptive cognitions, FoMo, dysfunctional emotion regulation, psychiatric distress) can robustly predict SNS addiction. Measures of goodness of fit (e.g., R^2) and effect sizes (e.g., Cohen's *d*) were estimated.[49] Power analysis to estimate the minimum sample size required for the analysis was calculated using G*Power (v. 3.1.9.2).[50] The *a priori* test as based on a pre-set power ($1 - \beta = .95$), a medium effects size ($f^2 = .15$), and $\alpha = .05$, with five predictors (POSI, maladaptive cognitions, FoMo, dysfunctional emotion regulation, psychiatric distress) and four control variables (gender, age, daily SNS use, weekly SNS use), demonstrated that the required sample size was 166, with a power of 0.95.

The data cleaning process involved screening for normality, univariate and multivariate outliers. Assumptions of the multiple linear regression were checked in order to determine the suitability of the data. The variables used in the regression model were also checked for multicollinearity by examining the Variation Inflation Factors (VIF). All VIF values were below 5 and not beyond the threshold of 10, indicating no issues of multicollinearity.[51] After cleaning the data, a final sample size of 511 participants was achieved. Bonferroni correction method was used whenever appropriate to minimize the chances of obtaining false-positive results (i.e., Type I errors).[52] The analyses were carried out on IBM SPSS Statistics for Windows, Version 24.[53]

Results

SNS addiction correlates and addiction risk profiles

Table 2 presents the zero-order Pearson correlations (r) and point biserial correlation coefficient (r_{pb}) for the main variables of the study. Overall, SNS addiction was strongly associated with FoMo ($r = .68$), maladaptive cognitions ($r = .67$), dysfunctional emotion

regulation (r = .52), and POSI (r = .51). Slightly weaker associations were found between SNS addiction and psychiatric distress and 12-month prevalence of self-reported problems due to SNS use (see Table 2).

Based on a strict monothetic cutoff approach, about 4.9% (n = 25) of the sample could be classed as high SNS addiction risk. Moreover, these participants utilized significantly more SNS platforms in comparison to low SNS addiction risk participants (Cohen's d = 1.57). In comparison to low SNS addiction risk participants, high SNS addiction risk participants presented increased levels of POSI (d = 4.19), maladaptive cognitions (d = 4.79), FoMo (d = 3.83), dysfunctional emotion regulation (d = 2.31), and psychiatric distress (d = 1.98). All mean differences between the two groups were statistically significant and large (see Table 3).[49]

[Please insert Table 2. about here]
[Please insert Table 3. about here]

SNS addiction predictors

A stepwise multiple linear regression predicting SNS addiction using the main variables of the study was computed. A final model was achieved after six steps that are fully detailed in Table 4. The final model estimated in the sixth step included daily SNS use (β = .13, t = 3.16), weekly SNS use (β = .20, t = 5.07), FoMo (β = .34, t = 8.14), maladaptive cognitions (β = .25, t = 5.97), and psychiatric distress (β = .12, t = 3.64) as significant predictors (i.e., p < .0001), contributing to explaining a total of 61% of the total variance in SNS addiction, with FoMo (β = .34) providing the strongest predictive contribution (ΔR^2 = .010, $\Delta F(1, 500)$ = 13.28, p < .0001). Among the control variables included in the final model, age (β = .04, t =1.31, p = .19) emerged as a non-significant predictor.

[Please insert Table 4. about here]

Discussion

The present study sought to investigate key psychosocial predictors related to SNS addiction that were scantly explored in the context of Facebook addiction but not broad SNS addiction. Based on the findings obtained, FoMo, maladaptive cognitions, dysfunctional emotion regulation, psychiatric distress, and POSI have emerged as important correlates of SNS addiction in unique ways. More specifically, FoMo explained about 46% of the total variance in SNS addiction, followed by maladaptive cognitions and psychiatric distress (45% each). Interestingly, self-reported problems due to SNS use was associated to SNS addiction, which constitutes a novel finding in the context of SNS use. Previous research found that self-diagnosis of Internet addiction might be indicative of an addiction.[54-56] Thus, this finding may be utilized by practitioners dealing with potential cases of SNS addiction as acknowledging perception of self-diagnosis from clients may be fruitful to enhancing the efficacy of diagnosis. This finding also paves the way to future research investigating the differential impact on health from self-diagnosed SNS addiction and psychometric diagnosis, which is key to establishing the grounds for differential diagnosis in SNS addiction.

According to a strict monothetic approach, about 4.9% of the sample could be potentially experiencing SNS-related problems due to their high risk of addiction. Although SNS addiction is not an official diagnosis as more research on this phenomenon needs to be conducted prior to formal psychiatric recognition,[57] this finding mirrors those reported by previous research. For instance, it has been found that SNS addiction has been found to range from 1.6% of Nigerian undergraduate students[58] to 18% in Malaysian students.[59] It is worth noting that the epidemiological data available on SNS addiction is currently limited as there are few robust studies reporting prevalence rates, and most reports published so far were based on small and unrepresentative samples that do not allow generalizations to the wider population,[14] similarly to the findings obtained in this study.

Despite this potential limitation, it was found that high SNS addiction risk participants utilized significantly more SNS platforms and presented higher levels of maladaptive cognitions, FoMo, POSI, and psychiatric distress than low SNS addiction risk participants. This finding parallels previous research and also extends the scope of existing findings from studies on SNS use focusing exclusively on Facebook addiction. More specifically, Facebook addiction has been linked to poor ability to provide emotional support and to manage interpersonal conflicts in adolescents,[60] potentially leading to peer alienation[61] and emotion dysregulation.[62, 63] Previous research has also linked Facebook addiction to decreased wellbeing[64-66] and augmented psychiatric distress.[44, 46, 67] Overall, it can be concluded that the findings obtained from past studies focusing on Facebook addiction are highly consistent with the findings reported here related to broad SNS addiction.

Regarding the most relevant predictive factors examined in the present study, it was found that FoMo, maladaptive cognitions, and psychiatric distress explained together about 61% of the total variance in SNS addiction. This highlights key predictive factors associated to SNS addiction over and above the effects of sociodemographic variables (gender and age) and patterns of SNS use (daily and weekly SNS use). Additionally, the results obtained further indicated that FoMo was the strongest predictor of SNS addiction, followed by maladaptive cognitions, and psychiatric distress. The intricate relationship between FoMo and SNS addiction indicates that in addition to increasing SNS use, FoMo is also an important risk factor for SNS addiction beyond Facebook use. This contention is aligned with previous empirical research on normative SNS use[32, 35] and mobile phone use.[33]

Although previous research has established the predictive role of maladaptive cognitions on other behavioral addictions, such as videogame addiction,[68-70] generalized Internet addiction,[37, 71] sex addiction,[72] and gambling disorder,[73] to the best of the authors' knowledge this is the first study to investigate the role of maladaptive cognitions in the context

of broad SNS addiction. This finding supports previous neuroimaging and survey studies suggesting that addictions share a high degree of commonalities at the behavioral and neural levels.[42, 74-78] Furthermore, at the clinical level, therapists may be able to refine their treatment protocols by acknowledging dysfunctional SNS-related cognitions and attempting to modify patterns of maladaptive cognitions in cases of SNS addiction either by using a Cognitive-Behavioral Therapy (CBT) or Metacognitive Therapy (CMT) framework.[68, 79, 80]

Although the findings obtained in this study were robust and produced relatively high effect sizes, there were a few potential limitations worth mentioning. Firstly, the participants were not recruited using probability sampling, consequently the degree of which these findings can be generalized is hampered. Secondly, another potential limitation may be present due to the over-reliance on self-reported data rather than behavioral tracking data. Finally, the cross-sectional nature of the study does not allow the inference of causal relationships. Thus, the validity of the present results is contingent on the accuracy and integrity of the responses provided by the participants recruited.

To summarize, the present findings suggest that about 4.9% of all participants could be classed as high SNS addiction risk profile. Furthermore, FoMo, maladaptive cognition and psychiatric distress emerged as significant risk factors for SNS addiction after controlling for the effects of specific sociodemographic variables and patterns of SNS use.

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Table 1. Sample's preferences and patterns of social networking sites (SNS) use (N = 511).

Variable	
Most used SNS (n, %)	
Instagram	370 (72.4)
LinkedIn	204 (39.9)
Facebook	505 (98.9)
Snapchat	321 (62.8)
Tumblr	72 (14.1)
Twitter	313 (61.3)
YouTube	329 (64.6)
Number of SNS used (n, %)	
1	37 (7.2)
2	54 (10.6)
3	69 (13.5)
4	124 (24.3)
5	121 (23.7)
6	81 (15.9)
7	25 (4.9)
Daily SNS use (n, %)	
Very rarely	41 (8%)
Rarely	101 (19.8)
Occasionally	60 (11.7)
A moderate amount	147 (28.8)
A great deal	162 (31.7)
Weekly SNS use (n, %)	
Very rarely	68 (13.3)
Rarely	121 (23.7)
Occasionally	181 (35.4)
A moderate amount	141 (27.6)
A great deal	
Problems due to SNS use (n, %)	
No	348 (68.1)
Yes	163 (31.9)
SNS addiction risk (n, %)	
Low addiction risk	486 (95.1)
High addiction risk	25 (4.9)

SNS addiction risk was estimated using a strict monothetic approach by considering scores of 4 or above on all six items of the Bergen Social Media Addiction Scale.

Table 2. Correlation matrix between the main variables of the study (N = 511).

Variables	1	2	3	4	5	6	7
Social networking site addiction (1)	1						
Problems due to social networking site use (2)	.37	1					
Preference for online social interaction (3)	.51	.20	1				
Maladaptive cognitions (4)	.67	.30	.66	1			
Fear of missing out (5)	.68	.31	.44	.70	1		
Dysfunctional emotion regulation (6)	.52	.28	.44	.57	.62	1	
Psychiatric distress (7)	.44	.21	.41	.45	.46	.69	1

Note: All results are significant after applying Bonferroni correction to mitigate potential Type I error (i.e., $p < .0018$).

Table 3. Main differences between participants presenting low and high risk of social networking site (SNS) addiction (N = 511).

Measure	Low risk mean (SD)	High risk mean (SD)	*t*-statistic	*df*	Mean differences	CI Lower	CI Upper	Cohen's *d*
Number of SNSs used	4.08 (1.57)	5.24 (1.36)	-4.12	27.4	-1.16	-1.74	-0.58	1.57
Preference for online social interaction	8.20 (4.69)	16.76 (3.71)	-11.09	28.01	-8.56	-10.12	-6.98	4.19
Maladaptive cognitions	27.82 (10.91)	51.20 (8.91)	-12.64	27.83	-23.38	-27.17	-19.59	4.79
Fear of missing out	23.66 (9.19)	40.44 (8.14)	-9.99	27.25	-16.78	-20.23	-13.34	3.83
Dysfunctional emotional regulation	44.75 (14.24)	61.48 (13.64)	-5.97	26.76	-16.73	-22.48	-10.97	2.31
Psychiatric distress	14.69 (5.65)	19.48 (4.36)	-5.27	28.32	-4.79	-6.65	-2.93	1.98

Abbreviations: SD: Standard deviation; df: Degrees of freedom; CI: Confidence interval. **Note**: All results are significant after applying Bonferroni correction to mitigate potential Type I error (i.e., $p < .0018$).

Table 4. Stepwise multiple linear regression of the relationship between social networking site (SNS) addiction and key psychosocial and key related predictors.

	Step 1			Step 2			Step 3			Step 4			Step 5			Step 6		
Predictors	*B*	SE	β	*B*	SE	β	*B*	SE	β	*B*	SE	β	*B*	SE	β	*B*	SE	β
Daily SNS use	2.28	.16	.54*	1.36	.21	.32*	1.19	.22	.28*	.071	.18	.17*	.57	.18	.14*	.55	.17	.13*
Weekly SNS use				1.75	.28	.31*	1.72	.28	.31*	1.2	.23	.22*	1.05	.22	19*	1.12	.22	.20*
Age							-1.03	.35	-.12*	.29	.30	.03†	.38	.28	.04†	.39	.28	.04†
Fear of missing out										.30	.02	.53*	.21	.02	.37*	.19	.02	.34*
Maladaptive cognitions													.13	.02	.28*	.12	.02	.25*
Psychiatric distress																.12	.03	.12*
Model summary																		
Variance explained by model	R^2 = .293 (29.3%)			R^2 = .344 (34.4%)			R^2 = .356 (35.6%)			R^2 = .563 (56.3%)			R^2 = .600 (60.0%)			R^2 = .611 (61.1%)		
Change in variance by next step				ΔR^2 = .051 (5.1%)			ΔR^2 = .012 (1.2%)			ΔR^2 = .207 (20.7%)			ΔR^2 = .038 (3.8%)			ΔR^2 = .010 (1.0%)		
Statistical significance of model	$F(1, 505) = 209.65$*			$F(2, 504) = 132.23$*			$F(3, 503) = 92.59$*			$F(4, 502) = 161.38$*			$F(5, 501) = 150.43$*			$F(6, 500) = 130.64$*		
Statistical significance of steps				$\Delta F(1, 504) = 39.02$*			$\Delta F(1, 503) = 9.08$*			$\Delta F(1, 502) = 237.27$*			$\Delta F(1, 501) = 47.20$*			$\Delta F(1, 500) = 13.28$*		

***** $p < .01$; † $p > .05$.

Abbreviations: *B*: unstandardized regression coefficient; SE: standard error; β: standardized regression coefficient; R^2: R square; ΔR^2: R^2 change.

Note: Outcome: SNS addiction. The final model (i.e., Step 6) excluded the following variables due to their low and non-significant predictive power in the outcome variable (i.e., SNS addiction): gender, preference for online social interaction, and dysfunctional emotion regulation.