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Social media and loneliness: Why an Instagram picture may be worth more than a thousand Twitter words

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ABSTRACT

Social media use continues to grow and is especially prevalent among young adults. It is surprising then that, in spite of this enhanced interconnectivity, young adults may be lonelier than other age groups, and that the current generation may be the loneliest ever. We propose that only image-based platforms (e.g., Instagram, Snapchat) have the potential to ameliorate loneliness due to the enhanced intimacy they offer. In contrast, text-based platforms (e.g., Twitter, Yik Yak) offer little intimacy and should have no effect on loneliness. This study (N = 253) uses a mixed-design survey to test this possibility. Quantitative results suggest that loneliness may decrease, while happiness and satisfaction with life may increase, as a function of image-based social media use. In contrast, text-based media use appears ineffectual. Qualitative results suggest that the observed effects may be due to the enhanced intimacy offered by image-based (versus text-based) social media use.

> "The more advanced the technology, on the whole, the more possible it is for a considerable number of human beings to imagine being somebody else." -sociologist David Riesman.

1. Introduction

As digital technologies continue to make communication channels and platforms more ubiquitous and effortless, human beings are more connected to each other than ever before. Social media (often referred to as social networking sites, or SNSs) can be broadly defined as the websites and applications that enable users to create and share content with networks (i.e., friends, followers, etc.) they construct for themselves. These forms of media have revolutionized how people interact with each other, and young adults are the most avid users. In a recent study, the Pew Research Center found that "fully 91% of smartphone owners ages 18–29 used social networking on their phone at least once over the course of the study period, compared with 55% of those 50 and older" (Smith, 2015, p. 35). Indeed, age is a strong determinant of the frequency and quality of an individual's social media usage, and it is unsurprising that younger people are more comfortable with online communication than adults (Thayer & Ray, 2006). In terms of platform popularity among young adults (18–29 years old) with Internet access, 87% use Facebook, 53% use Instagram, and 37% use Twitter (Duggan, Ellison, Lampe, Lenhart, & Madden, 2015).

Ostensibly, the heightened interpersonal connectivity afforded by social media should be associated with an overall increase in psychological well-being, yet the problem of loneliness persists in the same societies where social media usage is likely at its highest (e.g., the US, the UK, etc.). According to a nation-wide survey, commissioned by the Mental Health Foundation, 48% of British adults believe that people in the UK are getting lonelier as time progresses, 45% report feeling lonely at least some of the time, and 42% report having felt depressed due to being alone (Griffin, 2010). Importantly, nearly all indicators of loneliness reported in the survey are of the highest incidence among young adults aged 18–34 (as opposed to older adults). Similarly, in their book *The Lonely American*, Olds and Schwartz (2009) argue that loneliness in 21st century America is higher than in any previous generation, despite the fact that modern Americans "devote more technology to staying connected than any society in history" (p. 1).

The public health implications of this trend toward loneliness should not be understated. In 2015, *Time Magazine* ran an article,

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"Why Loneliness May Be the Next Big Public-Health Issue," arguing that loneliness is a potential pandemic "on par with obesity and substance abuse" (Worland, 2015; para 1). Researchers have established that loneliness is related to serious health risks in children (Asher & Paquette, 2003; Boivin, Hymel, & Bukowski, 1995), adolescents (Jones, Schinka, Dulmen, Bossarte, & Swahn, 2011; Mahon, Yarcheski, & Yarcheski, 1993), and adults (Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006; Patterson & Veenstra, 2010), and have suggested that it can increase risk of death by as much as 26% (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015). Clearly, understanding loneliness and its potential causes and cures is an important task for modern social science researchers. The present research contributes to this aim by showing that certain forms of social media (image-based media in particular) may be used to attenuate loneliness among the age group most affected by it (i.e., young adults).

Loneliness is often defined in terms of one's connectedness to others, or more specifically as "the unpleasant experience that occurs when a person's network of social relations is deficient in some important way" (Perlman & Peplau, 1981, p. 31). Scholars have yet to determine whether our newfound digital connectivity is of a kind that can stave off loneliness, and empirical research (as discussed more thoroughly in *Theoretical Background* below) has produced mixed findings regarding the link between loneliness and social media. Therefore, it is important from both a theoretical and practical perspective to understand how individuals today utilize their social relationships (e.g., via social media) in a way that makes them feel sufficiently connected and therefore less lonely. Such an understanding may shed light on when and why many people in modern industrialized nations are likely to feel particularly lonely in spite of the prevalence of social media.

Relatedly, maintaining social relationships has the potential to "subtly embrace us in the warmth of self-affirmation, the whispers of encouragement, and the meaningfulness of belonging" (Hughes, Waite, Hawkley, & Cacioppo, 2004, p. 1). That is, rather than merely preventing or attenuating *negative* psychological consequences (e.g., loneliness), an individual's social relationships may provide *positive* consequences (e.g., happiness, satisfaction with life [SWL], etc.). However, the capacity of social media to exercise this benefit remains uncertain at best (Allen, Ryan, Gray, McInerney, & Waters, 2014).

With advances in technology and bandwidth, the additional communicative abilities of cell phones have gone from short message service (SMS) texting to sending pictures and audio files to the recording and live transmission of high definition video. On the surface, it seems that the increased realism and definition of communication media should make people feel more connected with others, but the rate at which new social media platforms are released, initially adopted, popularized, and (possibly) obsolesced makes it difficult to study how any specific platform affects loneliness. By focusing on the primary modality of each platform—text or image/video—we might begin to understand how they each mitigate or exacerbate loneliness.

Considering the increasing role social media play in everyday life and the potential dangers of loneliness, the aim of the present research is to determine the relationship between use of popular social media platforms and feeling lonely. Specifically, we examine the relationships between loneliness (as well as two well-known correlates, happiness and SWL) and both text-based (Twitter and Yik Yak) and image-based (Instagram and Snapchat) social media platforms. Because Facebook is so ubiquitous and incorporates elements of both image-based and text-based social media, we include it as a fifth platform in our analyses.

In this paper, we first review communication literature with respect to the potential uses and gratifications afforded by the five social media platforms of interest, concluding that among other things, social media generally serve to fulfill users' needs for social interaction. However, the salience or "realness" (i.e., virtual social presence) of these interactions differs according to which platform is used. We then explain why image-based social media platforms (e.g., Snapchat and Instagram) should theoretically offer the highest level of simulated social presence, leading to our main hypothesis that these platforms will be most effective at combatting loneliness. Because text-based (e.g., Twitter and Yik Yak) and mixed social media platforms (e.g., Facebook) seem to offer a lower degree of simulated social presence, we do not expect them to ameliorate loneliness, and frame their potential effects on psychological well-being as open research questions rather than formal hypotheses. Next, we present both the quantitative and qualitative results of a mixed-design survey that generally support our hypotheses and shed light on our research questions. Lastly, we discuss the implications and limitations of our research, concluding with several suggestions for future research directions.

2. Theoretical background

2.1. Uses and gratifications of social media

The Uses and Gratifications (U&G) approach (Katz, Blumler, & Gurevitch, 1973; Rubin, 2002; Sundar & Limperos, 2013) is a well-established framework for approaching the study of media. It proceeds from the assumption that consumers are active in their choice of media and they engage with certain technologies to fulfill specific needs. Ruggiero (2000) notes that, compared to the mass media of the 20th century, the interactivity, demassification (i.e., control of individual over the medium), and asynchroneity (i.e., ability to stagger messages in time) of newer digital technologies are part of what makes them so appealing and engaging for users today. Extant U&G research has helped scholars understand why individuals might use certain technologies. However – although it is well understood that media consumption habits in general are guided by gratification needs (Katz, Blumler, & Gurevitch, 1999) – studies on the gratifications of social media in particular are limited.

The literature that *does* exist on the U&G of social media may help us understand what loneliness effects—if any—might be related to their use. Launched in 2004, Facebook is the best-established social media platform, and it lets users share text, photos, and videos with one another. According to Facebook, as of March 2015 it has 1.4 billion monthly active users and 936 millions daily active users. Nadkarni and Hofmann (2012) determined that the two primary motivating factors for Facebook use are the need to belong and the need for self-presentation. Quan-Haase and Young (2010) determined that, compared to direct messaging, which is used for maintenance of individual relationships, Facebook is more geared towards having fun and knowing what is going on in one's overall social network. Lonely individuals in particular are more likely to use Facebook to compensate for a lack of offline relationships (Skues, Williams, & Wise, 2012), and among certain populations, Facebook use has been linked to increased SWL (Basilisco & Cha, 2015). Malik, Dhir, and Nieminen (2015) found that users share photos to gratify needs of affection, attention seeking, disclosure, habit, information sharing, and social influence. It is unclear, however, what role photos and images play in gratifying social and affection needs, and how meeting those needs might mitigate loneliness. Moreover, because the photo-sharing and messaging functions of Facebook have largely been supplanted by newer, more specialized social media applications such as Snapchat and Instagram, Facebook's effect on psychological well-being – especially relative to other, more specialized platforms – remains

unclear.

Twitter, launched shortly after Facebook, is another popular social media platform that lets users share 140-character "tweets" of text which might link to other sites or photo/video files. Although Twitter's numbers do not quite match those of Facebook, the platform still commands an impressive following (302 million active users that send over 500 million tweets every day) and initial research indicates an array of socially-related gratifications. Chen (2011) determined that the more one uses Twitter, the more that use gratifies a need for connection. Lee and Ma (2012) found that users pursuing gratifications such as information seeking, status seeking, and socializing were more likely to share news in social media platforms such as Facebook and Twitter. Research has examined and verified Twitter's viability in communicating news and events (Bollen, Mao, & Zeng, 2011; Hull & Lewis, 2014; Sakaki, Okazaki, & Matsuo, 2010; Tumasian, Sprenger, Sandner, & Welpe, 2010; Watson, 2015), particularly for fans of sports (Lee, Han, Kim, & Kim, 2014) and television (Wood & Baughman, 2012). Twitter has also been shown to facilitate parasocial interaction to varying degrees, depending on the interpersonal orientation of the user (Lee & Jang, 2011) or famous account they are following (Frederick, Lim, Clavio, & Walsh, 2012). Despite studies on Twitter's many uses, it remains unclear whether any of those uses might mitigate or exacerbate loneliness. Certainly it is convenient, but does use of Twitter to, for example, vent frustration about the World Cup (Yu & Wang, 2015) or converse with a friend about a favorite television show (Pittman & Tefertiller, 2015) have a measureable impact on one's psychological well-being?

Relative to Facebook and Twitter, there is a dearth of research on each of Instagram, Snapchat, and Yik Yak. Thus, we can only speculate as to the U&G satisfied by each of these three media. Instagram was released in 2010 and functions like a photo version of Twitter: users choose whom to follow, but instead of posting 140-character tweets, they post aesthetically-filtered photos or videos. Pittman (2015) found that as one's affinity for and activity on Instagram increased, self-reported loneliness decreased. Photos with friends and selfies are the most popular (Hu, Manikonda, & Kambhampati, 2014) and unsurprisingly, Bakhshi, Shamma, and Gilbert (2014) found those sort of photos (ones with faces, regardless of age or gender) are 38% more likely to receive a "like" and 32% more likely to receive a comment than those without. If likes and comments contribute to the immediacy and/or intimacy that is required for simulated social presence, this would seem to make Instagram a good bet to mitigate loneliness.

Snapchat was released in 2011 and functions a bit like an ephemeral Instagram: users send each other photos or videos that self-destruct after a set amount of time, typically three to ten seconds. As the first major social media platform to offer non-permanent content creation, Snapchat initially received attention for its potential in sexting (Poltash, 2012), but little else is known about the platform. Anecdotally, because it lets users send their friends silly or "ugly" photos of themselves that they might not want recorded permanently, we might expect Snapchat to relate to gratifications of intimacy or social bonding, since those casual expressions are more akin to what those friends might experience in non-mediated (face-to-face) interaction.

Yik Yak was released in 2013 functions like an anonymous, geo-centered Twitter: users can create, view, and up- or down-vote "yaks" within a 1.5 mile radius. Yik Yak has received attention for its potential link to cyber bullying (Darling, 2015) and some colleges have banned it entirely (Mahler, 2015). Anecdotally, although Yik Yak activity near a college campus does occasionally contain bullying or trash-talking, it typically ranges from the jovial ("Where's the party tonight?") to the mundane ("My roommate ate too many burritos."). Therefore we might expect gratifications of entertainment and information seeking, but it is unclear what effect its use might have on psychological well-being.

With their variegated forms of interaction—permanent and ephemeral, personal and anonymous, images and text—do any of the five above-mentioned social media platforms let users interact with one another in a way that combats loneliness or contributes to happiness and SWL? After all, as discussed above, the U&G of each platform pertains to fulfilling needs for social interaction to some degree. However, the *nature* of the social interactions offered by each platform differs considerably in terms of the salience of the person or people with whom the user interacts. It seems logical that the social media platforms that offer the greatest degree of salience—thereby most closely imitating real-life social interactions—would be most effective at attenuating loneliness. This level of salience is referred to as "social presence" in communication literature (Gunawardena, 1995; Short, Williams, & Christie, 1976), and depends primarily on both the immediacy and intimacy of communication, such that social presence is highest in interactions that have both highly immediate and intimate communication. Immediacy is certainly positive, but it is doubtful that one could achieve meaningful social connection without also experiencing intimacy of some kind. Therefore, in investigating which social media platforms might ameliorate loneliness, it may be most useful to consider which platforms provide both immediacy and intimacy to their users. We contend that the medium through which users of each platform primarily communicate (i.e., images or text) may shed light on this latter consideration.

2.2. Images and text

Which aspects of mediated communication confer experiential aspects that might lead to a genuine social presence of immediacy *and* intimacy? Some research has determined that online communication has the potential to boost perceived social support and self-esteem while decreasing loneliness and depression (Shaw & Gant, 2002), whereas other studies have found that online communication might further isolate individuals offline and decrease social well-being (Kim, LaRose, & Peng, 2009; Moody, 2001). Thus, in an attempt to explicate this relationship, the present research examines the differences between image-based and text-based social media as they might relate to loneliness.

Sundar's (2008) MAIN model takes a heuristics approach to understanding how digital technology has altered our perception of credibility. Credibility, or assessing the authenticity of a source, may be in important factor for mitigating loneliness: if mediated communication is perceived as more authentic, individuals may feel more social support. The MAIN model posits that our brains implicitly trust visual modalities such as images and video more than text because those modalities cue the "realism heuristic." This heuristic immediately determines that a photograph of something is inherently more real than text written about the same thing; "that is, we trust those things that we can see over those that we merely read about. This heuristic also underlies people's general belief that pictures cannot lie (even in this day and age of digital manipulation) and the consequent trust in pictures over textual descriptions" (Sundar, 2008, pp. 80–81). When individuals share everyday media with each other, concerns over cost and time mean they are more likely to send photos than text, audio, or video (Goh, Ang, Chua, & Lee, 2009). People could potentially use text via Twitter, for example, to tweet about a vacation at the beach, which might conjure a mental model in the mind of the reader, but this is not the same as posting a picture of the beach itself. Why are images more specific than mental models?

A visual image is sensory-specific because it is linked to the visual modality, whereas a mental model is not sensory-specific

because it is able to integrate information from different sensory modalities. It is possible, for example, to construct a mental model of some spatial configuration based on visual, auditory, and touch information. This implies that a mental model is more abstract than a visual image. (Schnotz, 2005, p. 78).

3. Hypotheses and research questions

A visual image, then, is concrete and is more likely to conjure up the same emotions in the viewer that the poster felt and likely intended. That is, through the lens of social presence, images seem to offer both intimacy and immediacy, whereas text seems to offer only immediacy. In sum, varied perspectives from communication literature converge on the idea that image-based media offer a relatively real and intimate interpersonal experience. Thus, we predict the following:

Hypothesis 1 (H1). Image-based social media use will predict a decrease in loneliness

Hypothesis 2 (H2). Image-based social media use will predict an increase in happiness

Hypothesis 3 (H3). Image-based social media use will predict an increase in SWL

Text is more abstract than visual images and may not result in the same or similar psychological states for all users. Prior to social media, Shaw and Gant (2002) conducted an experiment in which participants were assigned random chat partners and determined that online communication had the potential to boost perception of social support and decrease loneliness. However, as online communication technology expanded the modal possibilities for mediated engagement, text alone began to lose some of its allure. Reid and Reid (2007) ran an online communication experiment and found that for lonely participants, texting was in fact rated as less intimate, but participants who were anxious still rated text communication as more intimate.

It is a lack of this intimate communication that is most likely to cause loneliness, even if one has many contacts in his or her social network (Reid & Reid, 2007). However, even purely text-based social media offer at least *some* level of interpersonal connection, albeit less than media based on images. Therefore, because it is unclear what relationship text-based social media use may have with offline well-being, we pose the following research question:

Research Question 1 (RQ1): Does text-based social media use predict loneliness, happiness, or SWL?

Furthermore, although Facebook incorporates elements of both image and text, its associated U&Gs vary so widely between individuals that formal predictions related to its use seem inappropriate. Additionally, while Facebook was once the Walmart of social media—one could go there looking for anything—newer specialized platforms now obviate the need for younger adults to go there to interact with one another. Thus, we pose the following research question:

Research Question2 (RQ2): Does Facebook use predict loneliness, happiness, or SWL?

4. Data collection research methodology

Because young adults are simultaneously the most affected by loneliness and the most active users of social media, we recruited a sample consisting of college undergraduate student participants. Our study aimed to investigate the link between different social media platforms and loneliness using a mixed-method survey design. Specifically, the study assessed usage of two exclusively image-based platforms (Instagram and Snapchat), two exclusively text-based platforms (Twitter and YikYak), and one generalized mixed platform (Facebook). Using pre-established scales, this study also employed measures of loneliness, happiness, and SWL. As explained in *Theoretical Background* above, we expect a negative relationship between loneliness and each of happiness and SWL (Lewis & Joseph, 1995), assuming our measures are valid (Cheng & Furnham, 2002; Ozben, 2013).

Due to the quasi-experimental nature of our research design, we proposed a somewhat complex pattern of results (see H1−H3) to reduce the plausibility of alternative explanations of the observed relationships between variables (Shadish, Cook, & Campbell, 2002). In short, we expect image-based social media use to be associated with a *decrease* in loneliness, but with *increases* in happiness and SWL. Using open-response questions, this study also sought to corroborate its quantitative findings with qualitative data.

4.1. Participants

Two hundred seventy-four undergraduate participants took part in the study. Prior to conducting any analyses, we excluded 21 participants from the dataset for failing an attention check item (described further in *Procedure* below). Thus, our useable sample included 253 participants ($M_{Age} = 22.55$, $SD_{Age} = 3.32$; 63.6% male, 36.0% female, 0.4% preferred not to disclose) from a large university in the northwestern United States. Of these participants, 163 (64.4%) were journalism majors recruited from a media studies class and were compensated with extra credit for their participation. The remaining 90 participants (35.6%) were business majors recruited from an undergraduate participant pool and were compensated with partial course credit. All participants underwent standard informed consent procedures and were treated in accordance with standards set by the local chapter of the Institutional Review Board (IRB).

4.2. Measures

Happiness was assessed using Lyubomirsky and Lepper's (1999) 4-item happiness scale ($\alpha = 0.808$), measured on 7-point semantic differential scales. Diener, Emmons, Larsen, and Griffin's (1985) 5-item scale was used to assess SWL ($\alpha = 0.837$), with each item measured on a 7-point Likert-type scale. Loneliness was measured using Hughes et al.'s (2004) shortened 3-item loneliness scale ($\alpha = 0.857$), measured on 7-point semantic differential scales. Appendix A displays exact items and anchors of these three trait scales.

To assess the factor structure of the three multi-item trait measures (i.e., happiness, SWL, and loneliness), three separate principal components analyses (PCAs) were conducted. For all three scales, we found strong evidence for a unidimensional structure. That is, for each of happiness ($EV_1 = 2.648$, explaining 66% of variance) SWL ($EV_1 = 3.135$, explaining 62% of variance) and loneliness ($EV_1 = 2.336$, explaining 77% of variance), only one large component emerged from the PCA. Thus, a composite score for each of the three measured constructs of interest was created by averaging their respective item scores, yielding one variable to represent each of happiness, SWL, and loneliness.

To further validate the loneliness measure, zero-order bivariate correlations between loneliness, happiness, and SWL were assessed. As expected, loneliness exhibited a strong negative correlation with happiness ($r = -0.531$, $p < 0.001$) and a moderate negative correlation with SWL ($r = -0.251$, $p < 0.001$), providing concurrent validity evidence for the loneliness measure.

4.3. Procedure

All aspects of this study were conducted online using Qualtrics survey software. Students from the journalism sample completed the study on their personal computers at home, whereas students from the business sample completed the study at a computer terminal in a controlled lab setting. After consenting to participate, each participant began the study by responding to loneliness, happiness, and SWL scales (see *Measures* above) in counterbalanced order. Participants were then asked if they "regularly (at least once per week)" use one of the five social media platforms described above (the order of presentation of these five platforms was also counterbalanced between participants) and were asked to respond with either *Yes* or *No*. If they selected *Yes*, they were then asked to respond to a 6-item scale to assess their attitude toward that platform (see Appendix B) and to indicate the amount of time they spend using that platform each day on a 6-point scale from 1 (*Less than 1 h*) to 6 (*5+ hours*). Next, those participants who selected *Yes* were asked to list three words or phrases that come to mind when thinking about people using that platform, followed by an open-ended question in which they were asked to list their own primary reason for using it. However, participants who selected *No* to the initial dichotomous question were automatically skipped ahead passed that platform's specific questions and onto the next platform's *Yes*/*No* question. This same sequence of questions and skip logic repeated until participants answered the requisite questions for all five social media platforms. Lastly, all participants responded to some basic demographic questions and – as an attention check –were presented with an item that read "Please choose 'Strongly Agree' so we know that your answers are real."

5. Data analysis

All quantitative data analyses were conducted using SPSS 21 (IBM, 2012). All qualitative data analyses were conducted using VOSviewer 1.6.1 (Van Eck & Waltman, 2010).

5.1. Results

5.1.1. Sample aggregation

Because all participants were recruited in a similar fashion from a fairly homogenous parent population, we assumed that the two samples (i.e., journalism school and business school) would be fairly similar. Basic descriptive statistics confirmed this assumption. A chi-square test revealed that gender frequencies did not statistically differ across the samples (χ^2 [2] = 2.937, $p = 0.230$). Further, a series of independent samples t-tests revealed that the two samples were not statistically different in terms of age, happiness, SWL, or loneliness (all *p*s > 0.220). Thus, because the two samples were highly similar both demographically and psychographically, we collapsed them into one large sample for all remaining analyses.

5.2. Image-based platforms

5.2.1. Preliminary analyses

Recall that our overarching hypothesis (H1) is that using image-based social media will be associated with decreased feelings of loneliness. As a preliminary test of this hypothesis, we first recoded non-users of either Instagram (n = 69) or Snapchat (n = 83) as scoring 0 on each platform's frequency-of-use measure to permit the creation of a composite score between them. As participants' self-reported usage frequencies of Instagram and Snapchat were moderately correlated ($r = 0.321$, $p < 0.001$), we averaged them into a single continuous composite score and examined zero-order correlations between this composite frequency score and the three outcome variables of interest. As expected, results showed that frequency of image-based social media use exhibited a negative correlation with loneliness ($r = -0.135$, $p = 0.032$) and marginally positive correlations with SWL ($r = 0.121$, $p = 0.055$) and happiness ($r = 0.115$, $p = 0.067$).

We also aggregated the two composite scores of attitudes toward Instagram and Snapchat ($r = 0.347$, $p < 0.001$) into a single variable but included only regular users of at least one of these platforms in the analysis (N = 216) because—unlike the above frequency variable—participants not using these platforms cannot be meaningfully "assigned" an attitude score of 0. This composite attitude toward image-based social media score showed a similar pattern of correlations: attitudes were negatively correlated with loneliness ($r = -0.137$, $p = 0.045$) and positively correlated with SWL ($r = 0.196$, $p = 0.004$) and happiness ($r = 0.190$, $p = 0.005$). Although these correlations provide converging—albeit preliminary—evidence supporting H1–H3, they are inherently simplistic and prohibit meaningful interpretation. Thus, we used the dichotomous image-based social media usage variables to construct more detailed models with starker contrasts between users and non-users of image-based social media.

5.2.2. Main analyses

To conduct a more formal test of our hypotheses, we summed the two dichotomous variables representing Instagram use and Snapchat use (1 = *Yes*; 0 = *No*) into an aggregated categorical variable with three levels: 0, 1, and 2, such that all 253 participants received one of these three scores. This variable represents the number of image-based platforms regularly used by each participant. Using this image-based media variable as the between-subjects factor, we conducted a multivariate analysis of covariance (MANCOVA) with happiness, SWL, and loneliness as the dependent variables. Because age is theoretically expected to correlate with social media usage, we included it as a covariate in our model.

Results of this MANCOVA support H1–H3 (see Table 1 below). Most importantly, our overarching hypothesis concerning loneliness (H1) was strongly supported by the data. In a linear fashion, loneliness was highest among those using zero image-based platforms ($M_{\text{Loneliness}} = 3.47$, $SD_{\text{Loneliness}} = 1.48$), followed by those using one image-based platform ($M_{\text{Loneliness}} = 3.12$, $SD_{\text{Loneliness}} = 1.40$), followed in turn by those using two image-based platforms ($M_{\text{Loneliness}} = 2.54$, $SD_{\text{Loneliness}} = 1.33$, F [2, 249] = 6.439, $p = 0.002$, $\eta^2 = 0.049$). Planned polynomial contrasts confirmed that this pattern was indeed linear (*Contrast* = −0.597, $p = 0.004$).

Consistent with H2, results also showed a linear increase in happiness as a function of number of image-based platforms being used. Specifically, happiness was lowest among those using zero image-based platforms ($M_{\text{Happiness}} = 4.82$, $SD_{\text{Happiness}} = 1.18$), followed by those using one image-based platform ($M_{\text{Happiness}} = 4.91$, $SD_{\text{Happiness}} = 1.02$), followed in turn by those using two image-based platforms ($M_{\text{Happiness}} = 5.28$, $SD_{\text{Happiness}} = 1.08$, F [2, 249] = 3.340, $p = 0.037$, $\eta^2 = 0.026$), and planned polynomial contrasts suggest that this pattern was marginally linear (*Contrast* = 0.278, $p = 0.079$). Results of the MANCOVA also partially supported H3, showing that overall, SWL (F [2, 249] = 4.188, $p = 0.016$, $\eta^2 = 0.033$) increased as a function of number of image-based platforms used. However, planned polynomial contrasts revealed that the pattern of effects for this latter relationship was more quadratic than linear (see Table 1 for quadratic contrast values). Fig. 1 below displays the three outcomes as functions of image-based social media use.

As an even more focused test of H1–H3, we conducted once more the MANCOVA specified above *including only those participants who do not use any text-based social media platforms* (N = 132).

Table 1
Summary of MANCOVA results (full sample, N = 253).

	No image-based platforms	One image-based platform	Two image-based platforms	Between groups *p*-value	Effect size η^2-value	Linear contrast *p*-value	Quadratic contrast *p*-value
Loneliness	3.47	3.12	2.54	0.002	0.049	0.004	0.494
SWL	4.95	4.75	5.24	0.016	0.033	0.694	0.015
Happiness	4.82	4.91	5.28	0.037	0.026	0.079	0.318

Note – Age was entered as a covariate.

In so doing, we observed a near-identical pattern of results with even stronger effects, as indicated by substantially larger η^2-values (see Table 2). Fig. 2 below displays the pattern of results from this latter analysis graphically. Taken together, the results of our analyses thus far strongly support H1–H3.

5.2.3. Qualitative analysis

Because of inevitable semantic and lexical differences, a quantitative analysis of qualitative data is imperfect, yet it may help illumine what is a relatively new research area and support or explain other data. Therefore, to support our quantitative findings, we turned to participants' open-ended responses. Recall that for each social media platform that participants reported using regularly, they were also asked to list three words or phrases that they associate with uses of the platform, as well as to report their own primary reason for using that platform. If image-based social media facilitate social presence, as we hypothesize, we should expect to find words and phrases that relate to immediacy (e.g., "share what I'm doing now", "see what a friend is up to") and intimacy (e.g., "keep in touch", "sneak peak into my life"). We combined the open-ended responses from both prompts—personal use and general use—into a single text file to gain overall perspective on the potential U&G (Katz et al., 1973) the participants might seek in image-based platforms. We then analyzed this text file using VOSviewer 1.6.1 (Van Eck & Waltman, 2010), a useful program for extracting salient terms from a corpus and then constructing and visualizing a co-occurrence network of those terms.

We set the threshold in VOSviewer to a minimum of ten occurrences, and of the 431 terms in the open-ended data file, eight occurred at least ten times. These terms are mapped out in a Density Visualization (Fig. 3) in such a way that the distance between two terms provides an indication of the number of co-occurrences of the terms. In general, the smaller the distance between two terms, the larger the number of co-occurrences of the terms. According to the designers of VOSviewer, "the density view is particularly useful to get an overview of the general structure of a map and to draw attention to the most important areas in a map" (Van Eck & Waltman, 2010, p. 528).

The colors in a Density Visualization correlate with frequency and relevance of contextual terms. The greater the number of items in the neighborhood of a term and the higher the relevance of the neighboring terms, the closer the color of the point is to red. For example, in Fig. 3, "friend" is the point with the most red in it because the word friend occurred with the greatest variety and salience of connecting words, e.g., "Share with a friend," "see a friend's life," etc. Conversely, the smaller the number of items in the neighborhood of a point and the lower the relevance of the neighboring items, the closer the color of the point is to blue. Thus in Fig. 3, "touch" appears to be one of the "coolest" points, indicating the least variety in respondents' use of the word. A detailed examination of the text file confirms this; every use of the word "touch" was preceded by "in", as in "keep in touch" or "stay in touch." The frequency of these phrases suggests that image-based social media affords a good deal of relational intimacy.

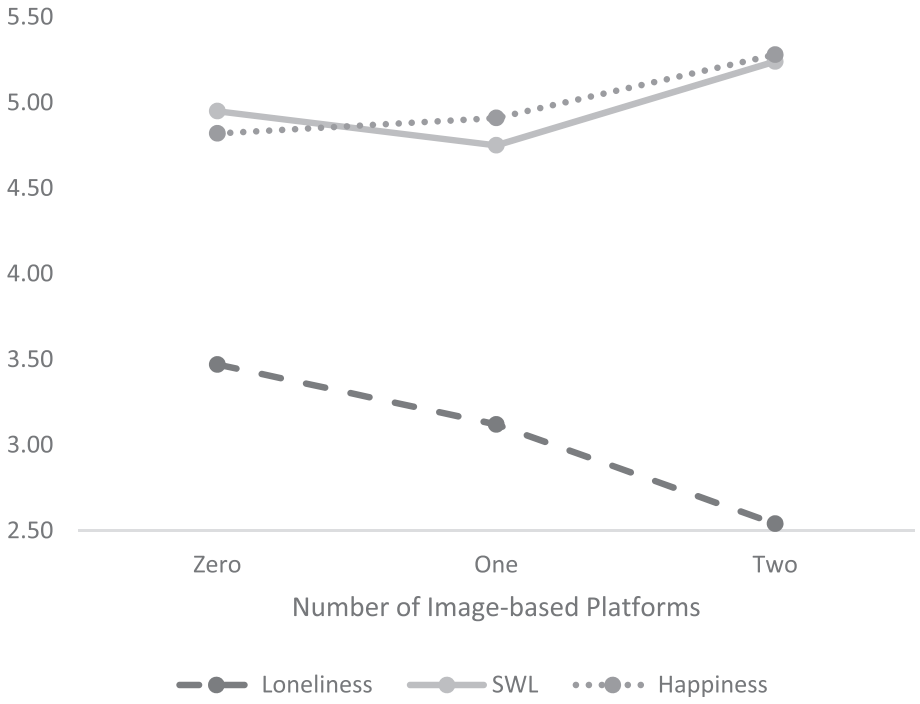

Fig. 1. Trait scores at three levels of image-based social media use (full sample, N = 253).

Table 2
Summary of MANCOVA results (text-based social media users excluded, N = 132).

	No image-based platforms	One image-based platform	Two image-based platforms	Between groups *p*-value	Effect size η^2-value	Linear contrast *p*-value	Quadratic contrast *p*-value
Loneliness	3.58	2.98	2.26	0.000	0.122	0.000	0.812
SWL	4.84	4.70	5.38	0.015	0.064	0.158	0.029
Happiness	4.75	5.01	5.42	0.026	0.056	0.011	0.704

Note – Age was entered as a covariate.

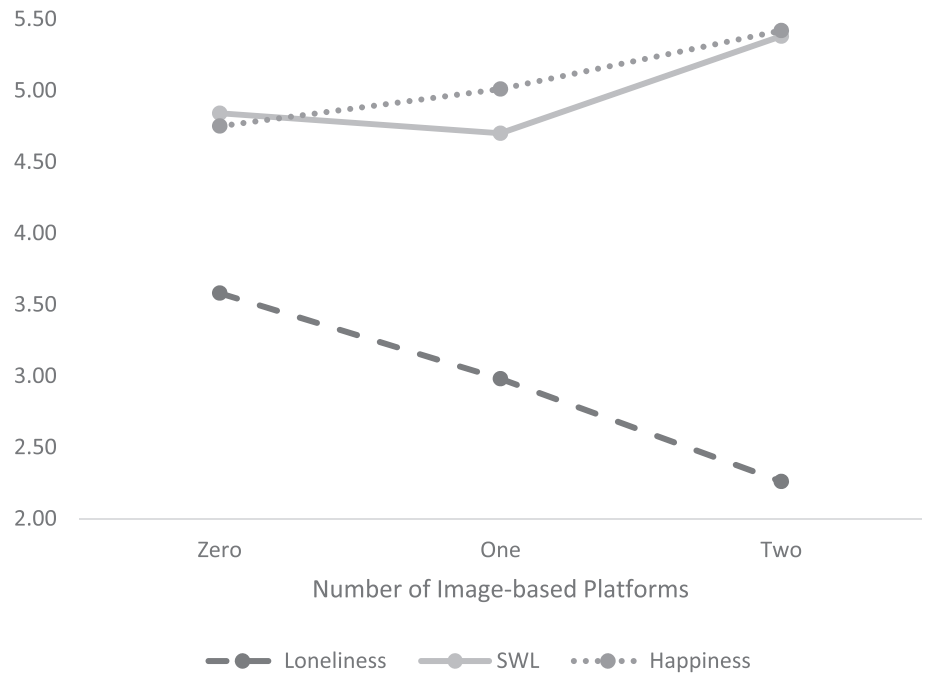

Fig. 2. Trait scores at three levels of image-based social media use (text-based social media users excluded, N = 132).

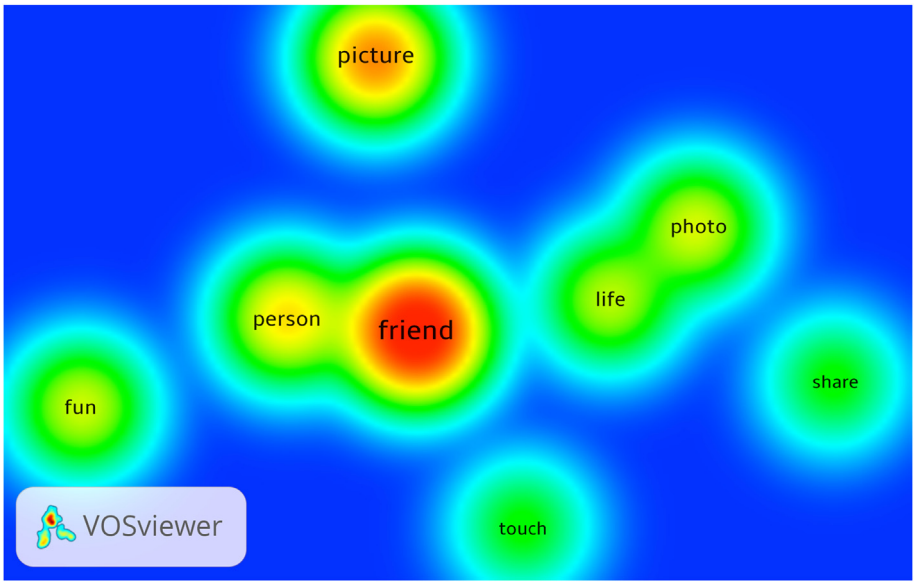

Fig. 3. Density Visualization Map of open-ended responses for image-based Social Media.

Similarly, the distance between two nodes approximately indicates the relatedness of the nodes. In general, the smaller the distance between two nodes, the higher their relatedness. For example, “friend” and “person” are the closest (distance-wise), and it is not difficult to imagine those two words being used interchangeably: e.g., “see a friend's life” or “see a person's life.”

Finally, the relevance of each term (Table 3) is determined by calculating similarity of co-occurrences with other terms. Noun

phrases such as “my life” or “a friend's photo” have a low relevance score if their co-occurrences with other noun phrases follow a mostly random pattern. For example, the word “photo” could be preceded by myriad phrases such as “I share my...”, “I like to see other people's...”, “cool nature...”, and more. On the other hand, noun phrases have a high relevance score if they co-occur mainly with a limited set of other noun phrases (Van Eck & Waltman, 2014). Thus the term “fun” has the highest relevance score (1.86), indicating its co-occurrence with few other terms (and thus most unique usage), whereas “life” has the lowest relevance score (0.29), indicating its co-occurrence with a great number of other noun phrases. Again, a detailed examination of the text file confirms these data: “fun” usually occurs by itself or succeeding “for”, whereas “life” occurs in many combinations with many possible meanings, e.g., “photos of my life,” “share my life,” and “see my friend's lifestyle.” In their own words, respondents have painted a general picture of friends delighting in the images that keep them familiar with each other's lives.

Occurrences are not simply the number of times a word occurred but rather the weighted calculation of that term's frequency, uniqueness, and co-occurrence with other noun phrases. The terms with the greatest number of occurrences and co-occurrences, “friend” and “picture”, indicate they were, in some form or another, the most popular responses from participants. The terms to which VOSviewer assigned the highest relevance, “fun” and “picture”, indicates they have the most specific meaning and occurred most often in the same form: “it's fun”, “for fun”, and “funny pictures” were common noun phrases. From these data we can surmise that one general gratification of image-based social media relates to pictures of or with one's friends, and one specific gratification is likely humor and fun. Intimacy can be defined as “close familiarity or friendship”, and these eight terms taken together connote that sharing photos of and with one's friends not only gratifies needs of affection and attention (Malik et al., 2015), but also the need for close familiarity with those friends. These gratifications may explain why we observed decreased loneliness and increased happiness and SWL among image-based social media users.

5.3. Text-based platforms

Although not formally hypothesized, we did pose a research question (RQ1) regarding text-based social media as well. Thus, we tested for associations between text-based social media use and the three outcome variables of interest in an analogous fashion to the image-based social media tests. We began testing for correlations between a composite frequency of text-based social media use score and each of loneliness, SWL, and happiness. We did observe a weak positive correlation between this frequency variable and loneliness, although it failed to reach statistical significance ($r = 0.098$, $p = 0.118$). Further, this frequency variable was statistically uncorrelated with SWL and happiness (both $ps > 0.716$). Similarly, the composite attitudes toward text-based social media score was statistically uncorrelated with the three constructs of interest (all $ps > 0.280$).

An analogous MANCOVA on the full sample showed that the three-level variable of text-based social media use did not have a significant association with loneliness, SWL, or happiness (all $ps > 0.486$). This pattern of results did not change when including only those participants who did not use any image-based platforms ($N = 37$, all $ps > 0.333$). Thus, with respect to RQ1, it appears that text-based social media use does little or nothing to attenuate loneliness or boost happiness and SWL. If anything, increased use of text-based media may exacerbate loneliness.

Table 3
Summary of terms' occurrences and relevance scores for image-based social media.

Term	Fun	Picture	Share	Friend	Person	Touch	Photo	Life
Occurrences	24	48	12	93	33	12	25	22
Relevance	1.86	1.38	1.10	0.96	0.87	0.82	0.71	0.29

5.3.1. Qualitative analysis

We set the threshold in VOSviewer to a minimum of three occurrences, and of the 184 terms in the open-ended data file, eight occurred at least ten times. These terms are mapped out in a Density Visualization (Fig. 4) with settings identical to the image-based Density Visualization of image-based social media (Fig. 3). In Fig. 4, “news” is the point with the most red in it, followed closely by “friend”, thus those words occurred with the greatest variety and salience of connecting words, e.g., “read the news”, “to get news”, etc. Conversely, “boredom” appears to be one of the “coolest” points, indicating respondents consistently used it in the same way; in this case it only ever appeared as a one word response to the query as to why they used Twitter or Yik Yak: “boredom.”

The terms with the greatest number of occurrences, “news” and “friend” (Table 4), indicate they were the most popular responses, in some form or another, from participants. The terms to which VOSviewer assigned the highest relevance, “person” and “sport”, indicates they have the most specific meaning and occurred most often in the same form: “personal opinions” and “sports news” were common noun phrases. From these data we can surmise that general gratifications of text-based social media may relate to reading about friends' activity and keeping up with news, and more specific gratifications could be reading friends' opinions and sports news. The eight terms taken together connote that engaging in text-based social media platforms may have a social component (Chen, 2011) but is most likely just about killing time or getting snippets of news from around the world. Text-based social media may have the immediacy necessary for social presence but lack the requisite intimacy, which may explain why we observed virtually no relationship between use of text-based social media and loneliness, happiness, and SWL.

5.4. Facebook

As described in *Theoretical Background* above, Facebook represents an interesting case of social media due to its hybrid nature, incorporating elements of text-based and image-based media. Examining the correlations between frequency of Facebook use (with non-users coded as 0) and the three outcomes of interest among the full sample showed no statistically significant effects (all $ps > 491$). Similarly, attitudes toward Facebook among Facebook users only ($N = 194$) were statistically uncorrelated with these three outcome variables (all $ps > 0.389$). Further, a MANCOVA with the dichotomous Facebook use variable as the predictor revealed no statistical association with SWL, happiness, or loneliness (all $ps > 0.468$).

As a more focused test, we reran the same MANCOVA including only participants who reported *not using* the other four social media platforms ($N = 28$; see Fig. 5). Results show directionally consistent but statistically non-significant associations between the dichotomous Facebook variable and SWL and loneliness (both $ps > 0.403$). These null results are not surprising given the small group sizes in the model, leading the analysis on these two outcomes to be extremely underpowered (both $\beta s > 0.870$). The association with happiness, in contrast, was statistically significant, with Facebook users ($M_{Happiness} = 4.34$, $SD_{Happiness} = 1.27$) being significantly less happy than non-users ($M_{Happiness} = 5.29$,

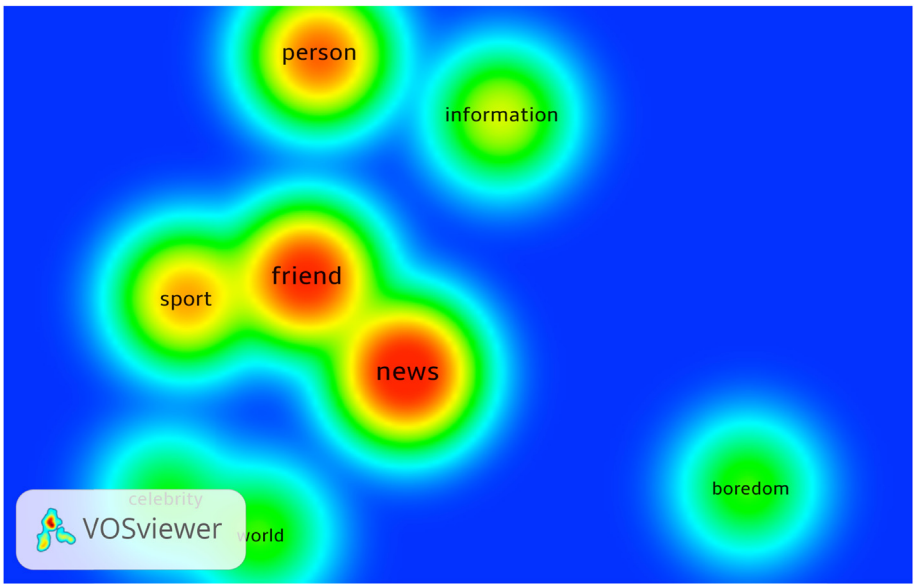

Fig. 4. Density Visualization Map of open-ended responses for text-based Social Media.

Table 4
Summary of terms' occurrences and relevance scores for text-based social media.

Term	Person	Sport	News	Friend	Celebrity	Information	World	Boredom
Occurrences	16	12	26	22	3	7	4	4
Relevance	2.16	1.77	1.18	1.14	0.76	0.60	0.39	0.00

$SD_{\text{Happiness}} = 0.96$, $F\,[1, 25] = 4.572$, $p = 0.042$, $\eta^2 = 0.155$). Thus, with respect to RQ2, we surmise that Facebook may work counter to image-based social media. That is, at least directionally, Facebook use appears to increase loneliness and decrease SWL and happiness. Although most of these results are not statistically significant, the magnitude and direction of effects is still compelling. However, the ambiguous nature of Facebook's "currency" (i.e., muddled mixture of images and text) makes it difficult to fit this platform into our theory. Thus, due to space constraints, we abstain from a qualitative analysis of Facebook users' open-ended responses.

5.5. Alternative explanations

One potential alternative explanation for our findings is that using more social media platforms in general—rather than image-based social media platforms in particular—is driving the observed pattern of results. However, if this were in fact the case, then we should expect to see significant associations between text-based social media use and each of loneliness, SWL, and happiness. Our analyses indicate that this is not the case (see *Text-based Platforms* above). To explore this possibility further, we summed the five dichotomous use variables across all five social media platforms,

Fig. 5. Trait scores for Facebook users and non-users (all other social media users excluded, N = 28).

creating a total social media use variable ranging from 0 to 5. Running another MANCOVA with this total social media use variable as the between-subjects factor did not reveal any statistically significant associations with the three outcomes of interest (all $ps > 0.105$). Although loneliness did approach marginal significance as an outcome ($p = 0.105$), no statistically significant polynomial contrast coefficients emerged (all $ps > 0.170$), rendering this near-effect spurious at best. Similarly, a composite score of frequency of social media use across all five platforms was statistically uncorrelated with loneliness, SWL, and happiness (all $ps > 0.122$). Thus, the attenuation effect on loneliness appears to be specific to image-based social media use rather than social media use in general.

6. Discussion

When it comes to offline well-being, is an Instagram image really worth more than a thousand Twitter words? It would seem so. Our results indicate that the more image-based social media platforms one uses, the happier, more satisfied with life, and less lonely he or she is likely to perceive being. These findings shed light on the nature of loneliness in a contemporary digital society as well as the potential side-effects of social media use.

6.1. Positive effects of image-based platforms

Image-based platforms such as Snapchat and Instagram confer to their users a significant decrease in self-reported loneliness. Equally significant was the use of these platforms predicting an increase in happiness and SWL. In line with our qualitative findings, this ability to mitigate an undesirable psychological state and induce positives ones may be due to the ability of images to facilitate social presence (Sundar, 2008), or the sense that one is communicating with an actual person instead of an object. This may occur "even without anthropomorphic features of the technology, although if there are cues in the interface that represent human characteristics such as voice, language, and personality, the social presence heuristic appears to be more strongly invoked" (Sundar, 2008, p. 84). Naturally, then, a photo of one's friend making a silly face or eating at a restaurant—even more so if it is a video and his or her voice is audible—is more likely to signal the brain that the friend is really there.

Even before Instagram and Snapchat were developed, Goh et al. (2009) found that photos were the medium of choice for individuals to share, because they quickly got the job done in terms of communicating feelings or situations. It makes sense that this trend only continues with specialized platforms like Instagram and Snapchat streamlining and augmenting the process of sharing image and video files, both publically (Instagram) and privately (Snapchat). Moreover, if lonely people "transmit the same feeling of loneliness to their remaining friends" (Cacioppo, Fowler, & Christakis, 2009), it is possible that feelings of connectedness and happiness could be similarly transmitted through image-based networks. Compared to (mostly) indirect public platforms such as Facebook, direct messaging is geared toward developing and maintaining relationships (Quan-Haase & Young, 2010), so photo or video messages sent to and from one's friends should be a powerful way to recreate the intimacy of social presence necessary to stave off perceived loneliness.

6.2. Negative or neutral effects of text-based platforms and Facebook

Real-life conversations occur in real time, so immediacy is important for social presence. Thanks to near-instantaneous speed of digital technology, text-based social media grant users immediacy but they lack the other component—intimacy—that is needed to more accurately replicate face-to-face conversations. Our qualitative data support this explanation for our null quantitative findings surrounding text-based social media use. Although Twitter, for example, does have some social utility (Chen, 2011), the advent of more specific and intimate platforms for use between friends has likely modified its role to be more centered around general news and alleviating boredom. It makes sense, then, that we observed virtually no relationship between text-based social media use and psychological well-being.

7. Limitations and future research

In a digital economy where attention is scarce, images are a quick and efficient way to communicate thoughts and feelings. Indeed, their use seems to imbue us with greater happiness and SWL. These findings are important for psychology and communication scholars alike, and contribute to a greater understanding of the consumption of social media and psychological well-being. That said, our research suffers from a few limitations.

First, our research design is correlational (as opposed to experimental) and thus does not permit causal inference. Although we hypothesized a fairly complex series of outcomes, supplemented our quantitative results with qualitative data, and statistically ruled out one alternative explanation, the threats of ambiguous temporal precedence and spurious effects (Shadish et al., 2002) remain plausible. Future research should use true experiments to probe the *causal* role of image-based social media use in psychological well-being.

Second, our study restricted participation exclusively to young adults. Sampling from this population was intentional due to the fact that this age group is at once most likely to use social media and to suffer from loneliness and thus most pertinent to our research questions. However, it would be interesting to explore whether the relationship between image-based social media use and loneliness extends to other demographic groups. For example, will the same findings result from a study with adolescents, who have greater fluency with new platforms, or with older adults that have less? Relatedly, our study relies on a convenience sample and thus cannot be extended to the general population. Although this sampling practice is fairly common in the social sciences, it leaves the generalizability of our findings open to future research.

Third, although image-based social media may have positive effects, there surely exists a point of diminishing returns. How much is *too much* time to spend on Instagram and Snapchat? At a certain point one's mediated interaction with the world would no longer augment real interaction but hinder it. As an exploratory study, this research did not have a chance to dive into the potential effects of individual characteristics on social media choice and use. How might one's personality traits moderate the effect of image-based platforms in reducing perceived loneliness? For example, do extroverts require *more* or *less* time on Instagram to feel socially connected? Future research should incorporate concepts such as personality and cellphone addiction in seeking to establish if and when use of image-based social media might lead to diminishing or negative returns.

In spite of the above limitations, our research suggests that the increasingly ubiquitous image-based social media platforms that are connecting people in new ways can actually facilitate a kind of human connection that mitigates loneliness and cultivates happiness and SWL. Although more research is needed to clarify, contextualize, and expand upon this phenomenon, our research takes a necessary first step in drawing the connection between image-based social media and loneliness attenuation through social presence.

Appendix A. Trait Scale Items and Properties

Construct	Items	Anchors	α	Item loading
Loneliness	In general, I feel like I lack companionship	1 (*Strongly Disagree*);	0.857	0.852
	In general, I feel like I am often left out of social situations	7 (*Strongly Agree*)		0.891
	In general, I feel isolated from others			0.904
Satisfaction with Life (SWL)	In most ways my life is close to ideal	1 (*Strongly Disagree*);	0.837	0.861
	The conditions of my life are excellent	7 (*Strongly Agree*)		0.830
	I am satisfied with life			0.864
	So far I have gotten the important things I want in life			0.715
	If I could live my life over, I would change almost nothing			0.669
Happiness	In general, I consider myself…	1 (*Not a very happy person*); 7 (*A very happy person*)	0.808	0.875
	Compared with most of my peers, I consider myself…	1 (*Less happy*); 7 (*More happy*)		0.879
	Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?	1 (*Not at all*); 7 (*A great deal*)		0.866
	Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterization describe you?	1 (*A great deal*); 7 (*Not at all*)		0.601

Note – all constructs unidimensional unless otherwise noted.

Appendix B. Attitude toward Social Media Scale Items and Properties

Items	Att1	Att2	Att3	Att4	Att5	Att6
	_____ has become part of my daily activity	I'm proud to tell people I'm on _____	I feel out of touch when I haven't logged onto _____ for a while	I feel I am part of a _____ community	_____ has become part of my daily routine	I would be sorry if _____ shut down
Anchors	1 (*Strongly Disagree*); 7 (*Strongly Agree*)					
Platform	Item	α	Item Loading	N responses		
Instagram	Att1	0.880	0.830	184		
	Att2		0.739			
	Att3		0.780			
	Att4		0.861			
	Att5		0.839			
	Att6		0.713			
Snapchat	Att1	0.890	0.817	170		
	Att2		0.740			
	Att3		0.813			
	Att4		0.843			
	Att5		0.838			
	Att6		0.782			
Twitter	Att1	0.900	0.874	112		
	Att2		0.685			
	Att3		0.852			
	Att4		0.829			
	Att5		0.870			
	Att6		0.790			
Yik Yak[a]	Att1	0.819	0.773	19		
	Att2		0.684			
	Att3		0.811			
	Att4		0.757			
	Att5		0.703			
	Att6		0.646			
Facebook	Att1	0.889	0.855	194		
	Att2		0.770			
	Att3		0.840			
	Att4		0.788			
	Att5		0.860			
	Att6		0.711			

Note – all constructs unidimensional unless otherwise noted.

[a] Two components emerged for Yik Yak items but all salient loadings (reported above) were on Component 1.

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