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Review

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Deviation from Design: A Meta-Analytic Review on the Link Between Social Media Use and Less Connection Between the Self and Others

Cameron J. Bunker, PhD[1] and Virginia S.Y. Kwan, PhD[2]

Abstract

Social media were designed to connect people and support interpersonal relationships. However, whether social media use is linked to the connection between the self and others is unknown. The present research reviewed findings across psychology to address whether social media use is linked to defining and expressing the self as connected to others (i.e., interdependence) versus separate from others (i.e., independence) and whether this link appears in both individualistic and collectivistic cultures. Eligible studies reported an association between social media use (e.g., time spent, frequency of use) and a characteristic supportive of independence (e.g., narcissism, envy, self-enhancement). Meta-analytic results of 133 effect sizes across the reviewed studies show that social media use is linked to independence rather than interdependence. This relationship was more pronounced in collectivistic cultures than in individualistic cultures. These findings suggest that characteristics linked to social media use differ from what one might expect based on the design of social media to connect people.

Keywords: independence, interdependence, self, self-construal, social media, social network sites

Introduction

Social media platforms constantly change, but they share a design to connect people. For example, Mark Zuckerberg designed Facebook to ''populate the wilderness, tame the howling mob and turn the lonely, antisocial world of random chance into a friendly world, a serendipitous world. You'll be working and living inside a network of people, and you'll never have to be alone again.''[1] On the other side of the globe, Allen Zhang designed WeChat (China's ''all-in-one app'') as a ''town square'' that ''makes socialization more fulfilling as there are more friends engaging in meaningful interactions.''[2] Zhang asserted that social media that ''benefit oneself but not others do not last.''[2] A similarity across the designs such as those of Zuckerberg and Zhang is the hope that social media help people achieve a sense of connection with others.

As early as Marshall McLuhan's proposal of the ''global village'' (i.e., the idea that electronic technology would connect the world),[3] people have hoped that digital technology would create strong ties among individuals.[4] Has the design of social media to connect people been fulfilled? Since the introduction of the iPhone in 2007, mobile use of social media has become an inseparable part of daily life. More than half of the world's population averages more than 2 hours daily on social media platforms.[5] In a world with digital communities encompassing billions of people, social media present exciting opportunities to investigate the extent that people are feeling connected to others.

The issue of whether social media connect people has received considerable attention since the introduction of websites for interpersonal interaction.[6–9] A prevailing view emphasizes the antisocial elements of social media that may disrupt connections between people. For example, the

[1]Department of Marketing Communication, Emerson College, Boston, Massachusetts, USA.
[2]Department of Psychology, Arizona State University, Tempe, Arizona, USA.

''bowling alone'' hypothesis[10] postulates that time spent consuming relatively passive media takes up time potentially engaging with others more interactively in the physical world. Previous research has documented a range of harmful consequences for psychological adjustment,[11] which may result from digital interference with everyday social interactions.[12,13] However, other researchers have argued that claims regarding the harmful psychological impact of social media are unwarranted for policy change.[14–16]

Most research has focused on how social media use may lead to harmful consequences and found it may depend on a range of factors: for example, different ways people use social media; users' personality traits, the presence of existing mental health problems among users, or the contextual features of social media.[17–20] In light of the burgeoning research on the psychological effects of social media use, there is a call for an organizing framework and systematic review of the effects of social media use on cognitive, affective, and behavioral characteristics.[21]

A fundamental question that has yet to be reconciled is whether social media use affects people's view of themselves in relation to others. Long before the advent of social media, Markus and Kitayama proposed the terms ''independence'' and ''interdependence'' to characterize how two distinct patterns of social relationships translate to a variety of psychological phenomena—beginning with how individuals construe themselves in relation to others.[22] The independent self-construal places an individual's own thoughts, affect, and behavior as the primary referent of experience. The interdependent self-construal places thoughts, affect, and the behavior of others with whom one shares relationships as the primary referent of an individual's experience. Individuals are both independent and interdependent to some extent.[23] However, according to the social constructionist perspective, the immediate environment of the individuals typically guides people to think, feel, and behave in ways that are consistent with either their independence or interdependence.[24–26]

In the present review, we sought to examine whether social media use is linked to characteristics supportive of independence. Thus far, two meta-analytic reviews have examined relationships between social media use and characteristics supportive of independence. Findings from these reviews suggested positive relationships between social media use and narcissism[27] and social capital.[28] Our approach to reviewing a wider range of characteristics indicative of independence builds on and extends prior work in the following ways. First, independence is a broad construct that may help to organize and summarize a wide range of findings from cyber and media psychology—and examine whether the findings are consistent with the idea that social media connect people.

Psychological independence is a vital factor in how individuals perceive their world and interact with others, and they have consequences for various life outcomes.[26] As such, independence could organize findings in a way that is of theoretical *and* practical importance, which are the major goals of systematic reviews.[29] The stakes of the relationships between social media and independence are high regarding the social and psychological well-being of the emerging digital world.

Second, the present approach may show whether the links between social media use and independence hold *across* different domains. Independence encompasses a wide range of psychological and behavioral characteristics across self-concept, cognitive, affective, motive, and behavioral domains,[26,30] which have been examined by cyber and media psychology.[31–38] It is possible that links between social media use and connection between people are stronger for some domains than others (e.g., the way people view themselves as connected with others vs. the way they behave). Thus, the present article sought to address whether the relationship between social media use and independence holds across psychological domains (self-concept, cognition, affect, motivation, and behavior).

Third, we sought to examine the relationships between social media use and independence across cultural backgrounds. A person's cultural background is part of their broader environmental context, which is important to consider in systematic reviews.[39] Individual differences in independence are most closely related to the cultural values of individualism–collectivism.[30] Traditionally, people who are socialized in an individualistic cultural system tend to endorse an independent self-construal, whereas people who are socialized in a collectivistic culture tend to endorse an interdependent self-construal. Nevertheless, changing ecologies, such as the constantly changing digital world, may shift people's view of themselves and their relationships with others.[40]

Below, we first discuss the criteria we used to select articles from cyber and media psychology to review. We then discuss the psychological and behavioral characteristics supportive of independence we used to classify findings from cyber and media psychology. Next, we present results from the systematic review with a meta-analysis of effect sizes representing relationships between social media use and independence.

Method

Review criteria

In June 2021, we searched for articles that assessed the relationship between social media use and independence/interdependence using PsycINFO. PsycINFO is the main index of research in the psychological and behavioral sciences.[41] Thus, PsycINFO is an ideal database to retrieve articles examining *psychological* or *behavioral* independence (as opposed to, e.g., retrieving articles on political or economic independence that may appear in a wider search). The keywords in the search captured terms and relevant synonyms and cognates commonly used to refer to (a) social media use (''social media use,'' ''social networking sites,'' and ''social network sites'') and (b) indicators of independence (''collectivism,'' ''interdependence,'' ''individualism,'' ''independence,'' ''personality,'' ''self,'' ''attribution,'' ''cognition,'' ''persuasion,'' ''emotion,'' ''motive,'' ''motivation,'' ''relationality,'' ''close relationships,'' ''social interaction,'' ''behavior''). We restricted the search to empirical and quantitative articles in English.

The search resulted in 658 articles. We followed a two-stage process to identify the articles for our meta-analysis below (see Fig. 1 for a diagram). In the first stage of our review, we included articles if their abstracts mentioned a relationship between social media use and a construct

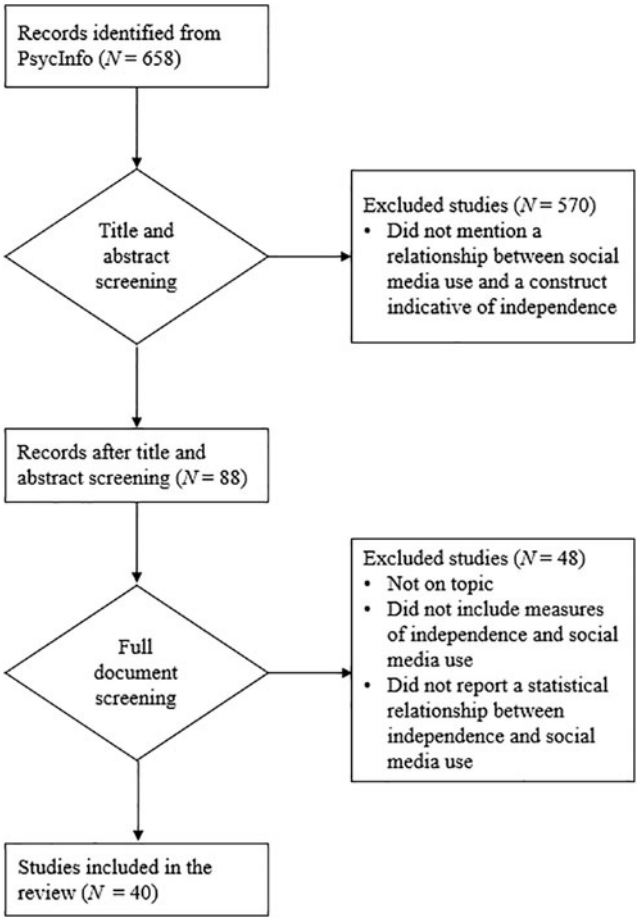

FIG. 1. Flowchart depicting the literature review criteria results.

indicative of independence. Based on this criterion, 88 articles passed this stage of the review.

In the second stage of our review, we included articles if they met the following criteria:

(1) The article had to include an empirical study that examined a construct classifiable as one or more of the characteristics (i.e., assessed the construct mentioned in the abstract).
(2) The article had to report a study that measured both a characteristic(s) of independence and social media use. The focus was on studies that measured social media use in terms of users' general engagement with social media (e.g., intensity, time spent on, or frequency of use, problematic use)—a criterion used in prior reviews of social media use.[42]
(3) The article must have reported a statistical relationship (e.g., bivariate correlation) between the characteristic(s) and social media use.

Based on these criteria, 40 articles passed this stage of the review. The 40 articles are listed alphabetically within each domain in Appendix Table 1.[43–82] Appendix Table 1 notes the following: cultural background of the participants in each study (if reported), the design (e.g., correlational, experiment), the characteristics of independence in each of the studies, and the findings regarding the link between social media use and independence (i.e., the effect size). One article did not report an effect size[72] and was thus excluded from the meta-analysis. The findings column in Appendix Table 1 further notes the type of social media use (e.g., time spent, problematic use), the period for each use type (e.g., time per log-on, weekly time on a platform), and the platform (e.g., Facebook, Snapchat) if applicable.

We also labeled all cases of ''addictive,'' ''pathological,'' or ''craving'' use as ''problematic,'' given the concerns that labeling problematic social media use as ''addictive'' or similar labels may be misleading.[83]

Coding independence

To classify findings from the literature, we identified relevant characteristics indicative of independence. Based on prior literature reviews,[30,84,85] we considered characteristics from five psychological and behavioral domains: self-concept, cognition, affect, motivation, and social behavior. Sampling from this wide range of viable characteristics helps to address concerns about whether independence converges at the level of the individual (e.g., some indicators of independence weakly correlate with each other[86–92]). Individuals may use different strategies to achieve the same goal.[93] For example, to achieve independence, one person may seek to distinguish themselves from others while another person may self-enhance. Thus, sampling characteristics from each of the five psychological domains more fully represents the different ways individuals may achieve independence, which may be possibly linked to social media use.

In the review, we focused on the characteristics that have been studied in the literature on social media. That is, we did not include all indicators of independence in our review, as some indicators were not included in our target literature. Table 1 lists the relevant characteristics with descriptions under the corresponding domain. Notably, our review found that the literature almost exclusively focused on characteristics typically supportive of independence. While independence and interdependence are not opposite of each other,[23] characteristics typically supportive of independence and those of interdependence tend to correlate with each other negatively.[94–97] Below, we discuss the characteristics identified in our literature review.

The reviewed articles showed two characteristics in the *self-concept* domain: Self-construal and narcissism. Studies have suggested that a construal of the self as separate from others and narcissistic tendencies are indicative of independence.[87,89,98–101] The reviewed articles showed two characteristics in the *cognition* domain: neural activity regarding the self and cognitive apathy. Prior studies have suggested that neural activity in brain regions associated with attending to potential gains or losses to the self (e.g., medial prefrontal cortex) and cognitive apathy (the opposite of cognitive empathy, i.e., the ability to take another's perspective) are indicative of independence.[102,103]

The reviewed articles showed three characteristics in the *affect* domain: envy, affective apathy, and emotional distance from others. Envy is an emotion concerning the desire to have what another has.[104] Affective apathy is the lack of sharing another's feelings (i.e., the opposite of affective empathy[105]), especially with close others.[106] Emotional distance is how distant a person feels from

Table 1. Characteristics Supportive of Independence

Domain	*Characteristic*	*Description*
Self-concept	Independent self-construal	Conception of the self as an autonomous, independent person
	Narcissism	Excessively self-centered personality expression (e.g., grandiosity, entitlement)
Cognition	Neural activity regarding the self	Heightened activity in brain regions (e.g., medial prefrontal cortex) associated with attention to potential rewards/losses for the self
	Cognitive apathy	Lack of understanding others' feelings
Affect	Envy	Emotion concerning the desire to have what another has
	Affective apathy	Lack of sharing others' feelings
	Emotional distance	Feeling distant from others
Motivation	Self-enhancement	Motivation to enhance the self
	Self-expression	Motivation to express a self that is distinct from others
Social behavior	Social capital	Large, loosely connected social networks; trust that is not targeted toward specific others
	Impulsiveness	Hedonistic, impulsive behavior; low self-control

another (i.e., the opposite of emotional closeness[107]), which predicts less desire to help them.[105] Prior research suggests that envy, affective apathy, and emotional distance are indicative of independence.[87,108–110] The reviewed articles showed two characteristics in the *motivation* domain: self-enhancement motives and self-expression motives. Prior studies suggest that self-evaluation motives to enhance oneself and maintain a positive self-concept and express oneself as autonomous and free are indicative of independence.[111–113]

The reviewed articles showed two characteristics in the *social behavior* domain: social capital and impulsiveness. Social capital concerns the extent that people build large networks and share resources among weak ties and is linked to trusting others regardless of whether a person is known or merely a stranger.[10,114] Social capital may increase dependency on society as it frees individuals from social bonds.[115] Given that psychological independence concerns the relationship between the self and others (rather than the relationship between self and collectives at the level of society; i.e., relational rather than group[22,26,116]), one would expect that social capital is linked to independence. Studies have suggested that social capital and expressions of impulsivity (e.g., hedonistic behavior; low self-control) are indicative of independence.[115,117,118]

Meta-Analysis

Analytic strategy

The articles included in the review reported a total of 133 effect sizes representing the relationship between social media use and independence. Some articles did not report effect sizes in *r*. We transformed standardized betas in multiple regression (β) into *r*: $r = .98\beta + .05\lambda$ where λ equals 1 when β is non-negative and 0 when β is negative.[119] This transformation reduces sampling errors by increasing the number of effect sizes.[119] Some articles dichotomized social media use into a categorical variable (e.g., light and heavy social media users) and reported differences in independence between groups of media users in *d*. We converted the effects from *d* into *r* where $r = d/\sqrt{(d^2 + 4)}$.[120] For ease of interpretation, we coded the signs of *r*s to show the extent they showed a positive link between social media use and independence. That is, correlations representing links between social media use and greater interdependence were reverse-coded.

Furthermore, one article reported *r*s separately for women and men[66]; we calculated the average *r*s across genders in this study (weighted according to the sample size of each group). With all *r*s calculated, we then transformed the correlation coefficients to Fisher's *z* to normalize the distribution of effect sizes.

To examine whether effects varied across studies, we estimated the amount of heterogeneity (i.e., τ^2) using the restricted maximum-likelihood estimator[121] and the *Q*-test for heterogeneity.[122] All analyses were conducted with R (version 4.2.0[123]) and the metafor package (version 3.4.0[124]). The *Q*-test was significant ($\tau^2 = 0.015$, $I^2 = 90.41$ percent, $p < 0.001$), suggesting that effects vary across studies and that a random-effects model and moderation analyses are warranted.

We sought to estimate the link between social media use and independence across the studies, and potential moderation effects of this link (i.e., by the domain of construct or the culture in which the study took place). We classified the domain of the study based on the indicator(s) of independence reported in the selected studies based on the domains in Table 1. We classified the culture of the study as individualistic or collectivistic based on the Compare Country Tool.[125] Studies in countries that scored below 50 (out of 100) in individualism were classified as collectivistic, while countries that scored 50 or above were classified as individualistic. We followed the MARS guidelines for meta-analytic reporting.[126] Data and analysis code are available in the Appendix.

Results

We examined the overall link between social media use and independence across studies (see Table 2). A random-effects model showed an average *r* of 0.13, 95 percent confidence interval (CI) (0.11–0.16), which was significantly different from 0 ($z = 11.421$, $p < 0.001$). Figure 2 shows a forest plot with the *r* and 95 percent CI in each study. Most findings showed positive *r*s between social media use and independence (111/133: 83 percent). These findings suggest a small but significant relationship between social media use and greater independence.

We checked whether there was evidence of potential bias in the meta-analytic effect. Figure 3 shows a funnel plot of the

Table 2. Summary of Meta-Analytic Effects

Category	r *(independence, social media use)*	k *(no. of findings)*	N_1 *(no. of articles)*	N_2 *(no. of participants)*
Across domains	0.13 (0.11 to 0.16)	133	39	89,754
Domain		133	39	89,754
Self-concept	0.14 (0.02 to 0.25)	60 (45.1 percent)	16 (41.0 percent)	53,619 (59.7 percent)
Cognition	–0.05 (–0.20 to 0.11)	7 (5.3 percent)	3 (7.7 percent)	4,099 (4.6 percent)
Affect	0.01 (–0.04 to 0.07)	18 (13.5 percent)	5 (12.8 percent)	10,379 (11.6 percent)
Motivation	0.23 (0.10 to 0.36)	13 (9.8 percent)	3 (7.7 percent)	5,568 (6.2 percent)
Social behavior	0.19 (0.07 to 0.31)	35 (26.3 percent)	17 (43.6 percent)	16,089 (17.9 percent)
Culture		107	37	60,729
Collectivistic	0.20 (0.14 to 0.26)	19 (17.8 percent)	11 (29.7 percent)	9,214 (11.5 percent)
Individualistic	0.12 (0.00 to 0.25)	88 (82.2 percent)	26 (70.3 percent)	71,070 (88.5 percent)

Note. Brackets denote 95 percent CI. Percentages represent how many findings/articles/participants in the category were included in each subcategory. Percentages within columns may not add up to 100 percent as some articles had findings in multiple subcategories.
CI, confidence interval.

effects. Neither the rank correlation test[127] nor Egger's regression test[128] indicated any funnel plot asymmetry ($p = 0.921$ and $p = 0.316$, respectively). Visually, there appeared to be equal amounts of effects surrounding the average correlation of $r = 0.13$. These findings do not support potential bias in the effect sizes reported in the reviewed studies.

Moderation analyses

Domain significantly moderated the relationship between social media use and independence ($Q(4) = 55.042$, $p < 0.001$) such that the strongest, positive relationship appeared for the domain of motivation characteristics ($r = 0.23$, 95 percent CI [0.10–0.36] followed by social behavior ($r = 0.19$, 95 percent CI [0.07–0.31]) and then self-concept characteristics ($r = 0.14$, 95 percent CI [0.02–0.25]). Notably, affect showed a negligible link between social media use and independence ($r = 0.01$, 95 percent CI [–0.04 to 0.07]), and cognition was the only domain to show a negative link between social media use and independence ($r = –0.05$, 95 percent CI [–0.20 to 0.11]).

Individualism significantly moderated the link between social media use and independence ($Q(1) = 5.666$, $p = 0.017$). The relationship between social media use and independence was stronger in collectivistic cultures ($r = 0.20$, 95 percent CI [0.14–0.26]) than in individualistic cultures ($r = 0.12$, 95 percent CI [0.00–0.25]).

Discussion

We identified 133 findings that examined the link between social media use and independence (vs. interdependence). Meta-analysis of these findings showed a small, positive relationship between social media use and independence ($r = 0.13$, 95 percent CI [0.11–0.16]). Small effects may play in understanding complex psychological phenomena[129–133]—especially in the case of meta-analyses.[134] In addition, the presence of a positive rather than a negative link between social media use and independence, regardless of size, is noteworthy given the ongoing debate about the psychological consequences of social media use in an increasingly digital world.[11,12,14–17] The present review showed more pronounced links between social media use and independence for self-concept, social behavior, and motivation than cognition or affect characteristics. Future research may clarify why relationships between social media use and independence appear more clearly for some psychological and behavioral characteristics over others.

One implication is that social media may be a context that supports independence. Indeed, the history of social media is not unlike the theorized history of independence. Some contexts (e.g., the American Frontier or cosmopolitan cities) offer economic opportunities and freedom that appeal to individuals with independent social orientations.[92,135–138] Within these contexts, individuals who exemplify independence achieve prestige and status. People will be more likely to imitate such individuals, culminating in the reinforcement of values consistent with independence. The early online environment preceding today's platforms offered similar opportunities to fulfill not met offline.[139] Networked individualism approaches argued that social media are partly responsible for changes in network structures from tightly knit social *groups* to loosely connected *individuals*.[140–143]

Social media may thus facilitate the changes from a deeply rooted sense of self and duty-based social relationships to a rootless sense of self and transient social relationships that characterize modern, individualistic societies.[144–149] The findings of the present review are consistent with these proposals. A question for future research is whether the implications of independence are the same on social media as offline (e.g., whether independence in the context of social media is indicative of individual freedom associated with independence in the offline world vs. constraint, which recent research has observed in today's digital environment[150]).

The present findings also have implications for the design of social media. Researchers can think about the design of social media in terms of *elements*: combinations of features and affordances that generally apply across platforms remain applicable despite the constant change to these platforms, and distinguish social media from other contexts.[20] Such elements may explain why social media use is linked to independence. One element is the *profile*: an audience-facing digital portrait of a social media user that allows them display information about themselves to others.[20] Profiles create digital self-representations in which people are no longer represented by physical bodies located in space and time, and profiles visually separate the self from others. As such, people may not perceive themselves as connected to others on social media as offline.

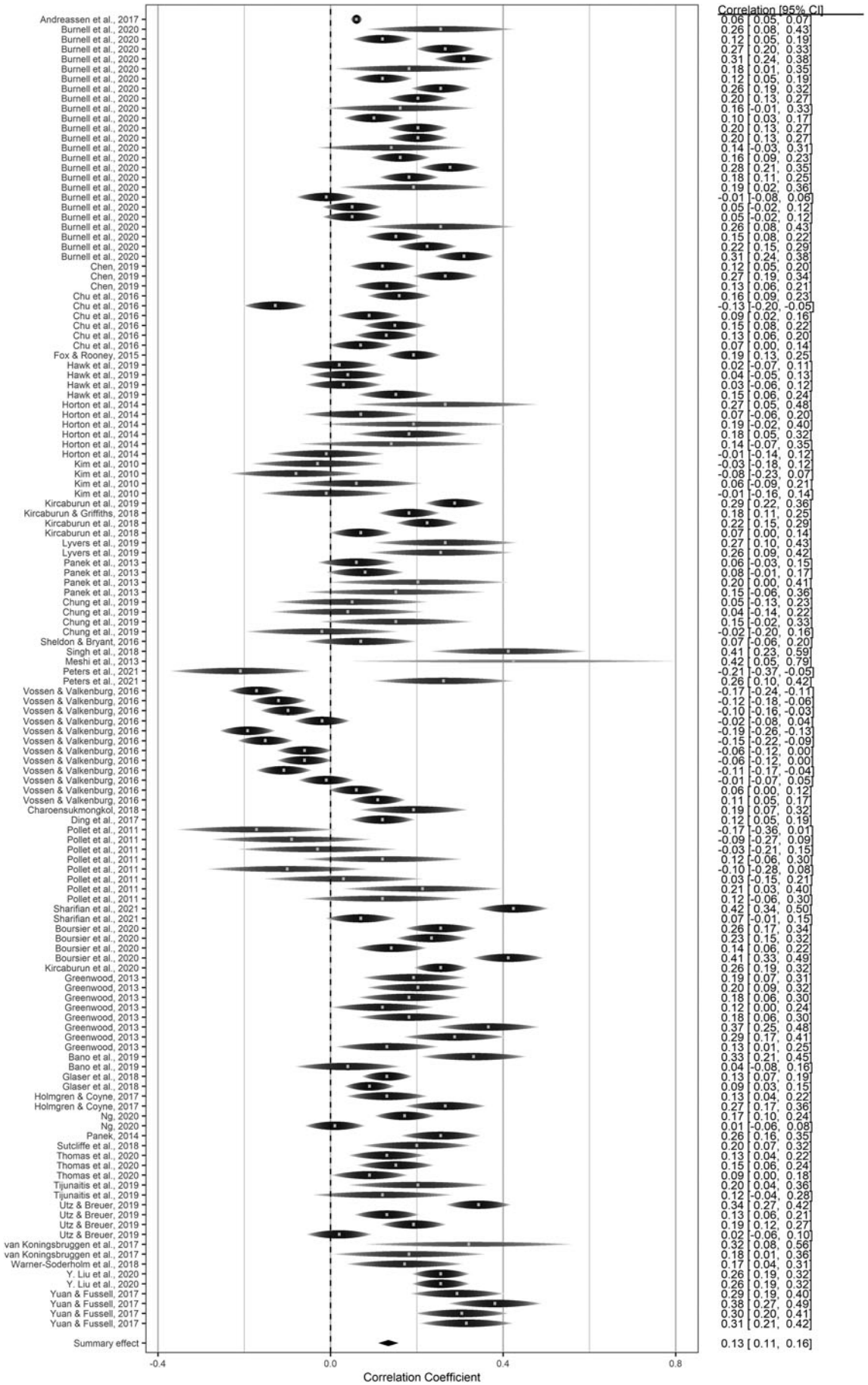

FIG. 2. Correlations between social media use and independence in the meta-analysis ($k = 133$).

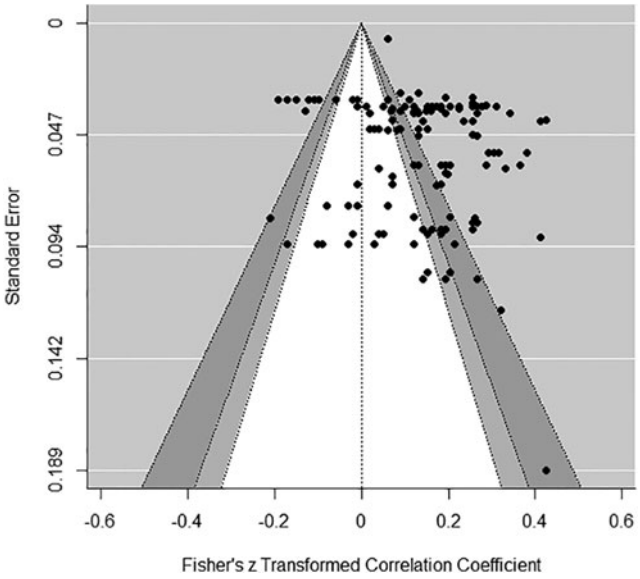

FIG. 3. Funnel plot for examining potential bias. *Note.* Values in *white region* are not statistically significant at $p < 0.05$. *Gray regions* denote thresholds at which effects are, respectively, significant at $p < 0.05$ and $p < 0.01$.

Another relevant element is the *network*: the interface for engaging other accounts that users are connected to on social media (e.g., ''friends'' on Facebook).[20] Although the network is designed to connect people, the benefits are often targeted at the self. For example, one may connect with distant others to receive benefits to the self (e.g., social support[151,152]), and another study showed that people providing emotional support to others on social media were not closer to the target than those who provided support offline.[153] People seem to express themselves on social media to connect with others and affirm the sense of self[154]; profiles and networks would seem to facilitate this.

However, the findings in the present research raise the question of whether the elements of social media relate to separation rather than connection between the self and others. Future research and social media developers may consider discrepancies between the expectations or consequences regarding how people use aspects of social media and how they are actually used.

The relationship between social media use and independence was also more pronounced in collectivistic than individualistic cultures. This finding may be somewhat counterintuitive given that collectivistic cultures generally show lower rates of independence and higher rates of interdependence than individualistic cultures.[30] One possibility is that individuals in collectivistic cultures with independent social orientations may seek social media as an environment to express themselves more freely. In support of this possibility, highly public self-conscious individuals (a characteristic more common in collectivistic cultures[155]) are more motivated to achieve independence on social media than offline.[156] Compared with individuals in individualistic cultures, those in collectivistic cultures may be more likely to seek liberation of themselves on social media from cultural constraints in the offline world (see a similar parallel between women and men[157]).

In addition, collectivistic cultures tend to have tight social norms,[158,159] which involve strict laws and punishment for violations of these norms.[160] Collectivistic cultures sometimes place restrictions on certain social media platforms that may circulate information challenging cultural norms (e.g., the restrictions on Facebook in China and Russia). As such, there may be additional social pressure to use alternative platforms or to use social media in specific ways in collectivistic cultures—as suggested by the higher rates of problematic use in collectivistic than individualistic cultures.[161] A fruitful direction for future research will be identifying cultural factors and platform designs that contribute to the relationship between social media use and independence.

The present review has several limitations. First, most of the reviewed studies used a cross-sectional and correlational design, and many used self-reported measures of independence and social media use—which have been challenged based on validity.[87,162,163] Social media may contribute to rising individualism,[164] leading individuals to become more independent. However, individuals with independent social orientations may also seek out social media—perhaps to seek out interpersonal connection online (e.g., a case of the ''rich-get-richer'' effect[165]). Experimental simulations of social media contexts[166,167] offer ways for future research to test the casual nature of the relationship between social media and independence.

Second, the present review did not equally sample the total possible range of characteristics indicative of independence. For example, many of the characteristics (e.g., narcissism, envy, impulsiveness) assessed in the reviewed studies are socially undesirable, inviting the negative bias that pervades psychological research.[168] Future research should examine whether social media use is associated with socially desirable and undesirable characteristics of independence.

Third, the present review focused on independence in terms of the relationship between the self and others rather than the relationship between the self and society—consistent with prior conceptualizations of independence.[22,26] However, cultural psychologists have distinguished the relationships between the self and others (relational) and between the self and society (group), which also has important outcomes for people (e.g., group identity and collective wellfare[116]). Future research may wish to examine whether the findings in the present review replicate when the reference to the self is society rather than others. For example, social capital theorists have argued that as individuals become liberated from social bonds, they may become more dependent on society.[115] Despite links between social media use and independence in terms of the self and others, social media use may be linked to greater connection between the self and society in some domains.

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Authors' Contributions

C.J.B.: conceptualization, data curation, formal analysis, writing—original draft, and writing—review and editing. V.S.Y.K.: conceptualization and writing—review and editing.

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Address correspondence to:
Dr. Cameron J. Bunker
Department of Marketing Communication
Emerson College
120 Boylston Street, 8th Floor
Boston, MA 02116
USA

E-mail: cameron_bunker@emerson.edu

Appendix

Link to Data and Code
https://osf.io/cqw25/?view_only=12ce63b05ec646c186797ee643aca96a

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Appendix Table 1. Studies Included in the Review

Domain and study	*Sample (cultural background, country of participant origin,* n*)*	*Design*	*Characteristic*	*Findings and effect size*
Self-concept				
Andreassen et al. (2017)	IND, Norway, 23,532	CORR	Narcissism	Narcissism with problematic social media use, $r=0.06$
Burnell et al. (2020)	IND, US, S1 = 134, S2 = 814	CORR	Narcissism	Narcissism (Grandiosity) with active use, $r=0.25$ (S1; Facebook), 0.12 (S2; Facebook), 0.26 (S2, Instagram), 0.30 (S2, Snapchat) Narcissism (Grandiosity) with passive use, $r=0.18$ (S1; Facebook), 0.12 (S2; Facebook), 0.25 (S2, Instagram), 0.20 (S2, Snapchat) Narcissism (Entitlement) with active use, $r=0.16$ (S1; Facebook), 0.10 (S2; Facebook), 0.20 (S2, Instagram), 0.20 (S2, Snapchat) Narcissism (Entitlement) with passive use, $r=0.14$ (S1; Facebook), 0.16 (S2; Facebook), 0.27 (S2, Instagram), 0.18 (S2, Snapchat) Narcissism (Vulnerability) with active use, $r=0.19$ (S1; Facebook), –0.01 (S2; Facebook), 0.05 (S2, Instagram), 0.05 (S2, Snapchat) Narcissism (Vulnerability) with passive use, $r=0.25$ (S1; Facebook), 0.15 (S2; Facebook), 0.22 (S2, Instagram), 0.30 (S2, Snapchat)
Chen et al. (2019)[a]	IND, Netherlands, 686	CORR	Narcissism	Narcissism with time spent on social media averaged across Facebook, Instagram, and Snapchat, $r=0.12$
Chu et al. (2016)	COL and IND, China and United States, 621	CORR	Self-construal	Independent self-construal with SNS intensity, $\beta=0.11$ Interdependent self-construal with SNS intensity, $\beta=0.13$ Independent self-construal with microblogging site intensity, $\beta=0.04$ Interdependent self-construal with microblogging site intensity, $\beta=-0.10$ Independent self-construal with video sharing site intensity, $\beta=0.08$ Interdependent self-construal with video sharing site intensity, $\beta=-0.02$
Fox and Rooney (2015)	IND, United States, 1000	CORR	Narcissism	Narcissism with time spent on SNSs, $r=0.19$
Hawk et al. (2019)	IND, Netherlands, 495	CORR LONG	Narcissism	Narcissism T1 with problematic use T1, $r=0.02$ Narcissism T1 with problematic use T2, $r=0.04$ Narcissism T2 with problematic use T1, $r=0.03$ Narcissism T2 with problematic use T2, $r=0.15$
Horton et al. (2014)	IND, United States, S1 = 88, S2 = 218	EXP	Narcissism	Narcissism with daily logs on Facebook, $r=0.26$ (S1), 0.07 (S2) Narcissism with time on Facebook, $r=0.19$ (S1), 0.18 (S2) Difference between agentic and communal Facebook use on narcissism, $d=0.28$ (S1)/–0.02 (S2)

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Appendix Table 1. (Continued)

Domain and study	*Sample (cultural background, country of participant origin,* n*)*	*Design*	*Characteristic*	*Findings and effect size*
Kim et al. (2010)	IND, United States, 170	CORR	Self-construal	Independent self-construal with weekly time on Facebook, $r=-0.03$ Interdependent self-construal with weekly time on Facebook, $r=0.08$ Independent self-construal with average time per Facebook log on, $r=0.06$ Interdependent self-construal with average time per Facebook log on, $r=0.01$
Kircaburun et al. (2019)	COL, Turkey, 827	CORR	Narcissism	Narcissism with problematic social media use, $r=0.28$
Kircaburun and Griffiths (2018)	COL, Turkey, 772	CORR	Narcissism	Narcissism with social media use frequency, $r=0.18$
Kircaburun et al. (2018)	COL, Turkey, 761	CORR	Narcissism	Narcissism with problematic social media use, $r=0.22$; time spend on social media, $r=0.07$
Lyvers et al. (2019)[a]	IND, Australia, 143	CORR	Narcissism	Narcissism with problematic social media use, $r=0.26$
Panek et al. (2013)	IND, United States, S1 = 486, S2 = 93	CORR	Narcissism	Narcissism with time spent on Facebook, $r=0.06$ (S1) Narcissism with time spent on Twitter, $r=0.08$ (S1) Narcissism with Facebook use frequency, $r=0.20$ (S2) Narcissism with Twitter use frequency, $r=0.15$ (S2)
Chung et al. (2019)[a]	COL, Malaysia, 128	CORR	Narcissism	Narcissism with logged social media use, $r=0.05$; social media problematic use, $r=0.04$
Sheldon and Bryant (2016)	IND, United States, 239	CORR	Narcissism	Narcissism with time spent on Instagram, $r=0.07$
Singh et al. (2018)	Unspecified, 124	CORR	Narcissism	Narcissism with time spent on SNS, $r=0.39$
Cognition				
Meshi et al. (2013)	IND, Germany, 31	EXP	Neural activity	When responding to gains in reputation for the self, relative to observing gains for others, reward-related activity in the left nucleus accumbens with Facebook use intensity, $r=0.40$
Peters et al. (2021)	IND, Netherlands, 150	CORR	Neural activity	Difference between self and other perceptions with time spent on social media, $\beta=-0.21$; with lower mPFC-activity during other perceptions compared with self-perception, $\beta=-0.21$
Vossen and Valkenburg (2016)[a]	IND, Netherlands, 942	CORR LONG	Cognitive apathy	Cognitive empathy with time spent on SNSs and IM applications, $r=0.17$ (T1), 0.12 (T2) Cognitive empathy at T2 with time spent on SNSs and IM applications at T1, $\beta=0.10$ Cognitive empathy at T1 with time spent on SNSs and IM applications at T2, $\beta=0.02$
Affect				
Charoensukmongkol (2018)	COL, Thailand, 250	CORR	Envy	Envy with social media use intensity, $r=0.19$
Ding et al. (2017)	COL, China, 707	CORR	Envy	Envy with passive SNS use, $r=0.12$

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Appendix Table 1. (Continued)

Domain and study	*Sample (cultural background, country of participant origin,* n*)*	*Design*	*Characteristic*	*Findings and effect size*
Pollet et al. (2011)[a]	Unspecified, 117	CORR	Emotional distance	Emotional closeness with support group with time on spent on SNS, $r=0.17$ Emotional closeness with support group with time on spent on IM, $r=0.09$ Emotional closeness with sympathy group with time on spent on SNS, $r=0.03$ Emotional closeness with sympathy group with time on spent on IM, $r=-0.12$ Emotional closeness with outer layer with time on spent on SNS, $r=0.10$ Emotional closeness with outer layer with time on spent on IM, $r=-0.05$
Sharifian et al. (2022)	IND, United States, 592	CORR	Envy	Envy with SNS frequency, $r=0.40$ Envy with active social media use, $r=0.07$
Vossen and Valkenburg (2016)[a]	IND, Netherlands, 942	CORR LONG	Affective apathy	Affective empathy with time spent on SNSs and IM applications, $r=0.19$ (T1), 0.15 (T2) Sympathy with time spent on SNSs and IM applications, $r=0.06$ (T1), 0.06 (T2) Affective empathy at T2 with time spent on SNSs and IM applications at T1, $\beta=0.11$ Affective empathy at T1 with time spent on SNSs and IM applications at T2, $\beta=0.01$ Sympathy at T2 with time spent on SNSs and IM applications at T1, $\beta=-0.01$ Sympathy at T1 with time spent on SNSs and IM applications at T2, $\beta=-0.06$
Motivation				
Boursier et al. (2020)	IND, Italy, 578	CORR	Self-expression/ enhancement	Self-presentation expectancy with time spent on social media, $r=0.25$ Self-presentation expectancy with problematic social media use, $r=0.23$ Self-confidence expectancy with time spent on social media, $r=0.14$ Self-confidence expectancy with problematic social media use, $r=0.39$
Kircaburun et al. (2020)	COL, Turkey, 1008	CORR	Self-expression	Make, express, or present a more popular self with problematic social media use, $r=0.25$

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Appendix Table 1. (Continued)

Domain and study	*Sample (cultural background, country of participant origin,* n*)*	*Design*	*Characteristic*	*Findings and effect size*
Greenwood (2013)	Unspecified, 281	CORR	Self-enhancement	Facebook frequency use with desire to become famous, $r=0.19$ Facebook active use (posting) with desire to become famous, $r=0.20$ Facebook active use (responding with desire to become famous, $r=0.18$ Facebook passive use (lurking) with desire to become famous, $r=0.12$ Facebook frequency use with desire to be visible, $r=0.18$ Facebook active use (posting) with desire to be visible, $r=0.35$ Facebook active use (responding with desire to be visible, $r=0.28$ Facebook passive use (lurking) with desire to be visible, $r=0.13$
Social behavior				
Bano et al. (2019)	COL, Pakistan, 266	CORR	Social capital	WhatsApp use intensity with bonding social capital, $r=0.32$ WhatsApp use intensity with bridging social capital, $r=0.04$
Chen et al. (2019)[a]	IND, Netherlands, 686	CORR	Impulsiveness	Time spent averaged across Facebook, Instagram, and Snapchat with risky selfie behaviors, $r=0.26$; with lenient attitudes toward such behaviors, $r=0.13$
Chung et al. (2019)[a]	COL, Malaysia, 128	CORR	Impulsiveness	Behavioral impulsivity with social media use, $r=0.15$; social media problematic use, $r=-0.02$
Glaser et al. (2018)	IND, New Zealand, 1157	CORR	Social capital	Offline social capital with social media use frequency (networking), $r=0.13$ Offline social capital with social media use frequency (news), $r=0.09$
Holmgren and Coyne (2017)	IND, United States, 442	CORR	Impulsiveness	Self-regulation with time spent on SNSs, $r=-0.13$ Self-regulation with problematic SNS use, $r=-0.26$
Lee et al. (2016)	COL and IND, South Korea and Australia, 1045	CORR	Social capital	SNS positively predicted bonding and bridging online social capital (effect size not reported)
Lyvers et al. (2019)[a]	IND, Australia, 143	CORR	Impulsiveness	Impulsivity with problematic social media use, $r=0.25$
Ng (2020)	Unspecified, 811	CORR	Social capital	Active use with helping a stranger in an extraordinary situation, $\beta=0.17$ Passive use with helping a stranger in an extraordinary situation, $\beta=0.01$
Panek (2014)	IND, United States, 454	CORR	Impulsiveness	Self-control with time spent on SNSs, $r=-0.25$
Pollet et al. (2011)[a]	Unspecified, 117	CORR	Social capital	Size of online networks with time on spent on SNS, $r=0.21$ Size of online networks with time on spent on IM, $r=0.12$
Sutcliffe et al. (2018)	IND, United Kingdom, 249	CORR	Social capital	Time on social media with network size, $\beta=0.15$

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Appendix Table 1. (Continued)

Domain and study	*Sample (cultural background, country of participant origin,* n*)*	*Design*	*Characteristic*	*Findings and effect size*
Thomas et al. (2020)	IND, United Kingdom, 496	CORR	Social capital	Social capital (maintain) with social media use intensity, $r=0.13$ Social capital (bridging) with social media use intensity, $r=0.15$ Social capital (bonding) with social media use intensity, $r=0.09$
Tijunaitis et al. (2019)	IND, United States, 152	CORR	Social capital	Social capital with social media use frequency at work, $r=0.20$ Online trust with social media use frequency at work, $r=0.12$
Utz and Breuer (2019)	IND, Netherlands, 685	CORR	Social capital	External networking with active LinkedIn use, $r=0.33$ External networking with passive LinkedIn use, $r=0.13$ Internal networking with active LinkedIn use, $r=0.19$ Internal networking with passive LinkedIn use, $r=0.02$
van Koningsbruggen et al. (2017)	IND, United States, S1 = 72, S2 = 128	CORR	Impulsiveness	Behavioral hedonistic reactions to Facebook content with time spent on Facebook and frequency of Facebook use with, $r=0.31$ (S1)/.18 (S2).
Warner-Søderholm et al. (2018)	Unspecified, 214	CORR	Social capital	Interpersonal trust higher in those who used LinkedIn and Instagram more frequently than lighter users, $d=0.34$
Liu et al. (2020)	COL, China, 872	CORR	Social capital	Offline social capital with active WeChat and QQ use with, $r=0.25$ Online social capital with active WeChat and QQ use, $r=0.38$
Yuan and Fussell (2017)	COL, China and South Korea, 335	CORR	Social capital	Bridging social capital with Renren/Cyworld, $\beta=0.24$ Bonding social capital with Renren/Cyworld, $\beta=0.32$ Bridging social capital with Facebook, $\beta=0.25$ Bonding social capital with Facebook, $\beta=0.36$

Studies used a cross-sectional design and self-reported measurement unless otherwise noted.

[a]Studies reported findings regarding the link between social media use and more than one characteristic.

COL, collectivistic culture; CORR, correlational design; EXP, experimental design; IM, instant messaging; IND, individualistic culture; LONG, longitudinal design; S, study; SNS, social network site; T, time point.