Depression as a Predictor of Facebook Surveillance and Envy: Longitudinal Evidence from a

Cross-Lagged Panel Study in Germany

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Abstract

Prior research has shown an association between Facebook users' likelihood of engaging in social surveillance (i.e., browsing through friends' postings without directly interacting with them), their experience of envy, and their depressive symptoms. Yet the directionality and duration of this effect are unclear. Drawing on the stress generation hypothesis, we postulate that depression increases Facebook surveillance and envy, which may increase depression over time. Using a cross-lagged longitudinal design with two waves spaced one year apart, we find that, as expected, depression was associated with more Facebook surveillance and more envy, both initially and one year later. However, neither Facebook surveillance nor envy at time 1 increased depression at time 2. Instead, depression predicted envy, and envy predicted Facebook surveillance over time. The results show the utility of the stress generation hypothesis in a social media context, and have implications for Facebook users' psychological well-being.

Keywords: Depression; Facebook surveillance; Facebook envy; psychological well-being; longitudinal cross-lagged panel analysis

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How do social network sites (SNSs) affect users' mental health? Recent research

shows that the answer to this question depends to a large extent on *how* social media are used

(Burke & Kraut, 2016; Seabrook, Kern, & Rickard, 2016). Passive uses, especially social

surveillance (i.e., browsing through friends and followers' postings without directly

interacting with them) have been shown to contribute to negative outcomes, such as depressed

mood, loneliness, and envy, whereas active engagement with other users (i.e., through likes,

comments, or direct messages) have been shown to increase well-being (Frison & Eggermont,

2015; Valenzuela, Park, & Kee, 2009).

The present article focuses on the mental health implications of passive uses of social

media, which are much more prevalent than active uses – by 50% more, according to one

account (Verduyn et al., 2015), and constitute the locus of much popular concern (e.g.,

Twenge, Joiner, Rogers, & Martin, 2017). In particular, we aim to deepen understanding of

the relationship between social surveillance on Facebook (the most popular social network

site worldwide), envy, and depression. A couple of studies have tackled the interplay between

these variables. In a cross-sectional survey, Tandoc, Ferrucci, and Duffy (2015) found that

Facebook surveillance increased users' depression by generating envy at other users'

accomplishments. While unable to establish causality, these authors theorized depression to

be the outcome of Facebook surveillance. However, it is also possible that depression is a

predictor of Facebook surveillance and envy, with individuals scoring higher on depression

more likely to experience envy after engaging in Facebook surveillance. Support for this

contention emerged in an experiment (Appel, Crusius, & Gerlach, 2015), where depressed

participants who were shown attractive Facebook profiles were more likely to experience

envy than non-depressed participants. However, this study did not investigate whether

Facebook envy intensifies participants' initial depression, a process which likely requires

time. To address these research gaps, we conduct a cross-lagged longitudinal study, where we test both (1) whether individuals with more depressive tendencies are more likely to engage in Facebook surveillance, and in turn, to experience envy; and (2) whether initial levels of Facebook envy intensify users' depression scores one year later. In other words, we consider depression both as a predictor and outcome of Facebook surveillance. We tackle these questions through the lens of the stress generation hypothesis (SGH), a theoretical perspective developed in the field of clinical psychology, which we argue has high utility in explaining the long-term reciprocal effects of Facebook surveillance and depression.

The Stress Generation Hypothesis (SGH) of Depression

The SGH was developed in response to the observation that depressed individuals tended to experience a great deal of interpersonal stress, defined as cognitive and emotional strain arising in the context of social relationships or meaningful social encounters. This stress did not cause the depression; rather, it was experienced *after* the depression had set in (Liu & Alloy, 2010). To explain this phenomenon, Hammen (2006) proposed that depressed individuals, by virtue of having inferior coping skills and dysfunctional emotional regulation, are more prone to engaging in maladaptive social behaviors, such as withdrawal or clinginess. These behaviors cause stress in depressed individuals' social lives, which in turn may worsen their initial depression. In short, depression generates interpersonal stress, potentially keeping individuals trapped in the depression cycle.

While not formalized into a fully-fledged theory, this hypothesis received substantial empirical support. Individuals scoring higher on depression were shown to be more likely to engage in stress-producing social behaviors, such as excessive reassurance-seeking (Potthoff, Holahan, & Joiner, 1995), social withdrawal (Caldwell, Rudolph, Troop-Gordon, & Kim, 2004), and insufficient assertiveness in their relationships (Shih & Eberhart, 2008). The evidence is mixed on the extent to which interpersonal stress maintains or aggravates depression over time (Liu & Alloy, 2010).

Depression as a Driver of Stressful Experiences on Facebook

As previously discussed, there are both adaptive and maladaptive uses of Facebook when it comes to users' well-being. There is robust evidence that social surveillance is a maladaptive behavior, because it produces envy at others' accomplishments (Krasnova, Wenninger, Widjaja, & Buxmann, 2013; Verduyn et al., 2015). The Facebook environment is apt to generate envy because users tend to post glamorized glimpses into their lives, rather than the full complexity of their positive and negative experiences, personal strengths and flaws (Toma & Carlson, 2015). The process of highlighting flattering aspects of life (e.g., trips, career accomplishments) while obscuring unflattering ones (e.g., failures, rejections) is rendered possible by technological affordances intrinsic to the Facebook platform, such as editability and unlimited composition time, as well as the presence of a large audience, which motivates users to put their best foot forward (for an overview see Toma, 2017). Thus, by engaging in Facebook surveillance, users expose themselves to a barrage of unrealistically positive representations of friends' lives, which in turn generates envy. Therefore, Facebook surveillance can be conceptualized as a maladaptive, stressful behavior in users' social lives.

The SGH predicts that, while non-depressed individuals might curb their Facebook surveillance in order to protect themselves from the stressful experience of envy, those with depressive tendencies lack the coping mechanisms to do so. One recent article even finds that depressed adolescents consistently engaged in unflattering social comparisons on online platforms over the course of three years, suggesting that they did not learn to reduce psychologically stressful behaviors over time (Nesi, Miller, & Prinstein, 2017). Therefore, we expect the relationship between depression, Facebook surveillance, and envy to be somewhat time-stable. That is, depression should be positively correlated with Facebook surveillance, and in turn, with envy both initially and a year later. However, the SGH is unclear on the longevity of effects: Will Facebook envy experienced initially increase

depression a year later? Given the paucity of longitudinal studies in this area, we pose this as a research question.

Method

Participants and Procedure

A two-wave online panel survey (t_1: August 2013; t_2: August 2014) was administered in Germany. The panel included voluntarily registered individuals starting from age 14 and yielded a heterogeneous non-probability sample of 1,530 participants in the first wave, of whom 841 completed the second wave.[1] The final sample included $N = 841$ participants, of whom only Facebook users who indicated to have used Facebook within the past 4 weeks "less than once a week" (7.8%), "not more than once a week" (9.0%), "more than once a week" (19.3%), or "(almost) daily" (61.9%) were retained in this study ($n = 514$; 62.8% women; age range: 14-79 years, $M = 34.74$, $SD = 13.88$). Participants received no monetary compensation. The data reported in this paper was part of a large survey on the links between depression, media use (broadly defined), and suicide (Scherr, 2016; Scherr & Reinemann, 2016).

Measures

Facebook surveillance. During both waves, participants indicated the frequency with which they monitor others on Facebook on a scale from 1 (never) to 7 (very frequently) (i.e., "How often do you look through others' profiles/others' conversations"). The two item scale (see Eisinga, te Grotenhuis, & Pelzer, 2013 for a discussion of reliability scores of two item scales) demonstrated sufficient reliability (t_1: α = .68, Spearman-Brown r = .68; t_2: α = .65, Spearman-Brown r = .65) to be averaged into an index (t_1: $n = 514$; $M = 3.26$, $SD = 1.53$; t_2: $n = 477$; $M = 3.32$, $SD = 1.51$).

Facebook envy. Participants indicated on a scale from 1 (never) to 7 (very frequently) how often they catch themselves envying "how happy other people are/what skills or abilities they have/how much they have seen of the world/ how successful they are"

when browsing Facebook (Krasnova et al., 2013). The four items showed high reliability (t_1: α = .85; t_2: α = .86), and were averaged into an index (t_1: $n = 514$; $M = 2.46$, $SD = 1.45$; t_2: $n = 477$; $M = 2.61$, $SD = 1.50$).

Depression was measured using a validated German short form of the Beck Depression Inventory (Schmitt, Hübner, & Maes, 2010). Items were measured on a scale from 1 (never) to 7 (very frequently) and included how often participants "felt discouraged about the future", "had troubles falling asleep," or "felt guilty" during the past month. At t_2, the question referred to the last couple of months. The 17 items achieved high reliability and were averaged into an index (t_1: α = .92; $M = 2.64$, $SD = 1.10$; t_2: α = .91; $M = 2.71$, $SD = 1.11$). Dropout analyses indicated no significant differences in depressive symptoms between the participants in the final sample and those who dropped out between t_1 and t_2.

Results

A cross-lagged panel analysis procedure, with unweighted data and a full information maximum likelihood estimator, was conducted using Mplus. Depression, Facebook surveillance, and Facebook envy measured at t_1 were allowed to simultaneously predict these same constructs at t_2. The three exogenous variables at t_1 and the error terms of the endogenous variables at t_2 were specified to correlate. In cross-lagged models each person is his or her own control, and results can be interpreted as pertaining to the relationship between within-person changes (Newsom, 2015), so we did not include other covariates. The saturated two-wave cross-lagged model was just identified and therefore model fit indices are not informative and little relevant (Newsom, 2015, p. 125) (see Figure 1).

R^2 ranged from 39 percent for Facebook surveillance to 56 percent for depression. Means, standard deviations, and zero-order correlations between all variables are reported in Table 1. First, depression, Facebook surveillance and Facebook envy were moderately correlated at both measurement points as predicted by the SGH. Neither Facebook surveillance ($\beta = .04$, $p = .170$, 95%-CI [–.019, .105]) nor envy ($\beta = .05$, $p = .163$, 95%-CI [–

.020, .116]) had an effect on depression one year later. However, we observed a significant cross-lagged effects of depression on Facebook envy ($\beta = .12$, $p < .001$, 95%-CI [.057, .192]), and of Facebook envy on Facebook surveillance ($\beta = .09$, $p = .036$, 95%-CI [.005, .167]). Second, considerable autocorrelations were found for all constructs over the course of one year (depression: $\beta = .72$, $p < .001$, 95%-CI [.668, .766]; Facebook surveillance: $\beta = .59$, $p < .001$, 95%-CI [.528, .653]; Facebook envy: $\beta = .661$, $p < .001$, 95%-CI [.602, .720]).[2]

Discussion

The present study shows that the higher individuals scored on depression, the more likely they were to engage in Facebook surveillance (i.e., passively browsing through friends' postings) and to experience envy. This pattern was robust, emerging both at initial assessment and one year later. However, cross-lagged findings show that participants' initial Facebook surveillance and the ensuing envy did *not* increase their depression scores one year later. This suggests that envy is an unpleasant upshot of Facebook surveillance for individuals with depressive tendencies in the short run, but that it is psychologically benign in the long run. We also found that depression sensitized people to experiences of envy on Facebook one year later, with depression at t_1 positively predicting envy at t_2. It is possible that depressive symptoms intensify reactions to social stimuli on Facebook, rather than dulling them (see also Steger & Kashdan, 2009). Initial Facebook envy also led to increased Facebook surveillance a year later. This finding somewhat echoes recent findings that envy increases "switch intentions," meaning that it motivates users to reduce their intensity of using a technology without completely giving up on it (Lim & Yang, 2015). In our case, users might browse Facebook more passively after envious experiences.

Our findings make the following contributions to the literature: Research has identified a positive link between Facebook surveillance and depression (Krasnova et al., 2013; Tandoc et al., 2015). But, due to the cross-sectional and correlational nature of these studies, it remained unclear what the direction of causality between these variables was, and

whether Facebook surveillance had any enduring effects on depression in the long-term. Consistent with the SGH, our results show that depression, not Facebook surveillance, increased envy one year later, whereas Facebook surveillance and envy did not increase depression over time. Thus, depression can be conceptualized as a predictor, rather than as an outcome of Facebook surveillance in future studies.

Conceptually, we show the utility of the SGH for understanding the interplay between Facebook surveillance and depression. While previous work in this area has been effects-driven, building on existing empirical evidence to derive hypotheses (e.g., Appel et al., 2015; Krasnova et al., 2013), we provide a theoretical lens for conceptualizing the relationship between depression and Facebook use. We also advance the SGH itself, which has been tested substantively in face-to-face contexts, but never before in a social media context. We show that Facebook surveillance is indeed a stressor for individuals with depressive tendencies, but that it is a fairly benign one, in that it does not aggravate depression over time. This is in contrast to marital discord or interpersonal conflict—more powerful stressors that have been shown to worsen depression over time (see Davila, Bradbury, Cohan, & Tochluk, 1997).

Finally, our findings speak to the growing literature that suggests social media should not be treated as a monolithic entity with homogeneous effects on mental health (Burke & Kraut, 2016; Scherr, 2013; Scherr & Brunet, 2017). Rather, specific types of social media use should be considered separately (e.g., active engagement vs. social surveillance). We provide a further refinement to this line of thinking by showing that the *temporal* dimension of these effects also matters: While Facebook surveillance emerged as a psychologically harmful activity by increasing envy in the short-term, this negative affective experience did not materialize in increased depression in the long-term. Thus, a picture emerges where the well-being correlates of social media use are complex: They vary by activity and also temporally.

Limitations and Future Research

For this short report we only collected data that directly pertained to the SGH. Since this hypothesis addresses maladaptive interpersonal behaviors, we focused on Facebook users' tendency to engage in passive surveillance—known to be especially problematic. We recommend that future research considers both active and passive uses of social media, to obtain a fuller picture of how individuals scoring higher on depression use and are influenced by social media (see Shensa et al., 2018). For instance, depression predicted more active use of Facebook precisely because depressed individuals sought to compensate for social deficits through online browsing (see Scherr & Brunet, 2017). Different time lags should also be explored in the future to ascertain whether Facebook surveillance may increase depressive tendencies within a shorter time span, say a few days or weeks, with effects dissipating later. Finally, both envy and depression scores in our study were low, but comparable to other studies (e.g., Appel et al., 2015; Rose, March, Ebener, & du Prel, 2015). These low scores prevented us from modeling a curvilinear relationship between depression and envy, such that more severely depressed participants experience substantially more envy. Future studies with clinically depressed populations are needed to test this possibility.

Conclusion

This study investigated the differential relationship between depression, envy and passive Facebook use and reveals that individuals scoring higher on depression felt more envious a year later, and envy on Facebook increased the noxious activity of passive Facebook use over time. On the sunny side, these experiences of envy did not make Facebook users more depressed after one year.

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Footnotes

[1] The first wave response rate RR1 = .47 and the response rate in the second wave was RR1 = .59 (American Association for Public Opinion Research, 2011). Participants were recruited from a German online panel, in which they have registered voluntarily and without obtaining monetary compensation.

[2] As can be seen in Table 2, the cross-lagged effects of depression on Facebook envy and of envy on Facebook surveillance emerged for participants who indicated to have used Facebook no more than once a week. For those who used Facebook more than once a week only the cross-lagged effect of depression on envy was significant and so was it in those who use Facebook daily. As indicated by the 95% confidence intervals, the effect of envy on Facebook surveillance was only observable among weekly users; the effect of depression on envy was observable for at least weekly Facebook users and did not vary with Facebook use frequency. Hence, the depression – envy link seemed more robust than the envy – surveillance link.

Tables

Table 1

Zero-Order Correlations between Depression, Facebook Surveillance, and Facebook Envy at

both Survey Waves

	M	*SD*	1	2	3	4	5	6
1. Depression (t_1)	2.6	1.1	-					
2. Depression (t_2)	2.7	1.1	.74***	-				
3. Facebook Surveillance (t_1)	3.3	1.5	.11*	.15**	-			
4. Facebook Surveillance (t_2)	3.3	1.5	.08	.16**	.61***	-		
5. SNS envy (t_1)	2.5	1.4	.43***	.37***	.35***	.27***	-	
6. SNS envy (t_2)	2.6	1.5	.42***	.44***	.25***	.30***	.72***	-

Note. Means, standard deviations, and correlations for Facebook users ($n = 477\text{-}514$) are

depicted below the diagonal. Higher figures are indicative of more depressive symptoms or of

higher consent in terms of the depicted construct.

*p < .05 **p < .01 ***p < .001

Table 2

Slope analysis of the cross-lagged effect of depressive symptoms on Facebook envy and envy on Facebook surveillance as depicted in Figure 1

based on multi-group models for different of Facebook use frequencies including 95% Confidence Intervals of effects

	Facebook used less than once a week			Facebook used once a week			Facebook used more than once a week			Facebook used daily		
	β	p	95% CI	β	p	95% CI	β	p	95% CI	β	p	95% CI
Depression → Facebook envy	.09	.543	[−.205, +.390]	.27	.009	[+.066, +.471]	.19	.009	[+.047, +.340]	.11	.009	[+.029, +.200]
Facebook envy → Facebook surveillance	.18	.196	[−.094, +.457]	−.43	.003	[−.709, −.146]	.14	.054	[−.002, +.281]	.06	.212	[−.035, +.156]

Note. Per reviewer request, we conducted a simple slope analysis of the observed longitudinal effects using a multi-group cross-lagged analysis with a Facebook frequency measure as the group variable. The resulting model showed an excellent fit to the data ($N = 514$; $\chi^2 = 10.422$, $df = 16$, $p = .844$; χ^2-contributions: "less than once a week" Facebook use group ($n = 64$) = 5.09; "not more than once a week" ($n = 38$) = 3.16; "more than once a week" ($n = 117$) = 1.13; "(almost) daily" ($n = 295$) = 1.04; RMSEA = .01; PCLOSE = .956; SRMR = .027; CFI = 1.00; TLI = 1.00).
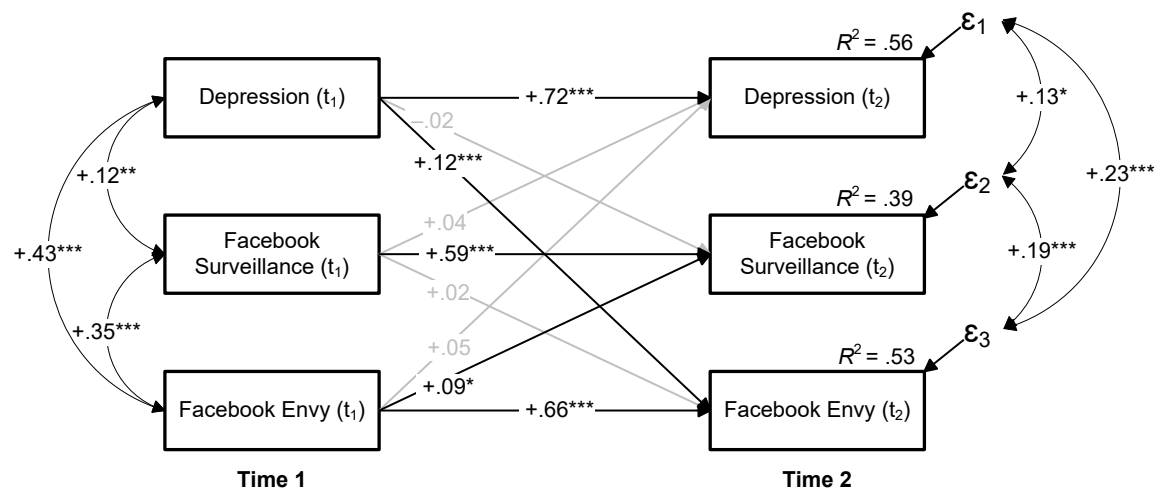
Figures

Figure 1. Cross-lagged path model of observed long-term effects of depressive symptoms,

Facebook surveillance, and Facebook envy over the course of one year.

Coefficients are standardized and a full information maximum likelihood estimator was used.

* *p* < .05. ***p* < .01. ***p* < .001