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Original Research Report

Social Media Bytes: Daily Associations Between Social Media Use and Everyday Memory Failures Across the Adult Life Span

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Abstract

Objectives: The prevalence of social media use in daily life is increasing; however, little is known about its cognitive costs and/or benefits. Social media use may help to offload memory to an external resource as well as to facilitate social relations, which could bolster or hinder everyday memory. Further, the relationship between social media use and memory may be moderated by age such that associations—whether positive or negative—could be exacerbated among older adults due to age-related declines.

Methods: Using an 8-day daily diary study from the Midlife in the United States Refresher cohort (n = 782, 25–75 years), multilevel models examined the impact of daily social media use, age, and their interaction on same-day and next-day memory failures.

Results: The concurrent model revealed that on days when social media use was high, individuals reported more memory failures. The lagged model further revealed that higher previous-day social media use was associated with more memory failures on the subsequent day, controlling for previous-day memory failures. These effects were not moderated by age. Post hoc analyses revealed no evidence of reverse-causation as previous-day memory failures did not predict next-day social media use.

Conclusions: Although past research has consistently shown that social engagement is a protective resource for memory, social media use may be a risk factor for memory failures for adults of any age. These findings highlight the growing importance of understanding the implications of social media use.

Keywords: Aging, Daily diary, Everyday memory failures, Social media

The popularity and use of social media has steadily increased over the past decade across all age groups (Pew Research Center, 2018). Within the United States, approximately two thirds of adults (68%) have at least one social media account, and of those adults, three fourths report daily use (Pew Research Center, 2018). Although prior research has consistently demonstrated that social engagement is beneficial for cognitive functioning in later life (Barnes, Mendes de Leon, Wilson, Bienias, & Evans, 2004; Bassuk, Glass, & Berkman, 1999), the proliferation of web-based technology has dramatically changed how we interact with others. These changes in the mode of social interaction necessitate an examination of the implications of social media use for cognition across the adult life span. Recent work has examined the relationship between social media use and cognitive functioning in young (i.e., Wang, Lee, & Hon, 2017) or older adulthood (i.e., Kim & Kim, 2014), but less is known about the day-to-day effects

of social media use on cognitive functioning. Therefore, the current daily diary study aims to examine how social media use influences everyday cognition in a large, adult life span sample.

The Potential Benefits and Costs of Social Media

Some evidence suggests that social media may be beneficial for cognition, particularly memory functioning, as it helps to facilitate social relations and maintain emotional closeness regardless of geographic proximity. Prior research has found that both young and older adults who use social media demonstrate better socioemotional outcomes, such as less loneliness and more social capital (Chopik, 2016; Steinfield, Ellison & Lampe, 2008). Better socioemotional functioning may, in turn, benefit general cognitive functioning through stress-buffering and/or cognitive stimulation mechanisms (see review; Hertzog, Kramer, Lindenberger, & Wilson, 2009). Further, social media may also help to enhance everyday memory (i.e., self-perceived daily memory functioning) in particular by reinforcing past events (i.e., looking at posts and/or photos from previous events), providing reminders of birthdays and future events, and strengthening links between people's faces and names through repeated exposure (Kanai, Bahrami, Roylance & Rees, 2012). Indeed, the Internet has been theorized to act as an efficient transactive memory source insofar as it helps to offload memory onto an external resource to maintain cognitive efficiency. Although research on the effects of social media use on cognition is extremely limited at present, some preliminary studies have found beneficial effects (Kim & Kim, 2014; Myhre, Mehl, & Glisky, 2017; Wang et al., 2017). For example, when examining social media use and autobiographical memory, posting about personal events on social media was associated with better subsequent recall of these events, even after controlling for the emotional intensity and personal importance of the events (Wang et al., 2017).

Alternatively, social media use may come with unintended costs to memory functioning through the same mechanism of offloading memory onto an external resource. Offloading memories rather than maintaining one's own memory traces may reduce metacognitive ability (i.e., what you do and do not know), as well as the construction of schemas necessary for encoding new memories (Sparrow, Liu, & Wegner, 2011; Ward, 2013). Specifically, prior research suggests that an overreliance on external rather than internal memory resources can reduce memory capacity (Tamir, Templeton, Ward, & Zaki, 2018). For example, in a cross-sectional study of social media use, individuals who reported high levels of Facebook use had significantly worse memory on an emotional word recall task than individuals classified as low Facebook users (Frein, Jones, & Gerow, 2013). However, this study could not rule out the possibility that individuals with lower cognitive ability were more likely to use Facebook than individuals with higher cognitive ability.

Frequent social media use may also compromise memory functioning through attentional disengagement, which interferes with memory encoding. Individuals may allocate attentional resources to their social media account rather than attending to real-world experiences. For example, an experimental study asked participants to either passively view a series of paintings, take photographs of the paintings, or use Snapchat (a photo-sharing-based social media platform) to document their experience of the paintings. Participants who used Snapchat demonstrated lower recall for the paintings than the other two groups (Soares & Storms, 2018). It may be that using Snapchat increases engagement in activities related to self-presentation (i.e., choosing between slight variations on the same photo, applying Snapchat filters, composing captions), thereby distracting individuals from the content of the photos themselves. Indeed, social media platforms have been found to be distracting and highly addictive (Kuss & Griffiths, 2011; Song, Larose, Eastin & Lin, 2004).

Does Age Moderate the Effects of Social Media Use?

The use of social media is often examined in younger adult populations; however, the prevalence of social media use in older adults is steadily increasing. In 2013, approximately 45% of adults 65 years and older used Facebook and this statistic increased to 56% when measured again in 2014 (Duggan et al., 2015). With the increasing use of social media in older populations, there is a need to assess whether the relationship between social media and cognition varies dependent on the age of the user. Although scant research has examined the use of social media in older adult populations, some evidence suggests that it may be beneficial for older adults. In a cross-sectional study, older adults who used social media had significantly better cognitive performance on the Mini Mental State Exam compared to older adults who did not use social media (Kim & Kim, 2014). In an intervention study, older adults who were trained to use social media had significantly better cognitive performance on laboratory measures of updating (i.e., one component of executive functioning) and processing speed compared to controls and those who were trained to use a private blog website (Myhre et al., 2017).

With increasing age, older adults are faced with age-normative declines in cognitive (Old & Naveh-Benjamin, 2008; Salthouse, 2006) and physical functioning (Hughes et al., 2001). If these age-related deficits in physical and/or cognitive functioning decrease older adults' ability to stay in touch with social network members, then social media use may act as a compensatory mechanism to maintain social contact (i.e., selection, optimization, and compensation model; Baltes, 1997). For older adults who are less able to meet face-to-face with friends/family, social media may

help to supplement social communication through online interactions and in turn, help to optimize these social relations (see review; Antonucci, Ajrouch & Manalel, 2017). Similarly, the use of social media as an external memory resource may help to compensate for age-related declines in memory. However, it is also possible that the negative consequences of social media, including overreliance on an external memory resource and attentional-disengagement, have disproportionate effects on older adults because of age-normative declines in cognitive resources.

Overall, prior research has shown mixed findings linking social media use and memory functioning. On one hand, social media may act as an efficient external memory aid and/or help to facilitate social relations, which can be beneficial for memory functioning. On the other hand, social media use may increase dependency on external memory aids and/or impede efficient memory encoding through distraction. Therefore, this study aimed to examine the relationship between social media use and memory functioning across the adult life span through a daily diary study. We were specifically interested in examining everyday memory failures as our index of memory functioning (Sunderland, Harris, & Baddeley, 1983). Laboratory tests of cognition may not accurately represent individuals' ability to function independently and efficiently in everyday life. Indeed, prior research has shown differential effects of laboratory-based and more naturalistic measures of memory (see meta-analysis; Henry, MacLeod, Phillips & Crawford, 2004). Thus, we were interested in examining memory in a more ecologically valid context.

Our goals for the current study were twofold: First, we aimed to examine whether social media use was beneficial or harmful to memory functioning on a daily level. Because of mixed findings in the limited extant research, we aimed to test two competing hypotheses. Specifically, on days when social media use is high, we hypothesized that individuals would either have (a) fewer memory failures (i.e., beneficial effect) or (b) more memory failure (i.e., harmful effect). Because both positive and negative effects are possible, finding no association between social media use and everyday memory could reflect a true lack of effects or similarly sized positive and negative that wash each other out. Second, we aimed to examine whether age moderated the relationship between social media use and memory failures. Specifically, we hypothesized that with increasing age, the effects of social media use—whether positive or negative—would be magnified due to age-related functional declines.

Method

Participants and Procedure

Participants in the current study were from the Midlife in the United States (MIDUS; Brim, Ryff, & Kessler, 2004) Refresher cohort. The MIDUS Refresher cohort was collected from 2011 to 2014 in order to replenish the original longitudinal MIDUS sample that had diminished over time due to attrition. A national probability sample of approximately 3,500 new participants were collected to mirror the original MIDUS baseline sample. Subsequently, a subsample of the MIDUS refresher (n = 782) participated in an 8-day daily diary study between 2012 and 2014. The procedure of this daily diary study in the MIDUS Refresher sample followed the same protocol of the previous MIDUS 2 National Survey of Daily Experiences (Brim et al., 2004). Details of the MIDUS Refresher daily diary study design, sampling, and all assessment instruments are available on the MIDUS website (http://midus.wisc.edu). The final sample included all 782 participants.

The sample consisted of 217 younger (20–39), 400 middle-aged (40–59), and 165 older adults (60+) who were predominantly non-Hispanic white (84.70%). On each day of the study, participants completed a short telephone interview about their daily experiences, such as activity engagement, well-being, and memory failures. More detailed information about the procedure and measures is described later. Compliance rates were high across the sample. Approximately 80.20% of participants completed all 8 days of the study, 90.40% completed at least 7 days, and 93.20% completed at least 6 days. In total, the data set comprises 5,849 days out of a possible 6,256 (N = 782 × 8 days), yielding an overall retention rate of 93.50%.

Measures

Age

Age was represented by a continuous variable representing participants' age in years.

Daily social media use

Each day, social media use was measured by asking participants how much time they spent using social media. Specifically, participants were asked, "Since this time yesterday, how much time did you spend on social media websites (i.e., Facebook, Twitter, MySpace)?" Responses were open ended and reported in hours and minutes. Responses were converted to minutes for the current analyses.

Daily memory failures

Each day, everyday memory failures were assessed with nine items (Sunderland, Harris, & Baddeley, 1983). Participants reported whether they experienced everyday lapses in memory, such as "forgot why you entered a room" and "forgot important information" by responding yes or no to each item. The total number of memory failures experienced were summed for each day and thus could range from 0 (no memory failures) to 9 (reported all memory failures).

Covariates

All analyses were controlled for gender, education, income, health burden, and daily stressors. Gender was self-reported on the first day of the daily diary (1 = Male, 2 = Female).

Education, income, and health burden were self-reported in Wave 1 of the MIDUS Refresher study. Education was self-reported highest completed degree and could range from No school (1) to Advanced Degrees such a PhD, MD, EdD, or other professional degrees (12). Income was self-reported yearly household income. Health burden was the number of health problems (history of heart condition, high blood pressure, cancer, and/or stroke) and could range from 0 (no health problems) to 4 (history of all listed health problems). Number of daily stressors was a time-varying covariate measured on each day of the daily diary study using the Daily Inventory of Stressful Events (DISE; Almeida, Wethington, & Kessler, 2002) and could range from 0 (no stressors) to 7 (all stressors).

Analytic Strategy

Multilevel modeling was used to analyze the current data set due to its nested structure (i.e., days within persons) and is a commonly used technique when handling daily diary designs (i.e., Neupert, Mroczek, & Spiro, 2006; Neupert & Bellingtier, 2017). This technique allows an examination of intraindividual variability (variance around an individual's own average) in social media use and memory failures from day-to-day and whether covariation within individuals is moderated by between-person characteristics (i.e., age). All analyses were conducted in SAS using the Proc Mixed command with the residual maximum likelihood estimation method, which allows for unbiased estimation when data are missing at random. Social media use, age, education, income, physical illness burden, and stressors were grand mean centered for all analyses.

Initially, a fully unconditional multilevel model (i.e., no predictors; see Raudenbush & Bryk, 2002) was conducted to assess whether there was sufficient variance in memory failures at the between-person level (Level 2) and within-person level (Level 1). Subsequently, social media use, age, their interaction, and all covariates were added to the model. This model examined how social media use was associated with same-day memory failures (i.e., concurrent assessments). To test the within-person relationship between age and social media use on same-day memory failures, we used the following formula:

Level 1:

$$\text{MEMORY FAILURES}_{it} = \beta_{0it} + \beta_{1it}\,(\text{Social Media}) + \beta_{2it}\,(\text{Stressors}) + r_{it} \quad (1)$$

Level 2:

$$\beta_{0it} = \gamma_{00} + \gamma_{01}\,(\text{Age}) + \gamma_{02}\,(\text{Gender}) + \gamma_{03}\,(\text{Education}) + \gamma_{04}\,(\text{Income}) + \gamma_{05}\,(\text{Health Burden}) + u_{0i.} \quad (2)$$

$$\beta_{1it} = \gamma_{10} + \gamma_{11}(\text{Social Media} \times \text{Age}) + \gamma_{12}(\text{Social Media} \times \text{Age}^2) \quad (3)$$

$$\beta_{2it} = \gamma_{20} \quad (4)$$

In Equation 1, the intercept (β_{0it}) is defined as the expected level of memory failures for person i when no stressors and no social media use has occurred. The β_{1it} slope is the expected change in memory failures associated with days when social media use increases and the β_{2it} slope is the expected change in memory failures associated with days when stressors increase. The error term (r_{it}) represents fluctuation around the mean, unique to the person i. Equation 2 includes all level 2 covariates: age, gender, education, income, and health burden. The intercept (γ_{00}) represents the average level of memory failures when all predictors are 0. In Equation 3, γ_{10} represents the average relationship between memory failures and social media use, and γ_{11} represents the test of the cross-level linear interaction between age and social media use. As the relationship between social media use and age may not be linear, γ_{12} represented the quadratic effect of age and social media use. Interindividual deviations from the mean level are represented by u_{0i}. In Equation 4, γ_{20} represents the average relationship between daily stressors and memory failures.

Finally, memory failures were lagged to assess whether previous-day social media use had a prolonged effect on next-day memory failures, controlling for previous-day memory failures. The formula for next-day memory failures is identical to same-day memory failures, with the exception of the inclusion of the slope of previous-day memory failures (β_{3it}) where γ_{30} represents the average relationship between previous- and next-day memory failures.

Results

Descriptive statistics across all variables of interest are listed in Table 1. Overall, a majority of participants reported using social media on at least one study day (68%). The fully unconditional model revealed that 47.65% of the variance in memory failures was between-person and 52.35% was within-persons. These findings indicate that there is sufficient day-to-day variance in memory failures and confirmed that multilevel modeling is appropriate. In subsequent models, constraining the slope of all level 1 predictors resulted in a better fitting model compared

Table 1. Descriptive Statistics Across Variables of Interest

	M	*SD*
Age (25–75)	48.27	12.68
% Female	55.10%	—
Health burden (0–4)	0.26	0.53
Education category (1–12)	8.05	2.43
Income (U.S. dollars)	73,205.55	66,513.74
Stressors (1–7)	0.55	0.76
Social media use (minutes)	24.18	58.77
Memory failures (1–8)	0.76	1.18

to the model in which the slopes were allowed to freely vary (concurrent model: $\chi^2(2) = 136.40$, $p < .001$; lagged model: $\chi^2(2) = 201.30$, $p < .001$). Therefore, the slopes were constrained in all subsequent models. Of note, patterns of findings were identical across the constrained and unconstrained models. Standardized coefficients and standard errors of both same-day and next-day memory failure models are listed in Table 2.

Same-Day Memory Failures

A significant concurrent association between social media use and memory failures was found. On days with greater social media use, individuals also reported more memory failures. This effect was not significantly moderated by age ($\gamma_{11} = -.02$, $SE = .02$, $p = .475$; $\gamma_{12} = .03$, $SE = .02$, $p = .156$). In regards to covariates, gender, health burden, and daily stressors also significantly affected memory failures. Specifically, being female, greater health burden, and a greater number of daily stressors were associated with more same day memory failures. This model accounted for 18% of the within-person variance and 21% of the between-person variance in same-day memory failures.

Next-Day Memory Failures

A significant lagged effect of social media use on memory failures was found. On days with greater social media use, individuals also reported more memory failures on the following day, controlling for previous-day memory failures. This effect was not moderated by age ($\gamma_{11} = .01$, $SE = .03$, $p = .958$; $\gamma_{12} = -.03$, $SE = .02$, $p = .209$). Consistent with the previous model, daily stressors and health burden were positively associated with next-day memory failures. This model accounted for 24% of the within-person and 47% of the between-person variance in next-day memory failures.

Post hoc Analyses

Because affect could drive both social media use and memory failures, sensitivity analyses tested whether the inclusion of average daily negative affect (level 1 covariate) changed our findings. Inclusion of daily negative affect did not alter our main findings from the concurrent or lagged models. Given that stress is a potential mediator of the social media use–everyday memory association, a sensitivity analyses was conducted removing stressors from the prior analyses to assess whether the inclusion of stressors influenced the effect size of social media on memory failures. Findings were identical regardless of the inclusion/exclusion of stressors.

Because there may be between-person differences in social media use, we ran an alternative model in which social media use was person-mean centered rather than grand mean centered. In this model, an additional Level-2 variable representing average social media use for the individual was added (i.e., γ_{06}). Findings from the person-mean

Table 2. Standardized Estimates From a Multilevel Model Predicting Daily Memory Failures

	Concurrent		Lagged	
Fixed effects	Est	*SE*	Est	*SE*
Memory failures β_{0it}				
Intercept (γ_{00})	−.01	.02	.01	.02
Age (γ_{01})	−.02	.03	−.02	.02
Gender (γ_{02})	.06*	.02	.04	.02
Education (γ_{03})	−.01	.03	.01	.02
Income (γ_{04})	.04	.03	.04	.02
Health burden (γ_{05})	.08**	.03	.07**	.02
Social media β_{1it}				
Intercept (γ_{10})	.06***	.02	.09***	.02
Age × Media (γ_{11})	−.02	.02	.01	.03
Age² × Media (γ_{12})	.03	.02	−.03	.02
Stressors β_{2it}				
Intercept (γ_{20})	.17***	.01	.10***	.01
Previous day memory failures β_{3it}				
Intercept (γ_{30})	—	—	.16***	.02
Random effects				
Memory Failures (τ_{00})	.37		.24	
Within-Person Fluctuation (σ^2)	.52		.55	
R^2 between-person	21%		47%	
R^2 within-person	18%		24%	

Note: Est = estimate. R^2 variance explained at the within-person and between-person levels were calculated using the Snijders and Bosker (2012) technique.

centered and grand-mean centered models were identical. Specifically, person-mean centered analyses revealed a significant main effect of social media use on memory failures (same-day: $\gamma_{10} = .05$, $SE = .03$, $p = .027$; next-day: $\gamma_{10} = .07$, $SE = .03$, $p = .012$), but no significant interactions between age and social media use for same-day and next-day memory failures ($ps > .08$). Average social media use across the week was not significantly related to memory failures in either the concurrent or lagged analyses ($ps > .11$).

In order to further clarify the directional relationship between social media use and memory failures, an additional multilevel model was conducted. Specifically, we examined whether previous-day memory failures predicted next-day social media use, controlling for previous-day social media use and covariates. This model equation was identical to the previously reported model with the exception that social media use was now the dependent variable and memory failures were the independent variable. Importantly, there was no significant lagged effect of previous-day memory failures on next-day social media, controlling for previous-day social media use (see Supplementary Table 1 for all standardized coefficients). This finding suggests that the link between social media and memory failures is not bidirectional.

Finally, as age may be a proxy for physical and cognitive decline, we ran additional analyses replacing age within our interactions with episodic memory or health burden. Episodic memory was assessed before the daily diary study (i.e., wave 1 of MIDUS Refresher longitudinal study) using a 15-item word free recall task. Health burden (previous described) was also assessed at wave 1. Initial correlations revealed older age was significantly correlated with greater physical illness burden ($r = .29$, $p < .001$) and lower episodic memory ($r = -.19$, $p < .001$). Multilevel modeling revealed no significant interactions (linear or quadratic) when using episodic memory or physical illness burden as a proxy for age.

Discussion

In the current study, we aimed to examine whether social media use was positively or negatively associated with daily memory failures and whether this was further moderated by age. Overall, we found that greater daily social media use was associated with more same-day and next-day memory failures, regardless of age. These findings are consistent with the notion that social media use is detrimental to memory functioning (Tamir et al., 2018; Ward, Duke, Gneezy, & Bos, 2017); however, they contrast with an intervention study that found beneficial effects of social media use in older adult populations (Myhre et al., 2017). This may be, in part, due to methodological differences. Specifically, interventions studies utilize laboratory tests of cognition whereas the current study used a more ecological assessment of memory in everyday life and this may, in part, account for the differential findings. Second, intervention studies require individuals to engage in more active rather than passive social media use (i.e., Myhre et al., 2017), and active use has been more consistently linked to better outcomes (Escobar-Viera et al., 2018). Finally, it may have been the act of learning how to use social media that was beneficial for cognitive function in that study, rather than the use of social media per se. Our findings further contrast with some cross-sectional (Kim & Kim, 2014) and daily diary studies (Wang et al., 2017). This may be, in part, because cross-sectional investigations cannot rule out reverse causation in that older adults with higher cognition may be better able to use social media (i.e., Kim & Kim, 2014). Further, the prior daily diary work showed better memory for specific autobiographical details posted on social media sites (Wang et al., 2017). It may be the case that social media helps to facilitate memory for the specific events shared on social media sites, but it is less helpful for more general daily memory functioning.

Potential Negative Consequences of Social Media Use

One pathway by which social media use may negatively influence memory is through offloading. Individuals may offload some of the responsibility for remembering information onto these social media platforms rather than actively maintaining their own memory traces (Ward, 2013). Social media provides an external memory source that can be used to store information about past autobiographical events, future events, birthdays, names, faces, etc. Therefore, social media users may perceive less necessity for deeply encoding this information internally. Indeed, prior research has demonstrated that media use impairs memory by externalizing experiences (Tamir et al., 2018). The use of these technologies may change how people remember information. Rather than remembering content, individuals are more likely to remember where to find information on the internet (Risko & Gilbert, 2016; Sparrow et al., 2011). Frequent use of this technology may create a long-term reliance on external memory sources, and disuse could lead to skill decay in aspects of memory encoding, consolidation, and/or retrieval.

Social media use may also negatively influence memory through attentional disengagement. When individuals are using social media, which can easily be accessed on smartphones, they may be less engaged in real-world activities and, therefore, may not encode the events and experience as deeply as they would otherwise. Prior research has shown that posting photos on social media is associated with disengagement with an experience (Henkel, 2014; Soares & Storm, 2018). In one study, the mere presence of a smartphone during an experiment was associated with worse cognitive performance (Ward et al., 2017), suggesting that people continuously allocate attentional resources to devices that facilitate these social technologies even when not currently using them.

Finally, social media use may increase exposure to distressing information. With the advent of the Internet, we are

constantly being exposed to a continuous stream of information. Although the content of social media is vastly influenced by user characteristics (i.e., "information bubbles"), news coverage of tragic or partisan events can be posted and reposted by social network members, leading to vicarious re-traumatization. For example, greater exposure to television coverage of the September 11th terrorist attacks was associated with more post-traumatic stress symptoms among a national U.S. sample (Schlenger et al., 2002), and these negative associations were independent of whether the exposure was direct or indirect (i.e., lived near attack location or did not; Silver et al., 2004). Social media has also been shown to increase awareness of stressors experienced by individuals in one's social network (Hampton, Rainie, Lu, Shin & Purcell, 2014). Overall, social media use may increase exposure to stress, and in turn, stress has been shown to negatively influence day-to-day memory functioning (Neupert et al., 2006). Of note, post hoc analyses revealed that daily stressors did not accounted for variance in the relationship between social media use and memory failures. Daily stressors measured in the current study were more general (i.e., work-place stressors) and may not account for specific stress stemming from social media use per se (i.e., seeing negative news or engaging in social comparison). Future research should further explore stress and negative affectivity stemming directly from social media.

Social Media Use Across the Adult Life Span

Past research examining the effects of social media use on cognition has primarily focused on either young or older populations separately; however, scant research directly examined whether associations vary across age. We had hypothesized that age-normative declines in cognitive and/or physical resources in later life would make older adults more vulnerable to the effects of social media use, whether positive or negative. Contrasting with our hypothesis, age did not moderate the relationship between social media use and memory failures.

The lack of distinction across the adult life span suggests that younger and older adults may be equally vulnerable to the consequences of social media use for everyday memory, though future research should include other cognitive outcomes and investigate whether effects are mediated through different pathways for younger and older adults. For example, pathways linking social media use to memory may differ between digital natives (i.e., individuals who have never known a world without advanced technologies) and digital immigrants (i.e., individuals who came into the digital era as adults; Prensky, 2001; Small & Vorgan, 2008). In addition, although the current sample was an adult life span sample (age 25–75 years), older adult participants in this sample are still relatively young (young–old adults). It may be the case that the inclusion of old–old adults (80+) may show greater differentiation of the relationship between social media and memory. Future research is needed to investigate social media use and a wider variety of cognitive outcomes in older populations.

Limitations and Future Directions

Although the current daily diary study found negative implications for everyday memory with the use of social media, it is important to note that these findings do not demonstrate that social media use is universally negative. The impact of social media may vary depending on how it is used. Prior intervention research has shown that isolated older adults who were exposed to social interactions through an Internet platform demonstrated increases in cognitive functioning (Dodge et al., 2015). Other research has shown that the use of social media, specifically Facebook, increases older adults' feelings of social connectedness (Sinclair & Grieve, 2017). These beneficial outcomes of social media use may, in part, depend on the individuals' underlying motives and patterns of use. Prior research has shown variability in motivation for using social media such as companionship, professional advancement, social interactions, habitual passing of time, meeting new people, entertainment, and escapism (Papachariss & Mendelson, 2010). Motivations and other person-specific characteristics may further drive the content that is viewed on social media sites. In particular, the valence of the content may moderate social media's effect on memory, and prior research has shown differential preferences for positive and negative information between young and older adults (Isaacowtiz, 2006; Isaacowitz, Wadlinger, Goren & Wilson, 2006). This age-related positivity effect may, in part, wash out potential age moderation, and future research should assess age differences in content viewed on social media.

How individuals use social media may also influence whether beneficial or detrimental effects emerge. Prior research has shown that more passive use (i.e., scrolling through feeds, "lurking") is associated with more negative effects on well-being relative to more active social media use (i.e., chatting, posting comments, and updates; Escobar-Viera et al., 2018). Overall, the ways in which social media is used may influence whether it is beneficial or harmful for memory. Because the current study could not examine these variables, more specific effects could not be identified. Future research should extend the current findings to examine whether results are moderated by social media site, motivation for use, content observed on social media sites, and patterns of use.

An additional limitation is the reliance on self-reported social media use. Prior research has shown that estimates of social media use may not be as accurate as objective measures (Junco, 2013). Future research should incorporate both self-reported and objective observations of social media use. Finally, the current study can only examine the short-term effect of social media use on everyday memory. Future longitudinal research is needed to examine the long-term implications for memory functioning across the life span.

Strengths of the current study include the use of an adult life span sample (age 25–75 years), which provided preliminary evidence that social media use is associated with memory failures, regardless of age. Another strength is the use of a daily diary study design, which allowed for a more

ecological assessment of the short-term effects of social media use on everyday memory. In addition, the inclusion of both concurrent and lagged models helped to reduce concerns of reverse causality in the relationship between social media use and everyday memory.

Conclusion

In conclusion, social media use, measured daily over 8 days, was associated with more subsequent memory failures, regardless of age. As existing and new social technologies continue to permeate daily life, these findings highlight the importance of understanding how they influence day-to-day cognitive functioning. The current study suggests that social media use may have unintended negative consequences for, at least, short-term memory functioning. Given the high popularity of social media, these findings highlight the need for rigorous investigations into social media use as a potential risk factor for cognitive impairment and decline among older adults. Better understanding of how different social technologies (e.g., Facebook vs Skype) under different conditions (e.g., active vs passive use) yield benefits versus consequences for different individuals (e.g., with and without mobility limitations or mental health risk factors) is needed in order to optimize cognitive health and well-being in our rapidly modernizing society.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological and Social Sciences* online.

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Conflict of Interest

None reported.

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