



Subtle momentary effects of social media experiences: an experience sampling study of posting and social comparisons on connectedness and self-esteem

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Abstract

Part of the current mental health crisis is attributed to the increasing reliance on social media for daily tasks. By understanding behavioral or cognitive patterns that influence facets of well-being *in real-time within* individuals, we can empower individuals to intentionally adjust their behavior, thereby enhancing these aspects. This study utilized an experience sampling method to investigate the real-time effects of social media-induced social comparisons and posting on self-esteem and connectedness. Six times per day for 5 days, 74 adults reported on their social media use in the previous hour and their experiences of connectedness and self-esteem. Multilevel modeling demonstrated statistically significant within-person associations. Social media-induced upward comparison was related to momentary decreases in self-esteem, and moments when individuals posted on social media were related to higher levels of connectedness. The findings emphasize that specific experiences on social media may produce immediate effects for connectedness and self-esteem.

Lay Summary

Part of the current mental health crisis is attributed to the increasing reliance on social media for daily tasks. A prominent position adopted by researchers and conveyed in the media is that browsing social media undermines well-being by inducing social comparison, whereas engaging in activities that facilitate interactions with others on social media leads to positive effects. Most research has explored the effects of social media use for the average user and average experience, and thus overlooks whether a single experience can affect an individual in that moment. To address this gap, the current study considered if social media-induced social comparison and posting immediately affected self-esteem and connectedness, respectively, for the individual. Six times per day for 5 days, 74 adults reported on their social media use (social comparison and posting) in the previous hour and their experiences of connectedness and self-esteem. Feelings of connectedness were heightened following instances when an individual posted more than usual, and self-esteem decreased following instances of social comparison induced by social media use. The findings corroborating social media use emphasize that specific experiences on social media may produce immediate effects for connectedness and self-esteem.

Keywords: social media, self-esteem, social comparison, connectedness, posting.

Social media has become central in daily life for most young adults (Schimmele et al., 2021; Valkenburg & Piotrowski, 2017). At a juncture where society increasingly attributes social media usage to the prevailing mental health challenges (Abrams, 2023), it becomes crucial to investigate elements enabling individuals to promptly detect signs of imbalance or distress, or conversely, indicators of wellness. Understanding behavioral or cognitive patterns that are associated with well-being in real-time or near-real-time, either positively or negatively, can empower individuals to intentionally adjust their behavior, thereby enhancing these aspects. Self-esteem and friendships have strong implications for positive psychological well-being (Fehr & Harasymchuk, 2017; Orth & Robins, 2014) and fluctuate in response to daily events, making them valuable metrics to evaluate. Moreover, social media serves a multitude of functions, including connecting with friends, staying updated on one's social network, and self-expression, which can impact interpersonal connectedness and self-evaluation daily. When exploring mundane social media interactions commonly linked with connectedness and self-esteem, posting content and engaging in social comparison consistently emerge as opportunities and potential pitfalls for

users (Popat & Tarrant, 2023; Weinstein, 2018). Therefore, the goal of the current study is to examine whether and how mundane social media activities (posting and social comparison) induce momentary fluctuations for connectedness and self-esteem within individuals. Using an experience sampling method (ESM), individuals in the current study reported on their social media experiences and current feelings multiple times a day for 5 days.

Insights into relationships between social media experiences and facets of well-being

Many studies have relied on higher-level measures of social media use, including duration or frequency of use and valence of experiences. Valkenburg et al. (2021b) assert that "that time spent on SM [social media] may be too "neutral" to arrive at a true understanding of the effect of SM use on self-esteem" (p. 2), proposing that the quality and nature of experiences matter more than mere time allocation. While research on the overall valence of experiences has provided valuable insights, it is well established that the effects of social media use depend on specific behavioral and cognitive

patterns. Interviews exploring social media users' perceptions of their affective experiences within these platforms highlight predominantly pleasant reactions linked to sharing and self-expression, juxtaposed with negative responses often associated with social comparison (Popat & Tarrant, 2023; Weinstein, 2018). Notably, social media users commonly browse their social networks (Beyens et al., 2020), an activity outweighing sharing current thoughts and feelings.

The following sections delve into our current understanding of the effects associated with posting content on social media and engaging in social comparison while viewing others' posts. Focusing on between-subject effects, the summary encapsulates (and is limited to) trends for groups regarding feelings of connectedness and self-esteem. Social connectedness refers to the feeling of relatedness, acceptance, or inclusion by other group members (Baumeister & Leary, 1995). Social media research has gauged connectedness either directly or indirectly, evaluating closely linked concepts that embody relationships and inclusion. These include aspects like the quality of friendships, a sense of belonging, or conversely, feelings of loneliness. Self-esteem generally refers to a person's positive and negative evaluation of the self (Leary & Baumeister, 2000; Rosenberg et al., 1995).

Posting and connectedness

Humans have a basic motive to establish and maintain close relationships and connections with others (Baumeister & Leary, 1995). Sharing information is crucial and very powerful for deriving a sense of connectedness (Reis & Patrick, 1996). The desire to share about oneself runs so deep that even thinking about sharing information with others triggers the reward center circuitry in the brain in a similar way as well-established secondary rewards, including money (Tamir & Mitchell, 2012). Moreover, one's own sharing elicits feelings of closeness even before the recipient reciprocates (Sprecher et al., 2013) and is a stronger predictor of connectedness than others' sharing (Utz, 2015). Hence, the positive effects related to sharing about oneself is central in various perspectives of social media use. According to the stimulation (Valkenburg & Peter, 2007) and the Internet-enhanced self-disclosure (Valkenburg & Peter, 2011) hypotheses, not only do social media encourage self-disclosure (that may not take place offline), but that sharing online is related to positive outcomes in regard to connectedness or related constructs (friendship quality, sense of belonging, and loneliness) and in turn subjective well-being.

Findings exhibit disparities, yet the prevailing trend is toward positivity. Both cross-sectional correlational studies (Desjarlais & Joseph, 2017; Utz, 2015) and experimental research wherein the frequency of posting is manipulated (große Deters & Mehl, 2013; Tobin et al., 2015) found that those who reported disclosing more personal information, on average, also reported more positive perceptions of social connectedness. Accordingly, literature reviews corroborate the positive effects of posting or sharing online (Desjarlais et al., 2015; O'day & Heimberg, 2021). On the other hand, a few scholars have observed null effects (Krause et al., 2023) or even increases in loneliness (Yang, 2016) in relation to broadcasting content on social media. Utz's (2015) work also suggests that sharing positive or entertaining posts leads to a heightened sense of connectedness for private messages but not public (social network site) status updates.

Social comparison and self-esteem

When browsing social media, users are exposed to an abundance of information on a vast number of members that individuals can use to make social comparisons. According to social comparison theory, comparing oneself with others who are viewed as similar provides individuals with information to evaluate their own capacities and characteristics (Brown et al., 2007; Festinger, 1954). Social comparisons are integral to self-evaluations (Harter, 2015) and can lead to ups and downs in self-esteem (Leary & Baumeister, 2000). The valence of self-evaluation depends on how an individual compares oneself with other people and their response to such evaluation, with a distinction made between upward and downward comparisons (Suls et al., 2002). Upward social comparison refers to instances where the target(s) of social comparison is perceived as doing better than oneself on a particular dimension. Although upward comparisons can stimulate inspiration and enjoyment, a recurring hypothesis in the literature is that upward comparisons lead to a negative self-image and decreases in self-worth because they stimulate feelings of inadequacy, jealousy, envy, or negative affect (Pyszczynski et al., 1985; Verduyn et al., 2017, 2020). Downward social comparison refers to the situation where the individual perceives the self as more fortunate than the target(s) of social comparison, which is typically associated with a more positive self-image, as well as enhanced feelings of self-worth (Suls et al., 2002).

The type of self-presentation that ensues on social media has elicited concerns for self-esteem. The hyperpersonal perspective emphasizes that the lack of audio-visual information in online venues facilitates users' ability to engage more readily in selective self-presentation (Walther & Whitty, 2021). Individuals can be more deliberate about choosing elements to establish a desired impression, and conceal undesirable characteristics, compared to face-to-face interactions. There has been a clear positivity bias on social media, where people tend to share more positive than negative information about themselves (Forest & Wood, 2012; Reinecke & Trepte, 2014; Waterloo et al., 2018). And, as image-based social media platforms, such as Snapchat and Instagram, increase in popularity, users are making use of readily available features to touch up photos with filters and hide flaws (Chua & Chang, 2016; Lup et al., 2015). The trend on Instagram consisting of posting "Instagram vs reality" images side-by-side illustrates the popularity and degree to which individuals depict an idealized and altered self-presentation on social media.

There is striking evidence for a small, but real impact of social comparison in response to how others present themselves on social media on self-esteem. In interviews, users express that the idyllic images others post generally evoke a sense of inferiority and dissatisfaction, triggering emotions such as jealousy and envy that harm psychological well-being (Chua & Chang, 2016). Even when individuals compare themselves with friends on social media, they tend to underestimate their friends' negative experiences and overestimate their positive experiences, which subsequently cause emotional distress (Jordan et al., 2011). Correlational (Jiang & Ngien, 2020; Krasnova et al., 2015; Sherlock & Wagstaff, 2019; Valkenburg et al., 2022; Vogel et al., 2014), experimental (de Vries et al., 2018; Vogel et al., 2014), and systematic reviews (Appel et al., 2016) largely show that upward comparisons and envy underlie decreases in well-being associated with

browsing on social media. While upward social comparison on social media is mostly negatively associated with self-esteem, findings on downward comparison are mixed. Some studies indicate a positive correlation with self-esteem (Desjarlais et al., 2023), while others indicate no relationship (Vogel et al., 2014).

The added value of a within-persons approach to examine social media experiences

Connectedness and self-esteem are said to fluctuate in response to daily events and contexts, emphasizing the need for within-person analyses when evaluating the effects of social media. Theories concentrating on social connectedness and self-esteem emphasize that daily events can lead to changes in these areas. The social identity theory posits that individuals derive a part of their self-concept from their membership in social groups (Tajfel & Turner, 2004). Daily fluctuations in feelings of connectedness can occur based on the strength of identification with particular groups or social circles, influenced by interactions, experiences, and the salience of group memberships. Similarly, according to sociometer theory, self-esteem is a psychological gauge that regularly monitors the degree of approval and disapproval from one's social environment (Leary & Baumeister, 2000). Self-esteem fluctuates in response to feelings of success and failure and perceptions of acceptance and rejection.

General theories of well-being and development also highlight the importance of daily events. Within the stress literature, uplifts (pleasant micro-experiences) and hassles (unpleasant micro-experiences) trigger temporary positive and negative affective reactions which influence daily and long-term well-being (Kanner et al., 1981). Uplifts and hassles characterize everyday life and originate because of an individual's environment, behavior, or their interaction. Affective micro-experiences can be rare or recurrent depending on the individual context, both having the potential to influence well-being. Similarly, the dynamic systems theory of psychosocial development emphasizes that psychosocial factors can fluctuate on a daily, or even hourly, basis as a result of positive or negative experiences (de Ruiter et al., 2019). These short-term, momentary fluctuations in social worlds are said to shape immediate and consequently long-term change in well-being and social relationships.

As social interactions play out on social media regularly, it is important to examine how this context might influence temporary shifts in connectedness and self-esteem. Researchers have traditionally examined the impact of social media activities by adopting a between-person approach (Griffioen et al., 2020). While promising and insightful, between-subjects associations inform us about whether individuals with particular behavioral or cognitive patterns experience greater (or lesser) benefits compared to their peers. Similarly, it provides insight into whether those who engage in, for example, frequent posting or social comparison report higher (or lower) levels of connectedness or self-esteem than those who post or socially compare less. Based on observed differences between groups, one might infer that individuals need to adopt similar engagement patterns as their peers who have experienced positive outcomes. This method may overlook nuanced social media-induced variations and seldom offers insights into the capacity of social media to trigger immediate fluctuations. Conversely, within-person effects allow

researchers to capture moment-to-moment factors that may contribute to outcomes, even at a small scale, which complements broad correlations with a more nuanced understanding of variable relationships. In the context of social media use, these effects indicate the extent to which social media experiences (like posting or social comparison) are associated with changes in a person's feeling of connectedness or self-esteem relative to their average score. This implies that (a) individuals need only to adjust their social media use beyond their own average to achieve greater benefits (rather than adopting patterns observed in others), and (b) slight changes to social media usage have the potential to yield immediate benefits, underscoring their significant practical applications. Understanding the proposed within-person relationships can offer insights into how users may be able to intentionally adjust their behavior to stimulate desired behaviors or thoughts, tactics for mental health interventions, and recommendations for platform redesign.

Within-person effects in social media research

ESM approaches are gaining traction in research on social media experiences, and collectively suggest the presence of momentary effects. However, the precise impacts of posting and social comparison on temporary shifts on connectedness and self-esteem remain uncertain due to the measurement of broader aspects of social media usage or well-being, alongside discrepant findings. Below is a summary of the emerging literature that pertains to connectedness and self-esteem in response to social media usage, respectively.

First, five recent studies have used ESM to examine within-subject effects of broader facets of social media use on connectedness. In one ESM study, participants completed surveys regarding if they had interacted on social media in the past hour with a friend, best friend, and/or partner (Armstrong-Carter et al., 2023). They found adolescents felt less social connectedness when they had interacted with peers on social media in the past hour; however, this was only apparent for those who were more susceptible to peer influences. Three additional studies examined the impact of active use on well-being (Beyens et al., 2020), affect (Bayer et al., 2018), and connectedness (Garrett et al., 2023), finding that instances when adolescents had more direct exchanges with others on social media lead to more positive outcomes, relative to their average. The fourth study investigated the within-person effect of social media use in general on friendship closeness (Pouwels et al., 2021). They observed very small negative within-person effects of Instagram and WhatsApp use on momentary experiences of friendship closeness. In other words, adolescents felt less close to their friends after they had used the platform the previous hour compared to when they did not use it. Because type of use was not specified, it is possible the results stemmed from social media use (such as browsing) that displaced quality time with friends.

Combining the within-person and previously mentioned between-subjects effects, it can be argued that (at least some) individuals experience heightened positive outcomes immediately as a result of posting information. By employing a person-specific perspective to intensive longitudinal data, the current study addressed, for the first time, the association between posting on social media and social connectedness in the moment at the individual level. It was hypothesized that individuals would experience higher levels of connectedness after posting about themselves on social media in the

previous hour as compared to when they had not posted (positive within-person level association, H1).

Second, research employing ESM has deduced upward social comparison as the fundamental mechanism in fluctuations of self-evaluations, rather than directly gauging social comparison. Additionally, these studies have not considered the effects of downward social comparison. One ESM study assessed the effect of how much participants browsed Facebook since the last survey on current well-being (Verduyn et al., 2015). Another ESM study repeatedly exposed participants to fit/thinspiration or neutral content and had them report their state body dissatisfaction (Yee et al., 2020). In both cases, social comparison processes were not directly assessed, and thus their conclusions regarding upward social comparison as the underlying mechanism in the negative within-persons effect were only speculative. One ESM study that did report women experiencing a decrease in appearance-esteem and social-esteem, relative to their average level, following an upward comparison, did not focus on the social media context (Leahy et al., 2011). Therefore, the current study sought to contribute to social media effects, and self-esteem and social comparison theories by investigating the momentary effects of social media-induced social comparison on self-esteem. Aligning with between-subjects effects, it was predicted that an individual would experience decreases in self-esteem after engaging in higher levels of upward social comparison when using social media in the previous hour as compared to moments with lower levels of upward social comparison (negative within-person level association, H2a). Conversely, it was hypothesized that an individual would experience increases in self-esteem after engaging in higher levels of downward social comparison when using social media in the previous hour as compared to moments with lower levels of downward social comparison (positive within-person level association, H2b).

Method

Participants

Participants were required to have their own smartphone to receive notifications of, and subsequently complete, the multiple daily surveys. The sample consisted of 74 undergraduate students recruited through the Department of Psychology Research Participation Pool. The sample size is consistent with smaller-scale ESM studies on social media use (e.g., Beyens et al., 2020; Verduyn et al., 2015).¹ Three participants were excluded for noncompletion of the baseline survey or all ESM surveys, resulting in a final sample size of 71. Forty-nine participants self-identified as female (68%), 19 as male (26%), and three as non-binary (4%). Adults were between the ages of 17² and 51 ($M=21.39$, $SD=5.29$, $Mdn=19.5$) with 86% between 17- and 24-years old. The ethnicity³ of most participants included: not of a visible minority (54%), South Asian (10%), Filipino (10%), Asian (5%), Indigenous (5%), and Black (4%). Less than 10% of the sample identified as Arab, Chinese, Latin American, Southeast Asian, or West Asian.

Procedure

The project was approved by the Human Ethics Review Board at the author's institution, and all methods were performed in accordance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2).

Within a span of six days, participants attended a baseline session and were asked to complete a total of 31 ESM surveys. Data collection took place February 2022 to December 2022.

Baseline session

Participants were sent an email which provided the ESM software application (Ethica Data) registration URL, a copy of the consent form, and a link to a virtual meeting. To adhere to institutional regulations regarding the conduct of research put in place in response to COVID-19, all meetings with participants were held virtually through Google Meet. During the baseline meeting, participants were provided with instructions about the ESM study, completed registration for Ethica Data, provided consent to participate, and installed the ESM software application on their smartphone. Subsequently, students completed a baseline survey in which they were asked to report demographic information and social media use metrics, and complete scales to assess trait self-esteem and peer attachment. Following this, participants were directed to complete the first ESM survey (detailed below). Participants received research participation credit (0.5%) in their introductory psychology course for participating in the baseline survey.

ESM surveys

Participants received notifications on the Ethica Data App to complete six 1-min surveys per day for 5 consecutive days (i.e., 30 ESM surveys per person) at random time points within a fixed period. The questions on the survey were administered in the same order as presented in the materials section. The number of questions on each survey varied (4–10 questions) depending on their recent social media use. Upon completion, participants received additional research participation credit in their introductory psychology course that varied according to the number of ESM surveys completed (maximum additional 1.5%).

Schedule of Surveys. The in-app notifications for the ESM surveys were sent between 9:00 am and 10:00 pm. To maximize compliance, a 1-hr time window was provided to complete each survey (as per Beyens et al., 2020). Participants received an in-app reminder notification if after 20 min of the first in-app notification they had not responded. If a participant did not respond within the 1-hr timeframe, then the ESM survey was marked incomplete.

Compliance. A total of 2,294 surveys were sent. A total of 1,844 were fully or partially completed, resulting in a compliance rate of 80%, which is comparable to previous ESM studies (Beyens et al., 2020). Participants completed an average of 25.2 surveys (range: 6 to 31). Three participants were removed from the sample because one only completed a single ESM survey and two failed to complete the baseline survey. This resulted in a final sample size of 71 participants with 1,809 observations.

Measures

Sociodemographic information (baseline)

They were asked to self-report their age, gender, and ethnicity along with responding on a seven-point Likert scale (0 = *not at all*, 6 = *multiple times a day*), on average, how often they use a variety of trending social media platforms: Facebook, Instagram, Snapchat, YouTube, TikTok, LinkedIn, Tumblr, Reddit, Twitter, and other.

Control variables (baseline)

Indicators of trait self-esteem and friendship quality were included as control variables in the study. The 10-item Rosenberg Self-Esteem Scale (Rosenberg, 1965) measures global self-worth by measuring positive and negative feelings about the self. All items are rated using a four-point scale (1 = *strongly agree*, 4 = *strongly disagree*). Positively worded items were reverse scored prior to summing, such that higher scores represent higher levels of trait self-esteem. Scores can range from 10 to 40 (Cronbach's $\alpha = .87$).

The 25-item peer subscale of the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987) was included to measure friendship quality. Participants rated how true each statement was regarding their feelings about their relationships with their close friends on a five-point scale (1 = *almost never or never true*, 5 = *almost always or always true*). Scores can range from 25 to 125 (Cronbach's $\alpha = .92$).

State self-esteem (ESM)

Based on the procedure of Valkenburg et al. (2021a), state self-esteem was measured by asking participants "How satisfied about yourself do you feel right now?" They answered on a seven-point scale ranging from 0 (*not at all*) to 6 (*completely*), with 3 (*neither satisfied or dissatisfied*) as the midpoint.

Connectedness (ESM)

Consistent with the single-item measure of self-esteem, participants were asked "How accepted and included by your friends do you feel right now?" They responded on a seven-point scale ranging from 0 (*not at all*) to 6 (*completely*), with 3 (*neither accepted/include or rejected/excluded*) as the midpoint.

Social media activities (ESM)

Participants were asked to indicate (yes or no) if in the previous hour they used (i) Instagram, Snapchat and/or Facebook and (ii) any other social media sites. They only received questions to elaborate on their social media experiences if they answered affirmatively to either item. In line with Valkenburg et al. (2021a), to reduce potential challenges with retrospective self-report regarding social media behaviors, the decision was made to limit the amount of time they were asked to reflect on to the past hour.

To measure social comparison, participants were provided with a context for social comparisons as "People can compare themselves to others based on how they look, how popular they are, their successes or achievements, degree of happiness, and so on." On a seven-point scale (0 = *not at all*, 3 = *sometimes*, 6 = *a great deal*), participants responded to the following two questions: (1) "When you were using social media in the previous hour, how much did you compare yourself to those who appear better off than you?" and (2) "When you were using social media in the previous hour, how much did you compare yourself to those who appear worse off than you?"

Participants were asked to indicate (yes/no) if they posted information about themselves on social media in the previous hour. When answering affirmatively, they were additionally asked "How positive was the information you posted about yourself on social media in the previous hour?" They responded on a seven-point scale ranging from 0 (*not at all*

to 6 (*very positive*), with 3 (*neither positive or negative*) as the midpoint.

Statistical analysis

ESM data can be conceptualized as hierarchical data, where repeated observations (ESM survey responses; level 1) are nested within a given individual (subject level; level 2). The current study followed Hedeker and Mermelstein (2022) and Bolger and Laurenceau (2013) to estimate mixed multilevel models using STATA software (version 18 for windows) using the mixed command and maximum likelihood for estimation. This approach takes into account the dependency of repeated measures within the same individual and is not affected by non-informative missing values. Separate multilevel random regression models (with random intercepts and random slopes) were used to estimate the effect of the independent variables (posting/social comparison) on the dependent variables (connectedness/state self-esteem). To determine the unique effect of social media activities on connectedness and satisfaction with oneself, friendship quality and trait self-esteem were entered as covariates. The models only included assessments during which participants had used social media.

Aligning with recent research (Bayer et al., 2018; Beyens et al., 2020; Pouwels et al., 2021), the current study separated social media-induced fluctuations for connectedness and self-evaluations *within* individuals from social media-induced differences *between* users. Multilevel models make it possible to model between-person effects and within-person effects simultaneously. Person-mean-centering refers to subtracting the individual participant's mean from each of their scores. Each model included real-time predictors of posting and comparison behavior (person-mean-centered) to depict within-person variance and their averages (person-means) to capture average levels of behavior (i.e., between-person component) over the course of the six days.

Results

Descriptives: social media platforms

Based on the demographic survey, participants reported social media use consistent with current social media patterns (Vogels et al., 2022). Most of the sample reported daily use of Instagram (85%), Snapchat (69%), YouTube (52%), and TikTok (56%). Facebook was less popular with 35% of the sample reporting daily access and 30% indicating they never use it. Most participants never use LinkedIn (59%), Tumblr (87%), Reddit (48%), or Twitter (49%). Seventeen participants identified using other non-listed platforms, including: BeReal ($n=4$), Clubhouse ($n=2$), Discord ($n=4$), Pinterest ($n=5$), Twitch ($n=1$), WhatsApp ($n=2$), and VSCO ($n=3$). On average, they used these platforms once a week to once/twice a month ($M = 2.33$, $SD = 1.37$). Of the 1,809 ESM surveys, participants reported accessing only Instagram, Snapchat, or Facebook for 443 assessments (25%), Instagram/Snapchat/Facebook along with other social media platforms for 356 assessments (20%), or other social media platforms besides Instagram/Snapchat/Facebook for 187 assessments (10%). Overall, participants used social media 55% of the assessments ($n = 986$), and 81% of the time they had used at least Instagram, Snapchat, or Facebook.

Descriptives and correlations: variables in the models

Table 1 presents the number of observations, descriptive statistics, and between-person and within-person correlations of all variables in the study. As the table shows, the average level of peer attachment and trait self-esteem was relatively high. Upward comparison, on average, was significantly negatively associated with trait self-esteem, indicating that those who have a higher level of global self-worth made upward comparisons less often (over the five-day period).

In total, participants used social media 55% of the assessments (986 observations) and reported posting 10% of the time they used social media (103 observations). They also indicated engaging very little in social comparison. At the within-person level, posting was positively correlated with connectedness, and upward comparison was negatively associated with satisfaction with oneself.

The intercept-only model without predictors revealed an intraclass correlation (ICC) of 0.45 for state self-esteem and 0.54 for connectedness (not reported in **Table 1**). In other words, 45% of the variance in momentary self-esteem and 54% of the variance in momentary connectedness were explained by differences between participants (i.e., between-person variance), whereas 55% and 46% of these variances were explained by fluctuations within participants (i.e., within-person variance). These ICCs confirm that the sampling scheme of six assessments a day yielded sufficient within-person variance in self-esteem and connectedness (Pouwels et al., 2021).

Investigating hypotheses

Short-term effects of posting on connectedness (Model 1)

Only 34 participants indicated posting (totally 103 observations), with an average of 3.03 ($SD = 3.24$) posts during the 5-day period. It should be noted, when posting, participants reported sharing relatively positive content ($M = 4.23$, $SD = 1.31$), with 74% of the posts deemed as positive to some extent, 18% neither positive or negative, and 8% as negative to some extent. The outcomes of the model analyzing the effects of posting (yes/no) on sense of connectedness are presented in **Table 2**. The moments when individuals posted on social media were related to higher levels of concurrent connectedness (0.30 points on a 0–6 scale) compared to moments when they did not post, after controlling for peer attachment ($B = 0.30$, $SE = 0.11$, $p = .009$). The results

suggest that posting is related to higher connectedness within persons, supporting H1. However, there was no evidence for a between-person association between posting and connectedness after controlling for peer attachment ($B = -0.32$, $SE = 0.71$, $p = .66$). This suggests that adults who posted more on average when using social media during the timeframe reported no more negative (or positive) average levels of connectedness compared to those who posted less frequently.

Short-term effects of social comparison on self-esteem (Models 2 & 3)

The outcomes of the models analyzing the effects of social comparison on state self-esteem are included in **Table 3**. Greater upward social comparison was related to lower satisfaction about oneself shortly after, over and above trait-level of self-esteem ($B = -0.22$, $SE = 0.03$, $p < .001$). Moments with higher upward social comparison (a one-unit increase relative to their average level on a 0–6 scale) are associated with lower satisfaction with oneself (a decrease of 0.22 points on a 0–6 scale) than moments with lower upward comparison. The results suggest that upward social comparison is related to lower self-esteem within persons, supporting H2a. Based on the nonsignificant between-person effect, there is no evidence of a relationship between upward comparison and self-evaluations, after controlling for trait self-esteem ($B = -0.04$, $SE = 0.09$, $p = .68$). In other words, adults with higher mean upward social comparisons during the timeframe reported no more negative (or positive) levels of satisfaction with themselves compared to those with lower mean upward comparisons when using social media.

The current study also investigated the between-person and within-person effects of downward social comparison on state self-esteem. The between-person ($B = 0.02$, $SE = 0.13$, $p = .87$) and within-person ($B = -0.06$, $SE = 0.05$, $p = .25$) associations between downward social comparison and satisfaction with oneself were not significant, controlling for trait self-esteem. H2b was not supported.

Discussion

Applying a within-person approach, the current study investigated how posting content and engaging in social comparison when using social media relate to momentary connectedness and self-esteem. The relationships were investigated with assessments six times a day for 5 days. The (near-)real-time

Table 1. Descriptives and correlations between study variables

Variable	Descriptives ^a				Correlations ^b					
	Obs	Range	<i>M</i> (<i>SD</i>)	<i>SE</i>	1	2	3	4	5	6
1. Connectedness	1,809	0–6	4.53	0.12	—	0.64***	0.08*	-0.08*	0.03	
2. State self-esteem	1,807	0–6	4.18	0.12	0.84***	—	0.05	-0.23***	-0.01	
3. Posting	986	0–1	0.10	0.02	0.01	0.03	—	0.003	0.08*	
4. Upward SC	986	0–6	1.28	0.13	-0.05	-0.07	0.03	—	0.44***	
5. Downward SC	986	0–6	0.61	0.08	0.04	0.14	0.19	0.63***	—	
6. Peer attachment	71	63–122	97.80 (14.07)	1.67	0.59***	0.47***	0.12	0.12	0.10	
7. Trait self-esteem	71	20–40	28.68 (5.15)	0.61	0.49***	0.60***	0.06	-0.27*	0.01	0.42**

Note. The range represents the range of scores observed in the study. Obs = total number of observations; SC = social comparison.

^a Means of connectedness, state self-esteem, posting, and social comparison represent the average of the person-mean scores.

^b Within-person correlations are presented above the diagonal, and between-person correlations are presented below.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

Table 2. Predicting connectedness from posting at the within-person and between-person level

Effects	Estimate ^a	SE	<i>p</i>	CI ₉₅	
				LL	UL
Fixed effects (intercept, slopes)					
Intercept ^b	4.57	0.12	<.001	4.33	4.80
Peer attachment ^c	0.04	0.01	<.001	0.03	0.05
Posting BP	-0.32	0.71	.66	-1.71	1.08
Posting WP	0.30	0.11	.009	0.07	0.52
Random effects ([co]-variances)					
Intercept	0.62	0.12		0.43	0.89
Posting WP	0.01	0.02		0.0001	1.05
Intercept and posting WP	-0.07	0.09		-0.24	0.10
Residual	0.88	0.04		0.80	0.96
Fit indices					
BIC	2,883.51				
AIC	2,844.37				

Note. Model was based on 985 observations across 71 people with an average of 13.9 times completed assessments (range: 2–24 ESM surveys). WP = within-person, BP = between-person. BIC = Bayesian information criterion. AIC = Akaike information criterion.

^a Estimates are unstandardized.

^b Intercept represents connectedness level for those who never post and have an average level of peer attachment.

^c Peer attachment was grand mean-centered so 0 represents those with the average level of attachment.

Table 3. Predicting Self-esteem from Social Comparison at the Within-Person and Between-Person Level

Effect	Estimate ^a	upward				downward				
		CI ₉₅		LL	UP	CI ₉₅		LL	UP	
		SE	<i>p</i>			SE	<i>p</i>			
Fixed effects (intercept, slopes)										
Intercept ^b	4.12	0.14	<.001	3.83	4.40	4.06	0.12	<.001	3.82	4.30
Self-esteem ^c	0.12	0.02	<.001	0.08	0.15	0.12	0.02	<.001	0.08	0.15
Comparison BP	-0.04	0.09	.64	-0.21	0.13	0.02	0.13	.87	-0.24	0.28
Comparison WP	-0.22	0.03	<.001	-0.27	-0.16	-0.06	0.05	.25	-0.15	0.04
Random effects ([co]-variances)										
Intercept	0.48	0.10		0.32	0.72	.047	0.10		.31	0.71
Self-esteem WP	0.02	0.02		0.001	0.18	0.02	0.02		.002	0.17
Intercept and self-esteem WP	0.02	0.03		-0.05	0.09	-0.01	0.04		-0.08	0.06
Residual	1.19	0.06		1.08	1.31	1.26	0.06		1.15	1.38
Fit indices										
BIC	3,155.39					3,207.40				
AIC	3,116.26					3,168.27				

Note. Models were based on 984 observations across 71 people with an average of 13.9 times completed assessments (range: 2–24 ESM surveys). WP = within-person; BP = between-person; Self-esteem = state self-esteem. BIC = Bayesian information criterion. AIC = Akaike information criterion.

^a Estimates are unstandardized.

^b Intercept represents self-esteem level for those who never engaged in social comparison and have an average level of trait self-esteem.

^c Trait self-esteem was grand mean-centered, so 0 represents those with the average level of trait self-esteem.

effects of posting on connectedness and upward social comparison on self-esteem reveal positive and negative associations, respectively, supporting H1 and H2a. These findings supplement between-subjects effects by emphasizing that relatively specific social media experiences are associated with immediate (subtle) effects within individuals at the state level. Thus, although relatively rare for some individuals, posting may be conceptualized as an uplifting experience and social media-induced upward social comparison as a hassle. This distinction is important when considering affective daily experiences and emphasizes the need to incorporate social media experiences into affective event models.

Moments when an individual posted something on social media were associated with feeling more connected to peers, relative to their mean connectedness, compared to instances

when they did not post during their social media use. Even within the limited instances of observed posting, a consistent trend of positive content norms was evident on social media. Individuals shared relatively positive content about three-quarters of the time when they did post. Based on the capitalization theory (Gable et al., 2004), individuals could have derived positive relational outcomes simply from sharing positive information on social media. Additionally, according to the literature, positive posts receive greater response from one's social network compared to negative posts (Forest & Wood, 2012; große Deters et al., 2016). Social feedback online, which can take the form of direct replies, comments or likes, is often regarded as an indicator of social acceptance and has been found to influence feelings of belonging (Chua & Chang, 2016). Therefore, someone who adheres to the

positivity norm may be perceived as more likable, strengthening new and existing friendships. Notably, instances of posting were relatively infrequent and only present for a small number of people; 34 participants reported posting across 103 social media events. Therefore, people are not typically capitalizing on the established benefits associated with this means of engaging with peers. To boost engagement with peers when using social media, users can proactively customize existing notification and reminder settings, encouraging them to share updates, post content, or engage with others. Additionally, platforms could include messaging advising that for social benefits to be gained from posting, it should be carried out in a genuine and positive manner.

People experienced lower satisfaction with themselves following instances when they engaged in higher upward comparison relative to their average behavior during their social media use in the previous hour. Given that people reported very little social comparison on average, the model indicates that engaging in some (vs. little) comparison is associated with decreases in state self-esteem. Although feelings of inspiration and enjoyment were possible (as per Verduyn et al., 2020), the finding of this study indicate that adults more often succumb to feelings of jealousy or envy, leading to more negative self-evaluations. In a 2018 survey, almost half of teens believe social media has neither a positive nor negative effect on people their age (Anderson & Jiang, 2018). And, only about 15% of teens expressed that social media has a negative effect on their peers because it provides users with an unrealistic view of others' lives. As such, individuals may be using social media without an awareness of how it is actually impacting them on a daily basis or have the necessary tools to promote healthy use. Focusing on immediate effects for self-esteem, the current findings indicate that the effects of upward comparison present themselves in the moment, and therefore, restrictive practices such as controlling how much time is spent on social media would not be effective in this context. Since social media-induced downward comparisons did not boost subjective evaluations in the moment or on average (a finding consistent with Vogel et al., 2014), reframing one's position compared to another's would likely not be effective. Strategies that have shown potential for stimulating more positive social media experiences include mindfulness approaches (Hu et al., 2023) and social savoring (Andrade et al., 2023) as alternatives to social comparison. Both these approaches aim to reframe their thinking and behavior to promote more adaptive responses. Mindfulness focuses on maintaining the present moment in a nonreactive and nonjudgmental manner, whereas social savoring shifts the focus from the self to the target (i.e., feeling happy for someone else).

Limitations and directions for future research

The findings should be interpreted in light of some limitations. First, it should be noted that the young adults in this study represented those with relatively positive levels of peer attachment and self-esteem, and thus would be considered as those who are faring well socially. Studies with more vulnerable samples, including youth who exhibit severe social challenges or depression, may elicit different patterns of effects. Indeed, different within-subjects effects of social media interactions on connectedness have been observed for those more compared to less susceptible to peer influences (Armstrong-Carter et al., 2023). Second, although individuals

experienced ups and downs in response to posting and upward social comparison when using social media, these fluctuations were relatively small. Assuming a normal distribution, 95% of people exhibit (on a 0–6 scale) an increase of 0.07–0.52 points for connectedness when posting compared to not posting and a decrease of –0.28 to –0.15 for self-esteem when engaging in upward comparison one point higher than their average comparison behavior. The small fluctuations observed, however, further highlight the importance of using within-subjects approaches to understanding the subtle effects of social media use. As a next step, investigations are needed to clarify whether young adults who feel good or bad consistently in the moment would experience more positive or negative consequences over months or years.

Third, the social media experiences were considered in isolation of the rest of participants' social context, an approach that has dominated social media research. What happens on social media does not happen in a vacuum; social media experiences can affect offline interactions and vice versa (Desjarlais & Joseph, 2017). It is possible that any within-person effects from posting and upward comparison are subdued or elevated when combined with what happens in their real-life day-to-day experiences, before or after the fact. Additionally, although participants were asked about their social comparisons during social media use, it may be difficult for some to separate general social comparison thoughts from those induced by social media. In the absence of a non-media contrast, it remains conceivable that the connection observed between social comparison and self-esteem may be attributed to a tendency to engage in social comparison. To gain insight into the complexities of social media experiences, future research needs to consider the context in which users approach social media.

It should be noted that instances of posting and engaging in upward social comparison on social media were relatively rare over a span of 5 days. However, this information holds significance, considering existing research posits that such experiences play a pivotal role in both the advantages and disadvantages of social media. This prompts questions such as: Have the social media behaviors of undergraduate students evolved over time, resulting in reduced engagement today compared to earlier studies? Or, are variances attributed to differences in methodological approaches? The traditional correlational study asks users to self-report on their general or typical posting behavior or thoughts of social comparison (Griffioen et al., 2020). Recall of minor experiences becomes difficult as time passes (Stone & Shiffman, 2010), and can be biased by general beliefs of the self and current mood states (Mill et al., 2016). One advantage of ESM is that asking individuals to report on experiences in the past hour decreases recall bias associated with retrospective reports and increases the reliability (Hektner et al., 2007). If ESM data are more dependable, another question arises: How do these infrequent online experiences interact with offline experiences to shape state connectedness and self-esteem, and ultimately well-being? Consequently, scholars might explore the integration of experience sampling techniques with traditional longitudinal research methods to unravel the enduring effects of daily fluctuations of connectedness and self-esteem induced by social media.

Conclusion

The associations between mundane social media experiences and facets of well-being are observable on an hourly basis. The findings of the present study underscore the importance of social media use in daily life with specific usage behaviors changing how adults feel about themselves and their relationships in the moment. Whereas posting on social media is associated with increases in connectedness, moments of increased upward social comparisons were accompanied by decreases in self-esteem. Future studies are encouraged to consider the interplay between social media experiences and offline interactions on a daily basis and over time.

Acknowledgements

Nathan Vander Wal, Brittney Olsson, and Laura Infantes are acknowledged for providing support for data collection.

Data availability

The anonymous data set underlying this study is available at <https://data.mendeley.com/datasets/xb3pxmpjgn/1>

Funding

This work was supported by the Mount Royal University Faculty of Arts Endeavor Fund [October 21, 2021].

Conflicts of interest: The author declares that there is no conflict of interest.

Open science framework badges



Open Data

Digitally shareable data necessary to reproduce the reported results are publicly available for this article.

Notes

1. A target sample size of 100 was established, given that this sample size has been deemed sufficient for designs-intensive longitudinal studies with at least 10 observations per person (Hedeker, 2021). Additionally, the minimum of 30 participants is considered adequate to power within-person analyses in multilevel models (Khamis & Kepler, 2010). However, data collection stopped was when the target date for the deadline was reached, as determined by the available resources. Based on the listed ESM studies, the achieved sample size was considered adequate for investigating within-person effects.
2. Based on ethics protocols at the author's institution, university students can consent on their own behalf even though they may not yet be 18 years old. It is deemed that they have sufficient capacity to make this determination.
3. Ethnicity categories were derived from the Canadian Census Classifications.

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