You, Me, & AT&T: The role of technology in social interactions

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Abstract

Technology has become a ubiquitous form of communication in today's society. With new advancements constantly emerging and no end in sight, it appears that this form of communication is here to stay. But how does technology use relate to our in-person social interactions? And what mechanisms might be at play to help explain these relationships? The current thesis examines these questions across three studies. Study 1 focused on how various forms of trait-level social media use (e.g., Facebook, Instagram, Snapchat) relate to in-person liking amongst new acquaintances. We found that certain forms of social media use (i.e., Instagram, Snapchat, and passive use) were associated with liking others and being liked more by others, above and beyond the effects of relevant personality traits. Other forms of social media use, however (i.e., Facebook, active use) were not significantly associated with liking in in-person first impression situations. Study 2 expanded upon this by examining how various forms of computer-mediated communication (e.g., texting, phone calling, social media) were related to individual and relationship correlates within romantic relationships. We found that texting was most significantly associated with positive individual and relationship correlates, such as greater relationship quality and positive affect, whereas other forms of computer-mediated communication (i.e., phone calling) were not related to such correlates. Finally, Study 3 examined how the mere presence of a mobile phone influenced relationship quality within romantic relationships, and the role that emotion accuracy and bias plays in these relationships, using both an experimental lab and daily diary paradigm. We found that, in the lab, normativity mediated the relationship between phone presence and relationship quality, such that phone presence led to greater normativity which, in turn, predicted greater relationship quality. In daily life, we found that distinctive assumed similarity mediated the relationship between phone
presence and relationship quality, such that on days when participants had their phones present more than they usually do, they saw their partners with higher levels of distinctive assumed similarity which, in turn, predicted greater relationship quality. Overall, this thesis challenges the widespread belief that phone use is detrimental to social interactions. Rather, phone use is at least not harmful to, and in some cases can actually benefit, social interaction. Importantly, the way in which people use technology, rather than the simple amount of time spent on technology in general, seems to be the key to understanding how phone use relates to social interactions.
Résumé

La technologie est devenue une forme de communication omniprésente dans la société d'aujourd'hui. Avec des progrès constants et sans fin en vue, il semble que cette forme de communication soit ici pour rester. Mais quel est le lien entre l'utilisation de la technologie et nos interactions sociales en personne? Quels mécanismes pourraient jouer un rôle en aider à expliquer ces relations? Cette thèse examine ces questions à travers trois études. L'étude 1 s'est concentrée sur la façon dont diverses formes d'utilisation des médias sociaux au niveau des traits (par exemple, Facebook, Instagram, Snapchat) sont liées à l'appréciation de nouvelles connaissances en personne. Nous avons constaté que certaines formes d'utilisation des médias sociaux (c'est-à-dire Instagram, Snapchat et l'utilisation passive) étaient associées au fait d'aider les autres et d'être aimé plus par les autres, au-delà des effets des traits de personnalité pertinents. En revanche, d'autres formes d'utilisation des médias sociaux (Facebook, utilisation active) n'étaient pas associées de manière significative au fait d'aider les autres dans des situations de première impression en personne. L'étude 2 a approfondi ces résultats en examinant comment diverses formes de communication assistée par ordinateur (par exemple, les textos, les appels téléphoniques, les médias sociaux) étaient liées à des corrélates individuels et relationnels dans les relations romantiques. Nous avons constaté que l'envoi de textos était le plus significativement associé à des corrélates individuels et relationnels positifs, tels qu'une plus grande qualité de relation et un affect positif, alors que d'autres formes de communication assistée par ordinateur (c'est-à-dire les appels téléphoniques) n'étaient pas liées à de tels corrélates. Enfin, l'étude 3 a examiné comment la simple présence d'un téléphone cellulaire influençait la qualité des relations amoureuses et le rôle que jouent la précision et le biais des émotions dans ces relations, en utilisant à la fois un laboratoire expérimental et un paradigme de journal quotidien. Nous avons
constaté que, dans le laboratoire, la normativité médiait la relation entre la présence du cellulaire et la qualité de la relation, de sorte que la présence du cellulaire conduisait à une plus grande normativité qui, à son tour, prédisait une plus grande qualité de la relation. Dans la vie quotidienne, nous avons constaté que la similarité distinctive supposée médiait la relation entre la présence du cellulaire et la qualité de la relation, de sorte que les jours où les participants avaient leur cellulaire présent plus que d'habitude, ils voyaient leurs partenaires avec des niveaux plus élevés de similarité distinctive supposée qui, à son tour, prédisait une plus grande qualité de la relation. Dans l'ensemble, cette thèse remet en question la croyance répandue selon laquelle l'utilisation du téléphone nuit aux interactions sociales. Au contraire, l'utilisation du téléphone cellulaire n'est pas nuisible, et dans certains cas, elle peut même être bénéfique à l'interaction sociale. Il est important de noter que la façon dont les gens utilisent la technologie, plutôt que le simple temps passé sur la technologie en général, semble être la clé pour comprendre comment l'utilisation du téléphone cellulaire est liée aux interactions sociales.
Acknowledgments

First, I would first like to thank my supervisor, Lauren Human. It is not an understatement to say that I could not have completed this program without all of the support and guidance you have provided over the last six years. Your unwavering trust and nurturing gave me the confidence to venture forth in this program and grow as my own researcher. It is my sincere hope that one day I possess the expertise and professionalism that you have shown to me. I cannot thank you enough for all you have done for me: giving me the freedom to design my own studies, helping me to improve my writing skills, editing each one of my numbered drafts, and allowing me to spend way too much time making my plots look pretty, all with a smile on your face. I could not have asked for a better mentor.

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Contribution to Original Knowledge

As technology has become more and more integrated into society, a debate has arisen as to whether technology use is beneficial (Waytz & Gray, 2018; Heiberger & Harper, 2008; Kim et al., 2009; Gosling et al., 2011; Kraut et al., 2002; Kim et al., 2016; Dimmick et al., 1994) or detrimental (Kraut et al., 2002; Kushlev et al., 2016; Allen, 2019; Drago, 2015; Geladi, 2018; Turkle, 2012; Twenge, 2017) to individuals and relationships. The present thesis expands upon this work by examining how several different forms of technology use relate to individual and relationship experiences.

Chapter 1 provides the first empirical test of how several different forms of trait-level social media use relate to initial in-person interactions. The present manuscript shows how some forms of social media use, namely Instagram, Snapchat, and passive social media use, relate to more adaptive in-person interactions with new acquaintances, as indicated by liking others and being liked more by others. Other forms of social media use, namely Facebook and active social media use, were unrelated to liking. These findings help to shed light on how technology use relates to social experiences, by demonstrating that trait-level technology use can relate to in-person social experiences, even if people are not using technology during their interactions with others. A major contribution of this work was that some forms of technology use can actually be beneficial to in-person social experiences, whereas other forms are at least not detrimental to social interactions.

Chapter 2 extends upon this work by examining how using technology for the express purpose of interacting with a romantic partner was related to important individual and relationship correlates. Indeed, technology is most commonly used to maintain contact with others (Whiting & Williams 2013; Wooley, 2013; Subrahmanyam et al., 2008; Smock et al.,
2011), although little research has compared how different types of technology use relate to these experiences. Similar to the results from Chapter 1, we found that certain types of computer-mediated communication, namely texting and social media, were related to more positive individual and relationship correlates, such as higher levels of relationship quality and positive affect. Other forms of computer-mediated communication, though, were unrelated to these experiences. Furthermore, we were able to parse out the differences between inter- and intra-individual technology use to better understand when and how technology use relates to these experiences. This study is the first to compare how several mediums for computer-mediated communication relate to both individual and relationship correlates and highlights the importance of looking at both within- and between-person patterns of technology use.

Finally, Chapter 3 explores how the simple presence of a mobile phone during in-person interactions with one’s romantic partner relates to relationship quality, and the role that emotion accuracy and bias plays in this relationship. Using both an experimental and daily-diary design, we found that having a phone present was associated with higher levels of relationship quality via more biased emotion perceptions of one’s partner. This work is in stark contrast to the idea that the presence of a mobile phone is detrimental to relationships (Przybylski & Weinstein, 2013; Allred & Crowley, 2017; Thornton et al., 2014; Dwyer et al., 2018; Kushlev et al., 2019), and sheds light on one possible mechanism through which phone presence may actually benefit relationships.
Contribution of Authors

I am the first author of all three chapters presented in this thesis.

For Chapter 1, I assisted in data collection with Lauren Gazzard Kerr and Marie-Catherine Mignault. Dr. Lauren Human supervised all aspects of this study and contributed to developing the research question for this manuscript. I analyzed the data and wrote the manuscript. Both Dr. Lauren Human and Lauren Gazzard Kerr read, edited, and approved the final manuscript, published in *Personality and Social Psychology Bulletin*.

Both Chapters 2 and 3 used a dataset from the same study. I conceptualized and designed the study under the guidance of Dr. Lauren Human. I collected and analyzed the data and prepared the manuscript for publication. Dr. Lauren Human assisted in implementing the study as well as read, edited, and approved the final manuscript. This manuscript is currently in final stages of preparation for submission.
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General Thesis Introduction
Introduction and Literature Review

If there is one thing that defines the last 40 years, it is technology. From mobile phones to social media, technological advancements have permeated every aspect of our lives, specifically our social lives (Whiting & Williams, 2013; Adestra, 2017). Technology use – such as using mobile phones and social media (heretofore collectively referred to as “technology”) – is an invaluable tool for social interaction. The most common reason for using technology is for communication (Whiting & Williams 2013; Wooley, 2013; Subrahmanyam et al., 2008; Smock et al., 2011), which is associated with positive social experiences (Koutamanis et al., 2013; Metzler & Scheithauer, 2017). However, along with this rise in technology use, there has been a rise in concerns about its implications for social well-being, among researchers and the public alike. Does frequently using technology to interact with others hurt our in-person social skills? Might technology begin to replace our in-person social interactions? And can the mere presence of technology interfere with our in-person interactions? Indeed, previous work in this area has found that technology can be associated with such negative social experiences (Kraut et al., 2002; Kushlev et al., 2016; Allen, 2019; Drago, 2015; Geladi, 2018; Turkle, 2012; Twenge, 2017). So, which is it? Does using technology help or hurt our social interactions? The present dissertation examines this question in depth, first by reviewing the existing literature and theories on technology use and social experiences, and then investigating how three different forms of technology use relate to social experiences across three manuscripts and two large-scale datasets.

First, Chapter 1 examines the implications of frequent social media use for initial in-person interactions. Second, Chapter 2 examines the implications of using technology for the express purpose of communicating with one’s partner using a daily diary design. Finally, Chapter 3 examines the implications of having one’s phone present during in-person interactions.
with one’s romantic partner, using both an in-laboratory experimental design and a daily diary design.

Technology and Positive Social Experiences

Social media and mobile phones were created to help people to connect with one another, and they have proven to be useful tools at every step of the relationship process, including initiation (Sprecher, 2009; LeFebvre, 2017), maintenance (Ellison et al., 2014; Billedo et al., 2015; Ling & Yttri, 2002), and even breakdown (Lukacs & Quan-Haase, 2015; Garimella et al., 2014; Arikewuyo et al., 2020). Technology use is associated with more positive in-person interactions, such as greater social skills and engagement (Waytz & Gray, 2018; Heiberger & Harper, 2008; Kim et al., 2009; Gosling et al., 2011), greater communication (Kraut et al., 2002; Kim et al., 2016), and greater social involvement and sociability (Kraut et al., 2002; Waytz & Gray, 2018; Dimmick et al., 1994). Several theories have been proposed to help explain the positive associations between technology use and social interactions.

Social Information Processing Theory

The social information processing theory of computer-mediated communication aims to explain how technology users can form impressions and develop relationships with others online that achieve a similar level of development achieved in offline communication (Walther, Van Der Heide, Ramirez, Burgoon, & Peña, 2015). When computer-mediated communication (CMC) began to rise in popularity, many believed that it would be harmful for effective communication due to the lack of nonverbal cues. Indeed, previous research has found that nonverbal cues are essential in facilitating effective communication, such that people are able to understand others’ personalities, emotions, and identities through nonverbal cues. As such, many people were concerned that the lack of nonverbal cues available in CMC would contribute to less successful
social interactions (Walther, 2010), termed the "cues-filtered-out approach" (Walther et al., 2015).

However, anecdotal accounts of CMC told a different story. People reported that CMC was actually beneficial for social experiences, particularly for those who lacked adequate social skills (Walther et al., 2015). For example, a shy child might be able to use CMC to form friendships with others online without the fear of immediate social rejection. As such, one aim of the social information processing theory of CMC was to account for both the empirical evidence for the cues-filtered-out approach and the anecdotal evidence suggesting that CMC facilitates the development of social relationships.

To start, this theory assumes that people seek to develop relationships with others through any medium available to them. In relation to CMC, if nonverbal cues are not available to convey or decode personality, emotion, or identity, people will adapt to process this information via verbal cues. Empirical evidence supports this idea. In one study, researchers compared the verbal cues exchanged in a CMC interaction to the multimodal cues exchanged in face-to-face interactions, including verbal, kinesic, and paraverbal cues (Walther, Loh, & Granka, 2005). As expected, verbal cues were the most important (and only) cues in conveying affect in the CMC interactions, whereas paraverbal and kinesic cues were more important in conveying affect in face-to-face interactions. Furthermore, verbal cues actually did not significantly contribute to affective expression in face-to-face interactions. Most importantly, verbal cues accounted for as much variance in affective expression in CMC interactions as the multimodal cues did in face-to-face interactions. This supports the idea that people will adapt to utilize available cues to convey important information to others when other cues are not available.
This theory also assumes that the development of relationships via CMC operates at a different rate from those via face-to-face interactions. This is due to the fact that less information is available via CMC than via face-to-face interactions. In fact, research shows that one minute of face-to-face interactions is equivalent to at least four minutes of CMC (Siegal et al., 1986; Tidwell & Walther, 2002). As such, people will need more time when interacting via CMC to obtain the same amount of information as those interacting face-to-face. Indeed, Walther (1993) had participants interact in small groups, either via CMC or face-to-face, across a period of six weeks. Results showed those who interacted face-to-face had formed solid impressions of their interaction partners after the initial meeting, whereas those who interacted via CMC had less-developed impressions after the initial meeting. However, impressions became significantly more developed by the second meeting, and by the third meeting those who interacted via CMC had the same level of impression development as those who interacted face-to-face.

Overall, this theory suggests that CMC can foster similar experiences to offline interaction, although certain adaptations must occur. First, people will rely more on verbal cues during CMC to express themselves and interpret information from others. Second, information processing that occurs via CMC will take longer than offline communication due to the slower rate at which information is transmitted. In sum, CMC and offline communication can both relate to positive relationship development, although the way through which people process information and the temporal trajectory of the development will differ.

*Hyperpersonal Model of Computer-Mediated Communication*

The hyperpersonal model of CMC extends beyond the social information processing theory of CMC by arguing that interactions that occur via CMC exceed, rather than parallel,
face-to-face interactions (Walther, 1996). There are four components to this theory: receivers, senders, channel, and feedback.

First, receivers refer to those who perceive information from others. For example, if Robby (the receiver) is having a conversation with Sam (the sender), Robby would be using the information that Sam expresses to form an impression about them. It is argued that receivers tend to exaggerate their interpretations of senders’ expressions by relying on normative heuristics to fill in missing information. For example, Spottswood and colleagues (2013) ran an experiment in which participants were asked to interpret the gender of online support providers. The results showed that messages reflecting sympathy and emotions were more commonly perceived as coming from female support providers. This is in line with the idea that high person-centeredness, or “the extent to which messages explicitly acknowledge, elaborate, legitimize, and contextualize the feelings and perspective of a distressed other” (Burleson, 2009), is seen as being more feminine (Holmstrom, Burleson, & Jones, 2005), whereas low-person centeredness is seen as being more masculine. In other words, receivers relied on a normative heuristic (i.e., that females provide more person-centered messages) to interpret the missing gender of the online support provider.

Second, senders are able to present themselves in ideal ways via CMC by taking time to edit their profiles and messages to reveal only the characteristics that they wish to share while, at the same time hiding other undesirable characteristics (Walther et al., 2015). For example, Tinder users commonly present an “idealized, yet authentic” version of themselves on their profiles, perhaps by selecting photos in which they think they look attractive, including humorous statements in their dating profile, and sharing information that demonstrates their values and interests (Dunlop, 2018).
Related to this, the online channel through which people choose to communicate via CMC allows people to achieve this self-presentation (Walther et al., 2015). Specifically, the asynchronous communication inherent to CMC affords users the time and tools to carefully construct their messages and profiles without disrupting the natural flow of conversations. Furthermore, CMC allows for more cognitive resources to be directed towards message construction compared to face-to-face interactions because people are not as distracted by other competing information, such as the partner’s body language or environmental distractions.

Finally, the components of this model provide a feedback loop in which senders present their ideal selves, which contributes to receivers making more positive impressions, which then reinforces the idea that communication should occur via CMC. For example, if Sam presents attractive pictures of themselves on Tinder, Robby will likely form a positive impression of Sam, which may contribute to a positive interaction between the two and increase the likelihood that Robby and Sam will continue to interact on Tinder.

This positive feedback loop via CMC is argued to contribute to more intimate interactions due to higher levels of self-disclosure (Walther, 2007; Tidwell & Walther, 2002; Walther, 1996). However, this may only be true for certain types of relationships, specifically for those who a) lack offline connections; and b) already have established offline connections with their online interaction partners (Waytz & Gray, 2018). In the former, technology provides an avenue for self-disclosure that people who lack the ability or opportunity to form offline social connections may otherwise not have access to (e.g., those with social anxiety or physical disabilities). In the latter, those with established offline connections have access to more information about their interaction partners through technology, thus complementing these existing relationships.
In sum, the hyperpersonal model of CMC argues that interactions via online channels actually exceed interactions occurring face-to-face. This may be particularly true for people who have few offline connections or for those who supplement their offline interactions with computer-mediated interactions.

**Stimulation and Reinforcement Hypotheses**

In line with the idea that CMC is particularly beneficial for those with established offline connections, the stimulation hypothesis argues that online communication contributes to well-being by fostering communication between existing friends (Valkenburg & Peter, 2007b; Gross, 2004; Subrahmanyam et al., 2000). Technology is most commonly used for relationship maintenance by allowing people to maintain contact with their existing social networks across time and social distance (Gross, 2004; Lenhart et al., 2005; Subrahmanyam et al., 2000; Valkenburg & Peter, 2007a). The use of technology for social purposes is associated with positive social experiences, such as greater empathy (Vossen & Valkenburg, 2016; Alloway et al., 2014; Collins, 2014; Carrier et al., 2015), relationship quality (Valkenburg & Peter, 2007a), and closeness (Valkenburg & Peter, 2007a).

Technology can even have a positive causal influence on in-person interactions. One longitudinal study examined whether technological communication reinforces greater communication across communication channels (i.e., Reinforcement Hypothesis), or whether it reduces face-to-face communication (i.e., Displacement Hypothesis; Dienlin et al., 2017). The results showed that if participants communicated with others via social networking sites, they were more likely to communicate with others face-to-face at a later time. However, communication via instant messaging was not significantly associated with face-to-face communication. This partially supports the reinforcement hypothesis, in that some forms of
technology use (i.e., communicating with others via social networking sites) leads to greater 
face-to-face communication later on, thus supporting the idea that technology may increase the 
potential for overall communication (Dienlin et al., 2017; Haythornthwaite, 2005; Vorderer et 
al., 2016).

In sum, these hypotheses support the idea that technology is related to positive social 
experiences by contributing to greater offline communication.

Co-Orientation Theory

Moving beyond individual technology use, co-orientation theory posits that group 
members in a relationship tend to develop similar attitudes about objects, which influences 
closeness (Newcomb, 1953). In other words, if Person A and Person B are in a relationship, they 
are likely to see Object X in a similar way, thus relating to positive relationship outcomes. This 
is termed the AB-X Co-orientation. In relation to technology, Person A and Person B might both 
believe that using technology during in-person interactions with one another contributes to more 
enriching conversations, which may increase their perceived closeness and enjoyment with one 
another.

There are three important aspects of co-orientation theory (McLeod & Chaffe, 1973). 
First, perceived similarity is the extent to which one believes that their partner holds the same 
beliefs as themselves. If Abby believes that using technology is beneficial, and they believe that 
Bobby shares this belief (regardless of whether Bobby actually holds this belief), Abby would be 
perceiving Bobby with high levels of perceived similarity. Actual similarity is the extent to 
which one’s beliefs actually line up with their partner’s beliefs. If both Abby and Bobby believe 
that using technology is beneficial, they would be experiencing high levels of actual similarity. 
Finally, understanding is the extent to which one’s perceptions of their partner’s beliefs are
accurate. If Abby’s understanding is that Bobby believes that technology is beneficial, and 
Bobby actually believes this, then Abby would have a high level of understanding. Each of these 
components of co-orientation theory predict more positive relationship outcomes (McLeod & 
Chaffee, 1973; Montoya, Horton, & Kirchner, 2008; Hall & Sereno, 2010).

Hall and colleagues (2014) examined mobile phone use and adherence to internal norms 
through the lens of co-orientation theory. Indeed, results showed that adherence to internal norms 
of mobile phone use predicted more positive relationship outcomes, including liking, 
satisfaction, and commitment (Hall et al., 2014). In addition, adherence to internal norms was 
associated with lower perceptions of mobile interference, or the thought that people’s phone use 
is interfering in the relationship. In other words, if both participants and their partners adhered to 
their internalized mobile phone norms, regardless of whether those norms aligned with societal 
norms, they experienced more positive relationship experiences.

**Summary of Beneficial Technology Use**

All of the theories presented thus far support the idea that technology is beneficial for 
social relationships. Specifically, technology use for communication with others is argued to be 
as good as, or in some cases better, than face-to-face communication, perhaps because it allows 
for deeper social interactions and provides an avenue for people to connect with one another 
more easily. Furthermore, the use of technology during social interactions may facilitate social 
engagement and may be the new norm.

**Technology and Negative Social Experiences**

Despite the above mentioned positive aspects of technology use, a growing concern in 
recent decades has been that technology use is harmful to social interactions (Allen, 2019; 
Drago, 2015; Geladi, 2018; The Learning Network, 2020; Orlowski, 2020). Indeed, technology
use has been associated with social inhibition and low levels of rapport and likeability (Iacovelli & Valenti, 2009), lower relationship quality (Milani et al., 2009; Liu & Kuo, 2007), and increased loneliness (Caplan, 2006; Kim et al., 2009; Burke et al., 2010). But why might technology use contribute to these negative social experiences?

**Social Comparison Theory**

A big concern is that the use of technology leads to greater feelings of envy and social comparison (Krasnova et al., 2013; Verduyn et al., 2015; Vogel et al., 2015), due to the thought that people tend to post information to promote their best features. According to the social comparison theory (Festinger, 1954), people tend to compare themselves to others as a way of obtaining an accurate evaluation of themselves. There are two types of social comparison: upward social comparison occurs when one compares themselves to others who are better off than them in some way, whereas downward social comparison occurs when one compares themselves to others who are worse off than them. Upward social comparisons tend to be associated with more negative outcomes, including increased feelings of inadequacy, poor self-evaluation, and higher levels of negative affect (Marsh & Parker, 1984; Morse & Gergen, 1970, Pyszczynski, Greenberg, & LaPrelle, 1985). In contrast, downward social comparison tends to be associated with more positive outcomes such as higher levels of positive affect and self-evaluation (Wills, 1981).

It is commonly thought that technology users, specifically social media users, present their best selves online (Dunlop, 2018; Zhao, Grasmuck, & Martin, 2008; Utz et al., 2012), thus contributing to social comparison. Despite this belief, it is important to note, that social media profiles do, indeed, represent accurate self-presentation (Back et al., 2010). Regardless, social comparison is a common theme in today’s world. Verduyn and colleagues (2015) found that
participants who used Facebook more frequently tended to engage in more social comparison, both upward and downward. Although Facebook is the most popular social networking site (Statista, 2022), social comparison, specifically upward comparison, tends to occur on other social networking sites as well, including Twitter (Giorgi et al., 2021) and Instagram (Lup, Trub, & Rosenthal, 2015).

However, it may be that only certain types of technology use relate to more social comparison. For example, much of the previous research points to the idea that passive social media use (i.e., using social media to consume content) is related to more negative experiences, such as increased envy (Krasnova et al., 2013; Verduyn et al., 2015) and loneliness (Burke et al., 2010), whereas active social media use (i.e., using social media to create content and interact with others) is related to more positive experiences (Burke et al., 2010; Ellison et al., 2007; Grieve et al., 2013; Liu & Yu, 2013).

Overall, technology use, specifically social media use, may contribute to more negative social experiences because people make more upward social comparisons. In other words, when users see other people’s “best selves” presented on social media, they may believe that their lives are not as good as others, thus contributing to negative experiences.

**Expectancy Violations Theory**

As discussed above, adherence to norms surrounding technology within a relationship can predict more positive social experiences. However, when one does not adhere to such norms, negative experiences may occur. According to Expectancy Violations Theory (Burgoon, 1993), people have certain expectations regarding appropriate behavior in social situations. When these expectations are violated, an emotional reaction occurs depending on the valence of the violation. For example, if an individual has the expectation that their romantic partner will
provide undivided attention while out on a date, they will experience a negative emotional response if their romantic partner is distracted by technology (Kelly et al., 2017). Many people have the expectation that people will not use technology during face-to-face interactions (Kadylak et al., 2018; Miller-Ott & Kelly, 2015) and 82% of adults perceive phone use during social gatherings as harmful (Rainie & Zickuhr, 2015). Despite this, a majority of people still use their phones when with others (Rainie & Zickuhr, 2015), which can be perceived negatively if it takes away from the current interaction (Cameron & Webster, 2011) or if it violates the group norm (Hall et al., 2014; Forgays et al., 2014; Inbar et al., 2014; Walsh et al., 2009).

Overall, this theory suggests that technology use, particularly use during face-to-face interactions with others, will relate to more negative social experiences if people have the expectation that others will refrain from use during the interaction.

**Social Presence Theory**

Moreover, when people are distracted by technology, they may not register or emit important nonverbal cues that are essential to social interactions. Social Presence Theory (Short et al., 1976) outlines the importance of such nonverbal cues (e.g., body language, eye contact), and engagement in such interactions. Social presence is defined as “the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships” (Short et al., 1976, p. 65). Specifically, this theory highlights both immediacy and intimacy of social interactions. Immediacy is defined as any communication behavior that increases closeness to nonverbal interaction (Wiener & Mehrabian, 1968). Intimacy is considered a composite of several interaction behaviors, such as eye contact, physical proximity, and intimate conversation topics, that increases feelings of closeness within an interaction (Argyle & Dean, 1965).
While Social Presence Theory was originally discussed in the realm of face-to-face interactions, it has evolved to incorporate interactions via technology by focusing on three dimensions: social context, online communication, and interactivity in the online environment (Tu, 2000).

Social context refers to the aspects of the environment through which communication is occurring (Tu, 2000). This includes the type of task that is being completed (McLaughlin, 1986), the topics being discussed (Argyle & Dean, 1965; Walther, 1992), the members of the group (Williams & Rice, 1983; Walther, 1992), and the level of privacy (McLaughlin, 1986; Champness, 1973). For example, dyadic online communication tends to be seen as more private compared to group online communication, thus increasing the level of social presence perhaps due to increased levels of self-disclosure.

Online communication refers to the information exchanged online (Tu, 2000). Those who are able to communicate more effectively online tend to have a higher degree of online social presence (Phillips, 1983; Gunawardena, 1991; Perse, Burton, Kovner, Lears, & Sen, 1992).

Finally, interactivity refers to the two-way exchange of information (Tu, 2000). It is argued that more immediate responses contribute to greater online social presence (Williams & Rice, 1983). For example, Andersen and colleagues (1998) described the importance of immediacy, or nonverbal behaviors that allude to availability and stimulation during interactions, which is associated with greater perceptions of competence and favorable evaluations (Manusov, 1991). Technological distraction could impede such processes, perhaps by reducing attention (Strayer et al., 2003), or by creating a competition for attention (Turkle, 2008).

Overall, the distraction caused by technology might relate to more negative social experiences due to a reduction in social presence. That is, being focused on the virtual world
rather than current social interactions with others may contribute to lower levels of intimacy and immediacy of responses, thus causing others to perceive the technology users as not being “present” in the interaction.

Absent Presence and Technoference

While social presence theory argues that people are distracted while using technology, recent research has found that people do not even have to be actively using such technologies to experience negative outcomes. The simple presence of a cell phone has been linked to reduced conversation quality and trust (Przybylski & Weinstein, 2013; Allred & Crowley, 2017), greater levels of distraction (Thornton et al., 2014), lower enjoyment (Dwyer et al., 2018), and even lower frequency of smiling (Kushlev et al., 2019). Similarly, phubbing, or the extent to which people use and are distracted by cell phones in the presence of others (Roberts & David, 2016), is associated with various negative experiences, including reduced relationship satisfaction and greater conflict in romantic relationships (Roberts & David, 2016), reduced job satisfaction (Roberts & David, 2020), and greater social exclusion (David & Roberts, 2017).

Technological distraction, regardless of whether it is due to technology use or the mere presence of a technological device, can lead to a phenomenon known as “absent presence,” whereby individuals are physically present with others but are cognitively focused on the technological world (Gergen, 2002). Indeed, many people report using their phones to connect with others who are not present at social gatherings (Rainie & Zickuhr, 2015). Absent presence and similar phenomenon (e.g., technoference; McDaniel & Coyne, 2016; McDaniel & Radesky, 2018), are associated with more negative experiences, including reduced relationship satisfaction and increased conflict (McDaniel & Coyne, 2016; McDaniel & Radesky, 2018).
In sum, technology use that interferes with ongoing interactions with others can detract from the experience, perhaps by contributing to greater conflict and feelings of exclusion, thus relating to more negative social experiences.

**Fear of Missing Out**

Why do people continue to use technology during interactions despite the common fear that it contributes to negative social experiences? One possible reason is that the constant connection provided by technology can contribute to Fear of Missing Out (FoMo), or the thought that others are having positive experiences in which one is not involved (Przybylski et al., 2013). People who are less satisfied with their basic psychological needs experienced greater FoMo which, in turn, led to greater social media engagement (Przybylski et al., 2013). Furthermore, FoMo predicted greater distraction, perhaps because people are more tempted to access social media to be involved in others’ experiences. Indeed, FoMo is related to compulsive checking of social media in order to stay informed on what others are doing (Oberst et al., 2017). This may contribute to a cycle in which people’s basic psychological needs are not met, thus leading them to be more concerned with what they are missing online, which in turn reduces the quality of their interactions.

**Integrative Theories**

As discussed so far, there is a large debate in society and literature as to whether technology use is good or bad for social experiences. More recent research, however, has begun to focus on more integrative theories, acknowledging that technology can be both beneficial and detrimental to social relationships and well-being, and trying to explain when each might be the case.

**Displacement, Interference, and Complementarity**
According to the Displacement-Interference-Complementarity framework (Kushlev & Leitao, 2020), the extent to which technology use relates to well-being depends on how it is used. Specifically, this theory is comprised of three components: the displacement, interference, and complementarity hypotheses.

The displacement hypothesis posits that technology can be negatively associated with well-being to the extent that it replaces time spent doing other activities (Kushlev & Leitao, 2020; Neuman, 1988). One of the most prominent concerns surrounding technology use and social experiences is that technology replaces time spent in-person with others (Waytz & Gray, 2018). Although evidence for the displacement hypothesis is mixed (Cho, 2015; Pollet, Roberts, & Dunbar, 2011; Dienlin et al., 2017; Lapierre, Zhao, & Custer, 2019), Verduyn and colleagues (2021) found evidence for the displacement hypothesis at the within-person level. That is, on days when people reported communicating with others more via CMC, they reported interacting with others less face-to-face. However, there was no evidence for the displacement hypothesis at the between-person level, such that those who tend to communicate with others via CMC more frequently compared to others in the study did not engage in less face-to-face communication compared to those who use CMC less frequently.

Closely related to this is the interference hypothesis, which suggests that technology use will be related to well-being to the extent that it disrupts time spent doing other activities (Kushlev & Leitao, 2020). For example, if one tends to frequently check their smartphone for notifications, one may experience lower levels of well-being due to reduced quality of attention and cognitive capacity. Indeed, research shows that the mere presence of a smartphone during conversations with others is related to more negative social experiences due to lower quality conversations (Misra et al., 2016; Przybylski & Weinstein, 2013).
Finally, the complementarity hypothesis suggests that technology will be positively related to well-being to the extent that it provides access to information and activities that would otherwise not be available (Kushlev & Leitao, 2020). For example, the COVID-19 pandemic presented an unprecedented disruption in in-person social interactions due to the quarantine and social distance regulations. However, technology allowed people to maintain virtual contact with their social networks. Without the use of technology, people’s connection with others would have been restricted to only those with whom they share a living space. Thus, technology provided an avenue for continued communication that otherwise would have been unavailable.

**Sociability**

Closely related to this framework is the idea that technology use can influence sociability, or people’s ability and tendency to recognize and respond to others (Cacioppo & Patrick, 2008), depending on the extent to which it contributes to a deeper understanding of others (Waytz & Gray, 2018). Specifically, technology use can be detrimental to sociability to the extent that it replaces deep offline engagement with shallow online engagement. For example, if people interact with others via Twitter, their ability to express themselves is limited to 280 characters of written text, thus reducing the nuance and emotional expression that could be accomplished via offline interactions (Waytz & Gray, 2018). This is in line with the displacement hypothesis discussed above (Kushlev & Leitao, 2020).

However, in line with the complementarity hypothesis (Kushlev & Leitao, 2020), technology use can be beneficial for sociability to the extent that it complements existing offline engagement with others (Waytz & Gray, 2018). For example, reading a Tweet from a friend is likely to provide insight into their thoughts and feelings because of the high degree of understanding that has already been established offline (Waytz & Gray, 2018; Stinson & Ickes,
This idea that technology use provides people with additional opportunities to interact with their existing social networks is echoed in similar theories, such as the enhancement hypothesis (Fernandez, Levinson, & Rodebaugh, 2012).

Similarly, technology use can be beneficial for sociability if offline connections are otherwise unavailable or difficult to obtain (Waytz & Gray, 2018). For example, those with social anxiety may benefit from interacting with others online as they will experience less discomfort compared to face-to-face interactions (Valkenburg & Peter, 2008; Shepherd & Edelmann, 2005; Erwin, Turk, Heimberg, Fresco, & Hantula, 2004; Young & Lo, 2012). This is in line with other related theories, such as the compensation hypothesis (Valkenburg & Peter, 2008).

In sum, this idea suggests that technology can be both beneficial and detrimental to social experiences depending on how it is used. Technology use that replaces deep, offline connections with more shallow, online interactions will relate to lower sociability. In contrast, technology use that enhances existing offline connections or use that allows for otherwise difficult or unavailable interactions will benefit people’s sociability.

**Interpersonal-Connection-Behaviors Framework**

The Interpersonal-Connection-Behaviors framework of CMC similarly argues that technology is associated with more positive outcomes when it is used to promote connection with others (Clark, Algoe, & Green, 2017). The authors specifically highlight that technology use that fulfills the need for acceptance and belonging will relate to more positive social experiences. For example, several studies have found that Facebook use relates to increases in feelings of connection (Ahn & Shin, 2013), social support (Deters & Mehl, 2013), and social capital (Ellison, Steinfield, & Lampe, 2007). In line with Verduyn and colleagues’ (2017) work
on active and passive social media use, each of these studies focused specifically on socially-oriented use of Facebook, such as messaging others (Ahn & Shin, 2013), posting status updates (Deters & Mehl, 2013), and number of Facebook friends (Ellison et al., 2007).

However, when technology is not used to promote connection, and when it does not fulfill the needs for acceptance and belonging, it is associated with more negative outcomes (Clark et al., 2017). For example, some forms of social media use, such as passively viewing profiles or “social snacking,” might feel as though they fulfill social needs. However, ultimately these activities do not meet our social needs, thus resulting in less positive social experiences such as increased feelings of loneliness (Song et al., 2014; Gardner, Pickett, & Knowles, 2005).

Overall, this framework is in line with other integrative theories of technology use as it suggests that some forms of technology use, namely use that promote and fulfills need for connection, will be associated with more positive outcomes, whereas use that is not intended for communication and does not meet our social connection needs will be associated with more negative outcomes.

**Summary**

In sum, technology use can be both beneficial and detrimental to social experiences depending on how it is used. Specifically, if technology use fosters greater connection amongst people and if internal norms surrounding technology use are followed, people may experience more positive interpersonal experiences. In contrast, if technology use distracts people from their ongoing interactions or if it is used in a non-normative way, people may have more negative social experiences. Thus, if, in general, people use technology to complement and support their in-person social relationships and interactions, and primarily use technology in a normative way, it may tend to be more benign or beneficial for social well-being.
Overview of Research

The main objective of this thesis is to examine how several different types of social media and cell phone use relate to individual and relationship experiences. To determine the extent to which technology use is generally complementary and normative, and therefore linked to primarily positive social experiences, or interfering and nonnormative, thus linked to more negative social experiences, this thesis examines three different forms of technology use across two social contexts (first impressions and romantic relationships). Specifically, this thesis contains three manuscript-based chapters describing two studies, each addressing a distinct research question. Chapter 1 examines how various forms of trait-level social media use relate to liking in an in-person first impression context. In other words, does online social engagement relate to offline social engagement and success, positively or negatively? Chapters 2 and 3 originate from two separate components, a daily diary component and an experimental lab component, of a large-scale study examining how technology use relates to social experiences within romantic relationships. Using the daily diary component, Chapter 2 examines how communicating with one’s romantic partner via technology, such as texting and social media, relates to important individual and relationship correlates, including relationship quality, attachment, and affect, and how this compares to in-person interactions. In other words, does mobile mediated communication with a romantic partner complement or displace in person interactions? Finally, using both the lab and daily diary components, Chapter 3 examines whether phone presence during interactions with one’s partner influences accuracy and bias in emotion perceptions, in turn contributing to relationship quality. In other words, does the mere presence of technology have negative (or positive) implications for romantic partner interactions? Combined, these three chapters will shed light on the implications of these different
forms of technology use for our in-person social interactions and relationships, providing insight into whether they tend to be harmful or helpful.
Chapter 1

Social Media Use Predicts Greater Liking in In-Person Initial Interactions

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Abstract

Does how people generally engage with their online social networks relate to offline initial social interactions? Using a large-scale study of first impressions ($N = 806$, $N_{dyad} = 4565$), we examined how different indicators of social media use relate to the positivity of dyadic in-person first impressions, from the perspective of the participants and their interaction partners. Many forms of social media use (e.g., Instagram, Snapchat, passive) were associated with liking and being liked by others more, although some forms of use (e.g., Facebook, active) were not associated with liking others or being liked by others. Furthermore, most associations held controlling for extraversion and narcissism. Thus, while some social media use may be generally beneficial for offline social interactions, some may be unrelated, highlighting the idea that how, rather than how much, people use social media can play a role in their offline social interactions.

Keywords: Social media; Impressions; Liking; Extraversion; Narcissism
**Introduction**

In the technological era, people spend an increasing amount of time on social media sites like Facebook and Instagram. Many people use these sites to foster communication and connection with others via online mediums (Whiting & Williams, 2013; Wooley, 2013; Subrahmanyam, Reich, Waechter, & Espinoza, 2008), but many people have raised concerns about whether social media may have negative implications for in-person social interactions (Allen, 2019; Drago, 2015; Geladi, 2018). Indeed, there is evidence that Internet use is associated with social inhibition and lower levels of rapport and likeability (Iacovelli & Valenti, 2009). Yet, some forms of social media use appear to have more positive links with offline social experiences. For example, greater instant messaging and Facebook use has been shown to increase offline friendship initiation (Koutamanis, Vossen, Peter, & Valkenburg, 2013; Metzler & Scheithauer, 2017). To address these divergent findings, Clark and colleagues (2018) argue that using social media to connect with others is beneficial for well-being and interpersonal closeness, whereas use that is associated with isolation and comparison is more detrimental. In the present study, we sought to extend this research by examining whether general social media use relates to experiences during getting-acquainted face-to-face interactions. Specifically, does how we use social media in our daily lives relate to the first impressions we make of and have on others during in person interactions?

We examined this question with a large-scale study of getting-acquainted interactions ($N = 806, N_{dyad} = 4565$) by exploring whether different types of social media use relate to the positivity of initial social interactions, indexed by how much people like and are liked by others. Specifically, we focused on several forms of social media, including the frequency with which people use various sites (e.g., Facebook, Instagram, Snapchat), the size of people’s online social
networks, and how actively and passively people engage in social media use. Furthermore, we examined the role of relevant personality traits (i.e. extraversion and narcissism) in the associations between social media use and social interactions. Specifically, does social media use relate to liking others and being liked by others because of these personality traits? Or do links emerge above and beyond any associations with extraversion and narcissism? Capitalizing on the dyadic nature of first impressions, we examined how different types of social media use relate to how much people like others as well as how much people are liked by others, thus providing a unique opportunity to extend beyond only self-reports of social experiences.

**Social Media Use and Positive Social Interactions**

*Types of Social Media Use*

If trait-level social media use does relate to initial social interactions, would this link be more positive, indicated by greater liking in in-person interactions? One possibility is that people who use social media more may have stronger social skills and confidence, which could in turn contribute to more positive interactions. This could be because greater social media use contributes to social skills and engagement (Waytz & Gray, 2018; Heiberger & Harper, 2008) or because people who have stronger social skills and are more socially engaged also tend to use social media more (Kim, LaRose, & Peng, 2009; Gosling, Augustine, Vazire, Holtzman, & Gaddis, 2011). Of note, only some types of social media use may be linked to stronger social skills and, in turn, positive social interactions. Specifically, more socially oriented use, such as using social media to connect with other people, tends to be associated with positive experiences, including greater engagement in college life (Heiberger & Harper, 2008), greater communication (Kim et al., 2016), greater social involvement (Waytz & Gray, 2018), and greater well-being (Clark et al., 2018).
Additionally, more active social media use, defined as using social media to create content and interact with friends (Gerson, Plagnol, & Corr, 2017), is associated with more positive social experiences such as increased social capital (Burke, Marlow, & Lento, 2010; Ellison, Steinfeld, & Lampe, 2007; Verduyn, Ybarra, Résibois, Jonides, & Kross, 2017), connectedness (Grieve, Indian, Witteveen, Tolan, & Marrington, 2013; Verduyn et al., 2017), and social (Liu & Yu, 2013). While most of the previous research on passive social media use, defined as using social media to consume but not create content (Burke, Kraut, & Marlow, 2011), has found negative associations with social experiences (see below), some research has found passive social media use is associated with increased social engagement (MacKay, Van Winkle, & Halpenny, 2019). Thus, some aspects of social media use, such as socially-oriented and active use, tend to be associated with more positive social experiences. It could be that these indicators of social media use will also be associated with more positive in-person interactions, as indicated by liking and being liked more by others. Furthermore, most of the previous studies have used self-reports of both social media and offline experiences. The current study expands upon this by using both self-ratings (liking others) and other-ratings (being liked by others) of liking to circumvent self-report biases and shared-method variance.

**The Role of Personality**

Importantly, if these aspects of social media use are linked to more positive in-person interactions because of greater social skill and engagement, it is possible that it is not social media use per se that is relevant but rather personality traits related to more engaging social behavior that explain these links. In the present study, we examined the role of two personality traits that could underlie such links: extraversion and narcissism. Extraversion and narcissism are two of the most frequently examined and significant predictors of both social media use and
social outcomes in in-person interactions (Amichai-Hamburger & Vinitzky, 2010; Amiel & Sargent, 2004; Ross et al., 2009; Chen & Marcus, 2012; Kuo & Tang, 2014; Wyatt & Phillips, 2005; Kraut et al., 2002; Hamburger & Ben-Artzi, 2000; Tosun & Lajunen, 2010; Ryan & Xenos, 2011; Back et al., 2013; Leckelt et al., 2018; Leckelt, Küfner, Nestler, & Back, 2015; Küfner, Nestler, & Back, 2013). For example, extraversion, which includes being more outgoing and talkative, is associated with both offline and online positive social experiences, such as greater offline and online civic engagement (Kavanaugh, Carroll, Rosson, Zin, & Reese, 2005; Elshaug & Metzer, 2001; Russo & Amnå, 2016) and communication (Akert & Panter, 1988; Seidman, 2013). Similarly, narcissism, defined as having an excessive positive self-image, feelings of superiority, and desire for admiration (Bosson et al., 2008; Morf & Rhodewalt, 2001), has been linked to indicators of more positive social media use, such as having more friends on social media (McKinney, Kelly, & Duran, 2012), and more positive, charming social behavior, particularly for more agentic aspects of narcissism such as narcissistic admiration (Back et al., 2013: Leckelt et al., 2018; Leckelt et al., 2015; Küfner et al., 2013).

Overall, people who are more extraverted or narcissistic may use social media in more adaptive ways, which in turn may explain any links between social media and more positive getting-acquainted interactions. As such, we examined whether various indicators of social media use were related to both liking and being liked because of these personality traits, or if
these links emerged above and beyond these traits, indicating an independent role of social media use in in-person interactions\(^1\).

**Social Media Use and Negative Social Interactions**

*Types of Social Media Use*

There is evidence that some types of social media use have more negative links with social experiences. For example, problematic or excessive Internet use has been associated with lower quality relationships (Milani, Osualdella, & Di Blasio, 2009; Liu & Kuo, 2007) and increased loneliness (Caplan, 2006; Kim et al., 2009). Passive social media use has been associated with more problematic social experiences, including increased loneliness (Burke et al., 2010) and envy (Krasnova, Wenninger, Widjaja, & Buxmann, 2013; Verduyn et al., 2015; Verduyn et al., 2017). Although the majority of research has shown active social media use to be associated with positive social experiences (see above), there may also be a dark side to active use, as it has been shown to be associated with greater social comparison (Vogel, Rose, Okdie, Eckles, & Franz, 2015). Overall, people who engage in higher levels of social media use or more passive use may have less pleasant initial social interactions, perhaps because their attention may still be focused on their technological lives (i.e., fear of missing out; FOMO; Rifkin, Cindy, & Kahn, 2015) or because of broader social difficulties that contribute to or result from these types of social media use, such as social anxiety (Caplan, 2006). Indeed, Clark and colleagues (2018) argue that social media use that relates to isolation and social comparison tends to be more

\(^1\) We also examined the four other Big Five traits and found that none played a significant role in the relationships between social media use and liking or being liked (see Supplementary Materials pg. 6 – 10).
detrimental. As such, it is possible that these indicators of social media use would relate to liking others and being liked less in initial interactions.

The Role of Personality

As with the potentially positive links with social media use, the negative links could also be driven by relevant personality traits. Indeed, low levels of extraversion and high levels of shyness have been associated with more passive (Ryan & Xenos, 2011) and addictive (Chak & Leung, 2004; Satici, 2009; Huang & Leung, 2009) social media use. Similarly, narcissism, specifically more antagonistic aspects such as narcissistic rivalry, is associated with problematic social media use, although more agentic aspects of narcissism have been shown to be associated with problematic social media use as well (Savci, Turan, Griffiths, & Ercengiz, 2019). Perhaps social media allows narcissists to present their most favorable characteristics to a large audience (Andreassen, Pallesen, & Griffiths, 2017) while also increasing feelings of inferiority in their rivals (Seidman, Roberts, & Zeigler-Hill, 2019). Furthermore, low extraversion and high narcissistic rivalry have been shown to be associated with more negative social experiences, including social withdrawal (Coplan & Armer, 2007), negative social evaluations (Hendrick & Brown, 1971) and being liked less in in-person interactions (Leckelt et al., 2015; Küfner et al., 2013). Thus, we also examined whether narcissism and (low) extraversion played a role in any negative links between social media use and in-person interactions.

The Present Study

Overall, some forms of social media use may be related to more positive initial interactions because of greater social skill and engagement, whereas other forms of use may be related to more negative initial interactions because of more social difficulties or preoccupation with online social worlds. We assessed these possibilities by examining whether each type of
social media use was related to how much people liked and were liked by new acquaintances, above and beyond the role of relevant personality, namely extraversion and both the admiration and rivalry components of narcissism.

Importantly, most research examining social media has focused on general use (Whang, Lee, & Chang, 2003; Longstreet & Brooks, 2017) or one specific social media site (Ryan, Chester, Reece, & Xenos, 2014; Hong, Huang, Lin, & Chiu, 2014; Punyanunt-Carter, De La Cruz, & Wrench, 2017; Kircaburun & Griffiths, 2018), but people use different social media sites for different reasons (Alhabash & Ma, 2017), which may result in different links with in-person interactions. Therefore, we extended prior research by examining multiple social media sites (i.e., Facebook, Instagram, and Snapchat) to parse out differences between these sites. Moreover, we examined additional aspects of social media use, including social network size, active use, and passive use.

We also extended prior research by examining in-the-moment indicators of social experiences, specifically liking during in-person social interactions, rather than indexing offline social experiences with global self-reports of social and psychological well-being. Further, little work has examined the links between social media use and interpersonal experiences from the perspective of interaction partners (but see Vander Molen, Kaplan, Choi, & Montoya, 2018; Gosling, Gaddis, & Vazire, 2007), relying predominantly on self-reports to assess both online and offline social experiences, therefore raising the issues of shared method variance and reporting biases. Thus, examining whether social media relates not only to one’s liking of others but also how much a person is liked in naturalistic interactions, while controlling for relevant personality traits, provides a strong test of whether social media use is related to the positivity of in-person social interactions.
Analyses conducted in the present research were exploratory and not pre-registered. De-identified data as well as the code used for analyses can be found on the Open Science Framework (https://osf.io/qu8gn/). We state all data exclusions, analyses conducted, and variables pertaining to the present research questions. Additional variables collected in this study can be found in the study codebook provided on OSF.

**Study**

**Methods**

**Procedure**

Participants completed an online questionnaire assessing their personalities, including extraversion. They were then brought into the lab in groups of 4 – 8 where they engaged in a round-robin design, whereby each participant met with each group member for a two-minute, one-on-one unstructured interaction, after which participants rated how much they liked each other. This process was repeated until all participants interacted with every other group member. The participants completed another questionnaire assessing their social media use and other individual difference measures, including narcissism.

**Participants**

A total of 863 undergraduate students participated in this study. Only previously unacquainted individuals were included in the analyses, and we excluded those who did not complete the social media, personality, or liking items. This resulted in a final sample size of 806 participants ($N_{dyad} = 4565$, $M_{age} = 20.36$, $SD_{age} = 2.21$, 124 males, 670 females, 12 other).

**Measures**

**Types of Social Media Use.** Social media was assessed with several items from the Media and Technology Usage and Attitudes Scale (MTUAS; Rosen, Whaling, Carrier, Cheever,
& Rokkum, 2013). Three items were used to assess the frequency of which participants use social media sites: “How often do you use Facebook/Instagram/Snapchat” using a 1 (never) – 10 (all the time) scale ($M_{Facebook} = 6.87$, $SD_{Facebook} = 1.65$; $M_{Instagram} = 5.99$, $SD_{Instagram} = 2.67$; $M_{Snapchat} = 5.63$, $SD_{Snapchat} = 2.87$; see Table 1a). We also assessed two facets of the size of online social networks: the subjective amount of Facebook friends using the item “I have a lot of friends on Facebook” using a 1 (disagree strongly) to 7 (agree strongly) scale ($M = 5.11$, $SD = 1.42$) and the concrete number of Facebook friends using the item “How many friends do you have on Facebook” using a 1 (0) to 9 (751 or more) scale ($M = 7.02$, $SD = 1.97$).

Finally, to assess active and passive use, we asked participants to rate seven items to assess the extent to which they engage in activities such as “Post photos” and “Click like” on social media using a 1 (never) to 10 (all the time) scale.

To reduce the number of social media items, we ran an exploratory factor analysis on the two social network size items and the seven items assessing active and passive use. Three distinct factors emerged: 1) social network, which references the size of people’s online social networks with both the objective and subjective measure ($\alpha = .76$), 2) active social media use, indicating the extent to which people share and post photos and statuses on social media ($\alpha = .69$), and 3) passive social media use, indicating the extent to which people browse information on social media ($\alpha = .76$; see supplemental online materials for more detail). Most of the social media activities fell into the active and passive latent variables as expected, with the

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2 Use of Twitter and dating sites (e.g., Tinder) were also reported but were used very infrequently (Twitter: $M = 2.09$, $SD = 2.05$; Dating sites: $M = 1.62$, $SD = 1.40$) and were not significantly associated with liking (all $|r_s| < .04$, all $ps > .23$).
exception of “Click Like,” which was more closely aligned with passive use rather than active use. All of the latent variables showed high internal reliability (all $\alpha > .69$, see Table 2), and most of the social media indicators were weakly to moderately correlated with one another (all $r > .07$, see Table 2), with the exception of the correlations between active use and both Facebook ($r = .02, p = .50, 95\% CI [-.05, .09]$) and Snapchat ($r = .05, p = .19, 95\% CI [-.02, .11]$).

**Positivity of Impressions.** Participants were asked to rate the extent to which they liked their interaction partners using six items including “I like this person” and “This person is engaging” using a 1 (*disagree strongly*) to 7 (*agree strongly*) scale (see Table 1b). All of the items were significantly correlated with one another (all $r > .60$). After running an exploratory factor analysis, all of the items were combined to form a single “liking” factor (see supplemental materials for details).

**Table 1a. Descriptive Statistics for Types of Social Media Use**

<table>
<thead>
<tr>
<th></th>
<th>$M$ (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>6.87 (1.65)</td>
<td>1 - 10</td>
</tr>
<tr>
<td>Instagram</td>
<td>5.99 (2.67)</td>
<td>1 – 10</td>
</tr>
<tr>
<td>Snapchat</td>
<td>5.63 (2.87)</td>
<td>1 – 10</td>
</tr>
<tr>
<td>Social Network Size</td>
<td>6.06 (1.55)</td>
<td>1 – 8</td>
</tr>
<tr>
<td>Active Use</td>
<td>2.08 (1.14)</td>
<td>1 – 10</td>
</tr>
<tr>
<td>Passive Use</td>
<td>6.31 (1.47)</td>
<td>1 – 10</td>
</tr>
</tbody>
</table>

*Note: $M$ = Mean; $SD$ = standard deviation*

**Table 1b. Descriptive Statistics for Liking items**

<table>
<thead>
<tr>
<th></th>
<th>$M$ (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like this person</td>
<td>5.66 (0.88)</td>
<td>1 – 7</td>
</tr>
<tr>
<td>This person is engaging</td>
<td>5.51 (1.02)</td>
<td>1 – 7</td>
</tr>
<tr>
<td>I could be friends with this person</td>
<td>5.15 (1.19)</td>
<td>1 – 7</td>
</tr>
<tr>
<td>I got along with this person</td>
<td>5.82 (0.88)</td>
<td>2 – 7</td>
</tr>
<tr>
<td>The conversation flowed</td>
<td>5.42 (1.18)</td>
<td>1 – 7</td>
</tr>
<tr>
<td>I enjoyed talking with this person</td>
<td>5.69 (0.95)</td>
<td>1 – 7</td>
</tr>
</tbody>
</table>

*Note: $M$ = Mean; $SD$ = standard deviation*

**Extraversion.** Extraversion was measured using the Big Five Inventory (John & Srivastava, 1999). Participants rated the extent to which they agreed or disagreed with items such
as “I see myself as someone who is outgoing” using a 1 (strongly disagree) to 7 (strongly agree) scale ($M = 4.41, SD = 1.05$). Extraversion was significantly positively correlated with all of the social media indicators, narcissistic admiration, and both liking others and being liked by others (all $r$s $>.09$), and it was marginally positively correlated with narcissistic rivalry ($r = .06, p = .09$, 95%CI [-.01, .13]; see Table 2).

**Narcissism.** Narcissistic admiration and rivalry were measured using the six-item short form of the Narcissistic Admiration and Rivalry Questionnaire (NARQ; Leckelt et al., 2018). Three items were used to assess admiration, including “I deserve to be seen as a great person” ($M = 4.19, SD = 1.16$) and three items were used to assess rivalry, including “I want my rivals to fail” ($M = 2.84, SD = 1.09$) using a 1 (strongly disagree) to 7 (strongly agree) scale. ³ Admiration was significantly positively correlated with all of the social media use indicators (all $r$s $>.08$, all $p$s $<.03$), although it was not significantly correlated with liking others ($r = .02, p = .61$, 95%CI

³ As an additional non-self-reported covariate, we also examined the role of objective attractiveness ratings of the participants. Three to four trained research assistants viewed photos of the participants and rated the extent to which they agreed or disagreed with the statement “I find this person attractive” using a 1 (strongly disagree) to 7 (strongly agree) scale. The intra-class correlation coefficient (ICC) was calculated to assess interrater reliability between the raters. Using the two-way mixed effects model and “average rater” unit, we found that there was high agreement between the raters (ICC = .79, $p < .001$). Controlling for objective attractiveness did not significantly alter the results, suggesting that social media use does not appear to be linked to liking and being liked due to a person’s physical attractiveness.
or being liked by others ($r = .05, p = .20, 95\%CI [-.02, .11])

Rivalry was significantly positively correlated with the social network size and both active and passive social media use (all $r_s > .08$, all $p_s < .03$), although it was significantly negatively associated with both liking others and being liked by others (all $r_s < -.13$, all $p_s < .001$). Rivalry was not significantly correlated with the frequency of Facebook, Instagram, or Snapchat use (all $|r_s| < .06$, all $p_s > .09$).

Data analytic approach

To address non-independence reflected in the data, we ran a univariate analysis of liking in multiple round-robin groups ($N_{\text{group}} = 128$) using the Social Relations Model (Kenny & La Voie, 1984) and the TripleR package (Schönbrodt, Back, & Schmukle, 2012) to estimate perceiver, target, and relationship effects. Perceiver effects indicate the general tendency of the perceiver to like others, whereas target effects indicate the general tendency of the target to be liked by others. Relationship effects refer to the level of liking between the specific perceiver and target, independent of the perceiver and target effects. Given that our primary predictors of interest (social media use) are at the individual-level, we focus specifically on perceiver and target effects here.

Given the nature of the study design, we ran several multilevel models with participants nested within round-robin group. In order to obtain approximate effect size estimates and confidence intervals, we computed the partial correlations between each social media use indicator and both liking others and being liked by others, controlling for group membership and personality. Because our primary analyses focus on the relationships between individual-level (rather than dyadic- or group-level) variables, the number of participants in our sample is of primary importance in determining power.
(Snijders, 2005). With our sample size of 806 individuals, we had greater than .99 power to detect the mean effect size in published personality and social psychology studies (i.e. $r = .21$; see Richard et al., 2003).
Table 2: Correlations between Social Media Use Indicators and Personality Covariates

<table>
<thead>
<tr>
<th></th>
<th>Facebook</th>
<th>Instagram</th>
<th>Snapchat</th>
<th>Social Network</th>
<th>Active Use</th>
<th>Passive Use</th>
<th>Extraversion</th>
<th>Admiration</th>
<th>Rivalry</th>
<th>Liking Others</th>
<th>Being Liked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instagram</td>
<td>.16***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snapchat</td>
<td>.20***</td>
<td>.48***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Network</td>
<td>.46***</td>
<td>.29***</td>
<td>.31***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active Use</td>
<td>.02</td>
<td>.19***</td>
<td>.05</td>
<td>.07†</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passive Use</td>
<td>.35***</td>
<td>.47***</td>
<td>.40***</td>
<td>.27***</td>
<td>.29***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>.09**</td>
<td>.21***</td>
<td>.18***</td>
<td>.31***</td>
<td>.10**</td>
<td>.15***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admiration</td>
<td>.08*</td>
<td>.17***</td>
<td>.08*</td>
<td>.19***</td>
<td>.21***</td>
<td>.21***</td>
<td>.33***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rivalry</td>
<td>.06†</td>
<td>.04</td>
<td>-.02</td>
<td>.08*</td>
<td>.14***</td>
<td>.12***</td>
<td>.06†</td>
<td>.35***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liking Others</td>
<td>-.03</td>
<td>.11**</td>
<td>.10**</td>
<td>.09*</td>
<td>.01</td>
<td>.07*</td>
<td>.11**</td>
<td>.02</td>
<td>-.21***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being Liked</td>
<td>.05</td>
<td>.20***</td>
<td>.16***</td>
<td>.20***</td>
<td>-.06</td>
<td>.08*</td>
<td>.29***</td>
<td>.05</td>
<td>-.13***</td>
<td>.31***</td>
<td></td>
</tr>
</tbody>
</table>

*r = Pearson’s Correlation Coefficient. ***p < .001, **p < .01, *p < .05, †p < .10.*
Results

Target (20.10%), perceiver (21.80%), and relationship (58.20%) variance contributed to ratings of liking, indicating that ratings of liking were due to perceiver effects, wherein perceivers tended to like others across a range of targets, target effects, wherein targets tended to be liked by others across a range of perceivers, and relationship effects, wherein there was a unique relationship between specific dyads.

To examine whether social media use predicts perceiver and target effects, we ran a series of partial correlations controlling for both group membership and personality traits.

Liking of Others.

Types of Social Media Use. Instagram ($b = .05, z = 3.57, p = .0004, r = .18, 95\% CI [.08, .21]$) and Snapchat ($b = .04, z = 3.20, p = .001, r = .16, 95\% CI [.06, .20]$) use were significantly associated with liking others more, whereas Facebook use was not significantly associated with liking others ($b = -.03, z = -1.15, p = .25, r = -.03, 95\% CI [-.10, .04]$; see Table 3a). In other words, those who used Instagram and Snapchat more frequently tended to like others more during first-impressions, whereas Facebook use was not significantly associated with how much people liked others.

Additionally, both passive use ($b = .07, z = 2.89, p = .004, r = .13, 95\% CI [.04, .17]$) and having a larger online social network size ($b = .07, z = 2.96, p = .003, r = .14, 95\% CI [.04, .18]$) were significantly associated with liking others more. However, active use was not significantly associated with how much people liked others ($b = .02, z = 0.73, p = .47, r = .04, 95\% CI [-.04, .10]$).
The Role of Personality. Does personality account for any of these relationships? To answer this, we examined whether the associations between social media use and liking of others changed as a function of self-reported extraversion and narcissism. To see the full results as well as additional analyses examining the other Big Five personality traits, see the SOM.

Extraversion. Most of the significant associations between social media use and liking of others held after controlling for self-reported extraversion (all $|r_s| > .05$, all $p < .02$). However, after controlling for self-reported extraversion, the significant association between social network size and liking others became marginal ($b = .04$, $z = 1.75$, $p = .08$, $r = .08$, 95% CI [-.00, .13]). In other words, extraversion seemed to play a role in the association between social network size and liking others.

Narcissism. Admiration. All of the significant associations between social media use and liking of others held after controlling for self-reported admiration (all $|r_s| > .13$, all $p < .006$), meaning that admiration did not play a significant role in the relationship between different types of social media use and how much people like others in a first-impression context.

Rivalry. All of the significant associations between social media use and liking of others held after controlling for rivalry (all $|r_s| > .16$, all $p < .001$), meaning that rivalry did not play a significant role in the relationships between different types of social media use and liking of others. Interestingly, the non-significant association between active social media use and liking of others became marginally positive after controlling for rivalry ($b = .05$, $z = 1.74$, $p = .08$, $r = .08$, 95% CI [-.00, .14]). This represents a classic suppression effect (MacKinnon et al., 2000) and should be interpreted with caution as the replicability of suppression effects have been called into question (Gutierrez & Cribbie, 2019).
Table 3a: Associations Between Social Media Use and Perceiver Liking

<table>
<thead>
<tr>
<th></th>
<th>Liking</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$b$ (se)</td>
<td>$z$</td>
<td>$r$ [95% CI]</td>
</tr>
<tr>
<td>Facebook</td>
<td>-.03 (.026)</td>
<td>-1.15</td>
<td>-.03 [-.10, .04]</td>
</tr>
<tr>
<td>Instagram</td>
<td>.05*** (.015)</td>
<td>3.57</td>
<td>.18 [.08, .21]</td>
</tr>
<tr>
<td>Snapchat</td>
<td>.04** (.013)</td>
<td>3.20</td>
<td>.16 [.06, .20]</td>
</tr>
<tr>
<td>Social Network Size</td>
<td>.07** (.023)</td>
<td>2.96</td>
<td>.14 [.04, .18]</td>
</tr>
<tr>
<td>Active</td>
<td>.02 (.031)</td>
<td>0.73</td>
<td>.04 [-.04, .10]</td>
</tr>
<tr>
<td>Passive</td>
<td>.07** (.025)</td>
<td>2.89</td>
<td>.13 [.04, .17]</td>
</tr>
</tbody>
</table>

Note. $b$ = unstandardized regression coefficient; $SE$ = standard error. $r$ = Pearson’s correlation. 95% confidence intervals for $r$s are provided. ***$p < .001$, **$p < .01$.
Bolded values indicate associations that held controlling for personality covariates.

**Summary**

Greater social media use appears to be associated with liking others more, as most of the types of social media use (i.e., Instagram and Snapchat use, passive use, social network size) were positively associated with liking others. Facebook and active use, however, were not significantly associated with liking others. Moreover, most of the significant associations between social media use and liking others were not driven by extraversion or narcissism, suggesting that social media use is linked to how much people like new acquaintances above and beyond one’s general tendency to be sociable or charming. Next, we examined whether social media use relates to being liked by others.

**Being Liked by Others.**

**Social Media Use.** Similar to the perceiver effects, using Instagram ($b = .09, z = 5.41, p < .0001, r = .28, 95% CI [.16, .29]$) and Snapchat ($b = .06, z = 4.62, p < .0001, r = .23, 95% CI [.11, .25]$) were significantly associated with being liked more by new acquaintances, whereas using Facebook was not significantly associated with being liked ($b = .02, z = 0.61, p = .54, r = .06, 95% CI [-.02, .12]; see Table 3b). In other words, Instagram and Snapchat were associated
with being liked more by others, whereas Facebook was not significantly associated with being liked by others.

Similarly, passive social media use \((b = .07, z = 2.80, p = .005, r = .14, 95\% \text{ CI} [.04, .18])\) and having a larger online social network \((b = .14, z = 5.45, p < .0001, r = .26, 95\% \text{ CI} [.14, .27])\) were significantly positively associated with being liked. Active social media use was not significantly associated with being liked \((b = -.03, z = -0.89, p = .38, r = -.03, 95\% \text{ CI} [-.09, .05])\).

**The Role of Personality.**

*Extraversion.* Most of the significant associations between social media use and being liked held after controlling for self-reported extraversion \((\text{all}|r_s| > .16, \text{all} \ p < .0007; \text{see SOM for full results})\). However, after controlling for extraversion, the significant positive association between passive use and being liked became marginally positive \((b = .04, z = 1.66, p = .10, r = .08, 95\% \text{ CI} [-.00, .14])\), suggesting that extraversion accounted for the association between passive use and being liked by others. Of note, the non-significant association between active use and being liked by others became marginally negative after controlling for extraversion \((b = -.06, z = -1.88, p = .06, r = -.07, 95\% \text{ CI} [-.13, .01])\). Again, this suppression effect should be interpreted with caution.

*Narcissism.*

*Admiration.* All of the significant associations between social media use and being liked held after controlling for self-reported admiration \((\text{all}|r_s| > .13, \text{all} \ p < .01)\), suggesting that admiration did not play a significant role in the relationships between social media use and target liking.
**Rivalry.** Similarly, all of the significant associations between social media use and target liking held after controlling for self-reported rivalry (all \(|r_s| > .17, \text{ all } p < .0009\)), again suggesting that rivalry did not play a major role in these relationships.

<table>
<thead>
<tr>
<th></th>
<th>Liking</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(b) (se)</td>
<td>(z)</td>
<td>(r) [95% CI]</td>
</tr>
<tr>
<td>Facebook</td>
<td>.02 (.026)</td>
<td>0.61</td>
<td>.06 [-.02, .12]</td>
</tr>
<tr>
<td>Instagram</td>
<td>.09*** (.016)</td>
<td>5.41</td>
<td>.28 [.16, .29]</td>
</tr>
<tr>
<td>Snapchat</td>
<td>.06*** (.013)</td>
<td>4.62</td>
<td>.23 [.11, .25]</td>
</tr>
<tr>
<td>Social Network Size</td>
<td>.14*** (.026)</td>
<td>5.45</td>
<td>.26 [.14, .27]</td>
</tr>
<tr>
<td>Active</td>
<td>-.03 (.036)</td>
<td>-0.89</td>
<td>-.03 [-.09, .05]</td>
</tr>
<tr>
<td>Passive</td>
<td>.07*** (.026)</td>
<td>2.80</td>
<td>.14 [.04, .18]</td>
</tr>
</tbody>
</table>

*Note. \(b\) = unstandardized regression coefficient; \(SE\) = standard error. \(r\) = Pearson’s correlation. 95\% confidence intervals for \(r_s\) are provided. ***\(p < .001\). Bolded values indicate associations that held controlling for personality covariates.*

**Summary**

Overall, social media use appears to be associated with being liked more by others in a new-acquaintance context. Specifically, Instagram and Snapchat, passive use, and having a larger social network size were associated with being liked more. These associations tended to be larger in size than those seen with liking others. In contrast, Facebook and active use were not significantly associated with being liked by others. The majority of these associations could not be explained by extraversion or narcissism, with the exception of passive use whereby extraversion appears to contribute to the relationship between passive use and being liked.

**Discussion**

We found that how people use social media does, indeed, relate to liking and being liked by others in in-person interactions, extending previous research by examining how social media use relates to social experiences both from the perspective of the self and from people’s
interaction partners using in-the-moment assessments of social experiences. The associations between social media use and being liked appeared to be stronger than the associations with liking others (see SOM for analyses with both perceiver and target liking simultaneously), despite the fact that liking others and social media use ratings came from the same perspective (the self). Thus, greater social media use may have stronger implications for how much a person is liked than how much a person tends to like others. Some social media indicators also showed more consistent associations than others. Specifically, Instagram and Snapchat were consistently associated with liking others and being liked by others, above and beyond relevant personality traits, thus supporting the idea that social media use is associated with positive social experiences. Thus, using social media, particularly sites like Instagram and Snapchat, may indicate or foster greater social skills and engagement, which may in turn benefit in person social interactions, resulting in greater liking in getting-acquainted interactions. Similarly, passive use was associated with liking others and being liked by others, although these associations were largely accounted for by extraversion. Finally, neither Facebook nor active use were significantly associated with liking others or being liked by others.

Why might different social media sites relate to differences in social interactions, such that Instagram and Snapchat were associated with more positive interactions, but Facebook was not? People tend to use social media sites in different ways (Alhabash & Ma, 2017). Thus, motivations behind the use of these sites may relate to differences in social interactions. For example, people tend to use Instagram and Snapchat for self-expression, which has been related to positive social experiences (Chervonsky & Hunt, 2017). In contrast, Facebook is used more habitually (Vishwanath, 2014; Giannakos, Chorianopoulos, Giotopoulos, & Vlamos, 2013), perhaps indicating an automaticity and impulsivity to using Facebook that is not motivated by
the desire for social connection. It could be that people who use certain social media sites like Instagram and Snapchat might generally engage in more positive forms of self-expression, thus relating to more positive interactions, whereas those who use other sites, such as Facebook, might use it more out of habit without the goal of connecting to others. Future research should examine this possibility.

Unlike much previous research, passive use was associated with more positive social experiences, as indicated by greater liking of others and being liked more by others, although these associations were largely accounted for by extraversion. In other words, those who use social media more passively may have more positive in-person interactions due to having a more sociable personality. Why would passive use be linked to greater extraversion, given that past research has found it to be associated with lower social well-being and greater loneliness (Burke et al., 2010; Kraut et al., 1998)? One possibility is that our passive use indicator included “clicking like” in addition to browsing profiles and checking one’s homepage, for example. This may suggest that passive use, at least as indexed in the present study, may not be entirely passive, but may instead serve an interpersonal connection function, which tends to be beneficial (Clark et al., 2018). Indeed, clicking like may fulfill socialization needs, as it acts as a gesture of showing support for others (Hayes, Carr, & Wohn, 2016; Lowe-Calverley & Grieve, 2018). Therefore, passive use, specifically “clicking like,” may provide an easy way for people to engage with people online. Furthermore, in line with previous studies (Burke et al., 2010; Verduyn et al., 2015) passive use was more common than active use, suggesting that passive use may indicate a more normative, and potentially healthy use of social media which, in turn, is associated with more positive social experiences.
Related to this idea, active use was not significantly associated with liking others or with being liked by others, perhaps because of the low frequency by which people use social media actively (Burke et al., 2010; Verduyn et al., 2015). Perhaps having greater variability between participants in their tendencies to use social media actively would increase the power to detect small associations between active use and in-person interactions. Furthermore, our active use indicator was comprised of two items, posting photos and status updates, which may be more closely associated with self-promotion than interpersonal connection. As previous research suggests that active use that fosters social connection is associated with more positive outcomes (Clark et al., 2018; Burke et al., 2010; Ellison et al., 2007; Grieve et al., 2013; Liu & Yu, 2013), it could be that active use for the purpose of self-promotion is not significantly associated with social experiences, at least in-person.

Finally, social network size was significantly associated with liking others and with being liked by others. The association with being liked appeared above and beyond the effects of extraversion and narcissism, which is in line with previous research suggesting that those who have more friends on Facebook are seen more positively by others (Tong, Van Der Heide, Langwell, & Walther, 2008). However, the association with liking others was largely explained by extraversion, suggesting that people may have larger online social networks and like others more because they are more sociable. This is in line with previous research suggesting that social network size is significantly associated with extraversion (Pollet, Roberts, & Dunbar, 2011; Liu & Campbell, 2017). Perhaps motivation behind having a larger online social network may account for the relationships between social network size and interpersonal liking. For example, after controlling for extraversion, the association between social network size and liking of
others became non-significant, suggesting that those who have a larger online social network to connect with a more people (Schaefer, 2008) may have more positive in-person experiences.

Of note, most of the effect sizes in the present study were fairly small (|.01| < r < |.25|). However, the findings may still be important. As noted by Funder and Ozer (2019), small effects may not seem important in-the-moment but may be consequential over the long term. Thus, social media use may have a small effect on how much people like others and are liked by others in a single instance, as shown in the present study, but may have stronger effects over time, as people interact with more people.

**Limitations and Future Directions**

Given the cross-sectional nature of this study, we were unable to disentangle the direction of the associations between social media use and positive social interactions. Is it that social media use enhances a person’s social skills, which in turn benefits in-person interactions? Or do people who have stronger in-person social skills and more positive interactions use social media more and in more adaptive ways? Given that these links appear to emerge quite independently of relevant personality traits, future research should attempt to further understand causality with longitudinal and experimental designs. If some forms of social media use actually do benefit how much people like and are liked by others in person, this could be quite an easy, if surprising, method by which to enhance offline social interactions. Future research should also examine other potential mechanisms and individual differences, beyond personality and physical attractiveness (see Footnote 3), that could play a role in the links between social media use and liking in getting-acquainted interactions.

Although a strength of this study was that it examined various social media sites and different types of use within the same study, we were unable to examine how people use
different social media sites in different ways. That is, we did not examine using active and passive use on each site, or different motivations for use of different sites. Alhabash & Ma (2017) found that people use and are motivated to use social media sites in different ways (e.g., for self-expression vs. passing time), and personality can influence people’s motivations (Seidman, 2013) and preferences (Hughes, Rowe, Batey, & Lee, 2012) for social media use. For example, some people may use Instagram to share interests with those in their social network, whereas others might use it to promote product (e.g. Instagram Influencers). Similarly, people may differ in their use of specific aspects of social media sites, such as preference for Instagram stories over posts. It would be interesting to examine whether different types of use both within and between platforms (e.g., active Instagram use, passive Facebook use) and different reasons for using these platforms relate to differences in in-person interactions and personality, as the motivations underlying social media use may be more important than the platform or type of use that people engage in.

The current study used subjective self-reports to examine social media use and social network size. However, people tend to poorly estimate their technology use (Duncan, Hoekstra, & Wilcox, 2012), and the use of arbitrary cutoffs to measure social network size may remove important variance in the data. As such, future research should use open-ended response options and objective measures (e.g. phone tracking) to get a purer understanding of how social media relates to in-person interactions.

This sample was comprised of predominantly female university-aged students at a large North American university. Although men and women tend to use social media in similar ways (Auxier & Anderson, 2021), future research should collect a more balanced sample to improve the generalizability of these results. Further, social media use is rising amongst those of different
age groups and demographics (Perrin & Anderson, 2019). It is therefore necessary to examine these associations across a more diverse group of participants to examine the generalizability and possible moderators of these relationships. Social media use differs between those of various age groups, such that young adults tend to use Instagram, Snapchat, and TikTok more frequently than older adults, although Facebook use tends to be similar across age groups (Auxier & Anderson, 2021). Moreover, given growing concerns about the impact of social media on younger teenagers’ social interactions (Orlowski, 2020; The Learning Network, 2020) it is especially important to examine these associations for this age group.

Furthermore, social media trends are constantly changing. YouTube and Reddit use has increased since 2019, whereas use of other platforms have remained relatively stable (Auxier & Anderson, 2021). Additionally, social circumstances, like the COVID-19 pandemic, may influence motivations to use social media and alter what constitutes normative, positive, or negative use. For example, people may rely more on social media for communication when they are unable to interact with others in-person during a situation like a pandemic. Therefore, spending a large amount of time on social media may be considered normative and positive in such circumstances, whereas it would have otherwise been considered abnormal and problematic. As such, what is considered positive or negative social media use is likely to evolve and could be considered relative, subjective, and situationally dependent. Consequently, it may be difficult to formulate a concrete, formal definition of what constitutes positive and negative social media use. Future research should adapt its understanding of normative, positive use alongside the inevitable changes in norms and implications of social media use.

**Conclusion**
Overall, despite widespread concerns about how social media impacts in-person social interactions, we found that multiple forms of social media, including Instagram, Snapchat, and passive use, were associated with more positive initial face-to-face interactions, as indicated by liking others and being liked by others more. However, other types of use, including Facebook and active use, were not significantly associated with liking in in-person interactions. Importantly, most of the associations emerged above and beyond the effects of trait-level extraversion and narcissistic admiration and rivalry. Thus, social media may have links to offline social interactions that are independent of these more general individual differences. As social media use continues to flourish, it is important to examine how this medium of communication relates to offline experiences, and particularly whether it may carry benefits, as the current results may suggest, including broadly, within specific social interactions, and from multiple perspectives. This study was a first step in determining which forms of social media use may be beneficial and which forms may be less relevant to initial in-person social interactions.
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Bridge Between Chapter 1 and Chapter 2

One of the most popular functions of social media is the “like” button, whereby users are able to alert others that they like, enjoy, or support posted content. Research has shown that the type of content posted on social media predicts the number of likes (Bakhshi, Shamma, & Gilbert, 2014; Yan, Salmon, & Aubrey, 2022). In Chapter 2, we brought this association into the real world by examining how the type of social media use relates to liking within in-person social interactions. We found that certain types of social media use, namely Instagram, Snapchat, and passive use, predict liking others and being liked more by others, whereas other types of use, namely Facebook and active use, are unrelated to liking. Furthermore, these associations held controlling for relevant personality traits, such as extraversion and narcissism. Overall, this study demonstrated how trait-level use of different social media sites relate to differences in in-person interactions amongst new acquaintances. Furthermore, despite popular belief that social media is detrimental to social interactions, we found that social media is at least not harmful, and in some cases is actually beneficial, to social interactions. This is in line with the reinforcement hypothesis, such that greater online communication may foster greater offline communication.

Chapter 1 focused on how trait-level technology use may carry over to influence new in-person interactions, where technology is not present. But what are the social implications of in-the-moment technology use for the express purpose of communicating with others, relative to in-person communication? Is technology use of this form similarly complementary to in-person relationships, therefore benefiting relationships, or could it displace in-person interactions, therefore carrying negative consequences? To address these questions, in Chapter 2, I used a daily diary methodology to explore how the medium through which romantic couples
communicate (e.g., in-person, text, social media) in daily life relate to important individual and relationship correlates, including affect, state attachment, and relationship quality.
Chapter 2

Choose Your Medium: Comparing How Different Computer-Mediated Communication Channels Relate to Individual and Relationship Correlates

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Abstract

How does using digital media to communicate with one’s romantic partner relate to individual and relationship experiences? Participants (N = 342, 171 couples) completed five days of daily diary questionnaires measuring the extent to which they interacted with their romantic partners in-person, and via social media, phone calling, and texting. They also reported their relationship quality, attachment, and positive and negative affect. In-person communication was the most common mode of communication, positively associated with relationship quality, secure attachment, and positive affect, and negatively associated with avoidant attachment. However, texting showed a very similar pattern of positive correlates. Social media and phone calling were less consistently associated with such correlates. Overall, in-person interactions appear to be the most common and potentially beneficial form of communication among romantic partners, but digital communication, especially texting, may be a similarly positive way to interact with one’s partner.
Introduction

With the rise of digital media use, such as through social media and smartphones, many questions have arisen about how this new medium of communication influences individuals and relationships. There is growing evidence that when digital media use interferes with in-person interactions, it has negative outcomes for a variety of relationship types, including romantic relationships (Halpern & Katz, 2017; Roberts & David, 2016; Allred & Crowley, 2017; Krasnova, Abramova, Notter, & Baumann, 2016). For example, the mere presence of a mobile device during an interaction can reduce interaction quality (Allred & Crowley, 2017; Miller-Ott & Kelly, 2015; Lanette, 2018; Dwyer et al., 2018; Kushlev & Dunn, 2018). However, what is the role of digital media use between romantic couples, such as when couples use their phones to text, call, or interact via social media with each other? Given that the most frequent reason for using digital media is to maintain contact with others (Rainie & Zickuhr, 2015), it is unclear whether such digital media use would be similarly detrimental. Using a dyadic daily diary study of romantic couples, we examined 1) the extent to which couples interact with each other in person and via multiple different computer-mediated communication (CMC) channels, and 2) how both in-person and CMC relate to individual and relationship correlates, including positive and negative affect, state attachment style, and relationship quality.

How might digital media use between romantic partners relate to individual and relationship experiences?

In line with the Displacement-Interference-Complementarity Framework (Kushlev & Leitao, 2020), whether CMC between romantic partners helps or hurts relationships should depend on whether such use complements or displaces in-person interactions. Specifically, the complementarity hypothesis states that CMC should benefit relationships to the extent that it
provides information and activities that would otherwise not be available. Of course, for couples in long distance relationships, communicating digitally may be essential for relationship maintenance and connection. Indeed, digital media allows people to stay connected across time and physical distance (Licoppe, 2004; Masur, 2021). Holtzman and colleagues (2021) found that text messaging was associated with increased relationship satisfaction within long-distance relationships. But even couples who live in the same city are frequently apart, such as when they are at work, school, or spending time with other friends and family members. In these situations, they may still communicate digitally, texting about plans later in the day or liking each other’s social media posts. It seems plausible that such communications could be benign or even beneficial, enabling them to stay connected even when they are not physically together. Overall, digital media use for the purpose of interacting with one’s romantic partner, especially when in-person interactions are not possible, may be related to positive individual and relationship experiences.

In contrast, the displacement hypothesis states that digital media use may be detrimental to the extent that it replaces time spent doing other activities (Kushlev & Leitao, 2020). In the scope of romantic relationships, communicating via digital media at the expense of interacting in-person may result in lower levels of relationship quality, given that in-person interactions are rated as being more important than online interactions (Bourget, 2018). For example, if couples who spend more time texting or communicating on social media are in turn less motivated or interested in seeing each other in person, they may experience lower levels of well-being and feel less close and connected to their partner. This is in line with rising concerns that as digital media use increases, in-person interaction is declining, a trend that aligns with increased rates of loneliness (e.g., Twenge et al., 2019; Turkle, 2015). Although evidence for the displacement
hypothesis is scarce (but see Mannell, Kaczynski, & Aronson, 2005), much of the research examining the displacement hypothesis has asked participants to recall their levels of digital media use (Valkenburg & Peter, 2007; Hall, Kearney, & Xing, 2019; Ahn & Shin, 2013), which may be influenced by perspectives of socially desirable digital media use (Van de Mortel, 2008; Arnold & Feldman, 1981; Deshields, Tait, Gfeller, & Chibnall, 1995). As such, the present study uses in-the-moment measures of digital media use to examine how it relates to individual and relationship experiences.

The Present Study

The present study examined whether and how CMC (i.e., social media, phone calling, and texting) relates to individual and relationship experiences, relative to in-person communication. Specifically, while most previous research exploring computer-mediated communication has focused on one specific medium (e.g., social media, text messaging; Subrahmanyam et al., 2020; Macrynikola & Miranda, 2019; Holtzman et al., 2021), no prior research, to our knowledge, has examined how people use various forms of digital media to interact with others and its correlates, while simultaneously also examining in-person communication. The present study therefore aims to answer two questions:

RQ1: How frequently do people interact with their romantic partners via different mediums in daily life?

First, we aimed to obtain a snapshot of how frequently romantic couples tend to interact with each other via different communication channels, in order to get a general sense of how, given all of the channels available to them, romantic partners in geographical proximity to each other spend their time communicating. Specifically, we examined the extent to which people interacted with their romantic partners via social media, voice calling, and texting. Given that
interacting in person is likely still the norm, and perhaps ideal, for romantic relationships, we also examined the extent to which people interact with their romantic partners in-person for comparison purposes. Moreover, the extent to which people interact with their partner via digital media may be reflective of their (lower) opportunity or desire to interact face-to-face, and thus we also examined whether interacting via different computer-mediated communication channels was related to how much people interacted in person. Of note, both the complementarity and displacement hypotheses would predict that greater CMC would be related to fewer in-person interactions. However, whether this negative association between in-person and computer-mediated communication is likely driven by less opportunity to interact in person, and therefore complementarity, or a lower desire, and therefore displacement, might only become clear by examining how CMC among couples is related to indicators of individual and relationship well-being.

**RQ2: How does the medium through which people communicate with their romantic partner in daily life relate to individual and relationship correlates?**

Specifically, we examined whether the extent to which people communicate with their romantic partners via different communication channels relates to positive and negative affect, state attachment, and relationship quality. In line with the complementarity hypothesis, it is plausible that greater communication via any of the computer-mediated communication channels would relate to more positive experiences as reflected by greater relationship quality, more secure attachment, and greater positive affect. In contrast, in line with the displacement hypothesis, it is possible that greater communication via computer-mediated channels would relate to more negative experiences as indicated by lower relationship quality, more insecure attachment, and greater negative affect. Although we are conceptualizing these links as CMC use
influencing relationship and individual experiences, it is important to note that this study is correlative in nature, therefore we cannot confirm directionality, an issue we will revisit in the discussion. This study was not preregistered and analyses were exploratory.

**Methods**

**Procedure**

As part of a larger study examining how phone use influences interpersonal processes within romantic couples, participants completed five days of daily diary questionnaires using an Experience Sampling application. While in the lab for a separate part of the study, participants downloaded the mobile application “MetricWire” onto their smartphones which alerted them to complete a survey between 5:00pm and 12:00pm starting the following day. The survey asked about the extent to which they interacted with their partner in-person and via various mobile mediums (e.g. social media, voice calling, texting). Additionally, participants completed items assessing their relationship quality, attachment style, and positive and negative affect. Participants were paid $25 for completing this part of the study.

**Participants**

Approximately 90% of participants from the larger study completed the daily diary questionnaires ($N = 342, N_{couple} = 171, 179 females, 156 males, 7 others; M_{age} = 22.95, SD_{age} = 3.86; M_{relationship length} = 25.29 months, SD_{relationship length} = 26.08 months; 25.73% White). Participants had to be in a romantic relationship for at least three months and had to own a smartphone (215 exclusive relationships, 62 cohabiting, 23 married, 15 long-distance, 13
engaged, 11 dating non-exclusively, 3 other). Couples of all sexual orientations were welcome to participate in the study (151 heterosexual, 20 homosexual).

Measures

**Relationship Quality**

Participants completed four items to assess relationship quality. Specifically, participants were asked to report the extent to which they felt “positive, happy with their interactions” ($M = 5.68, SD = 1.26$), “satisfied with their relationship” ($M = 6.18, SD = 1.06$), “close to their partner” ($M = 6.19, SD = 1.03$), and “tense, in conflict with their partner” ($M = 1.97, SD = 1.36$, reverse coded) using a 1 (not at all) to 7 (extremely) scale. These items were all highly correlated with one another, so they were combined to form a single “relationship quality” item (all $|r_s| > .44$, all $p < .0001, \alpha = .85$)

**Attachment**

Participants completed three items to assess attachment style. Specifically, participants were asked to indicate the extent to which they felt “Secure” ($M = 5.58, SD = 1.22$), “Anxious” ($M = 2.26, SD = 1.46$), and “Avoidant” ($M = 1.99, SD = 1.34$) in their relationship or interactions with their romantic partner each day using a 1 (not at all) to 7 (extremely) scale.

**Affect**

We used the modified 11-item Positive and Negative Affect Schedule (PANAS; 5 positive items, 6 negative items; Watson et al., 1988) to measure participant affect. Specifically, participants were asked to “please indicate the extent to which you felt each of the following

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4 We also ran analyses removing long-distance couples from the study to focus solely on geographically-close couples. Generally, the results remained similar to those reported in this manuscript (see Supplemental Online Materials). We decided to keep the long-distance couples in the main analyses as they must have been physically together to participate in the lab-portion of the study and, thus, were physically together for at least part of the daily diary period.
today” using a 1 (not at all) to 7 (extremely) scale, including items such as “distressed,” “excited,” and “upset” ($M_{positive} = 4.67, SD_{positive} = 1.13; M_{negative} = 2.41, SD_{negative} = 1.22).

Communication Channels. Participants were asked to indicate “the extent to which you interacted with your partner in the following ways today”, including in-person ($M = 4.96, SD = 2.32$), via social media ($M = 2.13, SD = 1.57$), phone calling ($M = 1.89, SD = 1.37$), texting ($M = 2.94, SD = 1.67$), using a 1 (not at all) to 7 (most of the time) scale (see Figure 1a). We also included measures of the extent to which participants interacted via email ($M = 1.11, SD = 0.52$) and video chat ($M = 1.32, SD = 1.06$), but removed them from the present study due to very low variance and frequency of use (but see Supplemental Online Materials for details).

Data Analytic Procedure

To examine how the degree of use of different communication channels relate to individual and relationship correlates, we examined both within- and between-person variables. Between-person variables were calculated by computing each person’s average level of use on each communication channel across the five days (their person-mean), which were then grand mean centered. Thus, the between-person variables indicate the extent to which each person used the communication channels more or less than other people in the study on average across the five days. Significantly positive estimates between, for example, text messaging and relationship quality, would indicate that texting one’s partner more frequently compared to others in the study is related to greater relationship quality, whereas significantly negative estimates would indicate that texting one’s partner more frequently compared to others is related to lower relationship quality. Within-person variables were calculated by subtracting each participant’s person-mean (average level of use on each communication channel across the five days) from their raw level of use on each day. Therefore, within-person variables indicate the extent to which each person
used the communication channels more or less than their own average level of use. Significantly positive estimates between, for example, text messaging and relationship quality would thus indicate that relationship quality was higher on days when participants text messaged their partner more than they normally do, whereas significantly negative estimates would indicate that the relationship quality was higher on days when they text messaged their partner less than they normally do.

We used a multilevel model with each communication channel predicting relationship quality, attachment, and affect. To account for the non-independence of the data, we allowed the degree of use of each communication channel to vary randomly across participants nested within dyads.

Results

RQ1: How do people interact with their romantic partners?

Overall, people reported interacting with their romantic partners most frequently in-person on each of the five days (see Figure 1a), followed by texting, social media, and phone calling. Thus, despite the many opportunities for mobile-mediated communication, romantic couples still primarily interacted in person. When examining the combination of communication channels, people reported interacting with their romantic partners via a combination of in-person, social media, and text most frequently across the five days (see Figure 1b), followed by using all four communication channels and using a combination of in-person and text. People reported interacting with their romantic partners solely via voice calling the least frequently over the course of the experimental period. Furthermore, the intraclass correlation coefficients (ICCs) at the dyad-level were generally very low (see Table 1b), indicating that little variance in the extent to which people interacted with their romantic partners via the different communication channels.
occurred between-dyads. In other words, couples did not differ much in terms of which communication channels they used to interact with their partners. Rather, the majority of the variance of the extent to which people interacted with their romantic partners via various communication channels occurred between-people and days, indicating that individuals differ from others in the extent to which they use different communication channels to interact with their partners, and individuals differ in their use of communication channels across days.

Figure 1a. Frequency of use of each communication channel

![Figure 1a. Frequency of use of each communication channel](image)

Figure 1b. Frequency of use of each combination of communication channels

![Figure 1b. Frequency of use of each combination of communication channels](image)
Beyond overall use of each channel, does use on one channel relate to use on others? Of note, in-person communication was significantly negatively correlated with social media ($r = -0.20, p < .0001, 95\% CI [-0.25, -0.15]$), calling ($r = -0.14, p < .0001, 95\% CI [-0.19, -0.08]$), and texting ($r = -0.30, p < .0001, 95\% CI [-0.35, -0.25]$; see Table 1). In contrast, social media was significantly positively correlated with both calling ($r = 0.17, p < .0001, 95\% CI [0.12, 0.22]$) and texting ($r = 0.26, p < .0001, 95\% CI [0.20, 0.30]$), and calling was significantly positively correlated with texting ($r = 0.34, p < .0001, 95\% CI [0.29, 0.39]$). It is important to note that these correlations account for the nested structure of the data. Overall, then, couples that interacted more in person tended to interact via digital media less. In contrast, the greater the interaction on one digital media channel, the greater the communication on others. Of note, it is unclear whether the negative correlation between digital and in-person communication is driven by greater reliance on digital media when couples are unable to interact in person (in line with the complementarity hypothesis), or if couples sometimes use digital media communication instead of in-person interaction by choice (in line with the displacement hypothesis). If the former, we would likely expect that both in-person and digital media use would have benign or positive associations with positive affective and relational correlates, as here digital media is used to make up for lower in-person communication. In contrast, if the latter, and digital media communication detracts from in-person communication, it is plausible that digital media communication would be negatively associated with positive affective and relational correlates.
Table 1a. Within-Person Correlations Between Communication Channels

<table>
<thead>
<tr>
<th></th>
<th>In Person</th>
<th>Social Media</th>
<th>Phone Calling</th>
<th>Texting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>r [95% CI]</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Person</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Media</td>
<td>-.20***</td>
<td>[0.25, -0.15]</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Phone Calling</td>
<td>-.14***</td>
<td>[-0.19, -0.08]</td>
<td>.17*** [0.12, 0.22]</td>
<td>1.00</td>
</tr>
<tr>
<td>Texting</td>
<td>-.35***</td>
<td>[-0.35, -0.25]</td>
<td>.26*** [0.21, 0.31]</td>
<td>.34*** [0.29, 0.39]</td>
</tr>
</tbody>
</table>

$r = \text{Pearson’s Correlation Coefficient.} \quad *** p < .001$

Table 1b. Intraclass Correlation Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Level 1: Day</th>
<th>Level 2: Person</th>
<th>Level 3: Dyad</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ICC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Person</td>
<td>0.59</td>
<td>0.41</td>
<td>0.00</td>
</tr>
<tr>
<td>Social Media</td>
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<td>0.38</td>
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</tr>
<tr>
<td>Phone Calling</td>
<td>0.62</td>
<td>0.38</td>
<td>0.00</td>
</tr>
<tr>
<td>Texting</td>
<td>0.57</td>
<td>0.38</td>
<td>0.05</td>
</tr>
</tbody>
</table>

$ICC = \text{Intraclass Correlation Coefficient.}$

RQ2: How does the medium through which people communicate with their romantic partner in daily life relate to individual and relationship correlates?

Relationship quality
Does the extent to which people interact with their romantic partners via different communication channels relate to relationship quality? Both in-person communication and texting were significantly positively associated with relationship quality at the within (In-Person: $b = .05, z = 4.02, p < .0001$; Texting: $b = .05, z = 2.30, p = .02$; see Table 2) and between (In-Person: $b = .11, z = 4.39, p < .0001$; Texting: $b = .10, z = 2.97, p = .003$; see Table 3) person levels. In other words, on days when participants interacted with their romantic partners more in-person or via text than they normally do, they reported significantly higher levels of relationship quality. Similarly, those who interacted with their partners in-person and via texting more frequently compared to others in the study reported higher levels of relationship quality. Social media was positively associated with relationship quality at the within-person level ($b = .04, z = 1.82, p = .07$) and the between-person level ($b = .06, z = 1.76, p = .08$), but these associations did not reach statistical significance. Finally, calling was not significantly associated with relationship quality at either the within- ($b = -.02, z = -0.87, p = .39$) or between- ($b = -.06, z = -1.50, p = .13$) person level.

**Attachment**

Similar to the results found for relationship quality, both in-person and texting were positively associated with secure attachment at the within (In-Person: $b = .08, z = 4.89, p < .0001$; Texting: $b = .05, z = 1.87, p = .06$; see Table 2) and between (In-Person: $b = .14, z = 4.27, p < .0001$; Texting: $b = .11, z = 2.69, p = .007$; see Table 3) person levels. In other words, on days when people interacted with their romantic partners in-person or via text more frequently than they normally do, they reported higher levels of secure attachment. Similarly, those who interacted with their romantic partners more frequently in-person or via text compared to others in the study reported higher levels of secure attachment. Additionally, in-person communication
was significantly negatively associated with avoidant attachment at the within-person level ($b = -0.07, z = -3.43, p = .001$) and marginally negatively associated at the between-person level ($b = -0.07, z = -1.88, p = .06$). In other words, interacting with one's partner more than one normally does or more than others in the study was related to lower levels of avoidant attachment. Texting was marginally negatively associated with avoidant attachment at the within-person level ($b = -0.05, z = -1.70, p = .09$), and social media was significantly negatively associated with avoidant attachment at the within-person level ($b = -0.07, z = -2.06, p = .04$), indicating that on days when people communicated with their partners via text or social media more than they normally do, they reported lower levels of avoidant attachment. Finally, calling was significantly positively associated with anxious attachment at the between-person level ($b = .18, z = 2.98, p = .003$), although it was not significantly associated with anxious attachment at the within-person level ($b = -.04, z = -1.08, p = .28$). No other associations were significant.

**Affect**

In-person communication was significantly positively associated with positive affect at the within ($b = .15, z = 9.99, p < .0001$; see Table 2) and between ($b = .11, z = 3.88, p = .0001$; see Table 3) person levels. Thus, on days when participants reported interacting with their romantic partners more in-person, they reported higher levels of positive affect. Additionally, those who reported interacting in-person with their romantic partners more frequently compared to others in the study reported higher levels of positive affect. Similarly, both social media ($b = .08, z = 2.17, p = .03$) and texting ($b = .08, z = 2.15, p = .03$) were significantly positively associated with positive affect at the between-person level, although they were not significantly associated with positive affect at the within-person level (Social Media: $b = .02, z = 0.91, p = .36$; Texting: $b = .03, z = 1.08, p = .28$). Finally, calling was not significantly associated with
positive affect (Within: $b = -.00, z = -0.14, p = .89$; Between: $b = -.05, z = -1.12, p = .28$), and none of the mobile-mediated communication indicators were significantly associated with negative affect (all $ps < .16$).
Table 2. Within-Person Associations Between Computer-Mediated Communication Indicators and Individual and Relationship Correlates

<table>
<thead>
<tr>
<th></th>
<th>Relationship Quality</th>
<th>Secure Attachment</th>
<th>Anxious Attachment</th>
<th>Avoidant Attachment</th>
<th>Positive Affect</th>
<th>Negative Affect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( b ) (( se ))</td>
<td>( z )</td>
<td>( d ) [95% CI]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Person</td>
<td>.05*** (.013)</td>
<td>4.02</td>
<td>.26 [.027, .078]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texting</td>
<td>.05* (.021)</td>
<td>2.30</td>
<td>.15 [.007, .088]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Media</td>
<td>.04† (.023)</td>
<td>1.82</td>
<td>.12 [-.003, .086]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Calling</td>
<td>-.02 (.023)</td>
<td>-.87</td>
<td>-.06 [-.065, .025]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( b ) (( se ))</td>
<td>( z )</td>
<td>( d ) [95% CI]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Person</td>
<td>.08*** (.017)</td>
<td>4.89</td>
<td>.32 [.049, .114]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texting</td>
<td>.05† (.026)</td>
<td>1.87</td>
<td>.12 [-.002, .100]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Media</td>
<td>.03 (.029)</td>
<td>1.03</td>
<td>.07 [-.027, .087]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Calling</td>
<td>.01 (.029)</td>
<td>0.22</td>
<td>.01 [-.051, .063]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( b ) (( se ))</td>
<td>( z )</td>
<td>( d ) [95% CI]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Person</td>
<td>.00 (.021)</td>
<td>0.06</td>
<td>.00 [-.039, .042]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texting</td>
<td>-.04 (.033)</td>
<td>-1.08</td>
<td>-.07 [-.099, .029]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Media</td>
<td>-.05 (.036)</td>
<td>-1.33</td>
<td>-.09 [-.119, .023]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Calling</td>
<td>.03 (.036)</td>
<td>0.83</td>
<td>.05 [-.041, .101]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( b ) (( se ))</td>
<td>( z )</td>
<td>( d ) [95% CI]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Person</td>
<td>-.07*** (.019)</td>
<td>-3.43</td>
<td>-.22 [-.104, -.028]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texting</td>
<td>-.05† (.030)</td>
<td>-1.70</td>
<td>-.11 [-.111, .008]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Media</td>
<td>-.07* (.033)</td>
<td>-2.06</td>
<td>-.13 [-.135, -.003]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Calling</td>
<td>.01 (.034)</td>
<td>0.28</td>
<td>.02 [-.057, .075]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( b ) (( se ))</td>
<td>( z )</td>
<td>( d ) [95% CI]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Person</td>
<td>.15*** (.015)</td>
<td>9.99</td>
<td>.65 [.120, .178]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texting</td>
<td>.03 (.024)</td>
<td>1.08</td>
<td>.07 [-.021, .072]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Media</td>
<td>.02 (.026)</td>
<td>0.91</td>
<td>.06 [-.027, .075]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Calling</td>
<td>-.00 (.026)</td>
<td>-.14</td>
<td>-.01 [-.055, .048]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>( b ) (( se ))</td>
<td>( z )</td>
<td>( d ) [95% CI]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Person</td>
<td>-.01 (.016)</td>
<td>-0.85</td>
<td>-.06 [-.046, .018]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texting</td>
<td>.03 (.026)</td>
<td>1.12</td>
<td>.07 [-.022, .080]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Media</td>
<td>-.04 (.029)</td>
<td>-1.36</td>
<td>-.09 [-.095, .017]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Calling</td>
<td>.02 (.029)</td>
<td>0.76</td>
<td>.05 [-.034, .078]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. \( b \) = unstandardized regression coefficient; \( SE \) = standard error. \( d \) = Cohen’s \( d \) effect size estimate. 95% confidence intervals for \( b \)s are provided. †\( p < .10 \), *\( p < .05 \), **\( p < .01 \), ***\( p < .001 \).
### Table 3. Between-Person Associations Between Computer-Mediated Communication Indicators and Individual and Relationship Correlates

<table>
<thead>
<tr>
<th>Relationship Quality</th>
<th>Relationship Quality</th>
<th>b (se)</th>
<th>z</th>
<th>d [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In-Person</strong></td>
<td></td>
<td>.11*** (.026)</td>
<td>4.39</td>
<td>.47 [.063, .164]</td>
</tr>
<tr>
<td><strong>Texting</strong></td>
<td></td>
<td>.10** (.035)</td>
<td>2.97</td>
<td>.32 [.035, .170]</td>
</tr>
<tr>
<td><strong>Social Media</strong></td>
<td></td>
<td>.06† (.033)</td>
<td>1.76</td>
<td>.19 [-.007, .123]</td>
</tr>
<tr>
<td><strong>Phone Calling</strong></td>
<td></td>
<td>-.06 (.042)</td>
<td>-1.50</td>
<td>-.16 [-.146, .019]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secure Attachment</th>
<th>Secure Attachment</th>
<th>b (se)</th>
<th>z</th>
<th>d [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In-Person</strong></td>
<td></td>
<td>.14*** (.032)</td>
<td>4.27</td>
<td>.45 [.074, .199]</td>
</tr>
<tr>
<td><strong>Texting</strong></td>
<td></td>
<td>.11** (.042)</td>
<td>2.69</td>
<td>.29 [.031, .200]</td>
</tr>
<tr>
<td><strong>Social Media</strong></td>
<td></td>
<td>.03 (.029)</td>
<td>1.03</td>
<td>.13 [-.029, .130]</td>
</tr>
<tr>
<td><strong>Phone Calling</strong></td>
<td></td>
<td>-.07 (.052)</td>
<td>-1.35</td>
<td>-.14 [-.171, .032]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anxious Attachment</th>
<th>Anxious Attachment</th>
<th>b (se)</th>
<th>z</th>
<th>d [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In-Person</strong></td>
<td></td>
<td>.01 (.039)</td>
<td>0.31</td>
<td>.03 [-.063, .086]</td>
</tr>
<tr>
<td><strong>Texting</strong></td>
<td></td>
<td>.04 (.050)</td>
<td>0.80</td>
<td>.09 [.058, .139]</td>
</tr>
<tr>
<td><strong>Social Media</strong></td>
<td></td>
<td>-.01 (.048)</td>
<td>-0.18</td>
<td>-.02 [-.103, .086]</td>
</tr>
<tr>
<td><strong>Phone Calling</strong></td>
<td></td>
<td>.18** (.061)</td>
<td>2.98</td>
<td>.31 [.063, .304]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Avoidant Attachment</th>
<th>Avoidant Attachment</th>
<th>b (se)</th>
<th>z</th>
<th>d [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In-Person</strong></td>
<td></td>
<td>-.07† (.035)</td>
<td>-1.88</td>
<td>-.20 [-.135, .003]</td>
</tr>
<tr>
<td><strong>Texting</strong></td>
<td></td>
<td>-.03 (.047)</td>
<td>-0.58</td>
<td>-.06 [-.119, .064]</td>
</tr>
<tr>
<td><strong>Social Media</strong></td>
<td></td>
<td>-.00 (.045)</td>
<td>-0.10</td>
<td>-.01 [-.092, .083]</td>
</tr>
<tr>
<td><strong>Phone Calling</strong></td>
<td></td>
<td>.01 (.057)</td>
<td>0.09</td>
<td>.01 [-.106, .117]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Positive Affect</th>
<th>Positive Affect</th>
<th>b (se)</th>
<th>z</th>
<th>d [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In-Person</strong></td>
<td></td>
<td>.11*** (.030)</td>
<td>3.88</td>
<td>.42 [.057, .172]</td>
</tr>
<tr>
<td><strong>Texting</strong></td>
<td></td>
<td>.08* (.039)</td>
<td>2.15</td>
<td>.23 [.007, .161]</td>
</tr>
<tr>
<td><strong>Social Media</strong></td>
<td></td>
<td>.08* (.038)</td>
<td>2.17</td>
<td>.23 [.008, .155]</td>
</tr>
<tr>
<td><strong>Phone Calling</strong></td>
<td></td>
<td>-.05 (.048)</td>
<td>-1.12</td>
<td>-.12 [-.147, .040]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Negative Affect</th>
<th>Negative Affect</th>
<th>b (se)</th>
<th>z</th>
<th>d [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In-Person</strong></td>
<td></td>
<td>.01 (.033)</td>
<td>0.30</td>
<td>.03 [-.055, .074]</td>
</tr>
<tr>
<td><strong>Texting</strong></td>
<td></td>
<td>.04 (.044)</td>
<td>0.95</td>
<td>.10 [-.044, .127]</td>
</tr>
<tr>
<td><strong>Social Media</strong></td>
<td></td>
<td>-.03 (.042)</td>
<td>-0.75</td>
<td>-.08 [-.113, .051]</td>
</tr>
<tr>
<td><strong>Phone Calling</strong></td>
<td></td>
<td>.08 (.053)</td>
<td>1.42</td>
<td>.15 [-.029, .180]</td>
</tr>
</tbody>
</table>

*Note.* b = unstandardized regression coefficient; SE = standard error. d = Cohen’s d effect size estimate. 95% confidence intervals for bs are provided. †p < .10, *p < .05, **p < .01, ***p < .001.
Discussion

This study aimed to examine whether using digital media for the purpose of communicating with one’s romantic partner complements or displaces in-person interactions, and how it relates to important individual and relationship correlates. Despite the increased availability of digital mediums for communicating with one’s romantic partner, communicating in-person still appears to be the norm. Furthermore, communicating in-person may still be ideal as it was most consistently related to positive individual and affective correlates. Yet, digital media use, specifically texting, followed a similar pattern to in-person interactions such that it was related to more positive individual and relationship correlates, including greater relationship quality, secure attachment, and positive affect. In contrast, social media and phone calling were less reliably associated with such correlates.

Participants tended to interact with their romantic partners most frequently in-person, and in-person communication was related to less frequent CMC. However, in contrast to the displacement hypothesis, it was common for participants to interact with their romantic partners via a combination of in-person and digital mediums, thus supporting the idea that CMC may complement in-person communication rather than displace it. It is important to note that couples did not differ much in the extent to which they used various communication channels to communicate with their partner. Rather, the frequency of communication channels tended to differ more between-individuals and between-days. It could be that individuals differ in their preference for communication, such that one person in the relationship might text their partner more whereas their partner may prefer calling. Furthermore, couples may interact more in-person on weekends when they are less constrained by work and school schedules but may rely more in digital media to interact during the week.
After in-person interactions, texting was the next most common mode of interaction, and was also the digital medium that was most consistently related to individual and relationship correlates. Why is this? One possible reason that texting is the most common form of digital communication among couples is that texting is often seen as being easier than other methods of CMC due to low costs and flexibility surrounding availability (Conti-Ramsden, Durkin, & Simkin 2010). The asynchronous and quasi-synchronous communication means that people do not feel obligated to respond to messages immediately and allows for a more fluid temporal space in which conversations can occur compared to phone calling (Suler, 2011). Furthermore, asynchronous and quasi-synchronous communication gives people more control over their interactions by allowing for more time to craft a perfect message in response to others (Pettigrew, 2009; Suler, 2011). While this type of communication is prevalent in text-based mediums (e.g., texting, social media), other mediums of communication such as phone calling are more synchronous, thus requiring people to be available and to provide immediate responses during a conversation.

Furthermore, texting may be linked to positive individual and relationship correlates because it is unique in that it is often used for both micro- and hyper-coordination (Ling & Yttri, 2002). Micro-coordination is defined as nuanced, instrumental coordination that is available via digital media. For example, people often use texting to coordinate plans with others, thereby allowing people to adjust their plans as needed (Hertlein & Chan, 2020; Ling & Yttri, 2002). Furthermore, this micro-coordination may increase social awareness by reassuring others of one’s well-being, sharing one’s experiences, conveying that one is thinking of others, and to coordinate synchronous communication with others (Ijsselsteijn, 2003). Hyper-coordination expands upon micro-coordination by incorporating the use of digital media for emotional
expression and self-presentation (Ling & Yttri, 2002). For example, people often use emojis to convey emotional states, thereby increasing emotional expression and cognitive understanding (Tang & Hew, 2018). Additionally, self-disclosure tends to occur frequently within text-based communication (Tidwell & Walther, 2002) thus allowing for greater feelings of intimacy (Derlega, Metts, Petronio, & Margulis, 1993). In sum, texting is often used as an easy medium to quickly send brief messages to others to maintain social connection while still allowing for emotional expression and self-disclosure, likely contributing to its greater frequency of use as well as potential benefits.

In contrast, other forms of digital media, such as phone calls and social media, are less commonly used in this way. Rather, people report calling their romantic partners because it allows them greater opportunity to multitask while interacting with a romantic partner (Hertlein & Chan, 2020) or to discuss issues within the relationship (Miller-Ott, Kelly, & Duran, 2012), and people frequently use social media as a way of surveilling one’s romantic partner (Studije, 2017; Fox & Anderegg, 2014). These uses of digital media tend to be associated with more negative relationship experiences (McDaniel & Coyne, 2016; Halpern & Katz, 2017; Studije, 2017; Fox & Anderegg, 2014). Similarly, previous work has found that communication via instant messaging was not significantly associated with face-to-face communication (Dienlin, Masur, & Trepte, 2017). It is possible that we did not see significant associations between either phone calling or social media with individual and relationship correlates because these forms of digital media use are not being used for the purpose of communication, as was the focus of this study, but rather for other motives, such as to allow for multitasking and partner surveillance.
Furthermore, phone calling and social media may not have been significantly associated with individual and relationship correlates due to a floor effect. The mean frequencies of both phone calling and social media were fairly low ($M_{social \med} = 2.13$, $M_{phone \ calling} = 1.19$ on a 1-7 scale). It is possible that we would see associations with individual and relationship correlates if we used a more nuanced scale to detect the subtle distinctions in phone calling and social media, or among couples who used these channels more frequently to allow for a greater range. Future research should examine this possibility.

**Strengths, Limitations, and Future Directions**

A notable strength of this study was that the daily-diary design allowed us to examine more in-the-moment digital media use, rather than having participants recall the level of communication across several weeks, months, or years. However, participants still self-reported on the extent to which they interacted with their romantic partners via different mediums of communication and their own individual and relationship correlates, which could have been influenced by reporting biases and shared-method variance. Future research should obtain more objective measures of the extent to which people use various mediums of communication to gain a more accurate estimate of how people communicate with their romantic partners (Müller, Peters, Matz, Wang, & Harari, 2020; Vaid & Harari, 2019; Harari et al., 2020).

This study fills a gap in the literature by examining the role that CMC plays in predominantly geographically-close romantic relationships. The present study was part of a larger study which required romantic couples to participate in a lab task. Therefore, even though some of our participants did report being in long-distance relationships (15 couples), they were in the same city at the time of participating in the study. Much of the previous research examining the role of CMC within romantic relationships has focused on long-distance...
relationships (Neustaedter & Greenberg, 2012; Merolla, 2010) or has focused on comparing the frequency CMC use between long-distance and geographically-close couples (Holtzman, Kushlev, Wozny, & Godard, 2021; Jiang & Hancock, 2013; Janning et al., 2018; Stafford & Merolla, 2007; Taylor & Bazarova, 2018). However, no study to our knowledge has examined how digital media use for the explicit purpose of communicating with a romantic partner relates to important correlates amongst geographically-close couples. However, it remains unclear whether the results would be similar if we used this design to examine digital media use among long-distance couples. One notable difference would be higher rates of digital media use, particularly for video chat, which might lead to a different pattern of results, such that other forms of digital media use may be more strongly linked to positive individual and relationship correlates. It would also be interesting to see whether in-person interactions – when partners visit each other, for example – would be just as strongly linked to positive correlates, or more or less so.

The results could also differ if we examined other types of relationships, such as new acquaintances, friends, or family members. Digital media etiquette differs between relationship types (Miller-Ott & Kelly, 2016; Miller-Ott & Kelly, 2017; Kelly, Miller-Ott, & Duran, 2019). For example, mobile phone use amongst friends has been shown to be associated with higher mobile maintenance expectations, or expectations that friends will provide updates and narratives via digital media to ensure inclusion amongst those who are not co-present (Hall & Baym, 2011). These increased mobile maintenance expectations may, in turn, increase friendship satisfaction by increasing dependence on their devices (Hall & Baym, 2011). However, overdependence and feeling that one is “trapped” by their devices may reduce friendship satisfaction (Hall & Baym, 2011). In other words, moderate levels of phone dependence may relate to greater friendship
satisfaction, but too much dependence may relate to lower levels of friendship satisfaction. Future research should collect a more diverse sample of relationship types to compare how digital media use for communication purposes relates to individual and relationship correlates amongst different types of relationships.

Although the participants from this study were comprised of a community sample and did not rely solely on a student population, approximately 60% of participants were university aged (between 18 and 22 years old). Digital media use tends to differ amongst those of various age groups, such that older adults use digital media less frequently than younger adults (Auxier & Anderson, 2021; Pew Research Center, 2021). Therefore, future research should examine how CMC relates to individual and relationship correlates amongst other generations.

Finally, this study was correlational and, therefore, cannot speak to directionality. It is possible that communication channels cause changes in individual and relationship outcomes, perhaps by influencing feelings of closeness and intimacy. However, it is also possible that individual and relationship factors cause people to use different communication channels. For example, perhaps those who are in more satisfying relationships or feeling more satisfied on a particular day would choose to interact more frequently via multiple mediums, such as in-person and texting. Although the present study involved multiple assessments for participants across days, allowing for the possibility of cross-lagged analyses, we expect that the time course of these associations would not match the assessments. That is, it seems likely that if texting one’s partner promotes relationship quality, that effect would emerge almost immediately, rather than a day later. Similarly, feeling satisfied with one’s partner may promotes texting them in that moment or shortly after, rather than the next day. Future research should employ an experimental
design or more frequent assessments within days through the use of experience sampling to better parse out the directionality of these associations.

**Conclusion**

In sum, despite popular beliefs that computer-mediated communication is replacing face-to-face communication, which could have negative implications for social and psychological well-being (Goman, 2018; Turkle, 2015), people tended to interact with their romantic partners predominantly in-person and via a combination of in-person and digital mediums. Furthermore, in-person communication and texting tended to be associated with positive individual and relationship correlates, whereas social media and phone calling tended to be unrelated to such correlates. This study supports the idea that digital media use may not be detrimental among romantic partners, complementing rather than displacing the more common and potentially satisfying in-person interactions.
References


Tidwell, L. C., & Walther, J. B. (2002). Computer-mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit


Bridge Between Chapter 2 and Chapter 3

“When we change the way we communicate, we change society.” -Clay Shirky

With the constant advancement in technology, people have more ways than ever before to stay connected to others. In Chapter 3, we found that the medium through which people communicate with their romantic partners is related to differences in individual and relationship correlates. In-person communication and communication via texting were most consistently associated with positive correlates, such as greater relationship quality, secure attachment, and positive affect. Social media was also associated with positive correlates, although less consistently, and phone calling was not generally associated with individual or relationship correlates. Taken together, using technology to communicate with one’s partner, especially texting, appears to complement in-person interactions and may ultimately benefit the relationship and individual.

Chapter 2 established a connection between technology use for communication purposes and positive individual and relationship correlates. However, might technology be more detrimental when it is not used to communicate with one’s partner, but is simply present for in-person interactions? It is plausible that phone presence could interfere with in-person couple interactions. Alternatively, if phone presence still finds a way to be complementary to in-person interactions, it is possible it this form of technology use could also be benign or even beneficial.

To test this, in Chapter 3, we used both an experimental manipulation in the lab and the daily diary data to examine how the presence or absence of a mobile device relates to relationship quality within romantic couples. Furthermore, we examine the accuracy and bias of emotion perceptions as a possible mechanism that could help to explain the relationship between phone presence and relationship quality.
Chapter 3

Phone Presence and Relationship Quality: Examining the Role of Emotion Accuracy and Bias

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Abstract

Does having one’s phone out when conversing with a romantic partner influence the accuracy and bias of emotion perceptions? This two-part study examined whether phone presence – experimentally-manipulated in the lab (Part 1: N = 383) and assessed naturalistically in daily diaries (Part 2: N = 342) – relates to accuracy and bias and, in turn, relationship quality. In Part 1, participants who were randomly assigned to have their phone present (vs. absent) with their romantic partner exhibited more normative, positive emotion perceptions, which, indirectly, contributed to greater relationship quality. In Part 2, on days when participants reported having their phone present with their romantic partner, they exhibited greater assumed similarity, which indirectly in turn contributed to greater relationship quality on those days. Taken together, then, having one’s phone out with a romantic partner may actually be beneficial, as it could contribute to more biased partner impressions and, in turn, greater relationship quality.
Introduction

Pete and Tonya are on a lunch date, with Pete’s phone resting on the table. Does the presence of Pete’s phone influence how accurately, positively, and similar to himself Pete views Tonya’s emotions during their lunch? Does the presence of Tonya’s phone influence how Pete perceives Tonya’s emotions? And could this in turn influence how satisfied Pete feels in his relationship with Tonya? The proliferation of mobile devices has led to considerable interest in whether the mere presence of mobile phones influences social interactions and relationships, such as those among romantic couples. Most previous research has found phone presence to be associated with more negative social experiences, such as reduced relationship quality (Misra, Cheng, Genevie, & Yuan, 2016; Przybylski & Weinstein, 2013) and enjoyment (Dwyer, Kushlev, & Dunn, 2017). However, many people develop emotional attachments to their mobile phones (Cheever, Rosen, Carrier, & Chavez, 2014; Clayton, Leshner, & Almond, 2015; Keefer, Landau, Rothschild, & Sullivan, 2012; Konok, Gigler, Bereczky, & Miklósi, 2016; Trub & Barbot, 2016; Meschtscherjakov, Wilfinger, & Tscheligi, 2014), which could relate to more positive social experiences (Hunter, 2017; Plant, 2000). The current study aims to extend previous research by examining the accuracy and bias of interpersonal perceptions as potential, previously unexplored, mechanisms by which phone presence may relate to romantic relationship quality.

Specifically, using a large-scale, two-part, study of established romantic couples, we examined whether phone presence during in-person interactions with one’s romantic partner was associated with perceptions of partner emotions, and relationship quality, both in the lab (N = 383, N_{couple} = 192) and in daily life (N = 342, N_{couple} = 171). Specifically, we examined whether a relationship exists between the presence or absence of a phone and three components of emotion
perceptions: distinctive emotion accuracy (i.e. seeing one’s partner in line with their own unique affective profile), normativity (i.e. seeing one’s partner in line with the average, socially desirable affective profile), and distinctive assumed similarity (i.e. seeing one’s partner as having a similar affective profile to oneself). We then examined the relationships between phone presence and interpersonal perceptions with relationship quality and whether interpersonal perceptions may play a role in the relationship between phone presence and relationship quality. Finally, in additional exploratory analyses, we examined the roles of both attention and attachment in the relationships between phone presence, interpersonal perceptions, and relationship quality. This study’s analyses and hypotheses were originally pre-registered; however, due to substantial deviations we consider the present analyses and research questions to be exploratory.5,6

Phone Presence and Social Interactions

The vast majority of people around the world own cell phones or smartphones (Silver & Taylor, 2019) and nearly always have their devices turned on and carried with them (Rainie & Zickuhr, 2015). The constant accessibility of these devices has led researchers to question the role that mobile devices play in social interaction. Some research suggests that phone use does not impede social interactions but, rather, allows for greater communication across time and social distance (Coyne, Stockdale, Busby, Iverson, & Grant, 2011; Valentine, 2006; Neustaedter

5 The current study was pre-registered on OSF. Importantly, the pre-registrations outline the analyses used to examine how phone presence relates to distinctive emotion accuracy and normativity, both in the lab and in daily life. However, due to an error, we began analyzing the data with 200 participants rather than 200 couples, as pre-registered. Furthermore, the current analyses deviate from the pre-registrations as they additionally examine how phone use relates to assumed emotion similarity. Given this is a substantial deviation from the original analysis plan, and we did not have hypotheses for assumed similarity, we therefore characterize the present manuscript as fully exploratory. Note that all results for distinctive and normative accuracy were similar when assumed similarity was not included in the models, as originally pre-registered.
6 Note that this data was used in another project examining meta-accuracy within romantic couples (Tissera, Heyman, & Human, 2022). However, the current study focuses on a different theoretical question.
& Greenberg, 2012), although most of these studies have focused on cell phone use for communication and relationship maintenance purposes. In contrast, the majority of research focusing on the mere presence of mobile devices during social interactions has found phone presence to be detrimental.

Previous research has found the simple presence of a cell phone during an interaction to be related to more negative social experiences, including reduced conversation quality (Przybylski & Weinstein, 2013; Misra et al., 2016; Crowley, Allred, Follon, & Volkmer, 2018) and enjoyment (Dwyer et al. 2017). But why would cell phone presence result in these negative relationship experiences? Several mediators have been examined to help to clarify the relationship between phone presence and relationship experiences, including conflict (Roberts & David, 2016), reduced intimacy (Halpern & Katz, 2017), and expectancy violations (Burgoon, 1993; Kadylak et al., 2018; Miller-Ott & Kelly, 2015; Rainie & Zickuhr, 2015). Of particular relevance to the current study is the idea that the reduced attention caused by phone presence explains more negative social experiences. According to the interference hypothesis, exogenous factors, such as alerts and notifications, can direct attention away from current interactions and thus contribute to more negative experiences (Kushlev & Leitao, 2020). Similar concepts highlight the detrimental effects associated with paying attention to a mobile device at the expense of interaction partners. For example, “absent presence”, “technoference”, and “Phubbing” describe how people can be physically with others but are distracted by occurrences in the technological world (Gergen, 2002; McDaniel & Coyne, 2016; Roberts & David, 2016).

Several studies support the idea that phone presence is associated with more negative experiences due to reduced attention quality (Kushlev, Hunter, Proulx, Pressman, & Dunn, 2019;
Kushlev & Leitao, 2020; Dwyer et al., 2018; Kushlev & Dunn, 2019) or cognitive capacity (Kushlev & Leitao, 2020; Przybylski & Weinstein, 2013). For example, Kushlev and Dunn (2019) conducted an experiment whereby parents were instructed to either maximize or minimize their phone use when attending a museum with their children. Those who were told to maximize their phone use reported significantly lower levels of attention compared to those who were instructed to minimize their phone use, and this reduced attention significantly reduced levels of social connection.

Yet, there is also some research suggesting that phone presence may not always have negative social implications. For example, the presence of a cell phone may provide feelings of continual connection with others even if it is not actively being used (Plant, 2000), and phone presence may act as a buffer against negative social experiences (Hunter, 2017). Hunter (2017) found that people who had their phones present felt less socially excluded during a social exclusion paradigm compared to those whose phones were absent. Furthermore, the mere presence of a mobile phone was related to lower levels of salivary alpha amylase, an enzyme signaling the activation of the autonomic nervous system. In other words, the presence of one’s mobile phone acted as a “digital security blanket,” helping to reduce the impact of negative experiences.

Overall, if technology presence that detracts from the interaction, perhaps by reducing attention or cognitive capacity, it is likely to be associated with more negative relationship experiences. Alternatively, if phone presence increases feelings of continued connection and can help to buffer against the effects of negative social experiences, it may be linked to more positive relationship experiences. In either case, one previously unexplored set of mechanisms that may
further explain the relationship between phone use and relationship outcomes are accuracy and bias in interpersonal perceptions of a partner’s emotions.

**Accuracy and Bias in Interpersonal Perceptions**

Emotion accuracy is broadly defined as accurately perceiving others’ emotions, although researchers have typically examined more specific forms of emotion accuracy. For example, empathic accuracy is defined as accurately perceiving others’ emotions as well as their thoughts and feelings (Ickes, 1993). Furthermore, emotion recognition accuracy is defined as accurately perceiving others’ emotional states through nonverbal expression (Döllinger et al., 2021). Over the decades, emotion accuracy has been examined concurrently with perceptual biases, including positivity bias, or the tendency to see one’s immediate social network more positively (Klar & Giladi, 1997; Luo & Snider, 2009), and assumed similarity, or the tendency to assume that partners share the same thoughts, feelings, and emotions as oneself (Kenny & Acitelli, 2001).

Emotion accuracy has been shown to be beneficial in a variety of relationships (Gleason, Jensen-Campbell, & Ickes, 2009; Lorimer & Jowett, 2009; Carton, Kessler, & Pape, 1999, Nowicki & Duke, 1994; Rosenthal, Archer, Hall, DiMatteo, & Rogers, 1979; Elfenbein, Marsh, & Ambady, 2002; Hall, Andrzejewski, & Yopchick, 2009), but of particular interest to the present study is how emotion accuracy relates to romantic relationships. Generally speaking, emotion accuracy tends to be associated with more positive relationship outcomes, such as reduced conflict (Kilpatrick, Bissonnette, & Rusbult, 2002), greater communication (Ickes, Stinson, Bissonnette, & Garcia, 1990), and greater commitment, accommodation, and adjustment (Kilpatrick et al., 1999), perhaps because being seen accurately by one’s partner increases feelings of intimacy and understanding in the relationship (Swann, de La Ronde, & Hixon, 1994; Lackenbauer, Campbell, Rubin, Fletcher, & Troister, 2010). Similarly, positivity bias has been
shown to be associated with greater relationship satisfaction (Fowers, Lyons, & Montel, 1996; Murray, Holmes, & Griffin, 1996; Rusbult, van Lange, Wildschut, Yovetich, & Verette, 2000) due to feelings of unconditional acceptance that increases feelings of comfort and reduces insecurities within relationships (Murray et al., 1996; Lackenbauer et al., 2010). Finally, empathic assumed similarity has been associated with greater relationship adjustment (Thomas, Fletcher, & Lange, 1997; Arias & O’Leary, 1985; Hendrick, 1981; Levinger & Breedlove, 1966; Morry, 2005) and increased feelings of closeness and positivity (Aron & Aron, 1986, 1996; Sillars, Pike, Jones, & Murphy, 1984), perhaps due to feelings of greater engagement and connection to others (Human & Biesanz, 2011).

**Measuring Accuracy and Bias**

The most common approach to examining emotion accuracy among romantic partners has been with empathic accuracy. This involves matching a perceiver’s inferred thoughts and feelings to the actual thoughts and feelings of a target (Ickes, 2001). Specifically, the dyadic interaction paradigm involves two participants engaging in a short discussion with one another, after which they each rate what their own thoughts and feelings were during the interaction as well as what they think their partner’s thoughts and feelings were. A separate group of raters then read through the responses to determine how well participant’s inferences match the content of the target’s actual thoughts and feelings. An aggregated index of empathic accuracy is then measured by summing or averaging the empathic accuracy scores for each dyad.

The dyadic interaction empathic accuracy paradigm is well documented, validated, and reliable (Simpson et al., 1995; Gesn & Ickes, 1999; Ickes, 2001). However, this approach was not feasible for the current study, whereby participants engaged in multiple interactions with their romantic partners, both in the lab and in daily life. In the lab, having participants record and
infer every thought and feeling that they and their partner had over the course of three, 10-minute interactions would have been logistically challenging and time consuming. Furthermore, we wanted the lab portion of the study to parallel the daily diary portion, where it would not have been feasible to ask participants to record and infer every thought and feeling they had during discussions with their romantic partners throughout the course of the day for five days. Instead, then, participants completed a questionnaire asking the extent to which they felt a range of emotions during their discussions in the lab and over the course of the day during the daily diary period, as well as the extent to which they thought their partner experienced those same emotions. This procedure was less burdensome for the participants and allowed for a comparable examination of the lab and daily diary portions of the study. We then used the Social Accuracy Model (Biesanz, 2010) to take a profile approach in simultaneously examine several components of emotion perceptions.

Specifically, we were able to examine three components of emotion perceptions: distinctive emotion accuracy, normativity/positivity, and distinctive assumed similarity. Distinctive emotion accuracy is defined as accurately perceiving a target’s unique affective profile. For example, Pete, the perceiver, may be having a conversation with his partner Tonya, the target. If Tonya sees herself as being more calm than she is irritated, and Pete also sees Tonya as being more calm than irritated, then Pete would be perceiving Tonya with high levels of distinctive emotion accuracy. Importantly, distinctive emotion accuracy controls for the normativity of emotion perceptions, or seeing someone in line with the average affective profile. For example, people generally tend to be more calm than they are irritated. As such, Pete may be seeing Tonya as being more calm than irritated because Pete has an accurate idea of what the average person is like, rather than an accurate understanding of Tonya’s unique affective profile.
In other words, while Pete may see Tonya in line with the normative profile because he correctly recognizes that Tonya is experiencing normative emotions, it could just as easily be due to chance or successful utilization of a heuristic. As such, a more sensitive indicator of accuracy is distinctive accuracy, which reflects whether Pete recognizes that Tonya is even more calm and less irritated than the average person, which would be harder to achieve by chance.

Importantly, the normative profile tends to be highly correlated with social desirability and positivity (Borkenau & Zaltauskas, 2009; Wood, Gosling, & Potter, 2007). Indeed, in the present study, the normative profile of emotion self-ratings in the lab component of the study was highly positive in nature (see Tissera, Heyman, & Human, 2022). As such, although normative emotion accuracy can be considered a form of accuracy, it can also be considered an indicator of positivity, which is how we interpret it in the present paper (see also Human, Biesanz, Parisotto & Dunn, 2012; Orehek & Human 2017, for similar approaches).

Finally, we examined distinctive assumed similarity, or seeing someone’s affective profile as being similar to one’s own affective profile, controlling for actual affective similarity and normative similarity. For example, if Pete feels more happy than he is anxious, and in turn perceives Tonya as being more happy than anxious as well, above and beyond the extent to which for Tonya’s reports being more happy than anxious (and above and beyond similarity with the normative profile), Pete would be displaying distinctive assumed similarity. Assumed similarity, controlling for actual similarity, has been examined in previous research (Jowett & Clark-Carter, 2006; Kouros & Papp, 2019) and has been found to be strongly associated with relationship quality (Thomas et al., 1997).

**Accuracy, Bias, and Phone Presence**
In line with our pre-registration, we examined how the presence or absence of a cell phone relates to both distinctive accuracy and normativity in emotion perceptions. Deviating from our pre-registration, we also examined how cell phone presence relates to a second form of perceptual bias: distinctive assumed similarity.

**Distinctive Accuracy**

Given that phone use is argued to reduce attention, having one’s phone present during an interaction with one’s partner might influence the extent to which partners accurately infer each other’s emotions, thereby carrying downstream consequences for relationship quality. Indeed, attention has been argued and demonstrated to play an important role in empathic accuracy (Ickes et al., 1990; Ickes, 1997) and accurate interpersonal perceptions more broadly. According to the Realistic Accuracy Model (RAM; Funder, 1995; Letzring & Funder, 2019), there are four main steps to forming accurate impressions: one must be able to make relevant cues available for the perceiver to detect and accurately utilize. If any one of these steps is compromised, an inaccurate impression may be formed. As such, if phone use acts as a distraction from one’s partner (Strayer, Drews, & Johnston, 2003; Kushlev & Dunn, 2019; Dwyer et al., 2018), it may compromise a perceiver’s ability to detect or utilize their partner’s cues, thereby hindering accuracy.

It is also possible that phone presence may increase distinctive accuracy by increasing positive feelings and reducing negative feelings during the interaction. Previous research has found that liking predicts greater distinctive accuracy (Zimmerman, Schindler, Klaus, & Leising, 2018; Human & Biesanz, 2011; Human, Carlson, Geukes, Nestler, & Back, 2020; but see Wessels et al., 2020). As such, more positive and less negative feelings during in-person interactions may relate to seeing others more accurately. If the presence of a cell phone enhances
positive feelings, such as increased feelings of connection (Plant, 2000), and decreases negative feelings, such as stress (Hunter, 2017), it may in turn predict greater distinctive accuracy.

**Normative Accuracy**

Phone presence may also influence positivity bias by causing people to rely more on perceptual heuristics when forming impressions when distracted by their cell phones. Indeed, it has been argued that a lack of relevant information is related to a greater reliance on idiosyncratic stereotypes to form impressions of others, which may in turn result in higher levels of positivity bias (Kenny, 1994; Dawes, 1990; Funder, 1995). In other words, when distracted by one’s phone, a perceiver might simply assign a default, positive state to them, resulting in greater positive bias.

It is also possible that phone presence may influence positivity bias by causing people to feel calmer during their interactions. Given the emotional attachment that people form with their cell phones (Cheever et al., 2014; Clayton et al., 2015; Keefer et al., 2012; Konok et al., 2016; Trub & Barbot, 2016; Meschtscherjakov et al., 2014), it is possible that the mere presence of these devices can act as a “digital security blanket,” enhancing feelings of connection (Plant, 2000) or buffering against the effects of negative social experiences (Hunter, 2017) as experienced by lower levels of anxiety (Cheever et al., 2014; Clayton et al., 2015) and stress (Hunter, 2017). This reduction of negative emotions may contribute to more positively-biased interpersonal impressions (Christensen, Stein, & Means-Christensen, 2003; Chen, Short, & Kemps, 2020).

**Assumed Similarity**

Similarly, phone presence may be associated with a different form of biased perceptions: assumed similarity. That is, the distraction caused by having a cell phone present may lead
people to rely more on their own self-knowledge to form impressions of others, thus resulting in higher levels of assumed similarity (Funder, 1995; Kenny & West, 2010). In contrast, the enhanced feeling of connection (Plant, 2000) or reduced feelings of stress attributed to having one’s phone present (Hunter, 2017; Cheever et al., 2014; Clayton et al., 2015) may lead to more positive interactions and interpersonal impressions, which could be reflected in higher levels of assumed similarity given that people are motivated to see others they like as being similar to themselves (Locke, Craig, Baik, & Gohil, 2012).

Overall, then, phone presence may enhance the positive perceptual tendencies of normativity and assumed similarity, either for informational purposes – to fill in the gaps that distraction may cause – or because of the positive feeling that having one’s present could cause. Regarding accuracy, if phone presence is a distraction, it is more likely to reduce accuracy, whereas if phone presence is a positive attachment touchstone, it may actually enhance accuracy, given the links between liking and accuracy. To examine these possibilities, we conducted additional exploratory analyses to examine the role of attention and state attachment during the interaction.

The Present Study

In this two-part study, we examined whether phone presence relates to emotion accuracy and bias within romantic relationships, and in turn contributes to relationship quality. First, we aimed to examine whether the experimentally manipulated presence or absence of a phone during conversations in the lab influenced accuracy and bias in impressions of partner emotions and relationship quality, and whether accuracy and bias mediated the relationship between phone presence and relationship quality. In Part 2, we examined whether having a phone present when with a romantic partner in daily life related to attention and attachment, emotion accuracy and
bias, and relationship quality, again examining the potential mediating role of accuracy and bias. Furthermore, in both Parts 1 and 2, we examined the roles of both attention (both self-reported and observer rated) and self-reported attachment in the relationships between phone presence, emotion perceptions, and relationship quality. Note that in the daily diary study, all associations were examined concurrently and thus we examined whether the pattern of results could be consistent with mediation, acknowledging that these data do not allow for strong conclusions about causality. Importantly, we examined three distinct components of emotion accuracy and bias: 1) distinctive emotion accuracy, 2) normativity, and 3) distinctive assumed emotion similarity. It is possible that if the presence of a cell phone reduces attention to one’s partner, distinctive emotion accuracy will be hindered while normativity and assumed similarity will be bolstered. Conversely, if mobile devices serve as a positive attachment item or “touchstone” that create more positive feelings during the interaction, it is possible that phone presence could enhance distinctive accuracy, normativity, and assumed similarity.

**Part 1: Lab**

**Methods**

**Procedure.** The present study is part of a larger study examining how phone use influences romantic relationships (Tissera, Heyman, & Human, 2022). We only describe the methods and measures relevant to the present research questions. Participants completed an initial online questionnaire assessing demographics and personality. They then were brought into the lab and engaged in three ten-minute discussions with one another: 1) an unstructured discussion; 2) a conflict discussion; and 3) a positive discussion (see Gottman, Coan, Carrere, & Swanson, 1998; Gottman & Driver, 2005). After each discussion, participants completed a questionnaire assessing their own emotions and relationship quality during the discussion as well
as perceptions of their partner’s emotions. Participants were randomly assigned to one of two conditions: 1) in the phone present condition ($N = 198$), participants were allowed to have their phones with them during the discussions and were instructed to complete the questionnaires using their phones; 2) in the phone absent condition ($N = 185$), participants’ phones were removed from the room before the discussions began, and participants completed the questionnaires on an iPad provided to them. Participants were compensated $20 for completing the initial questionnaire and the lab visit.

**Participants.** To participate in this study, participants must have been at least 18 years of age, been in a relationship for at least three months, and owned a smartphone. An a-priori power analysis was conducted using G*Power3 (Faul, Erdfelder, Lang, & Buchner, 2007) to test the difference in emotion accuracy and bias between those in the phone present vs. phone absent conditions using a two-tailed test, medium effect size ($d = .50$), and an alpha of .05. Results showed that a total sample size of 384 participants was required to achieve a power of .99. Therefore, we aimed to collect a sample size of 400 participants. However, due to the COVID-19 Pandemic, we stopped data collection at 388 participants. Furthermore, due to technical issues, five participants’ responses were not saved, resulting in a final sample size of 383 participants ($N_{couple} = 194, M_{age} = 22.87, SD_{age} = 3.82, 176$ males, $200$ females, 7 other). Of these participants, the majority (62%) reported that they were in an exclusive dating relationship, followed by cohabiting (17%), married (6.5%), and engaged (4.4%).

**Measures.**

**Emotions.** To measure self-ratings and perceptions of partner’s emotions, a modified 10-item version of the Positive and Negative Affect Schedule was used (Watson, Clark, & Tellegen, 1988). Participants were instructed to “indicate the extent to which you felt each of the following
during your interaction with your romantic partner” with items such as “distressed,” “excited,” and “upset” using a 1 (strongly disagree) to 7 (strongly agree) scale ($M_{positive} = 4.91$, $SD_{positive} = 1.22$; $M_{negative} = 1.82$, $SD_{negative} = 0.89$). Similarly, participants were then instructed to “indicate to what extent you think your partner felt each of the following during your interaction,” using the same 10 items ($M_{positive} = 4.86$, $SD_{positive} = 1.22$; $M_{negative} = 1.96$, $SD_{negative} = 0.98$).

**Momentary Relationship Quality.** Four items were used to assess relationship quality. Using a 1 (not at all) to 7 (extremely) scale, participants were asked to what extent they felt “Positive, happy with their interaction” ($M = 5.70$, $SD = 1.28$), “Satisfied with their relationship” ($M = 6.18$, $SD = 0.91$), “Close to their partner” ($M = 6.15$, $SD = 0.96$), and “Tense, in conflict with their partner” ($M = 1.85$, $SD = 1.24$; Reverse scored). These items were all highly correlated with one another (all $|r| > .47$), so these items were combined to form a single “relationship quality” item ($M = 6.04$, $SD = 0.93$, $\alpha = .85$).\(^7\)

**Phone Presence.** Participants were randomly assigned to one of two conditions: 1) phone present ($N = 198$), whereby participants had their phones with them during their discussions and completed the questionnaires using their phones, or 2) phone absent ($N = 185$), whereby participants’ phones were removed prior to the first discussion and they completed the questionnaires on an iPad. Specifically, those in the absent condition were told that their cell phones might interfere with physiological recordings, thus they must be removed from the interaction room. Of note, physiological recordings were taken for other purposes of the study and thus are not examined in the present manuscript. When completing the questionnaires, participants were either told to “complete it on your phone” (present condition), or “complete it on this tablet” (absent condition).

\(^7\) We also controlled for relationship length, relationship status, and gender these analyses. All of the results of both Studies 1 and 2 hold when controlling for these measures.
**Attention.** Self-reported attention was measured with a single item from the Positive and Negative Affect Schedule (Watson et al., 1988) asking participants to what extent they felt attentive during their interaction with their romantic partner using a 1 (not at all) to 7 (extremely) scale ($M = 5.51, SD = 1.18$).

Furthermore, a trained group of research assistants watched the video recordings of the interactions and coded for the extent to which the participants paid attention during the interaction. Specifically, observers completed four items from the Responding subscale of the Active Empathic Listening Scale (Bodie, 2011) assessing extent to which the participant “assures their partner that they are listening by using verbal acknowledgements” ($M = 5.90, SD = 1.16$), “shows that they are listening through body language” ($M = 4.78, SD = 1.32$), “appears preoccupied” ($M = 2.82, SD = 0.87$; reverse coded), and “appears observant” ($M = 6.50, SD = 0.97$) using a 1 (never or almost never true) to 7 (always or almost always true) scale. These items were all significantly correlated with one another (all $|r_s| > .23$, all $p_s < .0001$). However, when combined to form a single “attention” item, the reliability was poor ($\alpha = .37$, ICC = .66).

Further probing revealed that the “preoccupied” item was generally the least correlated with the other items (see Supplemental Online Materials) and that the research assistants reported difficulty understanding this item. Furthermore, by dropping the “preoccupied” item, the reliability increased to $\alpha = .72$, ICC = .62. Therefore, we dropped the “preoccupied” item from the “attention” composite.

**Attachment.** Attachment was measured with three items asking participants to what extent they felt “secure” ($M = 5.69, SD = 1.16$), “anxious” ($M = 2.23, SD = 1.33$), and “avoidant (e.g., distant, closed off)” ($M = 1.77, SD = 1.12$) during their interaction with their romantic partner using a 1 (not at all) to 7 (extremely) scale.
Data Analytic Procedure. We examined emotion accuracy in line with the social accuracy multilevel modeling procedures outlined by Biesanz (2010), modified for dyads (e.g., Huelsnitz, Neel, & Human, 2020; Rogers, Wood, & Furr, 2018), using R (R Development Core Team, 2015) and the lme4 package (Bates, Maechler, Bolker, & Walker, 2014). The following equations were used to examine emotion accuracy:

Equation 1a:

\[ Y_{ij} = \beta_0 + \beta_1 \text{PartnerSelfReport}_{ij} + \beta_2 \text{MeanSelfReport}_j + \beta_3 \text{SelfReport}_{ij} + e_{ij} \]

Specifically, a multilevel regression model was examined with three predictors of perceiver impressions: 1) the distinctive accuracy validation measure (\(\beta_1\); the target’s self-report on each item); 2) the normativity validation measure (\(\beta_2\); the mean target self-reported affective rating on each item); and 3) the assumed similarity validation measure (\(\beta_3\); the perceiver’s self-report on each item). Prior to analyses, in line with recommendations (Biesanz, 2010, see pg. 878), we centered the distinctive accuracy and assumed similarity validation measures within-item (i.e. we subtracted the normative mean from each target and perceiver affective validity item) to reduce convergence issues and improve interpretability. Items were not reverse coded prior to analyses. Phone use condition was dummy coded to examine the differences between phone absence (= 0) and phone presence (= 1), and distinctive accuracy, normativity, and assumed similarity were allowed to vary randomly across perceivers (see Rogers et al., 2018). Given the nested nature of the data, we re-ran all analyses with perceivers nested within dyads and the results were highly similar. However, due to convergence issues when including dyadic nesting, we report the results with only perceiver random effects.

To first examine the extent to which phone presence was associated with emotion accuracy, we used the following equations:
Equation 1b:

\[
\begin{align*}
\beta_{1i} &= \gamma_{10} + \gamma_{11}\text{Phone}_i + U_{1i} \\
\beta_{2i} &= \gamma_{20} + \gamma_{21}\text{Phone}_i + U_{2i} \\
\beta_{3i} &= \gamma_{30} + \gamma_{31}\text{Phone}_i + U_{3i}
\end{align*}
\]

In these equations, we included phone condition as a moderator or predictor of each accuracy and bias slope. \(\gamma_{11}, \gamma_{21}, \text{and} \ \gamma_{31}\) represent the relationships between phone presence and distinctive accuracy, normativity, and distinctive assumed similarity, respectively. Positive interactions would therefore indicate that having a phone present led to viewing partners with greater distinctive accuracy, normativity, or assumed similarity. Similarly, to examine whether emotion accuracy was a significant predictor of momentary relationship quality independent from phone condition, we added momentary relationship quality as an additional moderator of each slope (see equation 1c). Thus, positive interactions would indicate that greater distinctive accuracy, normativity, or distinctive assumed similarity was associated with greater momentary relationship quality, independent of the effects of phone condition on relationship quality.

Equation 1c:

\[
\begin{align*}
\beta_{1i} &= \gamma_{10} + \gamma_{11}\text{Phone}_i + \gamma_{12}\text{RelationshipQuality}_i + U_{1i} \\
\beta_{2i} &= \gamma_{20} + \gamma_{21}\text{Phone}_i + \gamma_{22}\text{RelationshipQuality}_i + U_{2i} \\
\beta_{3i} &= \gamma_{30} + \gamma_{31}\text{Phone}_i + \gamma_{32}\text{RelationshipQuality}_i + U_{3i}
\end{align*}
\]

To examine how phone condition relates to momentary relationship quality, we used a multilevel regression model with momentary relationship quality being regressed onto phone condition using the following equations:

Equation 2:

\[
\text{RelationshipQuality}_j = \beta_0 + \beta_1\text{Phone}_i + e_j
\]
\[ \beta_{0i} = \gamma_{00} + U_{0i} \]

Here, \( \text{RelationshipQuality}_i \) represents participant \( i \)'s momentary relationship quality score, and \( \beta_{1i} \text{Phone}_i \) represents whether participant \( i \)'s phone condition (present vs. absent) relates to their relationship quality. Intercepts were allowed to vary randomly by perceiver. Similar to the above analyses, we also ran these analyses with perceivers nested within dyads. All results were similar, however due to convergence issues we report the analyses with only perceiver random effects.

Finally, to examine the indirect effects of phone condition on momentary relationship quality via emotion accuracy and bias, we used R’s lavaan package (Rosseel, 2012). Specifically, we saved out the empirical bayes estimates of dyadic accuracy and bias scores and used these scores as mediating variables. The parameters for direct effects were estimated using maximum likelihood, and the confidence intervals of the indirect effects were estimated using bias-corrected bootstrapping of 1000 samples.

**Results**

Participants saw each other with significant levels of distinctive accuracy \((b = .23, z = 23.61, p < .0001)\), normativity \((b = .89, z = 86.84, p < .0001)\), and distinctive assumed similarity \((b = .66, z = 60.22, p < .0001)\). In other words, participants were able to discern their romantic partners’ own unique affective profiles, saw their partners in line with the average, socially desirable affective profile, and saw their partners in line with their own self-reported affective profile, controlling for their partner’s own unique affective profile.

**Phone Presence, Emotion Accuracy, and Bias.** Phone condition did not significantly influence distinctive accuracy \((b = .02, z = 0.81, p = .42)\) nor distinctive assumed similarity \((b = .02, z = 0.92, p = .36; \text{see Table 1})\). However, phone condition significantly influenced
normativity \((b = .05, z = 2.25, p = .02)\), such that having a phone present led to people seeing their partner more in line with the average, positive affective profile. This effect was not significantly influenced by which discussion the couples were engaging in (i.e. unstructured, conflict, positive).

Table 1. Associations Between Phone Presence and Emotion Accuracy and Bias Indicators

<table>
<thead>
<tr>
<th></th>
<th>Distinctive Emotion Accuracy</th>
<th>Normative Emotion Accuracy</th>
<th>Assumed Emotion Similarity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(b (se))</td>
<td>(z)</td>
<td>(d (95% CI))</td>
</tr>
<tr>
<td>Study 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Presence</td>
<td>.02 (.020)</td>
<td>0.81</td>
<td>.11 [-.023, .055]</td>
</tr>
<tr>
<td>Study 2</td>
<td>Perceiver Phone Presence</td>
<td>- .01 (.006)</td>
<td>-1.44</td>
</tr>
</tbody>
</table>

Note. \(b\) = unstandardized regression coefficient; \(SE\) = standard error. \(d\) = Cohen’s \(d\) effect size estimate. 95% confidence intervals are provided. \(*p < .05\), \(**p < .01\), \(***p < .001\).

**Emotion Accuracy, Bias, and Momentary Relationship Quality.** Do emotion accuracy and bias relate to momentary relationship quality, controlling for phone condition? We found that both normativity \((b = .08, z = 8.17, p < .0001)\) and distinctive assumed similarity \((b = .07, z = 9.09, p < .0001; \text{see Table 2})\) were significantly associated with greater momentary relationship quality. In other words, seeing one’s partner more normatively and therefore positively or more in line with how one views themselves was related to greater momentary relationship quality.
Distinctive accuracy did not significantly predict momentary relationship quality ($b = .01$, $z = 0.95$, $p = .34$).

Table 2. Associations Between Emotion Accuracy and Bias Indicators and Relationship Quality Controlling for Phone Presence

<table>
<thead>
<tr>
<th></th>
<th>Relationship Quality</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$b$ ($se$)</td>
<td>$z$</td>
<td>$d$ (95% CI)</td>
</tr>
<tr>
<td>Study 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distinctive Emotion Accuracy</td>
<td>.01 (.008)</td>
<td>0.95</td>
<td>.05 [-.008, .022]</td>
</tr>
<tr>
<td>Normative Emotion Accuracy</td>
<td>.08*** (.010)</td>
<td>8.17</td>
<td>.50 [.061, .101]</td>
</tr>
<tr>
<td>Assumed Emotion Similarity</td>
<td>.07*** (.008)</td>
<td>9.09</td>
<td>.40 [.056, .087]</td>
</tr>
<tr>
<td>Study 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceiver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distinctive Emotion Accuracy</td>
<td>.02 (.011)</td>
<td>1.43</td>
<td>.09 [-.006, .038]</td>
</tr>
<tr>
<td>Normative Emotion Accuracy</td>
<td>.11*** (.019)</td>
<td>6.03</td>
<td>.60 [.076, .149]</td>
</tr>
<tr>
<td>Assumed Emotion Similarity</td>
<td>.06*** (.011)</td>
<td>5.22</td>
<td>.30 [.037, .081]</td>
</tr>
</tbody>
</table>

**Note.** $b =$ unstandardized regression coefficient; $SE =$ standard error. $d =$ Cohen’s d effect size estimate. 95% confidence intervals are provided. *$p < .05$, **$p < .01$, ***$p < .001$.

**Phone Presence and Momentary Relationship Quality.** Phone condition did not significantly directly influence momentary relationship quality ($b = .09$, $z = 1.24$, $p = .22$; $M_{\text{absent}} = 5.99$, $M_{\text{present}} = 6.08$; see Table 3), suggesting that participants’ ratings of momentary relationship quality did not differ between those who were allowed to have their phones with them and those whose phones were removed prior to their discussions.

Table 3. Associations Between Phone Presence and Relationship Quality

<table>
<thead>
<tr>
<th></th>
<th>Relationship Quality</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$b$ ($se$)</td>
<td>$z$</td>
<td>$d$ (95% CI)</td>
</tr>
<tr>
<td>Study 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Presence</td>
<td>.09 (.078)</td>
<td>1.24</td>
<td>.13 [-.053, .234]</td>
</tr>
<tr>
<td>Study 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceiver Phone Use</td>
<td>-.01 (.020)</td>
<td>-0.51</td>
<td>-.09 [-.049, .029]</td>
</tr>
</tbody>
</table>

**Note.** $b =$ unstandardized regression coefficient; $SE =$ standard error. $d =$ Cohen’s d effect size estimate. 95% confidence intervals are provided.

Although there was no significant total effect of phone condition on momentary relationship quality, there could still be indirect effects. Given the associations between phone
condition and normativity, and between normativity and momentary relationship quality, we examined the mediating role of normativity in the relationship between phone condition and momentary relationship quality. Since phone condition was not significantly associated with distinctive accuracy nor distinctive assumed similarity, we focused on the mediating role of normativity in the relationship between phone condition and momentary relationship quality.

Of note, we interpret the following results with caution, given potential issues with interpreting an indirect effect in the absence of a total effect and given that the mediators in the current analyses (i.e., normativity) was not experimentally manipulated. As a result, the estimates of the indirect effect may be biased due to unobserved confounding variables (Bullock, Green, & Ha, 2010). Specifically, unobserved confounding variables that influence the mediator and the outcome in the same direction may lead to inflated estimates of the effect of the mediator on the outcome. We discuss this in greater depth in the general discussion.

Mediating Role of Emotion Accuracy. We found support for a significant mediated effect of phone condition on momentary relationship quality via normativity ($b = .06, z = 4.56, p < .0001, abfs = .06, 95\% CI = [.034, .081]$). In other words, having a phone present led to viewing one’s partner’s emotions more positively, which, in turn, predicted greater momentary relationship quality (see Figure 1a).
Figure 1a. The relationship between phone condition and relationship quality via normativity.

**Additional Analyses: Potential Processes.** To better understand the mechanisms underlying the associations between phone presence, normativity, and momentary relationship quality, we ran exploratory analyses examining the roles of attention and attachment. Specifically, because normativity can be interpreted as either a heuristic (perhaps to fill in gaps when distracted) or a positive bias (perhaps driven by the positive feelings associated with the presence of one’s mobile phone), it is unclear whether phone presence boosts normativity for more informational or positive reasons.

*The role of attention.* Does attention help to further explain the relationships between phone presence, normativity, and momentary relationship quality? To start, phone condition did not significantly predict either self-reported ($b = .03$, $z = -0.27$, $p = .79$) or observer-rated attention ($b = -.05$, $z = -0.67$, $p = .50$). In other words, those who had their phones present did not
report or display significantly different levels of attention compared to those who had their phones absent.

Next, we examined whether attention predicted the emotion accuracy and bias indicators. Self-reported attention was significantly positively associated with normativity ($b = .03, z = 3.83, p = .0001$) and distinctive assumed similarity ($b = .04, z = 4.98, p < .0001$), indicating that paying more attention to one’s romantic partner is related to seeing each other more positivity and as being more similar to oneself. Observer-rated attention was significantly positively associated with distinctive assumed similarity ($b = .02, z = 2.27, p = .02$), but was not significantly associated with normativity ($b = .01, z = 1.26, p = .17$). None of the attention indicators were significantly associated with distinctive emotion accuracy (all $p$s > .12).

Finally, we examined whether any of the attention indicators were significantly associated with momentary relationship quality. Self-reported attention ($b = .29, z = 12.78, p < .0001$) and observer-rated attention ($b = .18, z = 5.96, p < .0001$) were significantly positively associated with momentary relationship quality. That is, paying more attention to one’s partner was related to higher levels of relationship quality.

Although self-reported attention was significantly associated with normativity, and although all of the attention indicators were significantly associated with momentary relationship quality, phone presence did not significantly predict any of the attention indicators. Therefore, we did not examine the mediating role of attention in the relationships between phone presence, normativity, and momentary relationship quality.

*The role of attachment.* What role does attachment play in the relationship between phone presence, normativity, and momentary relationship quality? Phone presence did not significantly predict either secure ($b = .12, z = 1.34, p = .18$) nor avoidant ($b = -.13, z = -1.51, p = .13$)
attachment. However, phone presence did significantly negatively predict anxious attachment \((b = -0.27, z = -2.61, p = .01)\). In other words, those who had their phones present during interactions with their romantic partners reported significantly lower levels of anxious attachment compared to those who did not have their phones present.

When examining how attachment relates to emotion accuracy and bias, we found that secure attachment was significantly positively associated with distinctive emotion accuracy \((b = 0.02, z = 3.65, p = .0003)\), normativity \((b = 0.05, z = 6.27, p < .0001)\), and distinctive assumed similarity \((b = 0.03, z = 4.33, p < .0001)\), indicating that those with higher levels of secure attachment saw their partners more in line with their unique affective profiles, more positively, and more similar to oneself. In contrast, both anxious and avoidant attachment were significantly negatively associated with distinctive emotion accuracy (Anxious: \(b = -0.02, z = -3.99, p < .0001\); Avoidant: \(b = -0.02, z = -2.67, p = .008\)), normativity (Anxious: \(b = -0.05, z = -7.58, p < .0001\); Avoidant: \(b = -0.06, z = -7.05, p < .0001\)), and distinctive assumed similarity (Anxious: \(b = -0.02, z = -2.60, p = .009\); Avoidant: \(b = -0.03, z = -5.26, p < .0001\)).

Finally, when examining how attachment predicts momentary relationship quality, we found that secure attachment was significantly positively associated with momentary relationship quality \((b = 0.51, z = 28.38, p < .0001)\), whereas both anxious \((b = -0.36, z = -20.31, p < .0001)\) and avoidant \((b = -0.49, z = -25.50, p < .0001)\) attachment were significantly negatively associated with momentary relationship quality.

Given these associations, we focused on the mediating role of anxious attachment in the relationship between phone presence, normativity, and momentary relationship quality. We found support for a significant indirect effect of phone condition on momentary relationship quality via both anxious attachment and normativity \((b = 0.01, z = 2.97, p = .003, abfs = 0.01, p = .01)\).
95%CI = [.004, .016]; see Figure 1b). That is, having one’s phone present led to people feeling significantly lower levels of anxious attachment. This reduced level of anxious attachment, in turn, contributed to higher levels of normativity. Finally, these higher levels of normativity predicted significantly higher levels of momentary relationship quality.

![Diagram](image)

Figure 1b. The relationship between phone condition and relationship quality via anxious attachment and normativity.

**Discussion**

These results lend support to a significant mediating effect of normativity in the relationship between phone presence and momentary relationship quality. Specifically, having a phone present led to seeing one’s partner more in line with the average, socially desirable affective profile which, in turn, was associated with greater momentary relationship quality. For example, if Pete and Tonya were allowed to keep their phones with them during their interactions, Pete was likely to see Tonya’s emotions more normatively which, in turn, was related to Pete experiencing greater momentary relationship quality. Because the normative
affective profile is also more positive and desirable in nature (Borkenau & Zaltauskas, 2009; Wood et al., 2007; see SOM for further details), this may in turn benefit momentary relationship quality by leading to more positive impressions of one’s partner’s emotions.

Why did phone presence result in more normative impressions? Could it be that phone presence reduces attention to one’s partner, thereby increasing reliance on a handy heuristic? Or does phone presence put people at ease, thereby fostering a rosy glow in one’s perceptions of their partner’s emotions? In the present study, the latter possibility appears more likely. Specifically, we found that phone presence did not significantly predict the level of attention one paid towards their romantic partner, either self- or observer-reported. However, phone presence was related to lower levels of anxious attachment, thereby increasing normativity and momentary relationship quality. In other words, people may perceive their partners’ emotional profile as being more positive, thereby increasing momentary relationship quality, due to feeling less anxious in their relationship with their romantic partners. This lends support to the idea of a “digital security blanket,” whereby the simple presence of one’s mobile phone increases positive feelings and acts as a buffer against negative experiences.

Thus, in contrast to prior research, having one’s phone out in a conversation with a romantic partner may actually benefit momentary relationship quality, albeit indirectly via a decrease in anxious attachment and an increase in the adaptive interpersonal perception tendency of normative emotion perceptions (for a more in-depth discussion of indirect effects in the absence of total effects, see the General Discussion).

Given that this study occurred in a lab setting, it is unclear if this pattern of results is limited to such a situation – where someone’s phone is taken away from them – or would also emerge when someone more naturalistically puts their phone away. Indeed, it is possible that the
above effect is more a function of the negative effects of having one’s phone taken away, vs. a benefit to having one’s phone present. To determine whether this pattern of results emerges in a more naturalistic setting, without researcher intervention, we tested the same associations in daily interactions.

**Part 2: Daily Diaries**

**Methods**

**Procedure.** Following the lab portion of the study described above, participants completed five days of daily diary questionnaires assessing their phone use habits, relationship quality, and both self- and perceptions of partner-emotions. This portion of the study was not mandatory; however, participants received an extra $20 if they completed the daily diary questionnaires.

**Participants.** Approximately 90% of the participants who completed the lab portion of the study completed at least one daily-diary questionnaire, resulting in a final sample size of 342 participants ($N_{couple} = 171, M_{age} = 22.95, SD_{age} = 3.86, 156 males, 179 females, 7 other). The average relationship length was 25.29 months ($SD = 26.08$), and the majority of participants were in an exclusive dating relationship (63%), followed by cohabiting (18%), married (6.7%), and long-distance (4.4%).

**Measures.**

**Emotions.** Self- and partner- perceptions of emotion were measured using the same 10-item version of the Positive and Negative Affect Schedule as used in Part 1 (Watson et al., 1988). Participants were asked to “please indicate the extent to which you felt each of the following today” using a 1 (*not at all*) – 7 (*extremely*) scale ($M_{positive} = 4.63, SD_{positive} = 1.21; M_{negative} = 2.40, SD_{negative} = 1.22$). They were then asked to “please indicate the extent to which you think
your partner felt each of the following today” ($M_{positive} = 4.69$, $SD_{positive} = 1.11$; $M_{negative} = 2.46$, $SD_{negative} = 1.21$).

**Daily Relationship Quality.** The same three items as Part 1 were used to assess daily relationship quality in the daily diary portion of this study. Participants rated the extent to which they felt “Positive, happy with their interactions,” ($M = 5.68$, $SD = 1.26$) “Satisfied with their relationship,” ($M = 6.12$, $SD = 1.06$) and “Close to their partner” ($M = 6.19$, $SD = 1.06$). These items were all highly correlated with one another (all $rs > .66$), so these items were combined to form a single “relationship quality” item ($M = 6.01$, $SD = 1.00$, $\alpha = .87$)

**Phone Presence.** Participants were asked to indicate the extent to which they “had their phone or other device out or visible” during any in-person interactions they had with their partner, using a 1 (not at all) to 7 (most of the time) scale ($M = 3.77$, $SD = 1.80$)8.

**Attention.** Self-reported attention was measured with the same item as Part 1. Specifically, participants were asked to what extent they felt attentive throughout the day ($M = 4.84$, $SD = 1.35$) using a 1 (not at all) to 7 (extremely) scale.

**Attachment.** Using the same items as Part 1, participants were asked to what extent they felt “secure” ($M = 5.59$, $SD = 1.22$), “anxious” ($M = 2.25$, $SD = 1.45$), and “avoidant (e.g., distant, closed off)” ($M = 1.99$, $SD = 1.34$) in their relationship or interactions with their romantic partner that day.

**Data Analytic Procedure.** We used the same Social Accuracy Model outlined in Part 1 to measure emotion accuracy. In this model, phone presence was examined as both a between-

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8 Given that the extent to which people have their phones present when with their romantic partners may be a result of how much time they are able to spend together in-person, we also controlled for the extent to which couples interacted in-person in additional analyses. Participants indicated the extent to which they interacted with their partner in-person using the same 1 (not at all) to 7 (most of the time) scale ($M = 4.96$, $SD = 2.32$). All results hold when controlling for in-person interactions.
person and within-person variable, thus allowing us to examine whether having a phone out more than other people on average across days (between-person) and having a phone out more than one normally does on a given day (within-person) relates to relationship quality and emotion accuracy and bias. We focus on the within-person effects in the current analyses, as those are more directly linked to our research question, but the results for the between-person effects can be found in the supplemental materials.

Equation 3a:

\[ Y_{ij} = \beta_{0i} + \beta_{1i} \text{PartnerSelfReport}_{ij} + \beta_{2i} \text{MeanSelfReport}_{ij} + \beta_{3i} \text{SelfReport}_{ij} + e_{ij} \]

\[ \beta_{1i} = \gamma_{10} + \gamma_{11} \text{PhoneWithin}_{i} + \gamma_{12} \text{PhoneBetween}_{i} + U_{1i} \]

\[ \beta_{2i} = \gamma_{20} + \gamma_{21} \text{PhoneWithin}_{i} + \gamma_{22} \text{PhoneBetween}_{i} + U_{2i} \]

\[ \beta_{3i} = \gamma_{30} + \gamma_{31} \text{PhoneWithin}_{i} + \gamma_{32} \text{PhoneBetween}_{i} + U_{3i} \]

Just as in Part 1, phone presence was added as a moderator of the distinctive accuracy (\( \gamma_{11}, \gamma_{12} \)), normativity (\( \gamma_{21}, \gamma_{22} \)), and assumed similarity (\( \gamma_{31}, \gamma_{32} \)) slopes. Positive interactions would therefore indicate that greater phone presence was related to greater distinctive accuracy, normativity, or assumed similarity. Daily relationship quality was then added as an additional predictor of each slope to determine whether distinctive accuracy, normativity, or distinctive assumed similarity significantly predicted daily relationship quality above and beyond the effects of phone presence (see equation 3b).

Equation 3b:

\[ \beta_{1i} = \gamma_{10} + \gamma_{11} \text{PhoneWithin}_{i} + \gamma_{12} \text{PhoneBetween}_{i} + \gamma_{13} \text{RelationshipQuality}_{i} + U_{1i} \]

\[ \beta_{2i} = \gamma_{20} + \gamma_{21} \text{PhoneWithin}_{i} + \gamma_{22} \text{PhoneBetween}_{i} + \gamma_{23} \text{RelationshipQuality}_{i} + U_{2i} \]

\[ \beta_{3i} = \gamma_{30} + \gamma_{31} \text{PhoneWithin}_{i} + \gamma_{32} \text{PhoneBetween}_{i} + \gamma_{33} \text{RelationshipQuality}_{i} + U_{3i} \]
A multilevel regression model with phone presence as a predictor was used to examine how phone presence relates to daily relationship quality using the following equations.

Equation 4:

\[
\text{RelationshipQuality}_j = \beta_{0i} + \beta_{1i}\text{PhoneWithin}_i + \beta_{2i}\text{PhoneBetween}_i + e_j
\]

\[
\beta_{0i} = \gamma_{00} + U_{0i}
\]

Here, \(\beta_{1i}\) represents whether participant \(i\)’s daily relationship quality was predicted by within-person variation of participant \(i\)’s phone presence. In other words, does participant \(i\)’s daily relationship quality differ on days when participant \(i\) had their phone out more or less than they normally do? \(\beta_{2i}\) represents the relationship between participant \(i\)’s daily relationship quality and between-person variation of phone presence. That is, does participant \(i\)’s daily relationship quality differ if participant \(i\) has their phone out more than other people in the study? Phone presence was allowed to vary by participant.

Finally, we saved out the empirical bayes estimates of dyadic distinctive accuracy, normative accuracy, and distinctive assumed similarity scores to assess the indirect effects of participant phone presence on daily relationship quality. Just as in Part 1, the parameters for direct effects were estimated using maximum likelihood and the confidence intervals of the indirect effects were estimated using bias-corrected bootstrapping of 1000 samples.

Results

**Phone Presence and Emotion Accuracy and Bias.** Was the presence of a phone significantly associated with emotion accuracy and bias? We found that perceiver phone presence was not significantly associated with distinctive nor normative emotion accuracy (all ps > .15; see Table 1). However, perceiver within-person phone presence was significantly positively associated with distinctive assumed similarity (\(b = .02, z = 3.62, p = .0003\))
Specifically, on days when participants had their phones out more than they normally do, participants viewed their partners as experiencing a more similar profile of emotions to the self.

**Emotion Accuracy and Bias and Daily Relationship Quality.** Both perceiver normativity ($b = .11, z = 6.03, p < .0001$; see Table 2) and distinctive assumed similarity ($b = .06, z = 5.22, p < .0001$) were significantly positively associated with daily relationship quality, even after controlling for perceiver phone presence. However, perceiver distinctive emotion accuracy was not significantly associated with within-person daily relationship quality (perceiver ($b = .02, z = 1.43, p = .15$).

**Phone Presence and Daily Relationship Quality.** How does the presence of a phone during in-person interactions with a romantic partner relate to daily relationship quality? Perceiver phone presence was not significantly associated with daily relationship quality ($b = -.01, z = -0.51, p = .61$; see Table 3). That is, the extent to which the participant had their phone out during in-person interactions with their partner did not significantly relate to their reported daily relationship quality.

**Mediating Role of Emotion Accuracy.** Given these associations, we examined whether the associations between phone presence, distinctive assumed similarity, and daily relationship quality were consistent with a mediating role for distinctive assumed similarity. Indeed, as with Part 1, although the direct associations between phone presence and daily relationship quality were not significant, there could be an indirect effect via assumed similarity. Specifically, we examined the indirect effect of distinctive assumed similarity in the relationship between perceiver phone presence and relationship quality. Neither phone presence nor distinctive assumed similarity were experimentally manipulated. As such, the estimates of the indirect effect may be subject to bias, as discussed in the general discussion.
We found evidence for a significant indirect effect of within-person perceiver phone presence and daily relationship quality via distinctive assumed similarity ($b = .01$, $z = 2.79$, $p = .005$, $ab_{fs} = .01$, 95%CI [.003, .023]; see Figure 2). Specifically, on days when participants had their phones out more than they normally do, they saw their partners with significantly higher levels of assumed similarity which, in turn, was associated with greater daily relationship quality.

**Figure 2.** The relationship between perceiver within-person phone presence and relationship quality via distinctive assumed similarity

**Additional Analyses: Possible Mechanisms.** Just as in Part 1, we conducted exploratory analyses to examine what processes might underpin this link between phone presence and assumed similarity. Specifically, might phone presence in daily life reduce attention, in turn enhancing reliance on self-information when perceiving one’s partner’s emotions? Or, as in the lab, does phone presence in daily life serve as a positive attachment item, promoting the positive interpersonal perception tendency of assumed similarity?
The role of attention. Perceiver phone presence did not significantly predict levels of self-reported attention ($b = .01, z = 0.40, p = .69$). That is, participants did not report being more attentive on days when they had their phones out more than they usually do compared to days when they had their phones out less.

Perceiver attentiveness significantly negatively predicted distinctive emotion accuracy ($b = -.02, z = -2.30, p = .02$), although it significantly positively predicted both normativity ($b = .03, z = 2.20, p = .03$) and distinctive assumed similarity ($b = .05, z = 6.14, p < .0001$). In other words, on days when participants reported being more attentive, they saw their partners less in line with their unique affective profiles, but more in line with the average, socially desirable affective profile and as having a similar affective profile to oneself.

Finally, perceiver attentiveness significantly positively predicted daily relationship quality, even after controlling for phone presence ($b = .18, z = 6.18, p < .0001$). In other words, on days when participants were more attentive than they usually were, they reported significantly higher levels of relationship quality.

Given that phone presence was not significantly associated with perceiver attentiveness, we did not examine sequential mediation with attention and distinctive assumed similarity in the relationship between phone presence and daily relationship quality.

The role of attachment. Perceiver phone presence did not significantly predict secure ($b = .05, z = 1.73, p = .09$), anxious ($b = .00, z = 0.11, p = .91$), nor avoidant ($b = -.01, z = -0.41, p = .68$) attachment. That is, people did not report significantly different levels of secure, anxious, or avoidant attachment on days when they had their phones out more often compared to days when they had their phones out less often.
None of the attachment indicators were significantly associated with distinctive emotion accuracy (all \( p > .15 \)). Secure attachment was marginally positively associated with normativity (\( b = .03, z = 1.90, p = .06 \)), whereas both anxious (\( b = -.03, z = -2.85, p = .004 \)) and avoidant (\( b = -.04, z = -3.53, p = .0004 \)) attachment were significantly negatively associated with normativity. Finally, all of the attachment indicators were significantly positively associated with distinctive assumed similarity (all \( p < .001 \)).

Finally, secure attachment was significantly positively associated with daily relationship quality (\( b = .39, z = 12.49, p < .0001 \)), whereas both anxious (\( b = -.24, z = -8.66, p < .0001 \)) and avoidant (\( b = -.33, z = 12.16, p < .0001 \)) attachment were significantly negatively associated with relationship quality, even after controlling for phone presence.

Although all of the attachment indicators were significantly associated with distinctive assumed similarity and daily relationship quality, phone presence did not significantly predict any of the attachment indicators. Therefore, we did not examine the sequential mediating effects of attachment and distinctive assumed similarity on the relationship between phone presence and daily relationship quality.

**Discussion**

Taken together, it appears that assumed similarity plays a significant role in the relationship between phone presence and daily relationship quality. That is, on days when participants had their phones out more than they normally do, they saw their partners with greater levels of assumed similarity, in turn relating to greater daily relationship quality. Importantly, these associations were significant when examined in relation to people’s own average levels of phone presence, rather than to the average level of phone presence across all participants (see SOM for details on between-person effects). That is, on days when Pete or
Tonya had their phones out more than usual, Pete was likely to see Tonya’s emotions as more similar to his own which, in turn, was linked to Pete feeling more satisfied in his relationship with Tonya. These findings support the results of the lab portion of the study, that phone presence may be beneficial, albeit indirectly, to romantic relationships. Specifically, similar to the potential role of forming normative and positive emotion perceptions in the lab portion of the study, having one’s phone present more than usual in an interaction with one’s partner was associated with seeing one’s partner more in line with how one sees themselves, and in turn enhancing relationship quality.

Unlike Part 1, anxious attachment did not play a significant role in the relationship between phone presence, interpersonal impressions, and relationship quality. One reason this might be is that people may not have been in significantly uncomfortable situations during the daily diary portion of the study, therefore the “digital security blanket” phenomenon may not have been as strong. It is possible that the reduced levels of anxious attachment as a result of having one’s phone present is only apparent during unfamiliar and ambiguous situations, such as in Part 1 whereby participants were in a lab, engaged in a conflict conversation, and were aware that they were being observed. We discuss this in greater detail in the General Discussion.

**General Discussion**

The current two-part study, integrating an in-lab experimental manipulation and naturalistic assessments in daily life, provides evidence that the presence of a cell phone during interactions with one’s partner may result in more adaptive interpersonal perception tendencies, in turn indirectly benefiting relationship quality during that interaction. Specifically, Part 1 demonstrated a causal relationship between the presence of a cell phone and increased normativity, which was in turn linked to greater momentary relationship quality. Furthermore,
anxious attachment played a significant role in this relationship, such that the presence of a phone led to lower levels of anxious attachment which, in turn, predicted greater normativity and momentary relationship quality. In Part 2, we found that the presence of a cell phone in naturalistic interactions with romantic partners was associated with greater assumed similarity, and that cell phone presence indirectly related to greater daily relationship quality via assumed similarity, although anxious attachment did not play a significant role in this relationship.

**Phone Presence and Bias**

Why was cell phone presence related to both normativity and assumed similarity? Although distinct interpersonal perception tendencies, similar processes could underlie both associations. Specifically, the presence of a cell phone, either one’s own or one’s partner’s, could be a source of distraction that leads people to rely more on pre-existing knowledge sources, such as normative knowledge of how people typically feel or their own self-experiences. It is unclear why the source of information that people relied upon differed in the two settings. It could be that the novelty of the lab setting led people to rely more on the normative profile – how people in general typically behave – rather than their own emotions, if they were uncertain whether their own emotions were typical in this situation. In other words, people may have perceived their own emotional experiences to be a less reliable benchmark to base inferences of their partners’ emotions within a lab setting. As a result, people may have relied more on the normative affective profile to infer what their partner was feeling while in the lab setting. In contrast, the naturalistic environment of Part 2 may not have produced such feelings of unfamiliarity, thus allowing people to rely more on their own affective profiles to infer their partner’s emotions. Indeed, there is evidence to support the idea that romantic partners share similar emotional experiences (Gonzaga, Campos, & Bradbury, 2007). Thus, reliance on self-knowledge to infer a
partner’s emotions may be an adaptive perceptual heuristic amongst romantic couples, particularly in more familiar situations. That said, perceiver attention was not linked to phone presence in either the lab portion of the study (perceiver and observer reported) or daily diaries (perceiver reported). Thus, attention may not be able to explain the links between phone presence and normativity nor assumed similarity.

Another possibility, which received slightly more support than attention, is that phone presence could serve as a “digital security blanket” that contributes to more positive interpersonal perception tendencies, like normativity, especially in novel or stressful situations. Indeed, in Part 1, those who had their phones present experienced significantly lower levels of anxious attachment compared to those whose phones were taken away, although this same pattern was not found in Part 2. This could be due to the unfamiliar situation in the lab portion of the study, as well as the inclusion of a conflict conversation, which may have elicited some stress for participants, relative to daily life. In other words, phone presence may have buffered against some of the anxiety and stress the lab portion of the study could have elicited, in line with the idea that cell phones may help reduce participants’ negative emotional experiences. In contrast, participants may not have experienced such unfamiliar and uncomfortable situations during the daily diary portion of the study, which may explain why phone presence did not have a direct link with anxious attachment. It therefore remains unclear why phone presence was linked to greater assumed similarity in daily life. It is possible that the presence of a cell phone could still act as a comforting object in daily life without having an obvious impact on anxious attachment. Perhaps other indicators of stress and affect would be able to detect differences when one has their phone present or absent during daily life, or that such links only emerge strongly on more stressful days. Alternatively, a different process could be at play in daily life and for assumed
similarity. Perhaps participants are more likely to put their phones away during more serious or stressful discussions, thus resulting in a negative association between phone presence and assumed similarity in daily life. Overall, then, the presence of a cell phone may have been related to more positive perceptions due to its role in reducing negative emotional experiences, particularly in uncomfortable and unfamiliar situations, or due to the idea that people are less likely to have their phones out in daily life during stressful or serious discussions; however, this finding requires replication and the possible mechanisms in daily life require further examination.

Another – unexamined – possibility is that the presence of a cell phone promotes communication and engagement during the interaction, which in turn facilitates these adaptive interpersonal perception tendencies. The majority of cell phone users report using their phones for reasons that directly pertain to their in-person social gatherings, such as to look up information or to post a photo of the group (Rainie & Zickuhr, 2015). The current study did not prohibit participants from using their devices when with their partners. As such, it is possible that those who were allowed to have their phones with them (Part 1) or who tended to have their phones present more during daily interactions with their partners (Part 2) were actually using them for purposes that facilitated the interaction. Using a cell phone in these ways may increase positive feelings towards the interaction and their partner. Given that social desirability and positivity are highly correlated with more normative impressions (Wood & Furr, 2016), the increased positive feelings may have been reflected by higher levels of normativity. Similarly, assumed similarity tends to be associated with more positive feelings, such as liking (Human & Biesanz, 2011; Heinke & Louis, 2009) and relationship satisfaction (Luo & Snider, 2009; Hendrick, 1981; Levinger & Breedlove, 1966; Acitelli, Douvan, & Veroff, 1993). As such, more
positive feelings towards the interaction may have been reflected by greater assumed similarity. Future research should examine these possibilities to better understand these associations.

**Phone Presence and Accuracy**

Unlike normativity and assumed similarity, the presence of a cell phone was not significantly associated with distinctive emotion accuracy, either in Part 1 or in Part 2. This may be because phone presence did not significantly influence participants’ levels of attention, either when examined with self-reported or observer-rated items. Therefore, it is possible that the manipulation did not influence distinctive accuracy due to the lack of effect on attention. However, it is possible that a stronger manipulation, perhaps by assigning participants to actually use their phones during interactions with their romantic partners, would have more apparent influences on attention and, in turn, distinctive accuracy. Furthermore, such a manipulation might have even stronger effects on attachment which, in turn, might influence accuracy. Assigning participants to actually use their phones during interactions may increase feelings of connection and intimacy (Plant, 2000), in they do so in a way that facilitates the interaction, thereby increasing positive feelings about one another during the interaction and increasing distinctive accuracy (Human & Biesanz, 2011; Human et al., 2020; Zimmerman et al., 2018; but see Wessels et al., 2020). Another possibility is that participants in this study already have a strong understanding of their partner’s unique affective profiles, or find this to be an easy task, even with distractions. Indeed, the participants in the current study demonstrated significantly high levels of distinctive accuracy, indicating that they were able to accurately perceive their partners’ unique profile of emotions. Furthermore, research supports the idea that emotion accuracy increases as the level of acquaintanceship increases (Stinson & Ickes, 1992; Gesn, 1995). As such, the presence or absence of a cell phone may not significantly affect people’s
abilities to infer their partner’s unique affective profiles above and beyond the levels of distinctive accuracy they experience in their everyday lives.

**The Mediating Role of Emotion Perceptions on Relationship Quality**

Despite the inconsistencies in which type of bias phone presence was linked to, in both cases the increase in these interpersonal perception tendencies was in turn indirectly associated with greater relationship quality. Thus, having one’s phone out may actually benefit immediate feelings of relationship quality. These findings are in contrast to much of the previous research showing detrimental effects of cell phone presence on social processes (Kraut et al., 1998; Nie, Hillygus, & Erbing, 2002; Kushlev & Leitao, 2020; Roberts & David, 2016; Gergen, 2002; McDaniel & Coyne, 2016; Przybylski & Weinstein, 2013; Misra et al., 2016; Dwyer et al. 2018). This could perhaps be because of the nature and sample of our study. For example, Dwyer and colleagues (2018) found that having a cell phone present during a meal reduced enjoyment of the meal. However, the participants in that study were friends or family members, unlike the present study which examined exclusive romantic couples. Perhaps the presence of a cell phone has different effects on different types of relationships, given that expectations and preferences differ depending on the type of relationship (Fuhrman, Flannagan, & Matamoros, 2009; Argyle & Henderson, 1985; Baxter, Dun, & Sahistein, 2001; Sprecher & Regan, 2002). Indeed, although prior research has found negative effects of phone presence among romantic partners (Roberts & David, 2016), it is possible that even since those studies, norms surrounding the use of phones in the presence of others has already shifted to be more common and acceptable. Thus, the more phones become integrated into our lives, the less problematic they may become.

Why would we observe a significant indirect effect in the absence of a significant total effect? It is possible that opposing mechanisms may be causing the absence of a total effect of
cell phone presence on relationship outcomes. For example, while cell phone presence is related to seeing one’s partner more normatively and, in turn, greater relationship quality (as shown in the present study), previous research has also found that phone presence is related to greater conflict and, in turn, lower relationship quality (Roberts & David, 2016). The two mediators (i.e., normative impressions and conflict) have opposing influences on relationship quality and may effectively cancel each other out, thus resulting in what appears to be a non-significant total effect of cell phone presence on relationship quality. While establishing a significant total effect has been regarded as a critical step in establishing mediation (Baron & Kenny, 1986), researchers have more recently argued that indirect effects in the absence of significant total effects are of significant interest (Rucker, Preacher, Tormala, & Petty, 2011).

While the results from the present study are consistent with a pattern of mediation, they should be interpreted with caution. The present study did not manipulate levels of emotion perceptions, attention, or attachment. As such, we cannot claim that higher levels of normativity, assumed similarity, or anxious attachment cause changes in levels of relationship quality. Although a strength of this study, particularly in Part 1, was that phone presence was experimentally manipulated, we cannot confirm a causal pathway between our mediators and relationship quality, as there may be unobserved confounds that may influence the associations between perceptual biases, anxious attachment, and relationship quality. For example, mood and fatigue are associated with perceptions (Forgas & Bower, 1987; Webster, Richter, & Kruglanski, 1996), anxious attachment (Jinyao et al., 2012; Wei, Russel, Mallinckrodt, & Zakalik, 2004), and relationship quality (Demir, 2008; Troxel, Robles, Hall, & Buysse, 2007). The covariance in perceptual biases, anxious attachment, and relationship quality that is accounted for by these unobserved confounding variables may result in an inflated association between these constructs.
(Rohrer, 2018; Bullock et al., 2010). Future studies should therefore experimentally manipulate levels of emotion accuracy and bias as well as anxious attachment to strengthen a causal claim for the hypothesized pathway.

**Implications for Interpersonal Perception Research: Beyond Phone Presence**

Beyond the examination of how phone presence was linked to emotion perceptions, other findings in this study have more general relevance to interpersonal perception research, replicating and extending prior findings. First, this study presents novel findings about how state attachment predicts emotion accuracy and bias. Specifically, secure attachment was positively associated with emotion accuracy and bias, whereas both anxious and avoidant attachment were negatively associated with emotion accuracy and bias. One possible explanation for this is that those with higher levels of secure attachment experience more positive interactions with their romantic partners. Previous research has found secure attachment to be associated with more positive relationship outcomes, such as increased feelings of trust (Feeney & Noller, 1990) and more positive feelings about the relationship (Pietromonaco & Carnelley, 1994), whereas insecure attachment is associated with more negative relationship outcomes, such as avoidance of intimacy and a tendency for neurotic (rather than companionate) love (Feeney & Noller, 1990) as well as greater anxiety and jealousy within the relationship (Pietromonaco & Carnelley, 1994). It is possible that those with secure attachment experience more positive feelings within their interaction, thus contributing to higher levels of accuracy and adaptive perceptual biases. In contrast, those with anxious or avoidant attachment styles may have more negative relationship experiences, thus contributing to lower levels of emotion accuracy and bias. Future research should examine this more closely.
Additionally, this study supports previous work on the relationship between attention and emotion accuracy and bias. Previous research supports the idea that attention is an essential process in forming accurate (Funder, 1995; Capozzi, Human, & Ristic, 2020; Human, Biesanz, Finseth, Pierce, & Le, 2014) and positive (Human, Biesanz, Parisotto, & Dunn, 2012; Lorenzo, Biesanz, & Human 2010) impressions of others. The present study supports the idea that attention is associated with more positive interpersonal impressions, as indicated by greater normativity and greater distinctive assumed similarity, both in the lab and in daily life. Unlike previous research, however, attention did not significantly predict distinctive accuracy in the lab, and actually predicted lower levels of distinctive accuracy in daily life. It is unclear why these patterns did not emerge in line with previous research. However, attention was measured with a single self-report item in daily life, so may not be highly reliable, and the item “attentive” may not have captured “objective” attention as much as a more positively tinged indicator of being engaged with or attentive towards one’s partner. Although positive experiences such as liking have been linked to greater distinctive accuracy (e.g., Zimmerman et al., 2018), other work has found negative associations, especially when controlling for how well perceivers know the target (Wessels et al., 2020). Thus, this negative association between attention and distinctive accuracy and should be interpreted with caution.

Finally, the present study supports previous work suggesting that more positively-biased perceptions are beneficial to relationships (Letzring, 2015; Murray, Bellavia, Holmes Griffin, & Dolderman, 2002). Specifically, the current study found that greater normativity and distinctive assumed similarity predicted greater relationship quality. Importantly, this study extends prior research by examining these associations both in the lab and in daily life. However, we did not find distinctive accuracy to be associated with relationship quality, either in the lab or in daily
life. Much of the previous research finding emotion accuracy to be associated with relationship benefits has utilized other empathic accuracy paradigms, such as the dyadic interaction or standard stimulus paradigms (Simpson, Oriña, & Ickes, 2003; Simpson et al., 1995; Le, Côté, Stellar, & Impett, 2020). Furthermore, previous research finding accuracy to be associated with relationship quality largely depends on the context (Simspon et al., 1995) and content of the perceived emotions (Simpson et al., 2003). Therefore, the link between accuracy and relationship quality is less consistent.

**Limitations and Future Directions**

This study has several limitations. First, the majority of participants in this study were university-aged students. This age group tends to be the most frequent users of cell phones, although members of other age groups are beginning to use cell phones at similar rates (Pew Research Center, 2021). However, younger people tend to be more attached to their phones and tend to check them more frequently without an explicit reason for doing so (e.g. an alert or notification; Smith, 2012), thus indicating that normative phone use may differ amongst different age groups. As such, it is important to examine how these associations play out amongst those of other demographics. If phone use is less normative in other groups, it may have more negative effects on interpersonal perceptions.

Similarly, the majority of couples reported that they were in an exclusive dating relationship, but it is important to examine these associations in other types of relationships, such as friendships and new acquaintances. Previous research has shown that cell phone use tends to differ between romantic relationships and friendships, such that people are more likely to adhere to internal norms of phone use within romantic relationships (Hall, Baym, & Miltner, 2014). Therefore, those within romantic relationships might use their cell phones more similarly
compared to friendships. As such, it is possible that the effects of cell phone presence on relationship quality and perception tendencies would be less positive when examined within friendships context if more violations of internal normative cell phone use occur (e.g., one friend has their phone out more frequently than the other). On the other hand, it is also possible that these associations would be less positive within romantic relationships compared to friendships, given that people tend to have higher expectations surrounding closeness, companionship, and positivity for romantic partners than for friends (Fuhrman et al., 2009). In other words, a violation in internal norms of cell phone use may be more influential to emotion perceptions and relationship quality within romantic relationships rather than friendships due to stricter expectations surrounding phone etiquette. Future research should examine whether the influence of cell phones on perceptions and relationship quality differ between relationship types.

Finally, although the naturalistic nature of Part 2 of the study was a major strength, it was limited in that it relied on self-reports of the extent to which participants had their phones present during interactions with their partners, thus presenting the possibility of reporting biases. Furthermore, we are unable to examine whether participants simply had their phones present but were not using them versus had their phones present and were using them for some purpose. Previous research has found that having a phone present, even if it is not being used, can have detrimental effects on social experiences (Dwyer et al., 2017). However, it is possible that using one’s phone during interactions with a romantic partner, particularly if the phone use excludes the partner or draws attention away from the conversation, may be related to more negative social experiences. In contrast, phone use that includes one’s romantic partner, such as watching an entertaining video together, may be related to more positive social experiences. Future research should use more objective measures to examine phone presence and how participants
were using their phones in daily life (Müller, Peters, Matz, Wang, & Harari, 2020; Vaid & Harari, 2019; Harari et al., 2020).

**Conclusion**

Overall, this study examined the role that emotion perceptions play in the relationship between phone presence and relationship quality within romantic relationships. Specifically, rather than interfering with in-person interactions, we found evidence that phone presence could indirectly benefit relationship quality via seeing one’s partner’s emotions more positively or as more similar to the self, in the lab and in daily life, respectively. Furthermore, anxious attachment could help to explain the relationship between phone presence and positive emotion perceptions, namely in uncomfortable and ambiguous situations. This study highlights a previously unexplored mechanism by which phone presence may indirectly influence relationship quality and concludes that the presence of a cell phone may actually benefit romantic relationships via the impressions that one forms of a romantic partner’s emotions.
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General Thesis Discussion

The way people choose to communicate has been evolving since the existence of humanity. From smoke signals and carrier pigeons, telegraphs and telephones, and finally texting and social media, there seems to be an ever-expanding system through which people can connect. Is the ever-increasing rise of technology in our daily lives a good thing, helping us to connect with others, hone our social skills, and complement our in-person social interactions and relationships? Or does technology interfere with and displace our higher-quality and more meaningful in-person interactions? These questions are the basis of large debates, both in public opinion and among researchers, although researchers are increasingly recognizing that there is not a simple answer – technology can be both beneficial and detrimental, depending on how it is used. Even so, across three manuscripts examining three different types of technology use in two relationship contexts, the results suggest that these forms of technology use may be at best beneficial and at worst, simply benign. Below, I summarize the main findings from each manuscript, discuss the key themes and implications, and close with a discussion of the strengths, limitations, and future directions of my work.

Summary of Main Findings

In the present research, we examined how various types of technology use relate to social interactions. In Chapter 1, we examined how different forms of trait-level social media use relate to liking amongst new acquaintances. We found that the frequency of which people use certain forms of social media (i.e., Instagram, Snapchat, and passive use) was related to more positive in-person interactions, as indicated by liking others more and being liked more by others. However, other forms of social media use (i.e., Facebook and active use) were unrelated to liking. Given that the most common reason for using technology is to communicate with others
(Whiting & Williams 2013; Wooley, 2013; Subrahmanyam et al., 2008; Smock et al., 2011), we expanded this idea in Chapter 2 to examine how the frequency with which people used different mediums of computer-mediated communication for the express purpose of communicating with their romantic partner was related to individual and relationship correlates. We found that some forms of computer-mediated communication (i.e., texting and social media) were related to more positive individual and relationship experiences, such as greater relationship quality, secure attachment, and positive affect, whereas other forms of computer-mediated communication (i.e., phone calling) were unrelated to such experiences. Given that technology use may be most detrimental when it detracts from in-person social interactions, Chapter 3 utilized both an experimental manipulation and daily diary paradigm to explore how the presence of a cell phone relates to relationship quality within romantic relationships. Surprisingly, we found that the presence of a cell phone was associated with higher levels of relationship quality via increases in adaptive perceptual biases.

Overall, it appears that technology use may actually benefit, or at least it is not harmful to, social interactions, at least when examined in these ways and with these samples. The present program of research contributes to existing literature on digital media by expanding upon the nuanced relationship between technology and social experiences. Specifically, in Chapters 1 and 2, we concurrently examined several forms of technology use (e.g., multiple social media platforms and mobile mediated communication channels), thereby allowing us to make comparisons across different types of technology. Furthermore, in Chapters 2 and 3 we were able to examine both inter- and intra-individual variation in technology use. Finally, in Chapter 3 we were able to establish a causal pathway between phone presence and relationship quality via a
previously-unexplored mechanism (i.e., perceptual bias). We discuss these contributions in more detail below.

**Key Themes and Implications**

**Technology Use: Good or Bad?**

There is a huge debate in the literature about whether technology use is beneficial or detrimental to social interactions, with some studies promoting the idea that technology is good for relationships (Khunou, 2012; Hall et al., 2014; Dienlin et al., 2017; Haythornthwaite, 2005; Vorderer et al., 2016; Waytz & Gray, 2018; Heiberger & Harper, 2008; Kim et al., 2009; Gosling et al., 2011; Kim et al., 2016; Clark et al., 2018) and others supporting the idea that technology is bad for relationships (Allen, 2019; Drago, 2015; Geladi, 2018; Iacovelli & Valenti, 2009; Milani et al., 2009; Liu & Kuo, 2007; Caplan 2006; Kim et al., 2009; Burke et al., 2010; Krasnova et al., 2013; Verduyn et al., 2015; Vogel et al., 2015). The present thesis helps to shed light on this plethora of divergent findings by demonstrating that it is not technology as a whole that is good or bad for society, but rather the way in which we use technology that will determine whether or not we reap the benefits. That said, in no study did we find strong evidence that technology use has major negative consequences for social interactions, suggesting that, perhaps as technology use becomes more integrated and normative it is becoming less problematic than earlier work may have indicated.

**Socially-Oriented Technology Use.** In line with several theories discussed earlier, it is possible that more social uses of technology relate to more positive social experiences (Waytz & Gray, 2018, Clark et al., 2017). In Chapter 1, we found that Instagram, Snapchat, and passive social media use were associated with greater liking within a new acquaintance context. Previous research has found that Instagram and Snapchat are used for more social-interaction purposes as
compared to Facebook (Alhabash & Ma, 2017). Furthermore, “Click Like” was associated with passive social media use, and previous research has shown that the “Like” button on Facebook is used for a variety of social purposes including dating efforts, conversation regulation, and maintaining social ties (Eranti & Lonkila, 2015). In Chapter 2, we found that texting was the most consistent computer-mediated communication channel that was related to positive individual and relationship experiences, and one of the strongest motivations behind texting is to express affection to others (Jin & Park, 2010). Finally, in Chapter 3, we found that having one’s phone present was related to greater relationship quality via adaptive perceptual biases. It is possible that those who had their phones present during interactions with their romantic partner felt more at ease (Hunter, 2017) or were using their phones to contribute to the interaction, perhaps by looking up information that pertained to the discussion or to share interesting content with their partner. In all of these studies, the technology indicators that were related to more positive social experiences tended to be the types of technology that could be used for social purposes and to complement in-person social interactions. Future research should examine the motivation behind technology use as a potential mechanism to explain the relationship between technology use and social experiences.

**Possible Mechanisms.** Related to this idea, the present thesis builds upon existing literature by examining previously-unexplored mechanisms that could help to explain the relationship between technology use and social experiences. In Chapter 3, we found that perceptual biases, as indicated by normativity (Part 1) and distinctive assumed similarity (Part 2), mediated the effect of phone presence on relationship quality. In other words, the presence of a mobile phone increased adaptive perceptual biases which, in turn, was related to greater levels of relationship quality. Furthermore, we found that the relationship between phone presence and
normativity was mediated by lower levels of anxious attachment, but not by different levels of attention. That is, the presence of a mobile phone appeared to reduce feelings of anxiety, thus increasing normativity and, in turn, relationship quality. Despite a large amount of research finding that phone presence acts as a large distraction during social interactions (Thornton, Faires, & Robbins, 2014; Dwyer, Kushlev, & Dunn, 2018; Misra et al., 2016; Allred & Crowley, 2017), these findings suggest that an affective process, rather than a cognitive process, may be more influential in driving the relationship between technology use and social experiences. Future research should examine other related mechanisms, such as feelings of intimacy and closeness, that may help to shed further light on these associations.

**Implications**

New technological advancements are being debuted every day, and they show no signs of slowing down. It appears that technology is here to stay. Therefore, we must learn how we can best harness the power of technology to provide optimal benefits to us as individuals and as a society. By understanding when and how technology relates to individual and social experiences, we will be able to maximize the benefits and minimize the costs of using this technology.

**Individual implications.** On the individual level, there is much concern that technology is creating a new era of mental health issues (Twenge, 2014. Twenge & Campbell, 2009). However, the present thesis supports the idea that technology can actually benefit individual experiences if it is used properly. At the very least, technology use might be negligible to individual experiences (Kushlev & Leitao, 2020; Orben & Przybylski, 2019). Specifically, Chapter 1 found that social media was generally positively associated with extraversion and narcissistic admiration, although it was less consistently associated with narcissistic rivalry. Chapter 2 found that texting and social media were related to more positive individual
experiences, including lower levels of insecure attachment and higher levels of positive affect. However, phone calling was unrelated to these individual experiences. Therefore, technology use may actually benefit individuals, or may not relate to their individual experiences at all.

Relationship implications. On the relationship level, many people believe that technology is taking away from social interactions, either by displacing time spent with others or by interfering with social interactions (Kushlev & Leitao, 2020; Przybylski & Weinstein, 2013; Misra et al., 2016). Using one’s phone at the expense of paying attention to one’s partner may relate to more negative social experiences (Roberts & David, 2016). However, as the present thesis suggests, technology may complement social interactions by allowing greater opportunity to maintain contact with others and by potentially providing a source of comfort and contributing information to the interactions that may otherwise not be available. Chapter 1 found that certain forms of technology use, namely Instagram, Snapchat, and passive social media use were related to more positive initial interactions with others, whereas other forms of use, namely Facebook and active use, were not related to such interactions. In line with the reinforcement hypothesis, it is possible that more adaptive forms of social media use may indicate or hone social skills that transfer to in-person interactions. Chapter 2 found that texting and social media tended to be associated with more positive relationship experiences, such as higher levels of relationship quality, whereas phone calling was not associated with relationship quality. In line with the individual experiences, the present thesis suggests that technology use is beneficial, or at least not detrimental, to social experiences with others. If we can better understand the circumstances under which technology use is beneficial, we can learn to use technology in a way that maximizes the benefits and minimizes the costs, both for individuals and relationships.

Strengths of the Present Research
Multiple Forms of Technology Use

The majority of research examining technology use has focused on self-report surveys to measure one specific form of technology. For example, participants may be asked to estimate the number of texts sent or received (Luo, 2014) or to complete a questionnaire assessing Facebook addiction (Tang, Chen, Yang, Chung, & Lee, 2016). However, little research has examined various forms of technology use within the same study, thus allowing for comparison across different types of use (but see Sutcliffe, Binder, & Dunbar, 2018). With the present package of studies in this thesis, we demonstrated the importance of concurrently examining several forms of technology use. Both in Chapters 2 and 3, we found that different types of technology use relate to differences in social experiences. Importantly, we were able to directly compare how these forms of technology use relate to social interactions. By concurrently examining several forms of technology use, we were able to explain some of the divergent findings in previous literature, such that some forms of technology use are related to more positive social interactions, whereas other might be unrelated to social experiences. Future research should continue to look at various forms of technology use to better understand its relation to social experiences.

Importantly, given the popularity and motives behind using different technologies changes constantly, it may be difficult to apply to findings from one period to another (Alhabash & Ma 2017; Scherr & Wang, 2021).

In-The-Moment Assessments of Technology Use

Furthermore, much of the previous research using self-reports has asked participants to recall how they used technology in general throughout their lives (Moore & McElroy, 2012; Lepp, Barkley, & Karpinski, 2015; Annisette & Lafreniere, 2017). However, people are very poor at estimating their levels of technology use (Andrews, Ellis, Shaw, & Piwek, 2015; Hodes,
Thus, Chapters 3 and 4 (Part 2) attempt to resolve this issue by using more in-the-moment assessments of technology use. By asking participants to recall how often they used technology each day, rather than asking them to recall their general habits over time, we are able to get a closer look at the nuanced ways in which people use their technology and begin to circumvent the issue of reporting biases.

**Inter- and Intra-Individual Experiences of Technology Use**

Moreover, the majority of previous research examining technology use has focused on between-person differences. For example, do those who use Facebook more frequently than others experience different levels of empathy and narcissism (Alloway, Runac, Quershi, & Kemp, 2014). However, as demonstrated in the current thesis, people tend to vary in their own average levels of technology use, perhaps by choosing to use different mediums to communicate with their partner on different days (Chapter 3) or by having their phone present more frequently on some days compared to others (Chapter 4). Therefore, the ways in which technology use relates to social experiences may differ both between and within people. The present thesis allows us to parse out the differences in inter- and intra-individual experiences of technology use on social interactions which can contribute to more individualized interventions that will help to maximize the benefits of technology use.

**Experimental and Experience Sampling Design**

Finally, most of the previous research has used cross-sectional designs to examine the relationships between technology use and social experiences. As such, causal pathways could not be reliably established. It is possible that the ways in which people use technology influence social experiences. For example, people who use their phones more during interactions with others may experience lower levels of enjoyment during the interactions. However, it is also

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possible that those who do not enjoy their interactions with others use their mobile phones more as a way of escaping the negative social experience. The present thesis addresses this issue by utilizing an experimental manipulation to more-clearly establish a causal pathway between technology use and social experiences (Chapter 4, Part 1).

**Limitations of Present Research and Future Directions**

*Cross Sectional vs. Experimental Designs*

The majority of the studies presented in this thesis and in previous literature utilized a cross-sectional design to examine the relationship between technology use and social interactions. Furthermore, we were unable to examine cross-lagged associations using the daily-diary data in Chapters 2 and 3 because many participants did not complete all of the daily-diary questionnaires over the course of the five-day period. As such, we could not parse out the directionality of these associations. This thesis, and much past literature, is framed around the idea that technology use influences social interactions, but it is possible that the quality of social interactions influences the extent and ways in which people use technology. For example, as suggested in this thesis, it is possible certain types of technology use (i.e., texting and social media) lead to increases in relationship quality when they are used to interact with one’s romantic partner. However, it is also possible that those with higher levels of relationship quality interact more frequently via these channels. Future research should utilize experimental, experience sampling, and longitudinal techniques to better parse out the directionality of these associations. For example, one could implement an intensive experience-sampling paradigm to examine whether assigning participants to either a) use technology solely for interacting with others or b) use technology for more self-focused purposes is related to individual and relationship correlates over the course of several weeks. A design such as this would provide
important insight into the directionality of the association between technology use and social experiences while at the same time expanding research on the within-person effects of technology use.

Sample Homogeneity

The vast majority of participants in these studies were university-aged students. Although people of different age groups are beginning to use technology in similar ways (Perrin & Anderson, 2019), there is still evidence to suggest that university-aged students are the most dependent on their smartphones (Pew Research Center, 2021). Furthermore, the differences in the ways those of different age groups use technology vary depending on the type of technology being discussed. For example, no fewer than 92% of adults own a cellphone between the ages of 18 and 65 (Pew Research Center, 2021). When examining social media use, though, those aged 18-29 tend to use social media at a similar rate as those aged 30-49 (84% vs. 81%, respectively), although there is a larger gap between those of other age groups, with approximately 73% of those aged 50-64 using social media and 45% of those aged 65 and older using social media (Perrin & Anderson, 2019). Additionally, the types of social media used by those of different age groups varies substantially. While Facebook and Instagram are used at similar rates for those aged 18-29 (70% vs. 71%, respectively), less than 50% of those aged 30-49 use Instagram, followed by 29% of those aged 50-64, and 13% of those aged 65 and older. Therefore, it is important that we examine the different ways that those of various age groups use technology and how it relates to social experiences.

It is possible that those of older generations do not use technology as much for social purposes as those of younger generations because they did not grow up with technology. In other words, those who grew up without technology might be more comfortable interacting with others
via more “conventional” means (i.e., face-to-face). It is possible that there is a curvilinear relationship between technology use and social experiences, whereby technology use is beneficial for social experiences up to a certain age, at which point technology might be detrimental to social experiences due to the difficulty that those of older age groups have in adapting to new advancements (Kuerbis, Mulliken, Uench, Moore, & Gardner, 2017). Overall, it is essential that we examine the relationship between technology use and social interactions amongst those of other age groups to better understand the broader impact that the technological era has on our social experiences.

**Subjective vs. Objective Measures of Technology Use**

Finally, each of the studies presented in this thesis included self-report measures to assess technology use. As mentioned previously, people tend to be inaccurate when reporting their levels of technology use (Andrews, Ellis, Shaw, & Piwek, 2015; Hodes, & Thomas, 2021), such that those who use technology more frequently tend to underestimate their use while those who use technology less frequently tend to overestimate their use (Timotijevic, Barnett, Shepherd, & Senior, 2008). There are many factors that might influence inaccurate recollections of technology use, such as the time reference for which one is being asked to recall their use (Timotijevic et al., 2008), the context of the recall prompt (Timotijevic et al., 2008), and self-report bias (Young, 2012; de Reuver & Bouwman, 2015). As such, future research should utilize more objective measures of technology use, perhaps by using phone-tracking apps, to better understand the ways in which people actually use these devices.

Beyond gathering more accurate representations of people’s technology use, using phone-tracking apps (Müller, Peters, Matz, Wang, & Harari, 2020; Vaid & Harari, 2019; Harari et al., 2020) would provide an interesting opportunity to examine whether perceived technology use
use and *actual* technology use relate to differences in individual and social experiences. For example, if one *thinks* that they frequently text their romantic partner, would they experience higher levels of relationship quality, regardless of the extent to which they actually text their romantic partner? Or would people *actually* have to text their romantic partner more frequently in order to reap those potential benefits? Future research should examine this possibility.

**Conclusion**

It is truly remarkable how technological advancements have given us the opportunity to connect with others like never before. With each new roll-out, communication with others becomes easier and easier. But before running to get in line for the new iPhone release or jumping on the new social media craze, we must take a step back to understand how this technology is influencing us, both on an individual and relationship level.

The present thesis supports the idea that technology use does, indeed, relate to our social experiences, both with new acquaintances and within romantic relationships, in what appears to be primarily positive ways. Importantly, though, the way in which we use this technology will determine the valence of our social experiences. First, I demonstrated that the general ways in which we use social media in our own, personal lives can relate to more positive interactions with others who we meet for the first time, regardless of whether we are using the technology in-the-moment. I then expanded upon this by demonstrating that using technology for the express purpose of interacting with a romantic partner can relate to individual and relationship benefits. Finally, I demonstrated how perceptual biases are an important process that might enable the mere presence of a phone and to benefit state relationship quality.
In sum, technology use may not be as bad as is commonly thought. However, we must be aware of how we are using these powerful devices, and use them responsibly to maximize the benefits for ourselves and our relationships.
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Appendix: Supplemental Online Materials
Chapter 1 Supplementary Online Materials for
Social Media Predicts Greater Liking in In-Person Initial Interactions

**Measures**

**Frequency of social media use.** Participants were asked “How often do you use [social media site]”, using a 1 (never) – 10 (all the time) scale (Rosen, Whaling Carrier, Cheever, & Rokkum, 2013). Participants completed this item about their Facebook, Instagram, Snapchat, Twitter, and Dating Sites use. Twitter and Dating Sites were used very infrequently ($M_{Twitter} = 2.09$, $SD_{Twitter} = 2.05$; $M_{Dating} = 1.62$, $SD_{Dating} = 1.40$), thus they were removed from the analyses. Of note, all three frequency measures were moderately negatively skewed (Facebook = -1.02; Instagram = -0.80; Snapchat = -0.52), and Facebook was leptokurtic (Facebook = 5.63; Instagram = 2.54; Snapchat = 1.99).9

<table>
<thead>
<tr>
<th>1 Never</th>
<th>2 Once a month</th>
<th>3 Several times a month</th>
<th>4 Once a week</th>
<th>5 Several times a week</th>
<th>6 Once a day</th>
<th>7 Several times a day</th>
<th>8 Once an hour</th>
<th>9 Several times an hour</th>
<th>10 All the Time</th>
</tr>
</thead>
</table>

**Active and passive social media use.** Participants were asked “How often do you do each of the following activities on the social networking sites that you most commonly use?” Participants saw items including “Check your News Feed or homepage for updates”, “Post status updates”, “Post photos”, “Browse profiles and photos”, “Read postings”, “Comment on postings, status updates, photos, etc.”, and “Click ‘Like’ to a posting, photo, etc.” using the same 1 (never) to 10 (all the time) scale described above. An exploratory factor analysis yielded two distinct items from these variables: active social media use and passive social media use (see description of Factor Analysis below). Active social media use was highly positively skewed (2.09) whereas

9 After transforming the moderately and severely skewed variables, the associations between social media use and both perceiver and target variance of liking remained the same.
passive social media use was symmetrical (-0.28), and both active and passive social media use were leptokurtic (Active = 9.40; Passive = 3.85).

**Social network size.** Participants were asked to indicate the size of their online social networks using two items. First, participants were asked the extent to which they agree with the statement “I have a lot of friends on Facebook” using a 1 (disagree strongly) to 7 (agree strongly) scale.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree strongly</td>
<td>Disagree</td>
<td>Disagree a little</td>
<td>Neutral</td>
<td>Agree a little</td>
<td>Agree</td>
<td>Agree strongly</td>
</tr>
</tbody>
</table>

They were then asked “How many friends do you have on Facebook” using a 1 (0) to 9 (751 or more) scale (Rosen et al., 2013).

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1-50</td>
<td>51-100</td>
<td>101-175</td>
<td>176-250</td>
<td>251-375</td>
<td>376-500</td>
<td>501-750</td>
<td>751 or more</td>
</tr>
</tbody>
</table>

An exploratory factor analysis showed that these two items loaded on to a single factor (see below). The combined social network size item was moderately negatively skewed (-0.98) and leptokurtic (3.49).

**Factor analysis**

**Social media.** The two items assessing social network size and the seven items to assess the different activities that people engage in on social networking sites were used in an exploratory factor analysis to reduce the number of items. The Kaiser-Meyer-Olkin was .70 which is above the recommended threshold of .6 (Kaiser & Rice, 1974), and the Bartlett’s Test of Sphericity (Bartlett, 1951) reached statistical significance, indicating that the correlations were significantly large enough to undergo exploratory factor analysis.
Both the scree plot and the parallel analysis showed a three-factor extraction method. Not all of the variables were normally distributed, so we chose to use a principal axis factoring method with oblimin rotation. We removed items with factor loadings less than .35 and with item communalities less than .20. The analyses yielded three factors explaining a total of 57% of the variance for the entire set of variables. Factor 1 was labeled “Social Network” and is comprised of the items that reference the size of peoples’ social networks (i.e. Amount and Number of Facebook friends). Factor 2 was labeled “Active Social Media” and is comprised of those social media activities which require a more active role (i.e. Post photos and statuses). Finally, Factor 3 was labeled “Passive Social Media” and is comprised of those social media activities which are more passive (i.e. Click “like”, browse profiles, read postings, check homepage). Each of these factors showed high internal reliability (Social Network $\alpha = .76$; Active $\alpha = .69$; Passive $\alpha = .76$; see Table S1a) and low correlations between the factors (see Table S1b).

Table S1a. Factor Analysis Table for Social Media Use

<table>
<thead>
<tr>
<th></th>
<th>Factor 1: Social Network</th>
<th>Factor 2: Active Social Media</th>
<th>Factor 3: Passive Social Media</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of Friends</td>
<td>.79</td>
<td>.02</td>
<td>-.03</td>
<td>.62</td>
</tr>
<tr>
<td>Number of Friends</td>
<td>.82</td>
<td>-.02</td>
<td>.03</td>
<td>.69</td>
</tr>
<tr>
<td>Post Status</td>
<td>-.11</td>
<td>.53</td>
<td>.06</td>
<td>.29</td>
</tr>
<tr>
<td>Post Photos</td>
<td>.01</td>
<td>1.01</td>
<td>-.01</td>
<td>1.01</td>
</tr>
<tr>
<td>Click Like</td>
<td>.16</td>
<td>.14</td>
<td>.51</td>
<td>.40</td>
</tr>
<tr>
<td>Browse Profiles</td>
<td>.05</td>
<td>.08</td>
<td>.62</td>
<td>.45</td>
</tr>
<tr>
<td>Read Postings</td>
<td>-.12</td>
<td>-.02</td>
<td>.80</td>
<td>.60</td>
</tr>
<tr>
<td>Check Homepage</td>
<td>.14</td>
<td>-.07</td>
<td>.65</td>
<td>.47</td>
</tr>
<tr>
<td>Total Variance</td>
<td>.17</td>
<td>.17</td>
<td>.22</td>
<td></td>
</tr>
<tr>
<td>Cronbach’s alpha</td>
<td>.76</td>
<td>.69</td>
<td>.76</td>
<td></td>
</tr>
</tbody>
</table>

Notes. Extraction method: maximum likelihood; Rotation method: Oblimin with Kaiser normalization. Loadings larger than .35 are in bold.

Table S1b: Factor Correlations for Social Media Use

<table>
<thead>
<tr>
<th></th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notes:</td>
<td></td>
</tr>
</tbody>
</table>
Factor 1: Social Network  
Factor 2: Active Social Media  
Factor 3: Passive Social Media

<table>
<thead>
<tr>
<th></th>
<th>Factor 1: Social Network</th>
<th>Factor 2: Active Social Media</th>
<th>Factor 3: Passive Social Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 2: Active Social Media</td>
<td>.15***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 3: Passive Social Media</td>
<td>.27***</td>
<td>.32***</td>
<td></td>
</tr>
</tbody>
</table>

$r = \text{Pearson’s Correlation Coefficient.} \quad ***p < .001.$

**Liking.** A second factor analysis was run to on the six liking items. The Kaiser-Meyer-Olkin was .91 and the Bartlett’s Test of Sphericity reached statistical significance, therefore indicating that these items are able to undergo exploratory factor analysis. A one-way random-effect model based on single ratings and consistency assessed the inter-rater repeatability. The intra-class correlation coefficient (ICCs) for each liking variable was poor (all ICCs < .05; Giuseppe, 2018), indicating low between-group variability. We therefore ran an exploratory factor analysis at the individual level.

**Table S2a. Intra-Class Correlation Coefficients for Liking**

<table>
<thead>
<tr>
<th></th>
<th>ICC</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like this person</td>
<td>.04</td>
<td>[0.02, 0.05]</td>
</tr>
<tr>
<td>I would like to be friends with this person</td>
<td>.05</td>
<td>[0.03, 0.07]</td>
</tr>
<tr>
<td>I think this person is engaging and interesting</td>
<td>.05</td>
<td>[0.03, 0.07]</td>
</tr>
<tr>
<td>They were easy to get along with</td>
<td>.03</td>
<td>[0.02, 0.04]</td>
</tr>
<tr>
<td>The conversation “flowed” very well</td>
<td>.04</td>
<td>[0.02, 0.06]</td>
</tr>
<tr>
<td>I enjoyed my interaction with them</td>
<td>.04</td>
<td>[0.02, 0.05]</td>
</tr>
</tbody>
</table>

The scree plot showed a two-factor extraction method and the parallel analysis showed a three-factor extraction method. As done in previous factor analyses, we used a principal axis factoring method with oblimin rotation. We removed items with factor loadings less than .35 and
with item communalities less than .20. For simplicity, we chose a two-factor extraction method as described by the scree-plot, explaining a total of 72.00% of the total variance. Factor 1 was labeled “liking,” indicating the extent to which the participants liked one another during the interaction (see Table S2b). Factor 2 was labeled “Engagement” and indicates the extent to which the participants were engaged in the interaction. The factors showed high internal reliability (liking_α = .82, interest_α = .89). However, the factors showed high correlations (see Table S2c). As a result, we combined the two factors to create a single “liking” indicator.

Table S2b. Factor Analysis Table for Liking

<table>
<thead>
<tr>
<th></th>
<th>Factor 1: Liking</th>
<th>Factor 2: Engagement</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like this person</td>
<td>.94</td>
<td>.04</td>
<td>.93</td>
</tr>
<tr>
<td>I would like to be</td>
<td>.49</td>
<td>.33</td>
<td>.60</td>
</tr>
<tr>
<td>friends with this</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>person</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think this person</td>
<td>.18</td>
<td>.61</td>
<td>.58</td>
</tr>
<tr>
<td>is engaging and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>interesting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>They were easy to get</td>
<td>.20</td>
<td>.67</td>
<td>.71</td>
</tr>
<tr>
<td>along with</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The conversation</td>
<td>-.15</td>
<td>.93</td>
<td>.67</td>
</tr>
<tr>
<td>“flowed” very well</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I enjoyed my</td>
<td>.18</td>
<td>.76</td>
<td>.83</td>
</tr>
<tr>
<td>interaction with</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>them</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Variance</td>
<td>.26</td>
<td>.46</td>
<td></td>
</tr>
<tr>
<td>Cronbach’s alpha</td>
<td>.82</td>
<td>.89</td>
<td></td>
</tr>
</tbody>
</table>

Notes. Extraction method: maximum likelihood; Rotation method: Oblimin with Kaiser normalization. Loadings larger than .35 are in bold

Table S2c: Factor Correlations for Liking

<table>
<thead>
<tr>
<th></th>
<th>Factor 1: Liking</th>
<th>Factor 2: Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1: Liking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 2: Engagement</td>
<td>.82***</td>
<td></td>
</tr>
</tbody>
</table>

_ r = Pearson’s Correlation Coefficient. ***p < .001._
The Role of Personality: Agreeableness, Conscientiousness, Neuroticism, and

Openness

To examine whether the other four Big Five personality traits may play a role in the relationships between social media use and both liking others and being liked by others, we examined how each trait was associated with social media use, liking, and if controlling for each altered the associations between social media use and liking.

Agreeableness was significantly positively correlated with Instagram and Snapchat use, as well as with the size of people’s online social networks (all $r > .10$; see Table S3a), although it was not significantly correlated with Facebook frequency, active, nor passive use (all $|r| < .04$). Conscientiousness was not significantly correlated with any of the social media use indicators (all $|r| < .05$). Openness was significantly negatively correlated with Instagram and Snapchat use (all $rs < -.08$), although it was not significantly correlated with the rest of the social media use indicators (all $|rs| < .06$).

Neuroticism was significantly negatively correlated with both Instagram use and passive social media use (all $|rs| < .10$), although it was not significantly correlated with any other social media indicators.

When examining how liking others and being liked by others relate to personality traits, we found that both agreeableness and conscientiousness were significantly positively associated with both liking others (Agreeableness: $r = .31, p < .001$; Conscientiousness: $r = .11, p = .002$) and being liked by others (Agreeableness: $r = .14, p < .001$; Conscientiousness: $r = .11, p = .002$). No other personality traits were significantly correlated with the liking indicators.
Table S3a: Correlations between Social Media Use Indicators and Personality Covariates

<table>
<thead>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facebook</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instagram</td>
<td>.16***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snapchat</td>
<td>.20***</td>
<td>.48***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Network</td>
<td>.46***</td>
<td>.29***</td>
<td>.31***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active Use</td>
<td>.02</td>
<td>.19***</td>
<td></td>
<td>.05</td>
<td></td>
<td>.07†</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passive Use</td>
<td>.35***</td>
<td>.47***</td>
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<td>.10**</td>
<td>.11**</td>
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<td>.04</td>
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<td>-.08*</td>
<td>-.12***</td>
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<td>.11**</td>
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<td>.10**</td>
<td>.09*</td>
<td>.01</td>
<td>.07*</td>
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<td>.03</td>
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<td>Being Liked</td>
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<td>.16***</td>
<td>.20***</td>
<td>-.06</td>
<td>.08*</td>
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<td>.01</td>
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<td>.31***</td>
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$r = $ Pearson’s Correlation Coefficient. ***$p < .001$, **$p < .01$, *$p < .05$, †$p < .10$. 
Liking of Others. All of the associations between social media use and liking of others held after controlling for personality (all $|r_s| > .07$, all $p_s < .04$; see Table S3b).

Being Liked by Others. All of the associations between social media use and being liked by others held after controlling for personality traits (all $|r_s| > .07$, all $p_s < .01$; see Table S3c).

Table S3b: Disattenuated Correlations between Social Media Use and Perceiver Liking Controlling for Personality Traits

<table>
<thead>
<tr>
<th>Liking</th>
<th>$b$ (se)</th>
<th>$z$</th>
<th>95% CI</th>
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</thead>
<tbody>
<tr>
<td>Facebook</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>-.04 (.025)</td>
<td>-1.49</td>
<td>-.05 [-.11, .03]</td>
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<tr>
<td>Agreeableness</td>
<td>-.02 (.023)</td>
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<td>-.02 [-.09, .05]</td>
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<td>Conscientiousness</td>
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<td>-1.05</td>
<td>-.03 [-.09, .05]</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>-.03 (.026)</td>
<td>-1.15</td>
<td>-.03 [-.10, .04]</td>
</tr>
<tr>
<td>Openness</td>
<td>-.03 (.026)</td>
<td>-1.09</td>
<td>-.03 [-.09, .04]</td>
</tr>
<tr>
<td>Admiration</td>
<td>-.03 (.026)</td>
<td>-1.21</td>
<td>-.04 [-.10, .04]</td>
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<tr>
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<td>-.02 (.024)</td>
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<td>-.01 [-.08, .06]</td>
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<tr>
<td>Instagram</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>.04** (.015)</td>
<td>2.89</td>
<td>.05 [.05, .18]</td>
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<td>Agreeableness</td>
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<td>.17 [.07, .21]</td>
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<td>.18 [.08, .11]</td>
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<td>.18 [.08, .22]</td>
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<td>.17 [.07, .21]</td>
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<td>Rivalry</td>
<td>.06*** (.014)</td>
<td>3.99</td>
<td>.20 [.09, .22]</td>
</tr>
<tr>
<td>Snapchat</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Extraversion</td>
<td>.04** (.013)</td>
<td>2.62</td>
<td>.14 [.03, .17]</td>
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<td>.13 [.03, .17]</td>
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<td>.16 [.06, .19]</td>
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<td>.16 [.06, .19]</td>
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<tr>
<td>Rivalry</td>
<td>.04** (.013)</td>
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<td>.16 [.06, .19]</td>
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<td>Social Network Size</td>
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<tr>
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<td>.14 [.04, .18]</td>
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<td>Openness</td>
<td>.07** (.023)</td>
<td>2.96</td>
<td>.14 [.04, .18]</td>
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<td>.17 [.06, .20]</td>
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<td>Active Use</td>
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<tr>
<td>Extraversion</td>
<td>.01 (.030)</td>
<td>0.33</td>
<td>.02 [-.05, .09]</td>
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Table S3c: Disattenuated Correlations between Social Media Use and Target Liking Controlling for Personality Traits

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<tr>
<td></td>
<td>b (se)</td>
<td>z</td>
</tr>
<tr>
<td><strong>Facebook</strong></td>
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<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>.00 (.002)</td>
<td>0.00</td>
</tr>
<tr>
<td>Agreeableness</td>
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<td>Conscientiousness</td>
<td>.02 (.026)</td>
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<td>Openness</td>
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</tr>
<tr>
<td>Admiration</td>
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<td>0.50</td>
</tr>
<tr>
<td>Rivalry</td>
<td>.02 (.025)</td>
<td>0.94</td>
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<tr>
<td><strong>Instagram</strong></td>
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<td></td>
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<tr>
<td>Extraversion</td>
<td>.06*** (.015)</td>
<td>4.28</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>.08*** (.016)</td>
<td>5.05</td>
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<td>Conscientiousness</td>
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<td>Admiration</td>
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</tr>
<tr>
<td>Rivalry</td>
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<td>5.65</td>
</tr>
<tr>
<td><strong>Snapchat</strong></td>
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<tr>
<td>Extraversion</td>
<td>.04*** (.012)</td>
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</tr>
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<td>Agreeableness</td>
<td>.05*** (.013)</td>
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</tr>
<tr>
<td>Conscientiousness</td>
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<td>4.60</td>
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<td>4.52</td>
</tr>
<tr>
<td>Rivalry</td>
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<td>4.60</td>
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Note. r = Pearson’s correlation. 95% confidence intervals for rs are provided. ***p < .001, **p < .01, *p < .05.
<table>
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<th>Active Use</th>
<th>Passive Use</th>
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<td>$b = .04, z = 2.56, p = .01, r = .12, 95% CI [.02, .16]$</td>
<td>$b = .04, z = 1.66, p = .08, r = .08, 95% CI [.00, .14]$</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>$b = .07, z = 2.74, p = .01, r = .13, 95% CI [.04, .17]$</td>
<td>$b = .07, z = 2.89, p = .01, r = .15, 95% CI [.04, .18]$</td>
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<tr>
<td>Conscientiousness</td>
<td>$b = .08, z = 2.93, p = .01, r = .15, 95% CI [.05, .18]$</td>
<td>$b = .08, z = 2.84, p = .01, r = .14, 95% CI [.04, .18]$</td>
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<tr>
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<td>$b = .07, z = 3.31, p = .01, r = .17, 95% CI [.06, .20]$</td>
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</table>

Note. $r =$ Pearson’s correlation. 95\% confidence intervals for $r$s are provided. ***$p < .001$, **$p < .01$, *$p < .05$.

**Instagram and Snapchat**

Given the high correlation between Instagram and Snapchat use ($r = .48$), we ran additional analyses to examine the unique influence of these social networking sites on both liking others and being liked by others. We found that Instagram ($b = .04, z = 2.56, p = .01, r = .12, 95\% CI [.02, .16]$) was more strongly associated with liking others than Snapchat ($b = .02, z = 1.71, p = .09, r = .08, 95\% CI [.00, .13]$). Similarly, Instagram was a stronger predictor of being liked by others ($b = .07, z = 4.30, p < .0001, r = .20, 95\% CI [.09, .23]$) than Snapchat ($b = .02, z = 1.79, p = .07, r = .10, 95\% CI [.01, .15]$). Generally, these associations held after controlling for personality.

**Simultaneous Examination of Perceiver and Target Liking Effects**
Perceiver and target liking effects were significantly positively correlated with one another ($r = .46, p < .0001$). Thus, people who tend to like others more also tend to be better liked. As such, it is possible that liking others and being liked by others may not have independent associations with social media use. We therefore ran additional analyses examining how social media use relates to perceiver liking controlling for target liking and vice versa. We found that when controlling for target liking, none of the social media use indicators were significantly associated with perceiver liking (all $|rs| < .08$, all $ps > .09$). However, when controlling for perceiver liking, the results are similar to those reported in the main manuscript. Instagram ($b = .06, z = 4.47, p < .0001, r = .23, 95\% CI [.11, .245]$), Snapchat ($b = .04, z = 3.53, p = .0004, r = .17, 95\% CI [.07, .20]$), and social network size ($b = .11, z = 4.70, p < .0001, r = .23, 95\% CI [.11, .25]$) were significantly positively correlated with being liked by others, whereas passive social media use was marginally positively associated with being liked by others ($b = .04, z = 1.65, p = .10, r = .09, 95\% CI [.00, .14]$). Neither Facebook use ($b = .03, z = 1.28, p = .20, r = .09, 95\% CI [-.00, .14]$) nor active social media use ($b = -.04, z = -1.15, p = .25, r = -.05, 95\% CI [-.11, .03]$) were significantly associated with being liked by others.

These analyses suggest, then, that social media use is more reliably associated with being liked by others than with liking others. However, given the potential issues with examining partial relationships (Lynam, Hoyle, & Newman, 2006), we continue to report the separate perceiver and target liking effects in the primary manuscript.
References


Measures

In addition to the communication channels described in the present manuscript, we also asked participants to indicate the extent to which they interacted with their romantic partners via email \((M = 1.11, SD = 0.52)\) and video chat \((M = 1.32, SD = 1.06)\) using a 1 (not at all) to 7 (most of the time) scale.

Results

When email and video chat were included in the models, we found that all of the primary associations between the communication channels and individual and relationship correlates remained the same (see Table S1). We therefore only describe the associations between email and video chat with individual and relationship correlates.

**Relationship Quality**

We found that email was significantly negatively associated with relationship quality at both the within \((b = -.16, z = -2.67, p = .01)\) and between \((b = -.29, z = -2.45, p = .01)\) person levels. That is, on days when participants emailed their partners more frequently than usual, or more frequently compared to others in the study, they reported significantly lower levels of relationship quality. Video chat was not significantly associated with relationship quality at either the within \((b = .04, z = 1.41, p = .16)\) or between \((b = .07, z = 1.09, p = .28)\) person levels.

**Attachment**

Email was significantly negatively associated with secure attachment at the between-person level \((b = -.37, z = -2.61, p = .01)\). In other words, those who interacted more frequently
with their romantic partners via email compared to others in the study reported significantly lower levels of secure attachment. In contrast, video chatting was marginally positively associated with secure attachment at the between-person level \((b = .14, z = 1.81, p = .07)\), indicating that video chatting more frequently compared to others in the study was associated with marginally higher levels of relationship quality. Neither email \((b = -.01, z = -0.08, p = .94)\) nor video chat \((b = .01, z = 0.37, p = .71)\) were significantly associated with secure attachment at the within-person level.

Furthermore, neither email nor video chat were significantly associated with anxious (all \(ps > .18\)) or avoidant (all \(ps > .30\)) attachment, although email was marginally positively associated with avoidant attachment at the between-person level \((b = .31, z = 1.94, p = .05)\).

**Affect**

Neither email nor video chat were significantly associated with positive affect at the within or between person levels (all \(ps > .14\)), although video chat was marginally positive associated with positive affect at the within-person level \((b = .05, z = 1.67, p = .09)\). In other words, people reported marginally higher levels of positive affect on days when they reported interacting with their romantic partners more frequently via video chat.

Email was significantly positively associated with negative affect at the within-person level \((b = .19, z = 2.53, p = .01)\), indicating that people reported significantly greater negative affect on days when they reported interacting with their romantic partners more frequently via email. However, email was not significantly associated with negative affect at the between-person level \((b = .03, z = 0.23, p = .82)\). Furthermore, video chat was not significantly associated with negative affect at either the within- \((b = .03, z = 0.93, p = .35)\) or between- \((b = .09, z = 1.11, p = .27)\) person level.
Table 1. Within-Person Associations Between Computer-Mediated Communication Indicators and Individual and Relationship Correlates

<table>
<thead>
<tr>
<th></th>
<th>Relationship Quality</th>
<th>Secure Attachment</th>
<th>Anxious Attachment</th>
<th>Avoidant Attachment</th>
<th>Positive Affect</th>
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<tbody>
<tr>
<td></td>
<td>$b$ (se)</td>
<td>$z$</td>
<td>$d$ [95% CI]</td>
<td>$b$ (se)</td>
<td>$z$</td>
</tr>
<tr>
<td><strong>In-Person</strong></td>
<td>.06*** (.013)</td>
<td>4.24</td>
<td>.28 [.030, .082]</td>
<td>-.00 (.21)</td>
<td>-0.02</td>
</tr>
<tr>
<td><strong>Texting</strong></td>
<td>.05* (.021)</td>
<td>2.45</td>
<td>.16 [.010, .091]</td>
<td>-.04 (.033)</td>
<td>-1.11</td>
</tr>
<tr>
<td><strong>Social Media</strong></td>
<td>.05* (.023)</td>
<td>2.04</td>
<td>.13 [.002, .093]</td>
<td>-.05 (.034)</td>
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<tr>
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<td>-.02 (.024)</td>
<td>-0.78</td>
<td>-.05 [-.064, .028]</td>
<td>.01 (.035)</td>
<td>0.41</td>
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<td><strong>Email</strong></td>
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<td>-2.67</td>
<td>-.17 [-.277, -.043]</td>
<td>.07 (.088)</td>
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<tr>
<td><strong>Video Chat</strong></td>
<td>.04 (.028)</td>
<td>1.41</td>
<td>.09 [-.016, .096]</td>
<td>-.04 (.042)</td>
<td>-1.04</td>
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<tr>
<td><strong>Positive Affect</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>In-Person</strong></td>
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<td>.66 [.124, .183]</td>
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<td>.07 [-.020, .072]</td>
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</tr>
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<td><strong>Social Media</strong></td>
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<td>0.64</td>
<td>.04 [-.035, .069]</td>
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<td>-.03 [-.066, -.039]</td>
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<td><strong>Email</strong></td>
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<td>.01 [-.127, .141]</td>
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<tr>
<td><strong>Video Chat</strong></td>
<td>.05† (.033)</td>
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<td>.11 [-.009, .118]</td>
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<td></td>
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</table>
### Negative Affect

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<th>d [95% CI]</th>
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</thead>
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<td>In-Person</td>
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<td>-.04 [-.044, .021]</td>
</tr>
<tr>
<td>Texting</td>
<td>.03 (.026 )</td>
<td>1.03</td>
<td>.07 [-.024, .077]</td>
</tr>
<tr>
<td>Social Media</td>
<td>-.06 (.029)</td>
<td>-1.91</td>
<td>-.12 [-.0113, .001]</td>
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<td>Phone Calling</td>
<td>.00 (.030 )</td>
<td>0.16</td>
<td>.01 [-.053, .063]</td>
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<td>.19* (.075)</td>
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<td>.16 [.043, .337]</td>
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<td>Video Chat</td>
<td>.03 (.036 )</td>
<td>0.93</td>
<td>.06 [-.037, .103]</td>
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</table>

*Note. b = unstandardized regression coefficient; SE = standard error. d = Cohen’s d effect size estimate. 95% confidence intervals for bs are provided. †p < .10, *p < .05, **p < .01, ***p < .001.*
Chapter 3 Supplementary Online Materials for Phone Presence and Relationship Quality: Examining the Role of Emotion Accuracy and Bias

Part 1

Measures

Video Coding. In Part 1 of the study, participants were video-recorded during their three 10-minute discussions with one another. After the study was complete, a group of trained research assistants watched the videos and completed ratings on a) the extent to which the participants used their phones (in the present condition) or iPads (in the absent condition) during the discussion and b) the extent to which the participants were expressive during the discussion. These ratings were then used to predict momentary emotion accuracy and relationship quality.

Phone Use. Observers completed ratings on seven self-generated items assessing different aspects of phone use. Specifically, the observers completed ratings of the extent to which the participant used ($M = 1.15, SD = 0.60$), looked at ($M = 1.46, SD = 0.78$), played with ($M = 1.13, SD = 0.51$), and touched ($M = 1.44, SD = 0.95$) their phone or iPad using a 1 (not at all) to 7 (very much) scale. They also completed ratings assessing the extent to which the phone or iPad was visible to the participant ($M = 5.04, SD = 2.15$), distracted the participant from the conversation ($M = 1.12, SD = 0.51$), and contributed to the conversation ($M = 1.08, SD = 0.37$) using the same 1 – 7 scale. These items were all highly correlated with one another (all $r$s > .10), so they were combined to form a single “phone use” item ($M = 1.78, SD = 0.60, \alpha = .67$).

Expressivity. Observers completed four items assessing the extent to which participants were expressive during the discussion. Using a 1 (never or almost never true) to 7 (always or almost always true) scale, participants rated the extent to which “this person expresses themselves verbally” ($M = 5.65, SD = 1.00$; Interpersonal Communication Competence Scale;
Rubin & Martin, 1994) and the extent to which “this person appears indifferent” \((M = 1.75, SD = 0.85;\) Emotional Expressivity Scale; Kring, Smith, & Neale, 1994). They also completed two self-generated items to mirror similar aspects of attention, including the extent to which “this person expresses themselves via facial expressions” \((M = 4.85, SD = 1.05)\) and the extent to which “this person expresses themselves via body language” \((M = 3.92, SD = 1.30)\). These items were all highly correlated with one another (all \(|r| > .26\)). However, the combined “expressivity” composite had poor reliability \((\alpha = .18)\). Therefore, these items were assessed separately in the following analyses.

**Results**

**Condition.**

*Condition Predicting Phone Use.* There was no significant difference between those in the present and absent conditions in the extent to which they used their phones or iPads during the discussions \((M_{\text{present}} = 1.78, M_{\text{absent}} = 1.77; t(1032) = -0.25, p = .81)\).

*Condition Predicting Expressivity.* Similarly, there was no significant difference between those in the present and absent conditions in the extent to which they expressed themselves verbally \((M_{\text{present}} = 5.68, M_{\text{absent}} = 5.62; t(1032) = -0.99, p = .32)\), via facial expressions \((M_{\text{present}} = 4.84, M_{\text{absent}} = 4.89; t(1032) = 0.81, p = .42)\), via body language \((M_{\text{present}} = 3.94, M_{\text{absent}} = 3.91; t(1032) = -0.24, p = .81)\), or the extent to which they appeared indifferent \((M_{\text{present}} = 1.77, M_{\text{absent}} = 1.71; t(1031) = -1.11, p = .27)\).

**Emotion Accuracy and Bias.**

*Phone Use, Emotion Accuracy, and Bias.* Does the extent to which participants used their phones during interactions with their romantic partner influence emotion accuracy and bias? Phone use was significantly positively associated with distinctive emotion accuracy \((b = .03, z = \ldots\)
2.61, \( p = .01 \); see Table S1b), indicating that those who used their phones more saw their partners more in line with their unique affective profiles. Furthermore, phone use was marginally negatively associated with distinctive assumed similarity (\( b = -.03, z = -1.88, p = .06 \)). However, phone use was not significantly associated with normativity (\( b = .01, z = 0.84, p = .40 \)).

**Expressivity, Emotion Accuracy, and Bias.** Verbal expressivity was significantly negatively associated with distinctive emotion accuracy (\( b = -.02, z = -2.42, p = .02 \); see Table S1b), indicating that those who expressed themselves more verbally were seen less in line with their unique affective profile. Body language was significantly positively associated with normativity (\( b = .01, z = 2.20, p = .03 \)) and distinctive assumed similarity (\( b = .02, z = 2.44, p = .01 \)), indicating that those who had more expressive body language tended to be seen more in line with the average, socially desirable affective profile and as having a similar affective profile to their partner. In contrast, indifference was marginally negatively associated with normativity (\( b = -.02, z = -1.89, p = .06 \)), indicating that those who were less indifferent tended to be seen less in line with the normative affective. No other significant associations were found.

**Momentary Relationship Quality.**

**Phone Use Predicting Momentary Relationship Quality.** The extent to which participants used their phones during interactions with their romantic partners did not significantly relate to momentary relationship quality (\( b = .01, z = 0.19, p = .85 \)). In other words, those who used their phones more during interactions with their romantic partners did not significantly differ in their ratings of momentary relationship quality compared to those who used their phones less.

**Expressivity Predicting Momentary Relationship Quality.** Most of the expressivity indicators were significantly associated with momentary relationship quality (all \( ps < .0001 \); see...
Table S1a). That is, those who were more expressive during discussions with their romantic partner experienced significantly higher levels of momentary relationship quality compared to those who were less expressive. However, body language was not significantly associated with momentary relationship quality (b = .03, z = 1.47, p = .14).

Table S1a. Associations Between Phone Presence and Emotion Accuracy and Bias Indicators

<table>
<thead>
<tr>
<th></th>
<th>Distinctive Emotion Accuracy</th>
<th>Normative Emotion Accuracy</th>
<th>Assumed Emotion Similarity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b (se)</td>
<td>z</td>
<td>d (95% CI)</td>
</tr>
<tr>
<td>Phone Use</td>
<td>.03 (.012)</td>
<td>2.61</td>
<td>.28 [.008, .057]</td>
</tr>
<tr>
<td>Expressivity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

Note. b = unstandardized regression coefficient; SE = standard error. d = Cohen’s d effect size estimate. 95% confidence intervals are provided. *p < .05, **p < .01, ***p < .001.

Table S1b. Associations Between Phone Use, Expressivity, and Relationship Quality

<table>
<thead>
<tr>
<th></th>
<th>Relationship Quality</th>
<th>b (se)</th>
<th>z</th>
<th>d (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone Use</td>
<td>.01 (.046)</td>
<td>0.19</td>
<td>.01 [-.082, .010]</td>
<td></td>
</tr>
<tr>
<td>Expressivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td>.14 (.027)</td>
<td>4.99</td>
<td>.30 [.082, .189]</td>
<td></td>
</tr>
<tr>
<td>Indifference</td>
<td>.16 (.032)</td>
<td>5.12</td>
<td>.31 [.101, .227]</td>
<td></td>
</tr>
<tr>
<td>Body Language</td>
<td>.03 (.021)</td>
<td>1.47</td>
<td>.09 [-.010, .072]</td>
<td></td>
</tr>
<tr>
<td>Facial</td>
<td>.17 (.026)</td>
<td>6.67</td>
<td>.40 [.122, .224]</td>
<td></td>
</tr>
</tbody>
</table>
Note. $b$ = unstandardized regression coefficient; $SE$ = standard error. $d$ = Cohen’s d effect size estimate. 95% confidence intervals are provided. $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Part 2

Here we report the between-person effects of phone presence on emotion accuracy, bias, and relationship quality. In other words, do those who have their phones present more frequently during in-person interactions with their romantic partner compared to others in the study report different levels of emotion accuracy, bias, and relationship quality?

Results

**Phone Presence and Emotion Accuracy and Bias.** We found that perceiver phone presence was not significantly associated with any of the emotion accuracy or bias indicators (all $ps > .35$; see Table S2a).

**Emotion Accuracy and Bias and Daily Relationship Quality.** All of the emotion accuracy and bias indicators were significantly positively associated with daily relationship quality, even after controlling for perceiver phone presence (all $ps < .002$; see Table S2b).

**Phone Presence and Daily Relationship Quality.** Phone presence was not significantly associated with daily relationship quality ($b = .02, z = 0.56, p = .57$; see Table S2c). That is, those who had their phones present during in-person interactions with their romantic partner more frequently did not report significantly different levels of daily relationship quality compared to others in the study who had their phones present less frequently.

Table S2a. Associations Between Between-Person Phone Presence and Emotion Accuracy and Bias Indicators

<table>
<thead>
<tr>
<th></th>
<th>Distinctive Emotion Accuracy</th>
<th>Normative Emotion Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 2 Perceiver Phone Presence</td>
<td>$b$ ($se$)</td>
<td>$z$</td>
</tr>
<tr>
<td></td>
<td>.01 (.010)</td>
<td>0.94</td>
</tr>
</tbody>
</table>
Study 2  
Perceiver Phone Presence  

<table>
<thead>
<tr>
<th>(se)</th>
<th>z</th>
<th>d (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.00 (.012)</td>
<td>0.36</td>
<td>.01 [-.019, .028]</td>
</tr>
</tbody>
</table>

Assumed Emotion Similarity  

<table>
<thead>
<tr>
<th>(se)</th>
<th>z</th>
<th>d (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-.01 (.011)</td>
<td>-0.62</td>
<td>-.01 [.028, .014]</td>
</tr>
</tbody>
</table>

Note. *b* = unstandardized regression coefficient; *SE* = standard error. *d* = Cohen’s d effect size estimate. 95% confidence intervals are provided. *p* < .05, **p** < .01, ***p*** < .001.

Table S2b. Associations Between Between-Person Emotion Accuracy and Bias Indicators and Relationship Quality Controlling for Between-Person Phone Presence

<table>
<thead>
<tr>
<th>Relationship Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>(se)</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Distinctive Emotion Accuracy</td>
</tr>
<tr>
<td>Normative Emotion Accuracy</td>
</tr>
<tr>
<td>Assumed Emotion Similarity</td>
</tr>
</tbody>
</table>

Note. *b* = unstandardized regression coefficient; *SE* = standard error. *d* = Cohen’s d effect size estimate. 95% confidence intervals are provided. *p* < .05, **p** < .01, ***p*** < .001.

Table S2c. Associations Between Between-Person Phone Presence and Relationship Quality

<table>
<thead>
<tr>
<th>Relationship Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>(se)</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Perceiver Phone Use</td>
</tr>
</tbody>
</table>

Note. *b* = unstandardized regression coefficient; *SE* = standard error. *d* = Cohen’s d effect size estimate. 95% confidence intervals are provided.