Comparing Smartphone, WhatsApp, Facebook, Instagram, and Snapchat: Which Platform Elicits the Greatest Use Disorder Symptoms?

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Abstract

In recent years, smartphone and social networking services (SNS) use have received a great amount of scholarly attention regarding their potentially addictive effects. Conceptualized as smartphone or SNS use disorder, research has consistently demonstrated relations with daily-life impairments. However, Smartphone Use Disorder (SmUD), WhatsApp Use Disorder (WAUD), Facebook Use Disorder (FBUD), Instagram Use Disorder (IGUD), or Snapchat Use Disorder (SCUD) scores have not been compared with each other. This comparison could provide insight into which device/platform could be most related to daily-life impairments. The effective sample of this study comprised 439 German-speaking individuals (age $M = 25.08$, $SD = 9.74$; 271 women) who reported actively using a smartphone, as well as WhatsApp, Facebook, Instagram, and Snapchat, and responded to the respective use disorder scales. Within-subjects analysis of variance and *post hoc* tests (p values adjusted with the Holm method) were used to compare smartphone and SNS use disorder scale scores. The results suggest that SmUD scores are highest in comparison with other SNS platforms. Although WAUD and IGUD scores did not differ from each other, these scores were higher than for FBUD and SCUD. SCUD scores were higher than FBUD scores. These results provide novel insight into how the smartphone and different SNSs may relate to engagement in problematic digital technology use.

Keywords: problematic smartphone use, social media addiction, smartphone addiction, WhatsApp, Facebook, Instagram, Snapchat, use disorder

Introduction

APPROXIMATELY TWO THIRDS of world's population own a mobile device, and almost half use social media.[1] Social media include messenger applications as well as social networking sites, as both allow users to connect with each other, create and consume content, display and view others' profiles.[2] Social media apps and sites could also be called social networking services (SNS).

The most popular SNS platforms are Facebook, Youtube, WhatsApp, WeChat, and Instagram, with each having more than a billion users worldwide.[1] Furthermore, Snapchat is a very popular platform, with ~300 million users.[1] Each of these platforms provides many similar, but also distinct functions. Facebook encompasses almost all functions that

other SNS platforms individually have. For instance, one may use Facebook for active social interaction (phone and video calls, messaging), creating and sharing one's own and interacting with others' content. One may also sell and buy products on Facebook.[3] WhatsApp, in essence, focuses on enabling active social communication; its main features are instant messaging and calling functions.[4] Instagram is a more visual SNS, as people mainly post pictures, videos, or broadcast live content; nevertheless, it is also possible to interact with others through posting one's own content and interacting with others' content, and through direct messaging.[5] Facebook, WhatsApp, and Instagram are owned by Facebook, Inc. Finally, Snapchat, similar to Instagram, is also more visual content based; however, its main feature arguably is sharing and viewing content (typically pictures or

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videos) for a limited period of time before becoming inaccessible.[6] Smartphones typically allow accessing all of these SNS apps, as well as other features, such as social activities (e.g., phone and video calls, and text messaging), Internet access, games, watching videos, music, and productivity apps.

Recently, relations between excessive digital technology use and worse everyday life outcomes have been demonstrated.[7–14] It has been debated whether excessive smartphone or SNS use-related adversities could be considered behavioral addictions.[15–17] Terms such as "problematic smartphone use,"[17–19] "social networks use disorder,"[16] and "problematic Facebook use"[20] have been proposed. The platforms mentioned in this article tend to use persuasive application design aimed at increasing user engagement; in some cases, one might become "hooked" to their digital technology use.[21,22] This, in turn, may lead to a specific use disorder of the device/platform, characterized by excessive engagement with the technology platform that may cause impairments in daily life.[14,16,23] For instance, one could develop symptoms resembling withdrawal (e.g., irritability when unable to use the technology), or tolerance (e.g., engaging in technology use more over time).

The aim of this study was to investigate which of the following platforms—smartphone, WhatsApp, Facebook, Instagram, or Snapchat—could elicit the greatest severity of technology use disorder symptoms. Interestingly, there is little research[24] comparing several SNS and Smartphone Use Disorder (SmUD) scores with each other. Based on previous study,[25] we hypothesized that SmUD scores should be higher than WhatsApp Use Disorder (WAUD), Facebook Use Disorder (FBUD), Instagram Use Disorder (IGUD), and Snapchat Use Disorder (SCUD) scores. Our reasoning is that smartphones are more ubiquitous, have more features, and could accommodate all mentioned SNS apps.

Methods

Sample and procedure

Using various local German media (e.g., TV, print, and social media), German-speaking individuals (age 12+) who use both a smartphone and social media participated in a web-based survey, hosted on the SurveyCoder platform.[26] Participants received anonymized feedback on their personality and smartphone usage in comparison with other survey participants, to motivate study participation.

Altogether, there were 3,435 participants. However, in this study, we were interested in participants actively using a smartphone and WhatsApp, Facebook, Instagram, and Snapchat. After inspecting the data, we excluded participants who were noneligible (e.g., participants owning a smartphone but not using all of the SNS apps) or provided implausible values (e.g., reported age <12, or >100), resulting in $n = 439$ individuals (age $M = 25.08$, $SD = 9.74$; 271 women). Three hundred seventy-three (85 percent) individuals were from Germany, and the remaining participants were from other German-speaking countries, including 62 (14 percent) from Austria and 4 (1 percent) from Switzerland. A majority (313; 71 percent) did not have a university degree. The sample was a convenience sample of German-speaking adults, setting potential restrictions to generalization of findings.

It should be noted that this study was part of a larger project. The Institutional Review Board of Ulm University approved the study project.

Measures

We asked about sociodemographics (age, gender, education level, and country) and levels of smartphone and different SNS use disorders.

We used a German version of the short Smartphone Addiction Scale d-KV-SSS.[27] This is a 10-item questionnaire (with responses ranging from 1 = *strongly disagree* to 6 = *strongly agree*) reflecting the extent of daily-life disturbances (e.g., problems at work and with concentration, physical and psychological adversities) due to smartphone use; scores are summed to form a SmUD score.

Scales for SmUD, WAUD, FBUD, IGUD, and SCUD were very similar; only the word "smartphone" from the d-KV-SSS was substituted with the name of the platform in each item of the scale. Previous study has shown that SmUD, WAUD, and FBUD negatively correlated with life satisfaction.[25] All scales showed adequate internal consistency (Table 1). The wording of items is in Supplementary Table S1.

Analysis

We used R software version 3.6.3[28] for data analysis. There were no missing values among the variables, because consenting participants were prompted to answer every question. We computed Cronbach's alphas as internal consistency statistics. Pearson correlations were used to investigate associations between the use disorder scales. To investigate differences in scale scores, we conducted within-subjects analysis of variance (ANOVA) and *post hoc* tests (p values adjusted with the Holm method), and Cohen's d as effect size estimates for scale score differences. p Values for correlations and ANOVA results were adjusted with Holm's method.[29] We also computed results for men and women separately, because there may be gender differences in digital technology engagement across gender.[30] The data and analysis script are available within the Open Science Framework: https://osf.io/n3cqx/

Results

Descriptive statistics and correlations

Descriptive statistics and correlation results for full sample and subsamples split by gender are presented in Table 1. Descriptive statistics and correlations by education are in Supplementary Table S2.

The following results are reported for the total sample. According to Table 1, the highest average score was found for SmUD, followed by WAUD, IGUD, SCUD, and FBUD. With the exception of a nonsignificant association between FBUD and SCUD, all use disorder scale scores were positively correlated with each other, with correlations ranging from $r = 0.210$ to $r = 0.759$. Younger age was associated with higher scores on IGUD and SCUD, whereas older age was linked with higher scores in FBUD, and there was no age effect for SmUD or WAUD scores.

TABLE 1. DESCRIPTIVE STATISTICS AND PEARSON CORRELATIONS FOR THE KEY VARIABLES

						Total sample (n=439)				
Variable	M	SD	Min	Max	α	1	2	3	4	5
1. SmUD	31.74	8.91	10	57	0.83	1				
2. WAUD	25.46	9.85	10	60	0.88	0.759***	1			
3. FBUD	15.64	7.53	10	53	0.91	0.435***	0.438***	1		
4. IGUD	25.20	11.49	10	59	0.92	0.639***	0.587***	0.282***	1	
5. SCUD	17.49	11.21	10	60	0.96	0.309***	0.210***	0.098	0.427***	1
6. Age	25.08	9.74	13	58	—	−0.079	−0.112	0.217***	−0.309***	−0.399***
						Men (n=168)				
1. SmUD	30.40	8.68	10	52	0.83	1				
2. WAUD	24.09	9.62	10	50	0.89	0.775***	1			
3. FBUD	15.65	7.44	10	43	0.92	0.439***	0.412***	1		
4. IGUD	22.55	10.25	10	59	0.91	0.633***	0.642***	0.308***	1	
5. SCUD	17.22	10.50	10	60	0.95	0.215*	0.226*	0.204*	0.408***	1
6. Age	24.60	9.54	13	58	—	−0.019	−0.038	0.280**	−0.236*	−0.364***
						Women (n=271)				
1. SmUD	32.58	8.97	10	57	0.83	1				
2. WAUD	26.31	9.91	10	60	0.87	0.746***	1			
3. FBUD	15.64	7.59	10	53	0.91	0.438***	0.457***	1		
4. IGUD	26.84	11.93	10	59	0.92	0.634***	0.550***	0.277***	1	
5. SCUD	17.65	11.64	10	59	0.96	0.359***	0.200**	0.040	0.442***	1
6. Age	25.38	9.88	13	57	—	−0.123	−0.163*	0.180*	−0.366***	−0.420**

α=Cronbach's alpha.
p Values were adjusted with Holm's method. *$p<0.05$, **$p<0.01$, ***$p<0.001$.
FBUD, Facebook Use Disorder; IGUD, Instagram Use Disorder; SCUD, Snapchat Use Disorder; SmUD, Smartphone Use Disorder; WAUD, WhatsApp Use Disorder.

Differences in average scales scores

Results of within-subjects ANOVA are in Table 2, and *post hoc* comparisons are in Table 3.

The overall model predicting different scale scores was statistically significant (Table 2). Table 3 shows that SmUD

TABLE 2. WITHIN-SUBJECTS ANALYSIS
OF VARIANCE RESULTS

	Total sample (n=439)			
	Sum of squares	df	Mean square	F
Between scales	75,403	4	18,851	325.20***
Within scales	113,430	438	259	
Total of residuals	101,555	1,752	58	
	Men (n=168)			
Between scales	23,249	4	5,812	114.10***
Within scales	39,234	167	234.90	
Total of residuals	34,019	668	51	
	Women (n=271)			
Between scales	53,364	4	13,341	217.20***
Within scales	72,471	270	268.40	
Total of residuals	66,326	1,080	61	

***$p<0.001$.

scores were significantly higher than all SNS use disorder scores. In fact, the largest difference (indicated by Cohen's d) was found between SmUD and FBUD ($d=1.495$). WAUD scores were higher than FBUD and SCUD scores; however, WAUD and IGUD scores were not significantly different. IGUD scores were significantly higher than FBUD and SCUD scores. Finally, SCUD scores were higher than FBUD scores, although the absolute effect size was small ($d=0.171$).

Discussion

The aim of this study was to investigate whether smartphone, WhatsApp, Facebook, Instagram, or Snapchat use are differentially associated with daily impairments, measured by respective use disorder scales.

The hypothesis that SmUD scores would be higher than other SNS use disorders scores was supported by the data. Perhaps because SNSs are accessible through a smartphone, and because smartphones have additional features (watching videos, playing games, and listening to music), smartphone use engagement may be more potent. This finding is also in line with results from previous research where only excessive use of smartphones, WhatsApp, and Facebook (but not Instagram or Snapchat) were compared.[25] Interestingly, WAUD and IGUD scores were highest among the SNS platforms, whereas FBUD and SCUD scores were the lowest. It is also relevant to mention that WAUD and IGUD scores did not differ significantly. Although SCUD scores were higher than FBUD scores, the effect size was small.

Table 3. *Post Hoc* Comparisons of Use Disorder Scales Based on Estimated Marginal Means

Comparisons		Total sample (n=439)		Men (n=168)		Women (n=271)	
Scale 1	Scale 2	t	d	t	d	t	d
SmUD	WAUD	12.221***	0.583	8.103***	0.625	9.301***	0.565
SmUD	FBUD	31.326***	1.495	18.943***	1.462	25.153***	1.528
SmUD	IGUD	12.735***	0.608	10.083***	0.778	8.518***	0.517
SmUD	SCUD	27.740***	1.324	16.925***	1.306	22.166***	1.346
WAUD	FBUD	19.105***	0.912	10.840***	0.836	15.851***	0.963
WAUD	IGUD	0.514	0.025	1.980	0.153	−0.784	−0.048
WAUD	SCUD	15.519***	0.741	8.822***	0.681	12.864***	0.781
FBUD	IGUD	−18.591***	−0.887	−8.860***	−0.684	−16.635***	−1.011
FBUD	SCUD	−3.586***	−0.171	−2.018	−0.156	−2.987**	−0.181
IGUD	SCUD	15.005***	0.716	6.842***	0.528	13.648***	0.829

Degrees of freedom for total sample = 1752; for men = 1668; for women = 1080.
p Values were adjusted with Holm's method. **$p < 0.01$, ***$p < 0.001$.

Interestingly, age was negatively associated with higher scores on IGUD and SCUD, and positively associated with FBUD scores, while SmUD and WAUD were not correlated with age. These age findings could be due to Instagram and Snapchat users being younger (and Facebook users older), and that smartphone and WhatsApp use are more diffused across generations.[31] Therefore, when considering studying SNS use disorders, researchers need take into account age differences across the usage of different platforms.

Although there may be an advantage of using smartphone-based scales over platform-specific scales in measuring general Internet use disorder/SmUD (as it probably includes other behaviors aside from SNS use), platform-specific use disorder scales may provide insight into specific platform effects on daily-life outcomes. Different platforms have different features, and a specific use disorder could be linked to different externalizing and internalizing behaviors.

Although differences in potential "addictive" features of SNS platforms have been studied before,[24] this is the first study to compare differences between smartphone and several popular SNS platforms use disorder scale scores. The results could be further helpful in the discussion regarding digital technology's impact on daily life; results indicate that, in comparison to SNS platforms, smartphones may play a larger role in one's life, as can be expected by their ubiquity and myriad of features. As a potential limitation, although we measured the extent of specific media and use disorders, they were self-reported, and we did not have objective measures of duration or frequency of use. Including objective use measures can allow expansion on the findings, as well as test convergent validity of the scales. Importantly, several studies have demonstrated the disparity between objectively measured and self-reported digital technology use.[32–36] However, it should also be added that potentially adverse relations due to excessive digital technology use have a subjective component of perceived dysfunction, which may not necessarily reflect in the duration or frequency of a device or platform use. This notion is also coherent with theoretical frameworks conceptualizing the potential effects of digital technology use.[19,23,37] A further limitation is the focus on the aforementioned platforms, whereas Twitter, TikTok, or YouTube, as well as WeChat, are also relevant.[38] Further research should include those SNS platforms too.

Author Disclosure Statement

Funding Information

Supplementary Material

Supplementary Table S1
Supplementary Table S2

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Supplementary Table 1.

Items of scales.

Item number	Item content
1	I miss planned work due to [XXX] use.
2	I am having a hard time concentrating in class, while doing assignments, or while working due to [XXX] use.
3	I feel pain in the wrists or at the back of the neck while using [XXX].
4	I won't be able to stand not having [XXX].
5	I am feeling impatient and fretful when I am not having [XXX].
6	I have [XXX] in my mind even when I am not using it.
7	I will never give up using [XXX] even when my daily life is already greatly affected by it.
8	I am constantly checking [XXX] so as not to miss conversations.
9	I am using [XXX] longer than I had intended.
10	The people around me tell me that I use [XXX] too much.

Notes. [XXX] = depending on the scale, either "smartphone", "Facebook", "WhatsApp", "Instagram", or "Snapchat".

Supplementary Table 2

Descriptive statistics and correlations by education

	Do not have a university degree (N = 313)									
Variable	**M**	**SD**	**Min**	**Max**	**α**	**1**	**2**	**3**	**4**	**5**
1. SmUD	30.04	9.03	10	57	.83	1				
2. WAUD	25.95	10.15	10	60	.89	.767***	1			
3. FBUD	15.35	7.55	10	44	.92	.425***	.433***	1		
4. IGUD	26.12	11.70	10	59	.91	.628***	.586***	.253***	1	
5. SCUD	19.50	12.30	10	60	.96	.312***	.185**	.082	.414***	1
6. Age	22.70	8.96	13	55	-	-.041	-.032	.321***	-.228***	-.376***

	Have a university degree (N = 126)									
Variable	**M**	**SD**	**Min**	**Max**	**α**	**1**	**2**	**3**	**4**	**5**
1. SmUD	31.00	8.61	10	51	.83	1				
2. WAUD	24.25	8.99	10	53	.86	.735***	1			
3. FBUD	16.37	7.45	10	53	.90	.479***	.480***	1		
4. IGUD	22.92	10.68	10	56	.92	.671***	.578***	.405***	1	
5. SCUD	12.50	5.18	10	40	.91	.364***	.317**	.391***	.505***	1
6. Age	30.98	9.10	18	58	-	-.124	-.248*	-.066	-.439***	-.158

Notes. SmUD = smartphone use disorder; WAUD = WhatsApp Use Disorder; FBUD = Facebook Use Disorder; IGUD = Instagram Use Disorder; SCUD = Snapchat Use Disorder; SCUD = Snapchat Use Disorder. α = Cronbach's alpha. p-values were adjusted with Holm's method. * p < .05, ** p < .01, *** p < .001.