

ORIGINAL ARTICLE

**The Disclosure–Intimacy Link in
Computer-Mediated Communication:
An Attributional Extension of the
Hyperpersonal Model**

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The present research investigated whether the attribution process through which people explain self-disclosures differs in text-based computer-mediated interactions versus face to face, and whether differences in causal attributions account for the increased intimacy frequently observed in mediated communication. In the experiment participants were randomly assigned to a face-to-face or computer-mediated interaction with a confederate who made either high- or low-intimacy self-disclosures. Results indicated that computer-mediated interactions intensified the association between disclosure and intimacy relative to face-to-face interactions, and this intensification effect was fully mediated by increased interpersonal (relationship) attributions observed in the computer-mediated condition. The article presents an attributional extension of the hyperpersonal model (Walther, 1996) by demonstrating the role of causal attributions in interpersonal intensification processes in text-based computer-mediated interactions.

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The availability of interactive communication technologies has made the Internet part of everyday life, which people use to form and maintain personal relationships. These relationships range from social supportive companionships (e.g., Wright, 2000; Parks & Floyd, 1996; Parks & Roberts, 1998) to romantic partners (e.g., Gibbs, Ellison, & Heino, 2006; Merkle & Richardson, 2000). In keeping up with the burgeoning of the Internet's expanded role as an interpersonal medium, social science research has moved from the early theoretical debates on whether people can be interpersonal and intimate on the Internet (see, for review, Walther & Parks, 2002) to examining the underlying cognitive and behavioral mechanisms for the formation of intimate relationships in computer-mediated communication (CMC) (e.g., Joinson, 2001; Peña, Walther, & Hancock, 2007; Tidwell & Walther, 2002).

Perhaps the most important basis of intimate social relationships is self-disclosure, the act of revealing personal information to other people (Archer, 1980; Derlega,

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Metts, Petronio, & Margulis, 1993). While self-disclosure has long been considered an important process in communication research (Berg & Archer, 1983), it has emerged as one of the most salient and critical behaviors in CMC. The self-revelation of private thoughts, experiences, and emotions is exceptionally widespread on the Internet, from personal blogs and social networks to online forums and dating Websites (Joinson & Paine, 2007). A recent national survey conducted by the Pew Internet and American Life Project shows that bloggers write most frequently about personal experiences in blog posts (Lenhart & Fox, 2006). Self-disclosure is also rife in profiles for online dating and social networking sites, playing a key role in self-presentation and romantic relationship development (Gibbs et al., 2006; Whitty, 2008). A recent content analysis of Facebook profiles (Nosko, Wood, & Molema, 2010) shows that on average Facebook users disclose approximately 25% of the standard information that could be disclosed, revealing highly personal, sensitive, and potentially stigmatizing information (e.g., political views, sexual orientation, religious affiliation, phone numbers, etc.) in their personal profiles. Self-disclosure is just as prevalent in interpersonal interactions online. Several studies have observed high levels of self-disclosure in online relationships and established a positive association between self-disclosure and friendship development (Parks & Floyd, 1996; Valkenburg & Peter, 2009), even over a long period of time (Baker, 2002; Wilkins, 1991). Considered together, these studies indicate that self-disclosure is a fundamental communication phenomenon on the Internet.

Recent research has demonstrated that some characteristics of CMC, such as anonymity and the absence of nonverbal cues, can facilitate frequent and more intimate disclosure (e.g., Joinson, 2001; Tidwell & Walther, 2002) and lead to increased intimacy in CMC (Parks & Floyd, 1996; Valkenburg & Peter, 2009; Walther, 1996). The existing research on online self-disclosure, however, has predominantly focused on self-disclosure production, examining characteristics of CMC that can trigger disclosures. Although most studies assume a direct link between self-disclosure production and increased intimacy online (e.g., Joinson, 2001; Schouten, Valkenburg, & Peter, 2007), self-disclosure by itself is not sufficient to guarantee relationship intimacy (Reis & Shaver, 1988). The effect of a disclosure on relationship intimacy depends on how the receiver makes sense of the disclosure, interprets it, and responds to it by making attributions about the sender's reasons for self-disclosure (Derlega et al., 1993). For instance, a receiver can attribute a disclosure to the sender's dispositional characteristics, such as an open personality, or aspects of the relationship between the sender and the receiver, such as an interest in pursuing a relationship (Berger & Calabrese, 1975).

While it has been established that people make more intimate self-disclosures in CMC than face-to-face (FtF) interactions (Tidwell & Walther, 2002), no research has empirically demonstrated that heightened disclosure leads to intimacy more strongly in CMC than FtF. The purpose of the present study is to compare the effect of self-disclosure on relationship intimacy in CMC versus FtF. Perhaps more importantly, the present article also attempts to advance interpersonal theory by examining

(a) how receivers form attributional interpretations of disclosures in different media, and (b) the role of these attributions in the link between self-disclosure and relationship intimacy in CMC. To these ends, we review the theoretical background of the disclosure–intimacy link, describe the hyperpersonal model (Walther, 1996) for understanding intimate interpersonal relationships in CMC, and introduce a theoretical extension to the hyperpersonal model by incorporating an attributional framework as a mechanism for relationship intimacy in CMC.

The disclosure–intimacy link

According to social penetration theory (Altman & Taylor, 1973), intimacy and self-disclosure are two key concepts in relationship development. The literature on interpersonal relationships has repeatedly demonstrated that the disclosures of personally relevant information, thoughts, and feelings to another person foster intimacy, or closeness and connectedness, in a relationship (Sternberg, 1988). The positive association between self-disclosure and intimacy development is related to the notion that self-disclosures carry certain relational values that express intimacy and solicit reciprocation. People consider self-disclosures to be valuable forms of information, thoughts, and feelings. As such, self-disclosure often facilitates understanding, increases liking, and invites reciprocation between conversation partners (Altman & Taylor, 1973). Because of the reciprocity, self-disclosures often escalate from exchanging nonintimate content (e.g., name, job, hometown, etc.) to highly intimate information on a broader range of topics (e.g., romantic relationships, sexual orientation, etc.). In parallel with this escalation process, intimacy levels in the relationship gradually increase (Reis & Shaver, 1988). In accordance with the disclosure–intimacy link demonstrated by previous research, increased self-disclosure is expected to increase relationship intimacy both in FtF and CMC interactions.

Media and the disclosure–intimacy link

Some online relationships tend to be more intimate than FtF relationships (Parks & Floyd, 1996), and CMC interactions are often rated as significantly more intimate than FtF counterparts (Joinson, 2001; Walther, 1997). One approach to explain this phenomenon is the hyperpersonal model (Walther, 1996), which highlights the cognitive and behavioral processes and CMC affordances that can contribute to greater online intimacy. These mechanisms are related to sender and receiver effects that result from the absence of nonverbal communication, reallocation of cognitive resources in asynchronous message composition, and the visual anonymity in computer-mediated exchanges. Specifically, senders of CMC messages engage in selective information sharing about themselves, which is not constrained by nonverbal attributes, limited cognitive resources, or the temporal constraints typical for message production in FtF interactions. Receivers, on the other hand, have limited access to contraindicating cues, which leads them to form stereotypical impressions of their partners that are more intense and extreme than in FtF (Peña et al., 2007; Walther & Parks, 2002).

Consistent with the sender effect proposed by the hyperpersonal model (Walther, 1996), people try to put their best foot forward in CMC by engaging in selective self-presentation. For instance, in text-based CMC such as e-mail or instant messaging, people may optimize impression management through thoughtful message composition (Walther, 2007; Walther, Slovacek, & Tidwell, 2001). An example of selective self-presentation is online dating, where daters can put up a professionally edited photo and omit less desirable features in dating profiles to appear attractive (Hancock & Toma, 2009; Toma, Hancock, & Ellison, 2008). Related to the sender's behavior in CMC, people appear to be more comfortable disclosing personal information in CMC than FtF (Baker, 1998; Joinson, 2001; McKenna & Bargh, 1998). Tidwell and Walther (2002) found that people engage in proportionally more intimate self-disclosure in CMC relative to FtF interaction. This, they suggested, may lead to positive hyperpersonal relational states characterized by high levels of intimacy.

The hyperpersonal model also suggests that the perceptions of the receiver contribute to increased intimacy (Walther, 1996). Receivers of CMC messages tend to overinterpret limited socioemotional and social identity cues available in text-based interaction leading to intensified impressions of the sender's personal qualities and their relationships (e.g., Boucher, Hancock, & Dunham, 2008; Hancock & Dunham, 2001; Lea & Spears, 1991). For instance, Hancock and Dunham (2001) found that although CMC partners rated each other on a smaller number of characteristics than FtF counterparts, their impressions were more exaggerated than those with an FtF interaction. Boucher et al. (2008) showed a similar intensification effect with status perceptions such that CMC participants made intensified perceptions of status, both for self and partners relative to status ratings in FtF interactions.

Given that CMC partners tend to overinterpret cues in CMC, they should also overinterpret the meaning of self-disclosures for intimacy development. Self-disclosure in CMC is highly salient because of the limited cues by which people exchange immediacy and affection in CMC (Walther, Loh, & Granka, 2007). Therefore, the disclosure–intimacy link described by social penetration theory (Altman & Taylor, 1973) should be intensified in CMC in much the same way that impression-related cues intensify interpersonal or status perceptions. As such, an interaction effect between medium and self-disclosure on intimacy should be observed.

H1: Relative to low self-disclosure, high self-disclosure leads to more intimacy in CMC than FtF interactions.

The receiver effect in hyperpersonal interaction

Although previous research has found support for the receiver overattribution effect predicted by the hyperpersonal model (e.g., Boucher et al., 2008; Hancock & Dunham, 2001), the receiver component has never been isolated from the sender's effect, and, therefore, it is unclear whether there is a *specific* receiver effect that leads to increased intimacy online, as predicted by the hyperpersonal theory (Walther, 1996). The hyperpersonal model conceptualizes the sender and receiver effects as conceptually distinct but interrelated. Yet Walther (1996) acknowledged that empirically, "it is

not yet clear which specific processes are necessary or sufficient for the hyperpersonal effect to be obtained” (p. 17). Tests of the hyperpersonal model have either focused on the sender’s behavior only (e.g., Gonzales & Hancock, 2008; Peña, Hancock, & Merola, 2009; Walther, 2007) or did not analyze variations in the sender’s behaviors across media (e.g., Boucher et al., 2008; Hancock & Dunham, 2001; Walther, 1997). Furthermore, it is often assumed that the sender’s selective self-presentation is a basis of the receiver’s intensified impressions in CMC. For instance, when commenting on exaggerated ratings of partner’s traits in CMC, Tidwell and Walther (2002) noted that the more extreme perceptions by receivers in CMC interactions can be explained by the sender’s behavior, which was “more selective and yet exaggerated social information sharing online, consistent with the hyperpersonal approach” (p. 320).

In contrast to previous studies, the present research isolates the receiver’s contribution to hyperpersonal effects and predicts more intimacy in CMC versus FtF (Hypothesis 1) even when the sender’s proportion and intimacy level of self-disclosure are equivalent across the two media. Specifically, it examines the effect of medium on intimacy and how the receiver’s attributions regarding self-disclosure contribute to relationship intimacy online.

Attributions and self-disclosure

As noted above, while most studies of self-disclosure in CMC assume a direct link between self-disclosure and relationship intimacy (for a review, see Joinson & Paine, 2007), this relationship is conditional on other factors, the most important of which is the receiver’s response to self-disclosure. According to Reis (2007), “although self-disclosure often triggers intimate interaction, in itself self-disclosure is insufficient to instill a sense of intimacy between two people” (p. 10). The interpersonal process model of intimacy (Reis & Shaver, 1988) conceptualizes intimacy as the product of a dynamic transactional process whereby both self-disclosure and what Reis and Shaver call “partner responsiveness” contribute to the perception of intimacy. The intimacy process therefore begins when the sender self-discloses. The initial disclosure encourages responsive behaviors from the receiver, which may prompt further disclosures from the sender. When the receiver’s responses are perceived as understanding, supportive, and caring, the intimacy level of the dyadic interaction should increase (for review, see Reis, 2007).

The receiver’s response to the sender’s self-disclosure is influenced by the receiver’s interpretation of the self-disclosure (Reis & Shaver, 1988). People make sense of events by assigning causal reasons to them, and then adjust their perceptions and behaviors based on their attributions (Kelley & Michela, 1980). People not only interpret the content of disclosures; they also attempt to understand the speaker’s various reasons and goals for sharing intimate information (Derlega & Berg, 1987; Miller, Cooke, Tsang, & Morgan, 1992). As Newman (1981) explains, “interpretation of *what* the message means takes the form of an implicit explanation concerning *why* person X would be sending this message” (p. 124). In this sense, attributions for self-disclosure become part of the meaning that the receiver assigns to the sender’s message.

Different types of attributions for a self-disclosure may have different implications for relationship intimacy (e.g., Jones & Archer, 1976; Taylor, Gould, & Brounstein, 1981; Town & Harvey, 1981). There are at least three types of attributions that can be used to explain the disclosure of intimate information: A dispositional attribution is when the receiver ascribes the disclosure to the sender's personality; a situational attribution is when the receiver ascribes the disclosure to a situational factor (e.g., the medium in which the self-disclosure took place); an interpersonal attribution (Newman, 1981) is when the receiver ascribes the disclosure to the unique relationship with the sender with the assumption that the receiver is a specially chosen target of self-disclosure by the sender. Whereas interpersonal attribution suggests something special about the relationship between the sender and receiver, situational or dispositional attributions imply that the sender reveals intimate information to many people because of his/her personality (dispositional attribution) or to anyone in similar circumstances (situational attribution).

When the receiver attributes self-disclosure interpersonally, it should enhance relational intimacy because the receiver perceives to have been personally chosen for the disclosure, and that the sender likes and trusts the receiver (see, for review, Collins & Miller, 1994; Derlega et al., 1993). As Collins and Miller note, both sender and receiver are cognizant that self-disclosure communicates something more than the actual content of the exchange. Disclosing to another communicates that we (a) trust that person to respond appropriately, (b) value his or her opinions and responses, and (c) are interested in knowing them, and having them know us, and so on (p. 471).

If this is the case, then the receiver's construal of self-disclosure in terms of interpersonal attribution should play a larger role than other types of attribution in the operation of the disclosure–intimacy link and account for the increased intimacy in CMC versus FtF predicted in Hypothesis 1:

H2: Interpersonal attributions mediate the proposed intensification effect of medium on the disclosure–intimacy link.

Attributions and medium

While some research has focused on attributions in computer-mediated distributed versus collocated groups (e.g., Bazarova & Walther, 2009; Cramton, 2001; Cramton, Orvis, & Wilson, 2007; Walther & Bazarova, 2007), no research to date has examined the effect of computer mediation on how partners make attributions across CMC and FtF interactions. Does the attribution process through which people interpret the causes of self-disclosure differ in text-based computer-mediated interactions versus FtF? Several prominent approaches to CMC argue that partners overinterpret cues available in text-based electronic communication and, consequently, form impressions about their partners that are more intense than those in FtF communication. Both the hyperpersonal model (Walther, 1996) and the social identification deindividuation theory (Lea & Spears, 1991) assume that stereotyped and exaggerated partner impressions occur in CMC because of a disproportionate reliance on the minimal identity cues available in text-based interactions. Because of the restricted

access to the partner's nonverbal or contextual cues, there are fewer contraindicating cues to moderate their idealized judgments of others' behaviors. Extending this perspective to causal attributions, we expect that CMC partners also overinterpret the meaning of self-disclosure by making more extreme interpersonal attributions for self-disclosure in CMC relative to FtF. Therefore,

H3: The effect of self-disclosure on interpersonal attributions is greater in CMC than FtF interactions.

Study overview

To examine the relative intensification of the link between disclosure and intimacy in CMC versus FtF, and how the receiver's attributions for the sender's self-disclosure may mediate this intensification, it was important to control the sender's self-disclosures across media. We followed the self-disclosure and operationalized high/low self-disclosure as revealing more/less intimate aspects of the self. The design of the experiment was a 2×2 factorial design, with communication medium (FtF vs. text-based CMC) and self-disclosure level (high vs. low) as between-subjects factors. Each participant was randomly assigned to interact in the FtF or CMC condition with one of two female confederates who made either high- or low-intimacy self-disclosures about her freshman year in college.

Method

Participants

Eighty-five participants were recruited from communication and psychology courses to participate in an experiment in exchange for an extra credit or \$5 cash. Five participants were removed from the analysis because they expressed suspicions regarding the confederate, and one participant was removed because of his/her extreme ratings and incomplete answers. Therefore, the final number of participants included for the analyses was 79. Fifty-six percent of them were female. The participants' age ranged from 17 to 27 years with a mean of 20; 14% were freshmen, 37% were sophomores, 18% were juniors, and 32% were seniors. Forty-seven percent of the participants were Caucasians, 33% Asians, 10% African Americans, 3% Hispanics, 1% Native Americans, and 6% identified themselves as others or did not indicate ethnicity.

Procedure

The participant and the confederate (posing as another participant scheduled for the same time slot) communicated either FtF or through a computer chat. In the FtF condition, the dyad met in a moderately sized meeting room that had a one-way mirror. In the computer-mediated condition, the dyad interacted from two individual rooms using the AOL Instant Messenger system, which allows users to communicate in real time in a text-based interface.

The naïve participant and the confederate were told that the purpose of this study was to examine how people communicate via different media and were asked to

sign a letter of informed consent. The discussion task assigned to each dyad was to propose 10 tips for the incoming freshmen students on how to survive college life. The discussion was structured so that the naïve participant and the confederate took turns suggesting their tips, with the confederate always starting first. Each had to contribute five tips along with their reasons for each tip. At the end of the discussion they had to agree on the two tips that they thought were most important for the freshman college experience.

To compensate for a slower rate of information exchange over the computer medium than FtF (Walther, Anderson, & Park, 1994), FtF partners were told that they could interact for up to 10 minutes, whereas CMC partners had up to 30 minutes for their interaction (see Tidwell & Walther, 2002). The results showed that on average FtF discussion took 10 minutes ($M = 9.53$, $SD = 1.87$) and CMC discussion took about 20 minutes ($M = 21.5$, $SD = 5.31$) to complete the task; importantly, partners in the FtF ($M = 652.13$, $SE = 52.99$) and CMC ($M = 713.31$, $SE = 32.99$) conditions produced equivalent word counts, $t(65) = .98$, $p = .33$, suggesting that the amounts of information exchanged in the conversations was similar across media.

When the dyad finished the task, the experimenter separated the confederate and the participant. The experimenter asked the participant to finish a questionnaire about the conversation and then debriefed him/her using a funneled debriefing technique that probed for suspicion.

Confederates and self-disclosure manipulation

The disclosure manipulation was patterned after a previous manipulation of self-disclosure (Weisel & King, 2007), which required the confederate to disclose information varying intimacy level across the two self-disclosure conditions. The manipulation of self-disclosure was embedded in the task discussion. The five tips that the confederate offered were identical in both high- and low-intimacy self-disclosure conditions (e.g., go to class, get someone to talk to, eat right, do more exercise, get organized, etc.). However, the supporting arguments differed in intimacy level for the third and fourth tips that the confederate suggested between the two self-disclosure conditions. The supporting arguments for the high-intimacy disclosure tips involved a discussion of personal problems and more self-references, whereas the supporting arguments in the low-intimacy disclosure tips made no reference to personal experience (see Table 1 for the disclosure script). The supporting arguments for the other three tips (control tips) were identical in the low- and high-intimacy self-disclosure conditions and also made no reference to personal experience.

To validate the disclosure manipulation, we pretested all the tips by asking 30 blind judges to rate the disclosure intimacy of the tips on a 10-point scale. The high self-disclosure tips ($M = 7.91$, $SD = 1.16$) were rated as significantly more revealing than the low self-disclosure tips ($M = 3.01$, $SD = .96$), $t(29) = 14.99$, $p < .001$, and also than the control tips ($M = 3.02$, $SD = .96$), $t(29) = 14.51$, $p < .001$. To ensure consistency across the two confederates, the confederates received 20 hours of training on self-disclosure manipulation and nonverbal (e.g., facial expression,

Table 1 Self-Disclosure Manipulation

Tips	High Self-Disclosure	Low Self-Disclosure
3	Eat right It's very important to stick to a balanced diet. I gained 20 pounds eating crappy dorm food in my first year and someone asked me if I was pregnant.	Eat right Do you know the "freshman 15?" Freshmen gain 15 pounds in the first year, because they don't have family there to serve balanced meals.
4	Do regular exercises When I was a freshman my life was a big mess. My parents were getting divorced and I was sick for a week . . . At that time I started to go to yoga class. It really helps me relax and take the stress out.	Do regular exercises Doing some exercises helps relieve the stress. It improves physical health, and also brings mental benefits—help people deal with problems in a positive way.

gesture, eye contact in the FtF condition) and typographic (e.g., the use of emoticons and pace in CMC) behaviors.

During the study, the experimenter monitored the conversations and confirmed the delivery of the tips. The supporting arguments of the scripted tips provided by the confederates were equal across media; there was no difference in the number of words spoken by the confederates in FtF ($M = 379.15$, $SE = 30.38$) and CMC ($M = 358.00$, $SE = 19.64$) conditions, $t(66) = .58$, $p = .56$.

Dependent measures

After each dyad finished the discussion task, participants completed a questionnaire assessing their attributions and their intimacy toward the partner. All the measures were presented on a 7-point Likert scale.

Attribution

Following the discussion, participants completed a 12-item scale to measure attributional judgments for the conversation partner's behavior that might pertain to the partner's dispositional characteristics, situational factors, and interpersonal causes. *Dispositional attributions* reflected attributional judgments based on the conversational partner's dispositions (e.g., "My partner's behavior in the discussion was consistent with his/her personality"). Situational causes captured influences attributable to environmental factors (Robins, Mendelsohn, & Spranca, 1996). Given that the present research focused on media effects on attributions, we only considered *media situation attributions* as potential situational behavior causes (e.g., "My partner's behavior was mostly shaped by the media environment"). Finally, as suggested by Newman (1981), an important causal category was *interpersonal attributions*, which captures relational

explanations (e.g., “My partner’s behavior was determined by the way I acted towards him/her,” or “Our unique relationship accounts for my partner’s behavior”).

An exploratory factor analysis with Varimax rotation produced a clear three-factor solution (eigenvalues greater than 1), with 68.98% of total variance explained and each item loading at .6 or higher on only one of the three factors. The analysis reflected the presence of the three proposed factors: interpersonal, dispositional, and media situation. Six items loading on the first factor were indicators of interpersonal attribution, Cronbach’s $\alpha = .85$, three items loading on the second factor were indicators of dispositional attribution, Cronbach’s $\alpha = .87$, and three items loading on the third factor were indicators of media situation attribution, Cronbach’s $\alpha = .69$.

Intimacy was measured by seven items from the Miller Social Intimacy Scale (Miller & Lefcourt, 1982), Cronbach’s $\alpha = .80$. Items included “I felt pretty close to my partner during the conversation,” “I have shown my partner my affection towards him/her,” “I’d like to confide very personal information to my partner,” “I was encouraging and supportive to him/her,” and “I felt affectionate towards my partner.”

Results

In the data analysis, we conducted an analysis of variance (ANOVA) on the dependent variables (attributions and intimacy) with self-disclosure level, medium, and participants’ gender as independent variables. The results revealed no main effects or interaction effects associated with the participants’ gender. Male and female participants did not show different patterns in the ratings of interpersonal, dispositional, and media situation attributions, and the intimacy ratings did not differ across gender; thus, the effect of participants’ gender was not included in the final analyses. We also probed for any differences on dependent measures that were associated with the two confederates. There were no differences between the two confederates on the three attribution ratings or on the intimacy ratings, allowing us to collapse our analyses across the two confederates.

Hyperpersonal effects on intimacy

The first analysis examined whether self-disclosure led to greater intimacy in CMC than FtF interactions, as predicted by Hypothesis 1. As expected, high self-disclosure led to more intimacy overall, $F(1, 75) = 33.96$, $p < .001$, $\eta^2 = .31$.¹ Supporting Hypothesis 1, there was also a significant interaction effect of medium and self-disclosure, $F(1, 75) = 4.00$, $p = .049$, $\eta^2 = .05$ (see Table 2 for means and standard deviations). As seen in Figure 1, whereas intimacy in the low self-disclosure condition was not different across media ($M_{\text{CMC}} = 3.65$, $SD = .76$; $M_{\text{FtF}} = 3.65$, $SD = .70$), $t(39) = .02$, $p = .98$, intimacy was higher in CMC ($M_{\text{CMC}} = 4.90$, $SD = .59$) than FtF ($M_{\text{FtF}} = 4.27$, $SD = .75$) in the high self-disclosure condition, $t(36) = 2.85$, $p < .01$, Cohen’s $d = .93$. In both communication media the participants who encountered high self-disclosure felt more intimate toward their partner than those participants who encountered low self-disclosure, in the FtF condition ($M_{\text{High}} = 4.27$,

Table 2 Means and Standard Deviations for Variables of Interests by Conditions

	Low Self-Disclosure		High Self-Disclosure	
	FtF (N = 19)	CMC (N = 22)	FtF (N = 21)	CMC (N = 17)
Intimacy	3.65 ^a (.70)	3.65 ^a (.76)	4.27 ^b (.75)	4.90 ^c (.59)
Dispositional attribution	4.68 ^a (.59)	4.74 ^a (.82)	5.02 ^{a,b} (.90)	5.35 ^b (.59)
Media situation attribution	4.42 ^{a,b} (.82)	4.46 ^a (.82)	4.00 ^a (.66)	5.20 ^b (.88)
Interpersonal attribution	4.09 ^a (.76)	3.67 ^a (1.04)	4.12 ^a (.42)	4.78 ^b (.70)

Note: Means with different superscripts within a row indicate significant difference ($p < .05$).

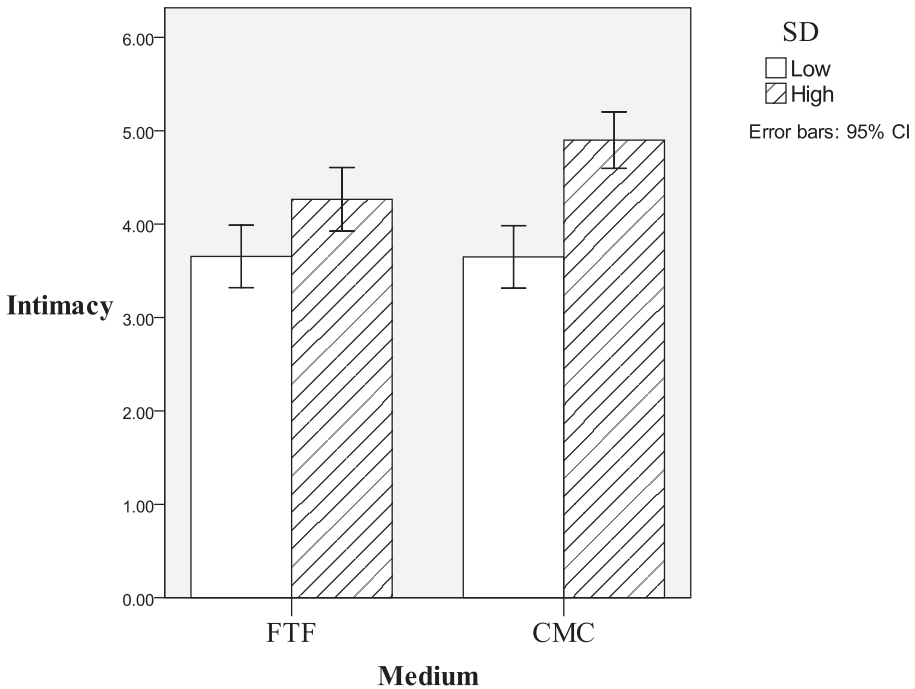


Figure 1 Means for intimacy by conditions.

$SD = .75$; $M_{Low} = 3.65$, $SD = .70$), $t(38) = 2.67$, $p < .05$, and in the CMC condition ($M_{High} = 4.90$, $SD = .59$; $M_{Low} = 3.65$, $SD = .76$), $t(37) = 5.62$, $p < .001$. But the effect of self-disclosure was much larger in the CMC condition than that in the FtF condition. The mean difference produced by manipulating self-disclosure in CMC was 1.25 ($SE = .21$), whereas the mean difference in the FtF condition was .61 ($SE = .23$). An additional t -test confirmed that the mean difference produced in CMC was larger than that in FtF, $t(34) = 2.04$, $p < .05$. Therefore, consistent with Hypothesis 1 the disclosure–intimacy link was intensified in CMC, relative to FtF, and self-disclosure led to more intimacy in CMC than FtF interactions.

Attribution as a mediator

We next sought to test whether attributions mediate the hyperpersonal effect observed on the disclosure–intimacy link. In H2 we predicted that not all attribution types would have such an effect; only interpersonal attribution should mediate the intensified disclosure–intimacy link in CMC. Statistically, we expected four specific results (Baron & Kenny, 1986): First, the interaction of medium by self-disclosure depth would predict intimacy; second, the interaction term of medium and self-disclosure would predict interpersonal attribution (H3); third, interpersonal attribution would predict intimacy; fourth, the effect of the interaction term would disappear (full mediation) or decline (partial mediation) after controlling for interpersonal attribution. The first criterion was supported by the result that the medium \times self-disclosure interaction predicted intimacy in Hypothesis 1. We also regressed intimacy perception on self-disclosure, medium, and their interaction, $F(3, 75) = 13.14, p < .001$. The regression analysis confirmed the significant interaction effect of medium and self-disclosure described above ($B = .64, SE B = .32, \beta = .31, t(77) = 2.00, p = .049$).

To test the other three predictions, we regressed interpersonal attribution on self-disclosure, medium, and their interaction, $F(3, 75) = 6.69, p < .001$. The interaction effect of medium and self-disclosure reached significance for interpersonal attribution, ($B = 1.08, SE B = .35, \beta = .53, t(77) = 3.10, p < .01$ (see Table 2 for means and standard deviations). CMC participants who encountered high self-disclosure were more likely to attribute the partner's behavior to the interpersonal relationship than those who encountered low self-disclosure in CMC, $t(37) = 3.78, p < .01$. FtF participants, on the other hand, did not show any difference with regard to interpersonal attribution in high self-disclosure versus low self-disclosure conditions, $t(38) = .16, p = .87$.

The results revealed that high self-disclosure led to more intense interpersonal attributions in CMC interactions *only*, satisfying the second step in the mediation analysis. This result also supported our prediction in H3 that CMC participants would make more intensified interpersonal attributions when encountering high self-disclosure relative to their FtF counterparts.

We then regressed intimacy perception on self-disclosure, medium, and their interaction, controlling for interpersonal attribution, $F(4, 74) = 14.42, p < .001$. The analyses showed that interpersonal attribution predicted intimacy ($B = .35, SE B = .10, \beta = .34, t(77) = 3.51, p < .01$, satisfying the third criterion. The interaction term of medium and self-disclosure became nonsignificant after interpersonal attribution was entered into the model, ($B = .27, SE B = .32, \beta = .13, t(77) < 1, p = .41$, satisfying the final criterion for mediation. We also reran the regression controlling for all the three types of attributions, $F(6, 72) = 10.15, p < .001$. Dispositional and media situation attributions did not predict intimacy: for dispositional attribution ($B = .17, SE B = .10, \beta = .15, t(77) = 1.64, p = .11$, and for media situation attribution ($B = .02, SE B = .10, \beta = .02, t(77) < 1, p = .88$). Interpersonal attribution still predicted intimacy ($B = .34, SE B = .11, \beta = .34, t(77) = 3.21, p < .01$). A Sobel test confirmed that the mediation of interpersonal attribution

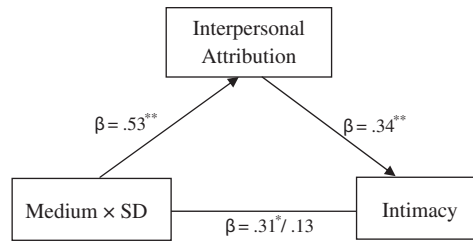


Figure 2 Interpersonal attribution mediates the interactive effect of medium and self-disclosure on intimacy ($N = 79$).

($z = 2.31, p = .02$) was significant. Taken together, these results indicated that interpersonal attribution fully mediated the intensified disclosure–intimacy link in CMC (Figure 2), as predicted by H2.

In order to show that of all the attributions, interpersonal attribution was the only mediator, we performed similar analyses for dispositional attribution and media situation attributions. The mediation of dispositional attribution was not significant because the interaction of medium and self-disclosure did not predict dispositional attribution ($B = .28, SE B = .34, \beta = .15, t(77) < 1, p = .41$), and dispositional attribution did not predict intimacy ($B = .16, SE B = .11, \beta = .15, t(77) = 1.52, p = .13$). Situation attributions did not mediate the hyperpersonal effect either because the situation attribution did not predict intimacy ($B = .12, SE B = .10, \beta = .12, t(77) = 1.14, p = .26$). Thus, the results confirm that only interpersonal attributions mediate the interaction effect of medium and self-disclosure on intimacy, supporting the prediction that the receiver's increased interpersonal attribution for the partner's high self-disclosure is what accounts for the intensified disclosure–intimacy link in CMC relative to FtF.

Discussion

The purpose of the present study was to investigate the causal link between self-disclosures and relationship intimacy in different media, and how communication media may shape attributional interpretations of self-disclosures and their role in experiencing intimacy online. Although self-disclosure is widespread and assumed to play a critical role in online acquaintanceship development, there is little direct evidence for the effects of disclosure in CMC, and the mechanisms underlying the disclosure–intimacy link in new communication media remain largely unexamined (but see Tidwell & Walther, 2002).

The present research offers three main contributions for understanding interpersonal communication in CMC. First, drawing on social penetration theory (Altman & Taylor, 1973), this study is the first to demonstrate the intensification of the disclosure–intimacy link in CMC. By holding disclosure constant across conditions we observed that equivalently intimate disclosures produce greater intimacy in CMC than FtF. This result is the first to establish a causal relationship between

self-disclosure and relational outcomes in CMC, and how the effects of self-disclosure on intimacy differ across the media.

Second, in addition to the communication channel, attributions that partners made for the confederate's high disclosures affected the disclosure–intimacy link. Specifically, intensified interpersonal attribution mediated between disclosures and online intimacy. The mediating role of attributions in the effect of disclosures on intimacy introduces a novel theoretical mechanism that focuses on perceptions rather than production of disclosure in CMC. Importantly, these results indicate that the receiver's inflated attributions of intimate disclosures can contribute to the creation of hyperpersonal states online, even when controlling for the sender's behavior in different media.

Finally, the key role of attributions in the disclosure–intimacy link adds to the recent theorizing of intimacy as an interpersonal process, which argues that partner's interpretations of intimacy are critical for establishing interpersonal intimacy (Reis & Shaver, 1988). Indeed, the present research found that the interpersonal attribution category described by Newman (1981), a category that reflects on *both* partners and their unique relationship, was the only attribution type to mediate the disclosure–intimacy link. The interpersonal attribution category goes beyond the static dispositional-situational dichotomy commonly used to capture attributions for behavior from an ongoing communication process (see Bazarova & Hancock, 2010).

Intensification of disclosure–intimacy link

While there is abundant evidence from both field and lab studies that the Internet facilitates more frequent and more intimate self-disclosure (e.g., Gibbs et al., 2006; Joinson, 2001; Tidwell & Walther, 2002; Valkenburg & Peter, 2009), there has been limited research linking self-disclosure with relational outcomes. Previous research has implicitly assumed a link from disclosure to intimacy based on social penetration theory (Altman & Taylor, 1973) such that increased self-disclosure online should lead to hyperpersonal relational states. Although some studies show that this might be the case (e.g., Valkenburg & Peter, 2009), others suggest that not every disclosive encounter produces relationship escalation, with some even leading to rejection (e.g., Tong & Walther, in press). The mechanism that previous research proposed for the effects of disclosure on relationship was grounded in the uncertainty reduction processes that disclosure in CMC changes uncertainty levels more dynamically than FtF disclosures do (Tidwell & Walther, 2002), although research has not produced evidence for why this may be the case.

The present study offers causal evidence for the effects of intimate disclosure that goes beyond the uncertainty reduction assumption. The key finding that text-based CMC interactions intensify the disclosure–intimacy link relative to FtF interactions is more consistent with the hyperpersonal model (Walther, 1996), according to which CMC partners can develop more intense impressions and relationships than in FtF because of the overreliance on limited cues (e.g., Hancock & Dunham, 2001; Walther, 1997).

An important difference between the present research and previous tests of the hyperpersonal model (Walther, 1996) is that it disentangles disclosure production from its perception by showing that equivalent levels of disclosure intimacy and quantity can lead to disproportional intimacy perceptions in CMC. This finding identifies the receiver's perceptions of self-disclosure as an independent contributor to hyperpersonal states online. As theorized in the hyperpersonal model, the receiver and the sender effects are interrelated but conceptually distinct. Previous tests of hyperpersonal theory, however, embedded the receiver's perceptions within the medium effect and the sender's behaviors, which obscured the role of the receiver's perceptions in hyperpersonal relations (e.g., Boucher et al., 2008; Hancock & Dunham, 2001; Tidwell & Walther, 2002). The next section discusses specific mechanisms related to the receiver's perceptions of disclosure, that are responsible for the intensification of the disclosure–intimacy link in CMC.

Attributional extension of hyperpersonal model

While the receiver component of the hyperpersonal model (Walther, 1996) suggests that perceivers form inflated impressions of their partners in CMC, the mechanisms for their inflated impressions are less understood. The original mechanism was derived from the social identity deindividuation theory (Spears & Lea, 1992), suggesting that people overattribute salient social categories, especially in the absence of individuating cues, about partners in CMC. The social categorization account, however, has been recently questioned as an adequate explanation for hyperpersonal relationships resulting from interpersonal information accrual (Walther, 2009; Wang, Walther, & Hancock, 2009). Other mechanisms, such as anticipated future interaction, individual stereotypes, and relationship seeking, have been proposed (Walther & Parks, 2002), but they await empirical evidence for their role in creating hyperpersonal relationships.

The present research sheds light on the role of the perceiver by identifying causal attributions as a novel mechanism underlying intensified intimacy in CMC. Our participants made more extreme causal attributions for high self-disclosure in CMC than FtF, and their attributions accounted for the effect of self-disclosure on the increased intimacy in CMC. Importantly, of the three attribution types, only interpersonal attribution mediated the relationship between self-disclosure and the increase of relationship intimacy in CMC versus FtF. This is not surprising as interpersonal attributions suggest something special about the partners' relationship prompted the disclosure. In contrast, when receivers discounted self-disclosures by attributing them either to situational factors or to the sender's personality there was no effect on the disclosure–intimacy link.

Self-disclosure as an interpersonal process

The role of interpersonal attributions in the disclosure–intimacy link also highlights the dynamic and collaborative nature of self-disclosure. Disclosures in social interaction are not a single communication act that can be viewed in isolation

from their interpretation by communication partners. Studies of disclosure and intimacy in online contexts tend to approach relationship intimacy as a direct one-way effect of heightened self-disclosure in CMC (for review, see Joinson & Paine, 2007). In contrast to this approach, the current research emphasizes the importance of partners' interpretations of self-disclosures, such as "why did she share that with me?" In this approach, attributions become part of the meaning assigned to the sender's self-disclosure, which should, in turn, affect the perceiver's responses to the self-disclosure. Future research needs to examine the link between partners' attributions for the sender's disclosures and their subsequent communication behaviors, such as partners' responsiveness in social interaction (Reis & Shaver, 1988).

Importantly, this is one of the few studies in general that has employed the interpersonal attribution category (Newman, 1981). The interpersonal attribution category goes beyond the dispositional-situational attribution framework previously used in FtF studies of self-disclosure (e.g., Harvey & Omarzu, 1997; Town & Harvey, 1981) and is more consistent with recent calls for considering behavior intentionality, the social interaction context, and inferred motives for communication behaviors (e.g., Bazarova & Hancock, 2010). The next step is to examine the effects of perceived intentionality and types of inferred motives (e.g., desires or beliefs) for the sender's self-disclosure on intimacy development in both online and offline settings (see Bazarova & Hancock, 2010).

Limitations

Participants in this study did not know each other and had no expectation of future interaction, which might have limited the context for making interpersonal attributions. Future research should explore a link between self-disclosure and intimacy perceptions in the context of ongoing relationships. Another limitation was the use of female confederates because males and females naturally differ in their self-disclosing styles, and there may be differences in self-disclosure perceptions of males versus females (Derlega & Berg, 1987). Although in this study we did not identify any gender differences associated with disclosure attribution, disclosure perception, or intimacy perception, future research needs to examine a broader range of contexts and types of disclosures with both female and male conversation partners before any conclusions about the role of gender can be drawn. Another concern related to the use of a confederate is that this design may constrain generalizability for the present findings to more naturalistic settings, but this limitation is balanced by the advantage of separating the receiver and sender effects, which is confounded in natural interactions. Finally, the low reliability of the media situation attribution calls for some caution in interpretation. We suspect that this attribution may not be a conscious cognitive process in all media conditions. For example, the salience of mediated channels may stimulate more conscious thinking about media influences relative to the FtF medium given its primacy in communication (Clark, 1996).

Conclusion

The present research advances our understanding of how people interpret messages and develop relationships in CMC. Consistent with the hyperpersonal model (Walther, 1996), the results presented here demonstrate that the disclosure–intimacy link is intensified in CMC relative to FtF, even when self-disclosures are equivalent across media. The results also demonstrate that intensified intimacy in CMC can be driven by changes in the receiver’s perception, rather than only in changes in a sender’s disclosure behaviors. Furthermore, it proposes and validates a new theoretical mechanism for the hyperpersonal model through which high disclosure generates relationship intimacy: While people disclose more intimately in CMC than FtF, the effect of disclosure on intimacy depends on the attributions assigned for the disclosure, with only interpersonal attributions predicting high relationship intimacy.

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Notes

- 1 The η^2 value reported in the study is the partial η^2 statistic, which reflects the proportion of total variance attributable to the factor in the F test, partialling out the effects of other factors.

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