

How do online social networks influence people's emotional lives?

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Abstract

In 2004, Mark Zuckerberg and his roommates launched a virtual directory of college student profiles. Fifteen years later, what began as a modest attempt to help students connect with one another became the largest online social network in the world, a technological innovation that changed the way human beings interact. In this chapter, we discuss what we have learned about how this technology influences people's emotional lives. We begin by providing a brief overview of research on online social network usage and emotional well-being, highlighting some of the conceptual and methodological challenges that prevented early work from drawing strong inferences about the links between these variables. We then describe a program of research designed to address these concerns by focusing on the mechanisms underlying how two different types of online social network usage—"active" and "passive"—influence how people feel in the lab and in daily life. We conclude by discussing how researchers can draw inferences about emotion from social media "big data" and whether online social networks can be strategically harnessed to promote well-being.

Keywords: online social networks, social media, well-being, emotion, big data, Facebook

The advent of online social networking sites like Facebook have rapidly altered the way human beings interact. With a gentle tap of one's finger, people can share their inner thoughts and feelings to untold numbers of people. A gentle swipe down on one's smartphone reveals a compilation of updates on other people's lives from an endlessly populated newsfeed.

These features of social media aren't restricted to an exclusive set of technophiles; they have been widely embraced by humanity. Indeed, at the time of our writing this chapter close to 2.8 billion people use social media, a number that is predicted to keep rising (Statista, 2019). Moreover, the average user spends approximately 50 minutes per day on Facebook, Instagram, and Facebook Messenger (Facebook, 2016).

But what consequence—if any—does engaging with these online social networks have for how people feel? When we and our colleagues became curious about this issue in the late 2000s, we did what most researchers do when become interested in a new topic: we performed a literature review. That's when we came across what we now call *The Puzzle*.

On the one hand, several studies revealed negative cross-sectional associations between self-reported Facebook usage and emotional well-being (Farahani, Kazemi, Aghamohamadi, Bakhtiarvand, & Ansari, 2011; Labrague, 2014; Pantic et al., 2012). But other studies revealed the opposite (Datu, Valdez, & Datu, 2012; Ellison, Steinfield, & Lampe, 2007; Nabi, Prestin, & So, 2013; Valenzuela, Park, & Kee, 2009). Still other work suggested that the relationships between Facebook usage and well-being was more nuanced; it depended on additional factors like individual differences in loneliness (Kim et al., 2009) or the number of Facebook friends people possessed (Manago et al., 2012). At the end of the literature review, we were left with more questions than answers.

In this chapter, we will review the work that we and others have performed to systematically address this puzzle over the past decade. We begin by providing a brief overview of research on online social network usage and well-being, highlighting the conceptual and methodological challenges that prevented early work from drawing strong inferences about the links between these variables. We will then describe a program of research designed to address these concerns by focusing on the mechanisms underlying how two different types of online social network usage—active versus passive usage—shape the emotional outcomes people experience inside and outside of the laboratory. In addressing these issues, we will focus our discussion predominantly on Facebook, the worlds’ largest online social network, because it has been the focus of the majority of empirical attention. We conclude by discussing (a) how researchers can draw inferences about emotion from “big data” and (b) whether online social networks can be strategically harnessed to promote well-being.

Facebook Use & well-being: Early research

Does using Facebook influence people’s well-being? Our review of early research that bared on this question revealed two issues that made it difficult to answer. First, nearly all of the studies that had been performed on this issue involved asking participants to self-report how much they used Facebook and how they felt in general. While there is clear value to using trait self-report measures to address certain kinds of questions concerns about using them to measure people’s moment-to-moment behaviors and emotions are well established (for discussion see Kahneman & Deaton, 2010; Kahneman et al., 2004). Second, the majority of the studies on this

topic had utilized cross-sectional, correlational designs that made it impossible to draw inferences about the causal or likely causal relationship between Facebook use and well-being.

As a first step towards overcoming these limitations, we used experience sampling, a methodology that is widely considered the “gold standard” for assessing in vivo behavior and psychological experiences over time and drawing inferences about the *likely* causal sequence of events between variables (Bolger, Davis, & Rafaeli, 2003; Larson & Csikszentmihalyi, 2014). Specifically, over the course of several months, we text messaged 82 participants five times per day between 10am and midnight for 14 consecutive days resulting in a data set consisting of 4,589 observations. Each time we texted participants, we asked them to rate how positive and negative they felt. We also asked them to rate how much they had used Facebook since the last time we texted them. We then examined whether the amount of time participants spent using Facebook systematically predicted changes in how they felt from the start of that period to its end.

Our results indicated that the more participants reported using Facebook during one chunk of time, for example, between 9am and 11am, the more their positive mood declined over the course of that time period. We also found that the reverse pattern of results was not true—i.e., feeling bad at one moment in time did not predict increases in subsequent usage. It was likewise not moderated by any of the individual differences we assessed—e.g., number of Facebook friends, motivation for using Facebook, perceptions of their Facebook network, gender, self-esteem, loneliness, or depressive symptoms.

Importantly, each time we texted messaged participants we also asked them to rate how much they had interacted with other people directly – i.e., face to face or via phone – since the last time we text messaged them to rule out the possibility that any results we observed might be

attributed to general social interaction. In fact, our analyses indicated that interacting with other people directly predicted the exact opposite set of results—the more people reported interacting with other people directly during one time period, the more their positive mood rose from the beginning of that time period to its end (Kross et al., 2013).

The paper reporting these results triggered a number of commentaries (e.g., Konnikova, 2013; Bohannon, 2013). In the exchanges that followed, a key question arose: How does Facebook use undermine subjective well-being? To address this question, we turned our attention to the different ways that people interact with Facebook might differentially influence the way it influences the way they feel.

Prior research at the time had distinguished between two broad categories of Facebook usage: passive and active usage (Burke et al., 2010; Deters & Mehl, 2013; Krasnova, Wenninger, Widjaja, & Buxmann, 2013). Passive usage refers to voyeuristically consuming information on a social media site—e.g. scrolling through one’s news feed to peer in on the lives of others without generating information. Active usage, on the other hand, involves producing information on the site and engaging in direct exchanges with others—e.g. chatting, uploading posts and pictures. Going into the next phase of the work, we predicted that passively using Facebook in particular might account for its harmful emotional outcomes.

We based this prediction on the idea that social media allows people to curate the way they present themselves to others to a degree that is not possible in daily life. We human beings, of course, always curate how we present ourselves to others to varying degrees (Goffman, 1959, 1961, 1964). Indeed, across multiple seminal works in sociology, Goffman (1959, 1961, 1964) argued that human beings are driven to present themselves in flattering terms. For example, most people think strategically about what clothing they should wear based on who they are going to

interact with later on that day. An important meeting may warrant dress attire whereas a casual get together with one's friends calls for more relaxed garb. But on social media, the ability to manage the way we present ourselves to others takes on a new form. It allows us to curate the way we appear to others to a degree that is not possible in daily life. We can add filters to our photos, carefully edit our posts, or even send them to friends for review before sharing. Indeed, one study found that a key reason people use Facebook is to serve self-presentational needs (Nadkarni & Hofmann, 2012).

But what might the emotional consequences of scrolling through a world populated by the most glamorized portraits of other people's lives be? Classic research on social comparisons (Festinger, 1954; Goethals, 1986; Wood, 1996) provides a clear answer to this question: when we are exposed to the unobtainable glorified lives of other people, we should engage in upward social comparisons that promote envy and lead us to feel worse (Salovey & Rodin, 1984).

We tested these assumptions over the course of two studies (Verduyn et al., 2015). In the first study, we brought participants into the laboratory and randomly assigned them to use Facebook actively or passively for ten minutes. We then assessed how people felt both immediately after the manipulation and at the end of the day (via an email survey).

Immediately after the active versus passive Facebook use manipulations participants in the two groups did not differ on how they felt. But by the end of the day, participants in the passive Facebook usage group displayed a significant positive emotion decline compared to both their baseline levels of emotion and the levels of end of the day affect that characterized the active Facebook users. The active Facebook usage condition, in contrast, did not display any changes in how they felt over the course of the three assessments.

But were the emotional well-being declines experienced by the passive Facebook users driven by envy? And would these findings replicate in a more ecologically valid context? We shifted back to experience sampling to address these questions. Specifically, we repeated the experience sampling protocol that we had used in our initial study (Kross et al., 2013), but this time asked people to rate how much they had used Facebook actively and passively since the last time we text messaged them. We also asked them to rate how envious they felt of others each time we texted them.

Our findings indicated that most of the time that people were using Facebook, they were using it passively. In fact, participants used Facebook passively 50% more than they did actively. In retrospect, this finding explained why we observed emotional well-being declines linked with overall Facebook usage in our first study (Kross et al. 2013)—i.e., most of the time people were on Facebook, they were likely using it the harmful way. Critically, longitudinal mediation analyses indicated that passive Facebook usage predicted emotional well-being declines, and it did so by promoting feelings of envy. Conceptually replicating the laboratory results, active Facebook usage once again had no impact on people's emotions.

Together, the results from these initial studies began to paint a portrait that described how using Facebook influenced people's emotional lives; an image suggesting that the majority of the times people use Facebook, they do so passively which in turn leads people to feel envious and predicts declines in their positive mood over time.

Does counting emotion words provide a window into emotion?

An early challenge to these findings came in 2014 when a group of researchers published a controversial experiment in which they manipulated the percentage of positive and negative emotional words contained in 689,003 Facebook user's News Feeds for one week (Kramer, Guillory, & Hancock, 2014).¹ The researchers leading the study were interested in examining emotional contagion on social media—i.e., the idea that emotions could spread across social networks just like diseases are transmitted between people who come in physical contact with each other. They predicted that consuming different amounts of positive (or negative) information on social media should lead people to experience more positive or negative emotions in their own lives. They furthermore suggested that they could index people's emotional states by counting the number of emotion words contained in their Facebook posts.

Kramer and colleagues tested their prediction by manipulating the amount of positive and negative words contained in participants Facebook News Feeds for one week. As predicted, they observed a statistically significant effect of their manipulation. Participants who were exposed to News Feeds that contained more (or less) positive (or negative) words ended up using more (or less) positive (or negative) words in their own News Feed. They interpreted these findings in support of their predictions noting, “these results indicate that emotions expressed by others on Facebook influence our own emotions, constituting experimental evidence for massive-scale contagion via social networks.”

At first blush, these findings directly contradicted the findings that had accumulated up to that point (Kross et al., 2013; Turkle, 2011; Verduyn et al., 2015; Vogel, Rose, Okdie, Eckles, & Franz, 2015). The results of our studies suggested that consuming positive information in other

¹ The controversy was a function of the fact that Facebook users were unaware that they were participating in this experiment (Kosinski, Matz, Gosling, Popov, & Stillwell, 2015; Puschmann & Bozdag, 2014; Shaw, 2016)

people's news feeds should instigate a social comparison process that leaves people feeling worse, not an emotional contagion process that enhances how good people feel.

However, there was an important difference characterizing these two lines of work. In prior studies on Facebook and well-being, emotional well-being was indexed by asking participants how they felt directly. Concerns about self-report measures notwithstanding, asking people how they feel remains the standard tool for indexing subjective experiences (Kahneman et al., 2004; Kahneman & Riis, 2005). In the aforementioned study, however, the authors assumed that counting the number of emotion words contained in participants' online social network posts would provide an equally valid tool for drawing inferences about people's emotional experience. But was this a reasonable assumption? Shortly following the publication of the Kramer study, we noted that there were three reasons to question it.

First, word counting methods fail to take context into account. Consider, for example, the following two statements: "I am feeling so great" and "I am not feeling great." A word counting algorithm that counts the percentage of positive words contained in each of these statements would produce the same result—20% (1 out of five words in each statement contains a positive emotion word)—even though the two statements convey opposite meaning.

Second, it is well documented that people tend to self-present on social media in ways that may not be accurate or authentic (Nadkarni & Hofmann, 2012; Walther, Van Der Heide, Ramirez, Burgoon, & Peña, 2015). For example, in response to learning that a colleague received a job promotion, a person might write, "That's great news," but not really feel happy for their colleague. They might also simply try to mimic the person they are interacting with to enhance rapport, a common technique in face-to-face interactions (Chartrand & Bargh, 1999; Chartrand & Jefferis, 2003). Thus, we suggested that it was also possible that a person might say something

online that on the surface conveyed positive (or negative) emotion but didn't track with how they actually felt.

Finally, compounding these conceptual concerns was the fact that no validation evidence existed to support the idea that counting emotion words on online social networks does in fact track how people feel. Some studies had looked at the correlation between online social network emotional word usage and judges' ratings of the emotionality of participants posts. But if participants posts don't honestly convey how people feel, then there's no reason to expect judges to be able to accurately categorize participants posts (for additional validation concerns see Kross et al., 2018).

So, do people's usage of emotion words in their posts actually reflect how they feel? To address this question, we collapsed four experience sampling data sets that contained two types of information: (a) participants' self-reports of how they felt throughout the day, and (b) their Facebook wall posts corresponding to the same time period that they rated their emotions (Kross et al., 2018). For each participant we computed the percentage of positive and negative words contained in their posts and then examined whether they correlated with how participants reported feeling around the same time that they made each post. Regardless of how we analyzed the data, our results did not reveal any significant associations between participants usage of emotion words in their Facebook posts and their self-reports of how they felt—a set of findings that cast doubt on researchers' ability to draw inferences about people's emotional states by counting the number of emotion words contained in their online social network posts (for conceptual replication, see Sun et al., in press).

The broader landscape

Between 2004 and 2012, 412 studies were published on Facebook. Yet, not a single one of those papers examined the relationship between Facebook usage and changes in people's well-being over time. Since that time, the literature on this topic has grown substantially. In 2017 we reviewed this literature, focusing specifically on longitudinal and experimental studies that had examined the relationship between Facebook usage and well-being up to that point (Verduyn, Ybarra, Résibois, Jonides, & Kross, 2017). We concluded that passive Facebook usage robustly predicts emotional well-being declines whereas the relationship between active Facebook usage and well-being was more tenuous. While some relationships revealed positive links between active Facebook usage and well-being improvements, many studies did not.

Since our 2017 review, several additional large-scale studies have been performed which broadly align with these conclusions. For example, Tromholt (2016) randomly assigned over a thousand Danish participants to either use Facebook as usual or stop using it altogether. Results indicated that Facebook abstention led to an increase in both cognitive and affective well-being (also see Mosquera et al., 2018 and Allcott et al., 2019).

In 2018, researchers at the University of Pennsylvania adopted a slightly different approach to experimentally examine the effects of online social network usage on emotionality (Hunt et al., 2018). Rather than use a deprivation paradigm that cut off participants' Facebook usage entirely, they randomly assigned 143 participants to either keep using social media as usual or to limit social media use to 10 minutes per day for three weeks. Their results indicated that the limited social media use group showed significant reductions in loneliness and depression over the course of the study period. However, there were no significant effects on social support, self-esteem, or psychological well-being—a pattern of differential results that

points to the need for future research to examine how the nature and length of Facebook interventions may systematically impact different variables (Hunt et al., 2018).

Finally, in one particularly persuasive study, Shakya and Christakis (2017) used Facebook log data in conjunction with three waves of nationally representative data to examine the longitudinal relationship between Facebook usage and changes in well-being over time in a sample of 5,208 participants. Their prospective findings indicated that Facebook use predicted decreases in well-being over time (Shakya & Christakis, 2017). Interestingly, the authors found that the more often participants engaged in active usage behaviors like updating one's status or liking another post, the more likely they were to have lower self-reported well-being—a finding that further speaks to the potentially nuanced nature of the relationship between active social media usage and well-being.

Frequently Asked Questions

Given the prevalence of social media, and the somewhat counterintuitive nature of the findings suggesting that a technology built to connect people frequently ends up undermining rather than elevating their positive mood, it is perhaps not surprising that people often have several questions about the aforementioned findings. Here we address two common issues that often arise.

FAQ #1: Why do people continue to use social media if doing so consistently leads them to feel worse? It is well established that people are motivated to approach pleasure and avoid pain (e.g., Freud, 1920; Higgins, 1997). Given this feature of the human condition, why do

people continue to engage in a behavior that undermines their positive mood? Although a definitive answer to this question has yet to emerge, here we suggest three possibilities.

First, human behavior is multiply determined; there are several goals activated at any moment. In the context of social media, for example, we may be motivated to engage in a behavior that improves the way we feel. But we may also be motivated by social goals that motivate us to stay abreast of how our social networks are functioning. In this vein, one study found that 88% of people report using social media to maintain social relationships (Whiting & Williams, 2013). Thus, it is possible that people use social media despite its negative emotional effects because doing so allows people to stay informed of what is happening in their social networks.

Second, it is well established that people engage in behaviors that they are addicted to even when they reap negative consequences—a phenomenon that neuroscience research has illuminated by highlighting the fact that different brain systems are involved in *wanting* and *liking* (Robinson & Berridge, 2001). These findings are noteworthy in the current context because a growing amount of evidence suggests that social media has addictive properties (Alter, 2017; Andreassen, 2015; Ryan, Chester, Reece, & Xenos, 2014).

Finally, some research suggests that people miscalculate how using Facebook will make them feel. For example, one study found, that participants predicted they would feel better after using Facebook for 20 minutes. In fact, they felt worse after doing so (Sagioglou & Greitemeyer, 2014).

Taken together, these different findings begin to explain why people may continue to engage in a behavior that leads to emotional well-being declines. However, future research is

needed to examine the role that each of these and other factors play in isolation and interactively in predicting types of social media usage.

FAQ#2: Are there ways of harnessing social media to improve well-being? There are many attempts underway to address this important question. One route that we have pursued to examine this issue involves focusing on people suffering from depression. A large literature stretching back to the 1980s indicates that people with depression are characterized by impoverished social support networks. (Fiore, Becker, & Coppel, 1983; Rook, 1984). One of the explanations that research has provided for why individuals with depression are characterized by low social support is because they talk frequently about their negative feelings (Blumberg & Hokanson, 1983; Kuiper & McCabe, 1985) in ways that end up pushing away those that care about them (Teichman & Teichman, 1990).

Park and colleagues (2016) were interested in whether these findings would generalize to social media. Given the psychological distance that social media provides people, they wondered whether the social networks of depressed individuals might be more responsive in the online versus offline world. They addressed this question across two studies (Park et al., 2016).

In Study 1, they focused on an unselected sample of participants with varying levels of depressive symptoms; in Study 2 they recruited psychiatrically diagnosed individuals with Major Depressive Disorder and their age-matched control participants. Across both studies, the experimenters had judges code how supportive the posts of participants' Facebook friend were in response to any negative experiences participants described on their Facebook accounts over the course of a month. They then compared the amount of support that depressed versus non-depressed participants received, controlling for the number of negative expressions that participants made during the month-long period.

As expected, participants with depression self-disclosed negative information more and positive information less to their Facebook networks. However, in direct contrast to prior research examining the links between offline social support and depression, participants with depression received *more* social support from their Facebook friends. These findings illustrate how social media may provide a platform for providing social support to individuals that may otherwise have difficulty acquiring it, highlighting the need for future research to extend these findings to other vulnerable populations.

Concluding Comment

The Internet does not, contrary to current popular opinion, have by itself the power or ability to control people, to turn them into addicted zombies, or make them dispositionally sad or lonely...the Internet is one of several social domains in which an individual can live his or her life, and attempt to fulfill his or her needs and goals, whatever they happen to be” (McKenna & Bargh, 2000).

At the turn of the millennium, McKenna and Bargh concluded that the overall sentiment toward the Internet was negative, if not “apocalyptic” (McKenna & Bargh, 2000). Over the course of the next few years, they documented the beneficial aspects of Internet use, highlighting how it can foster social relationships and provide people with meaningful routes to express themselves authentically (Bargh, McKenna, & Fitzsimons, 2002; Bargh & McKenna, 2004).

Their work was notably published before the birth of Facebook, 2005. Since that time, the tide of research has drawn away from focusing on Internet use to examining the links between social media and well-being instead. Yet, we see a similar pattern emerging. Some have voiced a concern that digital technology is destroying society (Twenge, 2017). Other have suggested that social networking addiction should be a clinically diagnosable disorder and

developed a Facebook Addiction Scale (Karaïskos et al., 2010; Andreassen et al., 2012; Ryan et al., 2014; also see Alter, 2017).

The goal of this chapter is not to paint a picture one way or the other about social media being good or bad. The social media world is multifaceted. Much like the offline terrestrial world, social media allows people to experience an infinite number of healthy and harmful emotional experiences. A critical challenge for future research is to illuminate the mechanisms that systematically predict these different kinds of emotional experiences. Doing so has the potential to enrich our understanding of how a ubiquitous technology can be harnessed to promote rather than undermine well-being.

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