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Cognitive Effects of Social Media Use: A Case of Older Adults

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Abstract

Research on the effects of social media use at older ages has largely focused on social benefits. Yet, participation in these new media forms may result in other favorable outcomes, such as improved cognitive functioning. Using a wait list-control design, this study examines the effects of social media engagement among novice adult social media users, aged 65 and older, in four cognitive domains: attention, processing speed, working memory, and inhibitory control. Baseline and multiple post-tests indicate improvement of intervention participants in inhibitory control. These findings demonstrate that the benefits of social media use at older ages extend beyond mere social engagement, and into other domains of everyday well-being.

Keywords

older adults; executive function; social media training; experiment

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The social implications of social media have fascinated researchers for some time. Platforms like Facebook and Twitter assist individuals to enhance their social connection (Grieve, Indian, Witteveen, Anne Tolan, & Marrington, 2013), help lonely people gain social support (Vitak & Ellison, 2013), and help students to develop social capital (Ellison, Steinfield, & Lampe, 2007). They intersect meaningfully with personality, offer users a venue to perform and construct identity, and spur and mediate social movements. Simply because the social dimensions of human existence are so important, researchers have placed an emphasis on understanding social media's effects on sociality.

Indeed, sociality is important. Loneliness and social isolation negatively impact overall health, especially for people at later stages in life (Hafner, 2016; Nutt, 2016), which merits the attention placed on how social benefits can be derived from technology and social media engagement. This connection has spotlighted the ways in which social technologies can reduce loneliness among older adults (Baecker, Sellen, Crosskey, Boscart, & Barbosa Neves, 2014; Sinclair & Grieve, 2017). Because social media platforms like Facebook and Twitter

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enhance social connection (Vitak, 2014), it follows that they may present accessible and relatively low-cost mechanisms to enhance social connection, and therefore life quality, at older ages.

It is notable, however, that sociality and cognitive ability are linked in later life. For example, loneliness and social isolation are predictors of cognitive decline among individuals over the age of 65 years (James, Wilson, Barnes, & Bennett, 2011; Tilvis et al., 2004; Wilson et al., 2007). The frequency of supportive interactions with others is protective of the onset of dementia and cognitive impairment (Seeman, Lusignolo, Albert, & Berkman, 2001). Social interaction helps older adults overcome age-related memory changes (Derksen et al., 2015). Thus, it is somewhat surprising that in effects research related to social media, other, non-social domains have not been widely explored among users at older ages.

Older adults[1] are an attractive population through which researchers might examine social media effects. Pew Research reported recently that about one-third of all adults over the age of 65 years reported using social media (Anderson & Perrin, 2017), leaving a considerable proportion, or roughly 40% of the Internet-using older adult population, with limited exposure to these media. This limited exposure provides opportunities for experimental research to be conducted, permitting the establishment of causality, for effects researchers. This study leverages this opportunity by examining the cognitive effects of social media training on a group of older adult, novice social media users. As a part of a larger study that examines how social media technologies might be employed to offset health risk factors and improve health outcomes in an aging population, this study employs a wait-list controlled design for a 4-week social media training workshop with a group of older adult, novice social media users, aged 65 years and older. Through baseline assessment and multiple post-tests, we examine the possibility that the use of social media by older adults results in cognitive change across a variety of executive function domains.

Social Connection and Cognitive Function

The relationship between one's social environment and health has long been recognized (Kaplan, Cassel, & Gore, 1977; Uchino, Cacioppo, & Kiecolt-Glaser, 1996), and numerous studies have explored the key dimensions of sociality that contribute to health. These include social support, or the provision of resources by an individual's social network (Wallston, Alagna, DeVellis, & DeVellis, 1983); social integration, or participation in a broad range of social relationships (Seeman, 1996); and social connectedness, or the ways in which individuals interact (Cohen, 2004). These linkages underscore the significance of interpersonal connection to health and well-being, and evidence the importance of the provisions that social relationships provide: intimacy; social integration; nurturing; reassurance of worth; and assistance (Weiss, 1969).

Maintaining social connection becomes more difficult in later life, however, due to declines in physical mobility and incidence of chronic disease, which occur at higher rates at

1. The term, "older adult" is used deliberately in this article to refer to adults aged 65 years and older. It acknowledges the heterogeneity of abilities represented this age group, and is the preferred terminology in gerontological research (Palmore, 2000).

older ages (Centers for Disease Control and Prevention, 2013). Retirement and the death of spouses and friends reduce the quantity and quality of social relationships. While often welcome and necessary, transition to alternative living facilities, such as assisted care or independent living communities, can exacerbate feelings of loneliness and social isolation, as ties with neighbors and friends in the community become more difficult to maintain (Bekhet & Zauszniewski, 2012; Cummings, 2002). Moreover, as adults age, their social networks reduce in size as they become more selective of the relationships that are maintained (Carstensen, 1992); they look to spend more time with familiar and rewarding relationships (Carstensen & Mikels, 2005).

The role that communication media and, particularly social media, play in facilitating access to sociality has received attention due to the new ways in which these technologies support social connection. Characterized by user profiles and navigable friend connections, social media platforms encourage users to share news and personal information with others to enhance sociability (Ellison & boyd, 2013). However, older adults experience lower levels of adoption of these technologies. Cognitive and physical declines associated with aging may provide some explanation for this lag (Czaja & Lee, 2012), but perceptual barriers, such as concerns about privacy, may also suppress use (Gibson et al., 2010; Maaß, 2011).

Age-related cognitive changes that affect technology use include declines in fluid intelligence (Czaja et al., 2006; Czaja & Lee, 2006), which reflects an ability to reason and solve problems. Executive functions, the higher order cognitive processes such as attention and working memory that are essential for everyday activities, also decline with age (Salthouse, Atkinson, & Berish, 2003). The time it takes to process information increases with age, and this can affect an individual's ability to remember instructions or attend to important information (Institute of Medicine, 2015). Similar decrements occur in reasoning, visuospatial skills, and working memory (Salthouse, 2010), which make decision-making, way finding, and remembering instructions more challenging.

Yet, because social engagement among older adults has been linked to higher levels of cognitive function (Barnes, Mendes de Leon, Wilson, Bienias, & Evans, 2004) and reduced levels of cognitive decline (Zunzunegui, Alvarado, Del Ser, & Otero, 2003), the effects of social media use may have some cognitive consequences. Prior studies have found that cognitive ability is a predictor of Internet use in older adults (Czaja et al., 2006; Freese & Rivas, 2006), and that cognitive ability is associated with the amount and types of activities in which older adults engage (Freese, Rivas, & Hargittai, 2006). Specifically, the executive function domains of cognitive flexibility, or the ability to shift between tasks or concepts, and speed of information processing have been found to be predictors of efficient technological use and proficiency in older adults (Slegers, Van Boxtel, & Jolles, 2009).

Older adults generally have lower levels of educational attainment than younger persons (Ryan & Bauman, 2016) and are less likely to subscribe to broadband Internet (Aaron Smith, 2014), factors which may contribute to reduced Internet use generally. Older adults often cite a lack of digital literacy skills, or lack of confidence in their own skills, as reason to not engage with social media platforms (Lee, Chen, & Hewitt, 2011; Luders & Brandtzæg, 2014; van Deursen & van Dijk, 2009). Instructional support has been demonstrated to promote social media participation among older adults (Gibson et al., 2010), and reduce perceptual barriers to adoption (Xie, Watkins, Golbeck, & Huang, 2012).

Because many older adults have extremely low levels of social media use, instructional and informational support enables them to build self-efficacy and skill in using these media more actively. An instructional session can thus be also used as an experimental intervention, to gauge the cognitive effects of learning a new technology. As social media use is encouraged through this process, the investigation of causality between social media use and certain areas of executive function, such as attention, inhibitory control (the degree to which an individual can suppress a habitual response in favor of a new one), working memory, and processing speed, can be ascertained. In employing such a design, the following research questions were investigated:

> *RQ*1: Does social media use at older ages result in changes to relative levels of cognitive function?
>
> *RQ*2: Do older adult social media users experience differences in dimensions of executive function over time from non-users?

Method

To isolate the cognitive effects of social media use, a 4-week social media training workshop was conducted using a randomized, controlled wait list design among novice older adult social media users. Subjects participated in pre- and post-test assessments on measures of Internet and social media use, social well-being, and cognitive function. Because this study involved human subjects research, the protocol was approved by the Institutional Review Board of the University of Illinois at Chicago.

Sample

Forty-seven participants were recruited through two sponsor independent living facilities and included both residents of the facilities and older adults living in nearby communities. Inclusion criteria included a minimum age of 65 years; being cognitively intact (as determined by the Short Portable Mental Status Questionnaire); and less than 10 hr of Facebook use during the previous 6 months.

Eligible participants were randomized into either the workshop group or “wait-listed” to the control group (which completed the workshop intervention after the study period concluded). Over the course of the study, six participants withdrew due to health considerations or family-member suggestion, and five participants were unable to attend all three assessment visits. Of the remaining 36 participants, 2 additional individuals were excluded from analysis because of low Mini-Mental State Examination (MMSE) scores (MMSE < 24). The remaining sample consisted of $n = 34$ individuals. The sample comprised 23 (67.6%) females and 11 (32.4%) males, with an average age of 76.5 years. Seventeen participants were randomized into the intervention group and 17 individuals participated as controls.

Intervention

The social media training workshops were conducted in a classroom format with groups of approximately 10 participants each. The six workshop groups met once per week for 4 weeks, 2 hr per session (eight classroom hours of instruction in total). Each workshop session was scripted, to ensure that the same material was covered between groups. Participants used individual laptop computers, provided by the research team, and visual support was provided via a screen and projector, which was connected to the instructor's laptop. Sessions were led by the researcher and support was provided by a research assistant, who provided with one-on-one support when participants needed additional help or clarification. Instructional topics included setting up and using accounts in Facebook and Twitter, privacy and online security, social media etiquette, and the use of social media for messaging, photo sharing, status updates, and information gathering. Participants were encouraged to use the social media platforms outside of the workshop sessions.

Measures

Participants were assessed at three time intervals: baseline, 4 weeks (at completion of the social media intervention workshop for the intervention group), and 4 months (3 months after workshop completion for the intervention group). In addition to some demographic information, participants reported on their Internet and social media use, depressive symptoms (Yesavage & Sheikh, 1986), and social well-being.

The cognitive portion of the assessment included an overall assessment of cognitive function, as measured by the MMSE (Folstein, Robins, & Helzer, 1983). The MMSE is a widely used tool that screens for cognitive status; it can also be used to track cognitive change over time (Strauss, Sherman, & Spreen, 2006). Scores are based on the total number of correct answers, with a maximum of 30, and lower scores represent greater levels of cognitive impairment.

In addition, four domains of executive function were assessed: processing speed, inhibitory control, attention, and working memory. The Trail Making Test-Part A (Corrigan & Hinkeldey, 1987) was used to measure processing speed, as it has been found to represent perceptual speed/ability (Christidi, Kararizou, Triantafyllou, Anagnostouli, & Zalonis, 2015). Scores are presented as the time in seconds the participant takes to complete the test.

The California Older Adult Stroop Test (COAST, Pachana, Thompson, Marcopulos, & Yoash-Gantz, 2004) was used to measure inhibitory control, or the ability to suppress a habitual response/irrelevant information in favor of information that is less familiar/more relevant. It is developed specifically for an older adult population, and is reported in the time in seconds to completion.

The symbol digit modalities test (Smith, 1991) is a measure of divided attention that requires visual scanning and tracking (Strauss et al., 2006). Participants use a key to fill in numbers that correspond with specific symbols. Scores are reported as the number of correct substitutions that are made in a 90 s interval.

Working memory function was determined using the Wechsler Digit Span—Forward and Backward subtest (Wechsler, 1997), which assesses both storage and processing capabilities of verbal memory (Myerson, Emery, White, & Hale, 2003). Scores are reported as a sum of the trials answered correctly for both forward and backward sequences.

Results

Descriptive analysis was performed on the cognitive function variables for both the control and intervention groups. At baseline, the control and intervention groups did not differ significantly on the overall MMSE scores ($t_{30.295} = -1.811$, $p = .08$). There was a slight difference between the control and the intervention group at baseline in processing speed ($t_{30.257} = 2.153$, $p = .039$), but in other respects the two groups showed no significant differences.

Internet and Social Media Use

Participants from both the control and intervention groups reported no significant differences in their Internet use over the study period, at either the 4-week or 4-month assessment. As expected, participants in the intervention group reported a significant increase in their social media use between the baseline and the end of the workshop intervention ($t = 3.933$, $p = .001$, $d = .954$). As social media use increased over the study period, the research team hypothesized that level Internet use may be attributed to social media sites substituting for other forms of general Internet use, such as email or visiting news sites. The increased use in social media dissipated somewhat in the months following the end of the intervention, however: between the end of the intervention and the 4-month follow-up visit, a significant decrease in social media use was evidenced by participants in the intervention group ($t = 2.28$, $p = .038$, $d = .553$). Over the entire 4-month study period, however, those participating in the intervention still reported an overall increase in their social media use over the baseline ($t = 2.00$, $p = .064$, $d = .485$).

RQ1: Effects of Social Media Use on Cognitive Function

To address *RQ*1, an examination of the within-group cognitive measures was performed. Table 1 provides a summary of the means and standard deviations of the cognitive function measures for the control and intervention groups at each of the measurement points, along with dependent sample *t*-tests for differences in these scores between (a) baseline and 4 weeks, (b) baseline and 4 months, and (c) 4 weeks and 4 months.

Table 1 demonstrates that, as expected, scores for MMSE, processing speed, attention, and working memory did not vary significantly for the control group over the study period. The inhibitory function measure did evidence some improvement over the full study period for the control group, which may signal a small practice effect. It should be noted that small practice effects on the inhibitory function measure do not affect interpretation of the results; practice effects are disregarded in within subject repeated measures of inhibitory function, as these tend to increase consistently (Strauss et al., 2006). In contrast, the intervention group evidenced slight improvement in processing speed and attention, a moderate increase in MMSE, and more significant improvement in inhibitory function (as indicated by a reduction in time to complete) during the study period. MMSE increased over the study period (t_{16} = 2.42, p = .028, d = .587), with the effect appearing after the intervention period had ended. As MMSE is an overall assessment of cognitive status, this increase is consistent with the other increases in measures of executive function, and may demonstrate the effects of exposure to the learning environment of the workshop. The improvement in inhibitory function scores for the intervention group occurred both over the period in which the workshop was conducted (t_{16} = 2.289, p = .036, d = .555) as well as over the entire study period (t_{16} = 8.97, p < .001, d = 2.176). Again, some of this change might be attributed to practice effects, but the effect size as measured by Cohen's d is large.

In summary, with respect to *RQ*1, it appears that there are positive cognitive effects of engagement with social media technologies for older adults as measured by the MMSE, with potentially significant improvement in the area of inhibitory function as measured by the COAST. The full effects of this improvement can be assessed more rigorously when compared with the intervention group through a mixed analysis of variance.

RQ2: Effects of Intervention

Data were further analyzed using a between-within subjects analysis of variance (mixed ANOVA) to assess the effect of social media use by comparing the measures of cognitive function between the intervention and the control groups across time, over the three assessment periods. Initial measurements were used as baseline measures in the analysis, and the outcome variables (the 4 week and 4 month measures) were examined for assumptions related to the homogeneity of variance and intercorrelations among the within subjects variables. Because the scores for inhibitory function violated the assumption of homogeneity of variance, analysis on these outcomes was conducted using reciprocal values. Table 2 summarizes the differences between the control and intervention groups in each of the domains of cognitive function at the 4-week and 4-month intervals.

As noted in the previous section, processing speed improved for both the control and the intervention groups over the study period. A mixed ANOVA further demonstrates that there was no significant interaction between social media use and time at either the 4-week, Wilk's λ = .985, $F(1, 32)$ = .495, p = .487, or the 4-month assessment, Wilk's λ = .971, $F(2, 31)$ = .469, p = .630, and no main effect for time at either the 4-week, Wilk's λ = .931, $F(1, 32)$ = 2.362, p = .134, or 4-month, Wilk's λ = .886, $F(2, 31)$ = 2.004, p = .152, assessments. Table 2 indicates that the intervention group evidenced a somewhat greater improvement (i.e., decrease in time) in processing speed at the 4-week interval, $F(1, 32)$ = 2.935, p = .096, though this difference was only significant at the α = .1 level.

Participants in the intervention group also showed significant improvement in inhibitory control, or the ability to ignore irrelevant stimuli, over the study period for both the control and the intervention groups. Inhibitory control typically declines with age and is thought to be a major factor of age-related decline in cognitive function (Tipper, 1991). There was no significant interaction between social media use and time at either the 4-week, Wilk's λ = .998, $F(1, 32)$ = .061, p = .806, or 4-month assessment, Wilk's λ = .956, $F(2, 31)$ = .707, p = .501. There was a significant main effect for time at the 4-week, Wilk's λ = .649, $F(1, 32)$ = 17.321, p < .001, η^2 = .351, and 4-month, Wilk's λ = .475, $F(2, 31)$ = 17.128, p < .001,

η^2 = .525, assessments, however, evidencing significant improvement in scores for both the groups. The intervention group evidenced a somewhat greater improvement (i.e., decrease in time) in inhibitory function than the control group, however, as shown in Table 2. These differences were moderate at the 4-week assessment point ($F_{1,32}$ = .4.071, p = .052, η^2 = .113), but had a large effect at the 4-month assessment ($F_{2,31}$ = 5.011, p = .032, η^2 = .135).

No significant differences related to either time or the intervention in attention or working memory were evidenced between the control and intervention groups at either the 4-week or the 4-month mark.

Discussion

The degradation of cognitive function is a serious complication in the process of aging, thus researchers have sought to find mechanisms to slow processes of cognitive decline. Technological efforts to alleviate declines in cognitive function has previously led researchers to focus on mechanisms such as computerized cognitive training and videogame play to improve specific aspects of cognitive function (Kueider, Parisi, Gross, & Rebok, 2012). These are often considered by researchers as efficient mechanisms to improve performance in such domains as memory and processing speed (Lampit, Hallock, & Valenzuela, 2014). However, the transferability of the effects of such cognitive training beyond the targeted ability (e.g., episodic verbal recall or pattern recognition) to other domains has been questioned (Park et al., 2014; Stine-Morrow et al., 2014). Thus, attention has turned to everyday experiential forms of mental stimulation, because these may provide alternatives for more broad-spectrum cognitive effects (Stine-Morrow et al., 2014). Cognitively stimulating activities that are novel or active (e.g., learning a new skill) deliver cognitive benefits (Hultsch, Hertzog, Small, & Dixon, 1999; Noice & Noice, 2008), and at least one study has found that productive activities such as learning new skills are superior to those that are more passive in nature, such as listening to music (Park et al., 2014).

The use of technology provides an everyday context that may offer cognitive stimulation for older adults. It is an important area of study as many older persons rely on technology to preserve their ability to live independently. Prior work has established that cognitive ability in such areas as processing speed are predictive of performance on various technological tasks such as using an ATM or email (Slegers et al., 2009; Zhang, Grenhart, McLaughlin, & Allaire, 2017). As cognitive function declines, older adults find using everyday technologies, such as a remote control or cell phone, increasingly difficult (Rosenberg, Kottorp, Winblad, & Nygard, 2009). However, because older adults learning to engage with technology have demonstrated improvement in dimensions of executive function, such as episodic memory and processing speed (Chan, Haber, Drew, & Park, 2016), the use of technology may be ultimately beneficial to cognitive health. Key to this potential benefit is that the process of acquiring new skills and developing the necessary conceptual models to successfully navigate technological environments is cognitively demanding (Chandler & Sweller, 1996; Quinn, Smith-Ray, & Boulter, 2016).

In debriefing interviews after the study had ended, participants revealed that they found learning to use social media to be cognitively stimulating, noting that learning new concepts was a “challenge” and that learning to use social media “opened up a whole new world.” Individuals noted that the workshops had “value” and that they offered the opportunity to “learn much.” This study extends prior work on the cognitive benefits of engaging with cognitively stimulating activities at older ages, in that it demonstrates that learning to use social media technology is a stimulating activity and that it improves cognitive function, specifically in an additional domain of executive function, inhibitory control.

Inhibitory control enables an individual to suppress a habitual response in favor of one more appropriate to accomplishing his or her goals. These findings are notable as inhibitory control is a salient factor of age-related cognitive decline (Tipper, 1991). Social media invoke inhibitory processes because of the myriad of information that is presented to users—newsfeeds, advertisements, connection recommendations, chat boxes. Users are frequently required to prioritize the type of information that is essential to their immediate purposes and discard information flows that are irrelevant. This means that users must filter their attention to relevant information flows—newsfeeds become important for obtaining information about connections, individual chat boxes are relevant for synchronous conversation—in order to use these platforms efficiently and effectively. It is therefore reasonable to associate the use of social media with an increased demand for inhibitory control. Improvement shown with these participants was significant, and provides insight into the ways in which social technologies may intersect with more general cognitive functioning.

Researchers often consider social media as a social, and not a cognitive, phenomenon. Yet, the functions of many social technologies, such as Facebook and Twitter, include important cognitive processes such as recollecting and reminiscing, retrieving information, offering spaces for reflection, and even remembering and reminding functions (such as the birthday reminding), making them cognitive, as well as social, technologies. How social technologies may shape cognitive processing, for better and worse, is only now being investigated and understood (Meshi, Tamir, & Heekeren, 2015). The results of this study provide insight into some of the ways that social media might impact the processing of information, effectively altering or supporting cognitive activities.

Social media also enable a linkage between social interaction and cognitive performance. Social media have been demonstrated to play an important role in sustaining social engagement for individuals at all ages, and particularly for older adults (Sinclair & Grieve, 2017). Previous studies on aging and cognitive function have emphasized the value of sociality and social interaction in preserving cognitive health (Ybarra et al., 2007). However, interventional studies have reported mixed results on this causal relationship with some reporting improvements (e.g., Derksen et al., 2015) or lower levels of cognitive decline (James et al., 2011) as a result of enhanced social interaction, while others have noted no association at all (e.g., Park et al., 2014). The results of this study support findings of cognitive benefit in technologically mediated social interaction, so additional studies that engage older adults with these platforms may enhance opportunities to clarify this relationship.

The finding that social media use can be stimulated through instructional and informational support is perhaps somewhat unremarkable, though it does provide further support to earlier work (e.g., Xie et al., 2012). Workshops, such as the intervention employed here, are feasible mechanisms to foster social media engagement in an older population. However, because increased levels of social media participation were not sustained over time after the conclusion of the workshop, findings here also indicate that other mechanisms of support might be required for older persons to remain engaged with these media on an ongoing basis. Future studies should examine whether ongoing support might be helpful in sustaining higher levels of social media use, once training has concluded, and which type of support might prove optimal.

It is important to also point out that the use of older adults as subjects in this study presented a significant opportunity. Because older adults offer a ready pool of novice social media users, studies involving this group can isolate social media effects and establish causality by employing experiments, offering pathways to understanding that are often unavailable in studies with younger users. This study demonstrated causal effects of social media use using an experimental technique, and similar methodologies may offer a means to examine how social technologies interact with and shape cognitive processes.

This pilot study was limited by its small sample size and the voluntary nature of experimental participation. Future work should include the capture of more detailed information related to the participants, such as socioeconomic status, educational attainment, and digital literacy, so that cognitive improvements can be better contextualized. In addition, by examining older adult users of varying social media proficiencies, future studies might investigate whether it is the cognitive aspects of using social media or the novelty of learning a new skill that triggers cognitive improvement in older adult users. Additional attention should be given to exploring the specific cognitive demands required in performing activities within a social media platform and how these might impact or enhance cognitive processes, especially in areas of executive function. Future work might also consider contrasts between social media-enabled social engagement and other interaction modes, such as face-to-face or telephone, and whether the impacts on cognitive function might vary by approach. As social media offer a low-cost, accessible, and widely employed network technology for enhancing sociality for adults of all ages, these directions are important avenues for investigation.

Conclusion

In summary, this study investigated the effects of social media use on executive function among a group of novice, older adult users. Findings from this study indicate that social media use has positive benefits to the function of inhibitory control, suggesting that these media impact the processing of information and cognitive function. In addition, these results indicate that social media use can be stimulated through instructional support.

It is clear from these results that additional investigation is warranted to understand what role, if any, social media can play in engendering cognitive benefits for those at older ages. Older adults offer a unique user base for studies of this nature, as the ready pool of non-using and novice social media users enable researchers to examine causality and effects. Policy makers may be interested in the mechanisms through which social media may contribute to older adult well-being, and designers might attend to the cognitive implications that platform use might hold specifically for the older adult population.

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Biography

Kelly Quinn (PhD, University of Illinois at Chicago) is a clinical assistant professor in the Department of Communication at the University of Illinois at Chicago. She has an interdisciplinary research focus on new media and how it intersects with such diverse areas as the life course, privacy, social capital, and friendship. Her recent studies have centered on the social and cognitive implications of social media use by older adults and the processes by which individuals conceptualize and navigate their privacy online.

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Table 1.

Mean (*SD*) Measures of Cognitive Function.

	MMSE	Processing speed	Inhibition	Attention	Working memory
Control ($n = 17$)					
Baseline	27.6 (2.0)	47.9 (14.7)	69.5 (14.3)	40.0 (10.7)	44.9 (9.4)
4 weeks	27.6 (2.5)	45.8 (11.8)	64.6 (16.5)	41.0 (11.3)	42.1 (10.3)
t_{16} (base – 4 weeks)	0.00	0.507	1.95	.795	1.522
4 months	27.5 (2.3)	42.3 (15.6)	63.2 (14.7)	40.7 (11.0)	43.8 (11.0)
t_{16} (base – 4 months)	.096	1.049	2.327*	0.470	1.003
t_{18} (4 weeks – 4 months)	.099	1.319	0.822	0.315	0.864
Intervention ($n = 17$)					
Baseline	28.7 (1.6)	43.8 (14.4)	60.1 (8.8)	41.5 (9.2)	44.4 (10.1)
4 weeks	28.3 (1.8)	37.9 (9.2)	56.2 (12.3)	42.6 (9.7)	43.4 (9.4)
t_{16} (base – 4 weeks)	0.811	1.970	2.289*	0.889	0.798
4 months	28.9 (1.2)	37.8 (10.1)	52.7 (8.7)	40.8 (11.0)	43.4 (11.0)
t_{16} (base – 4 months)	0.387	1.579	8.97***	0.552	0.561
t_{16} (4 weeks – 4 months)	2.416*	0.055	2.007	1.248	0.047

MMSE: Mini-Mental State Examination

*** $p < .001$,

* $p < .05$.

Table 2.

Between Group Differences in Cognitive Measures.

Measure	4 weeks	4 months
Processing speed	$F_{1.32} = 2.936$, $p = .096$, $\eta^2 = .084$	$F_{1.32} = 2.725$, $p = .109$, $\eta^2 = .078$
Inhibition	$F_{1.32} = .4.071$, $p = .052$, $\eta^2 = .113$	$F_{1.32} = 5.011$, $p = .032$, $\eta^2 = .135$
Attention	$F_{1.32} = .203$, $p = .655$, $\eta^2 = .006$	$F_{1.32} = .095$, $p = .760$, $\eta^2 = .003$
Working memory	$F_{1.32} = .012$, $p = .912$, $\eta^2 = .000$	$F_{1.32} = .001$, p=.971, $\eta^2 = .000$