



# General and Alcohol-Related Social Media Use and Mental Health: a Large-Sample Longitudinal Study

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## Abstract

The current study aimed to investigate if general and alcohol-related social media use predicts symptoms of depression and anxiety. Students in Bergen, Norway, participated in a Web-based survey during fall 2015 (T1) and a follow-up survey during fall 2016 (T2). A total of 5217 participated in both surveys. Crude and adjusted linear regression analyses were conducted to investigate if social media use at T1 predicted depression and anxiety at T2. Several social media use variables (e.g., using Instagram) were positively associated with depression and anxiety over time, but these associations became non-significant when covariates were controlled for. Number of online friends was inversely related to depression whereas using Twitter was positively related to anxiety at T2, when covariates were controlled for. The effect sizes of the observed associations were all very small. The current study found little support for a relationship between social media use and mental health.

**Keywords** Social media · Alcohol · Students · Mental health · Anxiety · Depression

Social media may have the potential to influence users' mental health and well-being (Lin et al. 2016). Still, it is unclear how social media affects the users' mental health. Some studies have found that social media use is associated with improved—and factors closely related to good—mental health, as social media provides an arena for social cohesion and support (Bessièrè et al. 2010; Ellison et al. 2007; Valenzuela et al. 2009). Other studies have (on the other hand) suggested that social media use may be associated with impaired mental health (Chou and Edge 2012; Kross et al. 2013; Lin et al. 2016; Sagioglou and Greitemeyer 2014). This may relate to exposure to others' flawless self-presentations which may cause upward social comparisons or the experience of social media use being a waste of time (Chou and Edge 2012; Sagioglou and Greitemeyer 2014). Social embarrassment and cyber-bullying are other examples of how social media use may have undesirable effects on the users' mental health

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(Lin et al. 2016; O’Keeffe and Clarke-Pearson 2011; Wang et al. 2011). It has also been argued that an inverse directionality may be at play, in which poor mental health leads to increased social media use. Individuals with poor mental health may be inclined to excessive use of social media as a means for self-distraction and relief from psychological distress or to receive social support in an arena which permits greater degrees of expressional control (Caplan 2006; Lin et al. 2016; Whiting and Williams 2013). However, several large sample studies with robust methodological designs have found use of digital technology (including social media) to be practically unrelated to mental health (Orben et al. 2019; Orben and Przybylski 2019a; Orben and Przybylski 2019b). Few studies on the association between social media use and mental health have employed longitudinal designs (Orben et al. 2019; Seabrook et al. 2016), and few have controlled for mental health at baseline, both of which are quintessential for being able to indicate directionality.

It should be noted that social media is not a uniform phenomenon, and consists of several applications (apps) and platforms. Some of the most popular sites include *Facebook*, *Snapchat*, *Instagram*, and *Twitter* (Davenport et al. 2014; Knight-McCord et al. 2016), which all have somewhat different features and are used for different purposes and in different ways (Davenport et al. 2014). Users of *Instagram* have, for instance, been argued to present a more polished (Boyle et al. 2016) representation of their lives on this site, compared to other social media sites/apps (). The heterogeneity of social media could suggest that the different sites may affect their users’ mental health differently (Lin et al. 2016). No previous study has investigated whether the various social media sites/apps differently affect the users’ mental health (Lin et al. 2016).

Disclosure and exposure of user-generated alcohol content on social media may increase later alcohol use (Boyle et al. 2016; D’Angelo et al. 2014; Huang et al. 2014), but no previous study has investigated the extent to which such disclosure or exposure can influence the mental health of the users. Given the strong link between alcohol use and social gatherings and friendships (Sayette et al. 2012), and further between social function and mental health (Fung et al. 2016), alcohol-related social media content might be one example of specific social media content that may influence social media users’ mental health. Sharing and viewing alcohol-related content on social media (e.g., party pictures) has been described as ways to bond with others, in part through reminiscence and the formation of group identities (Hebden et al. 2015; Niland et al. 2014). Based on the assumption that alcohol disclosure/exposure increases social cohesion and group belonging, one could reason that disclosure and exposure of alcohol-related content on social media may have beneficial effects on mental health. However, disclosure and exposure of alcohol-related content on social media can also be a cause of concern. In particular, sharing alcohol-related content could conceivably have negative effects on the sharers’ mental health, insofar as it triggers feelings of regrets and shame regarding the content being shared (Wang et al. 2011). Similarly, viewing alcohol-related content may make the receivers more likely to feel lonely or dissatisfied with their own social network, and subsequently have negative effects on their mental health.

Against this backdrop, the current study aims to investigate how different aspects related to social media investment (i.e., number of online-friends and frequency of logins), using specific social media sites/apps (i.e., *Facebook*, *Snapchat*, *Instagram*, and *Twitter*), and disclosure and exposure of alcohol-related content portraying positive and negative aspects of alcohol use relate to depression and anxiety 1 year later. Factors that may be associated with both social media use and mental health (i.e., demographics and alcohol use) (Andreassen et al. 2016;

Grant et al. 2004; Westgate et al. 2014; World Health Organization 2002) will be controlled for in the analyses.

## Methods

### Procedures and Sample

Data was collected by two Web-based surveys, one which was conducted during fall 2015 (T1) and a follow-up which was conducted during fall 2016 (T2). The surveys were designed and conducted within the software programme SurveyXact (Rambøll Mangement 2008). Students at the four largest institutions for higher education in Bergen, Norway, were invited to participate at T1. A total of 11,236 (39.4%) agreed to participate, 5217 (51.5%) of these chose to participate at T2 as well. A large proportion of the participants from T1 may not have received the invitation to participate at T2, as they were contacted by their student e-mails (approximately 40% ends their education every year at the institutions included in the study). This suggests a significantly higher response rate than 51.5% among those who actually received the invitation to participate at T2. The students were given information about the study, data storage and use, potential risk and benefits associated with participation, and their right to abstain from participation before they could choose to respond to the surveys. The project was approved by the Regional Committee for Medical Research Ethics, Western Norway (no. 2015/1154).

The current sample consists of the 5217 individuals who participated both at T1 and T2. A total of 97.8% reported to use social media at T1. The current sample consists of both social media users and non-social media users. The sample's characteristics are presented in Table 1. The sample consisted of 64.8% women, mean age at T1 was 24.8 years ( $SD = 6.3$ ), and 92.7% were born in Norway. The sample (i.e., participants at both T1 and T2) was compared to the participants who only participated at T1 on the demographics, alcohol use, social media use, and mental health variables. The results from the drop-out analyses (shown in Table 1) suggest that some very small drop-out biases were present.

### Measurements

**Demographics and Alcohol Use at T1** Demographics were assessed by the following questions: "Year of birth?" (response range: 1940–2000), "Sex?" (woman; man), "Place of birth?" (Norway; Nordic country, outside of Norway; European country, outside of the Nordic countries; Asia, Africa, Central- or South-America; North-America, Oceania; I do not know), "Relationship status?" (single; I have a steady boy/girlfriend, but I live alone; cohabitant; married/registered partnership; other), and "Do you have children?" (no; yes). Alcohol use was assessed by the 10-item Alcohol Use Disorders Identification Test (AUDIT) (Babor et al. 2001; Bohn et al. 1995). AUDIT includes questions regarding consumption level, alcohol harm, and the experience of dependency symptoms (Reinert and Allen 2007). In the current study, the Cronbach's alpha of AUDIT was .78.

**General and Alcohol-Related Social Media Use at T1** The participants were asked: "Do you have an account on a social media site/app?" (yes; no), "How often do you log on to

**Table 1** Sample characteristics and dropout analysis

	Participated only at T1, N = 6019	Current sample (participated at T1 and T2), N = 5217	Significance test and effect size of differences
	Mean (SD)% (95% CI)	Mean (SD)% (95% CI)	
<b>Demographics (T1)</b>			
Age (T1)	25.0 (6.6)	24.8 (6.3)	N.S.
Women	62.1% (60.8–63.3%)	64.8% (63.5–66.1%)	Phi = .028**
Born in Norway	92.2% (91.5–92.9%)	92.7% (92.0–93.4%)	N.S.
Single (T1)	47.6% (46.3–48.9%)	46.9% (45.6–48.2%)	N.S.
Parent (T1)	11.9% (11.0–12.7%)	11.1% (10.2–11.9%)	N.S.
Alcohol use (T1) <sup>a</sup>	8.2 (4.9)	8.2 (4.9)	N.S.
AUDIT-score	6.5 (1.3)	6.6 (1.2)	Cohen's <i>d</i> = .054** <sup>a</sup> , <i>f</i>
General social media use (T1)	447.6 (279.1)	444.0 (269.7)	N.S.
Frequency of logins to social media <sup>b</sup>	96.1% (95.5–96.6%)	96.8% (96.3–97.3%)	N.S.
Number of online-friends	85.2% (84.2–86.2%)	86.8% (85.8–87.8%)	Phi = .023*
Using Facebook	73.2% (71.9–74.4%)	74.0% (72.7–75.2%)	N.S.
Using Snapchat	24.5% (23.3–25.7%)	25.9% (24.7–27.2%)	N.S.
Using Instagram	2.2 (1.2)	2.2 (1.2)	N.S.
Using Twitter	1.4 (0.8)	1.4 (0.9)	N.S.
Alcohol-related social media use (T1) <sup>c</sup>	4.6 (1.8)	4.7 (1.8)	Cohen's <i>d</i> = .046 <sup>a</sup> , <i>f</i>
Frequency of disclosure of content reflecting positive aspects of alcohol	3.25 (1.6)	3.33 (1.6)	Cohen's <i>d</i> = .049 <sup>a</sup> , <i>g</i>
Frequency of disclosure of content reflecting negative aspects of alcohol			
Frequency of exposure to content reflecting positive aspects of alcohol			
Frequency of exposure to content reflecting negative aspects of alcohol			
Mental health (Hopkins Symptom Checklist-25)			
Symptoms of depression (T1) <sup>d</sup>	24.2 (7.5)	24.0 (7.2)	N.S.
Symptoms of anxiety (T1) <sup>e</sup>	15.0 (4.1)	15.0 (4.1)	N.S.
Symptoms of depression (T2) <sup>d</sup>	—	24.5 (7.5)	—
Symptoms of anxiety (T2) <sup>e</sup>	—	15.2 (4.2)	—

SD standard deviation, CI confidence interval, T1 time of the first survey, T2 time of the follow-up survey, N.S. not significant, AUDIT Alcohol Use Disorders Identification Test

<sup>a</sup> Total scores range 0–40

<sup>b</sup> 1 = Seldom/never, 2 = less than once a week, 3 = 1 time a week, 4 = 2–3 times a week, 5 = 4–6 times a week, 6 = 1–2 times a day, 7 = over 3 times a day

<sup>c</sup> 1 = Never, 2 = done it before, but not lately, 3 = less than once a month, 4 = monthly, 5 = a couple times a month, 6 = weekly, 7 = a couple times a week, 8 = daily or almost daily

<sup>d</sup> Total scores range from 15 to 60

<sup>e</sup> Total scores range from 10 to 40

<sup>f</sup> Equal variance not assumed

<sup>g</sup> Equal variance assumed

\* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001

social media?” (seldom/never; less than 1 time a week; 1 time a week; 2–3 times a week; 4–6 times a week; 1–2 times a day; more than 3 times a day), “About how many friends or followers do you have on the social media site/app you use the most?”, and “Which social media sites/apps do you use (you can select several sites)?” (Facebook; Twitter; Instagram; Myspace; Tinder; Snapchat; Jodel; Kik; None; Others) (Karl et al. 2010). Alcohol-related social media use was assessed by the following questions: “How often do you post content on social media that refers to positive consequences of alcohol use (e.g., increased pleasure, social cohesion, relaxation)?”, “How often do you post content on social media that refers to negative consequences of alcohol use (e.g., hangovers, loss of control, hangover anxiety)?”, “How often do you view alcohol-related content on social media that refers to positive consequences of alcohol use (e.g., increased pleasure, social cohesion, relaxation)?” and “How often do you view alcohol-related content on social media that refers to negative consequences of alcohol use (e.g., hangovers, loss of control, hangover anxiety)?” (never; I’ve seen it before, but not lately; less than once a month; every month; a couple times a month; every week; a couple times a week; daily or almost daily). The participants were asked to consider social media content which was shared with more than two social media users. For the questions regarding exposure to alcohol, the participants were asked to respond based on their exposure to user-generated alcohol content.

*Symptoms of depression and anxiety at T1 and T2* were measured by the 25-item Hopkins Symptoms Checklist (HSCL-25) (Derogatis et al. 1974). In the current study, the Cronbach’s alphas for the items measuring symptoms of depression were .89 (T1) and .90 (T2), while the corresponding alphas for the items measuring symptoms of anxiety were .81 (T1) and .82 (T2), respectively. The measurement of depression at T1 correlated strongly with the depression measurement at T2, with a Pearson correlation of .65. The measurement of anxiety at T1 and T2 had a strong correlation as well with a Pearson correlation of .63.

## Statistics

Data analyses were conducted in IBM SPSS 23. Missing data were deleted listwise. Several linear multiple regression analyses were conducted. The dependent variables were depression and anxiety at T2. The independent variables were number of online friends, frequency of logins, using Facebook, using Snapchat, using Instagram, using Twitter, frequency of disclosure of content depicting positive and negative aspects of alcohol, and frequency of exposure to content depicting positive and negative aspects of alcohol. All the independent variables were measured at T1. The first models were crude (i.e., no covariates were controlled for). In the next set of models, we adjusted for the effect of the other social media variables, demographics (i.e., age, sex, relationship, and parental status), alcohol use, and depression and anxiety at T1. The relationships between the independent and dependent variables were reported in terms of standardized betas in order to be comparable to each other and to provide an indication of effect sizes. According to Ferguson (2009), standardized betas of .20, .50, and .80 represent small, moderate, and large effect sizes, respectively. Standardized betas of .10 or lower have been argued to be too low to be interpreted as meaningful; hence, such effects are likely to reflect “noise” (e.g., common method variance) (Orben and Przybylski 2019b).

## Results

The results from the regression analyses are shown in Table 2. All the described associations were significant ( $p < .05$ ) and had effect sizes that are considered as very small.

Frequency of logins to social media and use of Facebook were positively associated with anxiety at T2 in the crude analyses, albeit the associations were not maintained in the adjusted model. Using Snapchat, using Instagram, and frequency of disclosure and exposure to content reflecting positive and negative aspects of alcohol use were all positively associated with depression and anxiety at T2 in the crude analysis, but none of the associations were maintained in the adjusted model. Number of online friends was associated with a decrease in symptoms of depression from T1 to T2, whereas using Twitter was associated with an increase in symptoms of anxiety from T1 to T2, in the adjusted analysis (i.e., adjusted for other social media variables, demographics, alcohol use, and symptoms of depression and anxiety at T1). Number of online friends and Twitter use was not significantly associated with depression or anxiety in the crude analyses.

**Table 2** The relationship between general and alcohol-related social media use and mental health. Crude and adjusted linear regressions,  $n = 4655$

Dependent variables (T1)	Symptoms of depression (T2)		Symptoms of anxiety (T2)	
	Betas	<i>t</i> value	Betas	<i>t</i> value
<b>Crude regressions<sup>a</sup></b>				
Frequency of logins to social media	.02	1.67	.06***	4.40
Number of online-friends	-.03	-1.79	.01	0.40
Using Facebook	.01	0.83	.04**	2.75
Using Snapchat	.03*	2.02	.05***	3.64
Using Instagram	.05**	3.12	.07***	4.90
Using Twitter	.02	1.34	.03	1.82
Frequency of disclosure of content reflecting positive aspects of alcohol	.04*	2.45	.05**	3.48
Frequency of disclosure of content reflecting negative aspects of alcohol	.04**	3.03	.06***	3.90
Frequency of exposure to content reflecting positive aspects of alcohol	.06***	4.06	.06***	3.98
Frequency of exposure to content reflecting negative aspects of alcohol	.05**	3.27	.06***	3.90
<b>Adjusted regressions<sup>b</sup></b>				
Frequency of login to social media	-.02	-1.39	.00	0.22
Number of online-friends	-.03*	-2.10	-.01	-0.58
Using Facebook	-.00	-0.09	.00	0.15
Using Snapchat	-.02	-1.08	-.02	-1.41
Using Instagram	-.01	-0.43	-.01	-0.74
Using Twitter	.02	1.83	.02*	1.99
Frequency of disclosure of content reflecting positive aspects of alcohol	-.01	-0.95	-.02	-1.00
Frequency of disclosure of content reflecting negative aspects of alcohol	.00	0.27	.01	0.85
Frequency of exposure to content reflecting positive aspects of alcohol	.01	0.88	-.01	-0.60
Frequency of exposure to content reflecting negative aspects of alcohol	.00	0.14	-.00	-0.33

<sup>a</sup> Covariates are adjusted for one by one

<sup>b</sup> The other social media variables, demographics, alcohol use, and symptoms of depression and anxiety at T1 are controlled for

T1 time of the first survey, T2 time of the follow-up survey, \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

## Discussion

The current study identified several associations between specific types of social media use patterns (e.g., having specific social media sites/apps) and mental health, which have not been reported in earlier research. Overall, small effect size associations were observed between social media use and depression/anxiety in this study. Contrary to previous assumptions, this result supports the findings by Orben et al. (2019), Orben and Przybylski (2019a), and Orben and Przybylski (2019b) and suggests that the association between social media and mental health may be weak (if any) and of limited practical value. Another possible explanation to the small effect sizes is that social media use may have had both positive and negative effects on mental health, which may have caused the effects to cancel each other out.

Frequent logins to social media, having accounts on specific social media sites/apps (i.e., Facebook, Snapchat and Instagram), and reporting frequent disclosure and exposure of alcohol-related content on social media were positively associated with depression and/or anxiety at T2. The fact that these associations disappeared when the covariates in this study were controlled for suggests that these social media use patterns do not cause an increase in symptoms of depression or anxiety, or at least that such causal effects are not strong or long-lived. It is possible that the associations between these social media use patterns and later mental health are explained better by either poorer mental health causing certain types of social media use, or by “third variables” causing both social media use and poorer mental health. Further, the very small effect sizes of the associations between social media use and mental health found in the crude analysis most likely reflect trivial relationships that should not be subject to substantial interpretations.

The number of online friends the students had and using Twitter both predicted changes in depression and anxiety, respectively, from T1 to T2 when other covariates were controlled for (i.e., other social media variables, demographics, alcohol use, and baseline mental health). The associations between number of online friends and Twitter use and mental health were weak and may reflect trivial and spurious relationships rather than true effects. Still, if reflecting real effects, these are undeniably very small and of little practical significance. Thus, possible explanations to the associations will only be briefly discussed.

The inverse relationship between number of online friends and symptoms of depression in the adjusted analysis suggests that having more online friends may protect against the development of depressive symptoms. If the number of online friends do protect against depression, this may be explained by the well-documented mental health promoting effects of friendships, which the current results suggest may also be valid in virtual settings (Cleary et al. 2018). It is also possible that the relationship could be due to potential third variables not included in the current study (e.g., sociability). The association between Twitter use and increased anxiety might be explained by the impersonal and sometimes anonymous aspects of Twitter which may result in a rougher tone on this site, compared to other social media sites/apps (Hughes et al. 2012; Suler 2004). Criticizing others, self being criticized, and viewing others being criticized (e.g., on Twitter) may trigger feelings of insecurity and increased anxiety (Taylor et al. 1997). The focus on current issues like international politics, which is common on Twitter, may also be anxiety-inducing insofar as it generates fear related to the future (e.g., fear of war, global warming, etc.) and exposes users to unpleasant facts/stimulus (e.g., famines) (McNaughton-cassill 2001). Finally, passive social media consumption seems to be more common on Twitter, compared to other sites (Huberman et al. 2008). Passive social

media use has further been argued to have more negative effects on mental health compared to more active usage (Verduyn et al. 2017). This is explained to be due to passive exposure to other expressions and interactions resulting in feelings of inferiority or loneliness (Lin et al. 2016). The association between Twitter use and later anxiety may also be explained by third variables not included in the current study.

## Limitations and Strengths

The current study has some limitations. The measurements are exclusively based on self-report and could hence be affected by certain response biases (e.g., social desirability bias) (Gnambs and Kaspar 2015; Raphael 1987). However, responses to Web-based surveys (like the current one) have been shown to be less affected by social desirability (Gnambs and Kaspar 2015). Further, some measurements were based on single items, which render the validity of the items unknown. Single-item measurements are more prone to be influenced by measurement errors than composite scores (Nunnally 1978), although some scholars have argued that this concern is exaggerated (Gardner et al. 1998). In addition, some relevant aspects of social media use were not included in the survey (e.g., time spent on social media and time spent on the different social media sites). Further, the item regarding frequency of logins to social media should include response alternatives, thereby increasing variability, for more frequent logins than “more than 3 times a day” as this option was chosen by the majority of the participants. It should also be noted that the rather long time lapse of 1 year, between the first and the second survey, may be too long to detect effects of social media use on depression and anxiety, as both symptoms of depression and anxiety are often considered as a product of more immediate processes.

The degree to which the study's results apply to Norwegian and other student populations is not known. The response rate in the first wave was somewhat low (39.4%), yet acceptable/good when compared to similar studies (Nedregård and Olsen 2014; Sheehan 2001). Further, the sample's characteristics (e.g., in terms of alcohol use, sex, age, and relationship status) are similar to the characteristics found among other samples of Norwegian students in higher education (Nedregård and Olsen 2014; Statistisk sentralbyrå 2017). Hence, the results are likely to be generalizable to the Norwegian student population as a whole. Whether the results are generalizable to student populations in other countries is harder to determine. Previous studies have suggested that different student populations vary in terms of their social media use (e.g., frequency of disclosure of alcohol) (Beullens and Schepers 2013; Karl et al. 2010). Further, the current student sample is likely to be somewhat older, and more homogenous in terms of race and ethnicity, than the student populations in some other countries. Student populations worldwide have, however, been suggested to be quite homogeneous and the similarities between different student populations may be increasing due to increased internationalization (Gargano 2009). These homogenization effects suggest that the current results might be relevant for student populations in other countries as well.

The current study also has some notable strengths. The most important ones are the large sample size and the longitudinal design, which has been lacking in previous research on social media use and mental health. The fact that use of multiple different social media sites was assessed should also be regarded as a strength of the current study.

## Conclusion

In conclusion, the current study found little support for the existence of a relationship between social media use and mental health. Certain aspects of social media use (e.g., frequent logins and using Facebook, Snapchat, and Instagram) may be weakly associated with psychological distress, but in general, social media does not appear to be a considerable cause of psychological distress. Having a higher number of online friends seems to be associated with a very small decrease in depression over time, while participation on Twitter may involve a slight increase anxiety over time. Future research should investigate the relationships between social media use and mental health further, preferably by employing longitudinal designs and should also aim for elucidating if and the mechanisms through which online friends and Twitter use may influence mental health.

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## Compliance with Ethical Standards

**Conflict of Interest** Eilin K. Erevik, Ståle Pallesen, Øystein Vedaa, Cecilie S. Andreassen, Amandeep Dhir, and Torbjørn Torsheim declare that they have no conflict of interest.

**Informed Consent** All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all participants for being included in the study.

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