



Mediated disclosure on Twitter: The roles of gender and identity in boundary impermeability, valence, disclosure, and stage



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ABSTRACT

Social media such as microblogs (Twitter™) allow more people to disclose more personal and private information more frequently to more others than ever before. But what is the nature of, and what factors influence, those disclosures? Applying concepts from research and theory on self-disclosure research and microblogging, this study analyses 3751 tweets, with nearly half including disclosures, over a three-day period. At the user level, user-controlled boundary impermeability varied by user gender, feed identity (parenting, social media professional), and their interaction. At the tweet level, tweet valence, presence of disclosure, and front- or back-stage disclosure were variously influenced by user gender, Twitter feed identity, interactions between them, and boundary impermeability. Social construction of gender roles and social identities, as well as individual tendencies, and possibly communication contexts, are reflected in the valence, presence, and stage of disclosures in microblog content.

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1. Introduction

Social media, such as Facebook and Twitter™, blur the lines between the public and private self, dynamically changing the landscape of communication and what we know about others and, in turn, what others are able to know about us. Yet we do not know much about this mediated disclosure. The Internet age offers multiple forms of presenting multiple selves, creating new opportunities for social scientists to study identity and influence, impression management, social support, and other communicative behaviors. Thus the goal of this study is to apply prior research on self-disclosure and microblogging to analyze the nature of and influences on disclosures on the popular microblog Twitter.com by its adult users.

In order to provide a conceptual and research background to this study, the following sections highlight salient aspects of self-disclosure (nature, privacy and boundary management, online and social media, gender, and social identity), leading to a set of hypotheses about how these are related to Twitter disclosures. The review section is longer than typical, because we want to provide a good integration of related research and concepts in this new area of mediated disclosure for both our own and others' research. The subsequent sections describe the methods and results, and discuss the limitations and implications.

2. Self-disclosure

2.1. The nature of self-disclosure

Self-disclosure, or the act of making new or secret information about yourself known to others, has been a focus of social science study since the 1960s. When Jourard (1971) introduced the concept of self-disclosure, he loosely defined it as “the act of making yourself manifest, showing yourself so others can perceive you” (p. 19). In 1973, Cozby conceptualized self-disclosure as personal information verbally communicated to another person, including descriptive information (e.g., one's political party) and evaluative information (e.g., how one feels about the election) that would not otherwise be easily known or discovered. By this standard, all communication includes some level of self-disclosure, be it between strangers or intimate friends. However, multiple definitions, approaches, and operationalizations of self-disclosure exist (Altman & Taylor, 1973; Archer, 1980; Derlega & Berg, 1987; Wheelless & Grotz, 1976). Self-disclosure is typically a gradual, reciprocal exchange process in which one person's disclosure often prompts an equal or even greater disclosure from the other person. Benefits include social control, validation, increased liking and intimacy, and relational maintenance. However, it also makes hidden things known, adding uncertainty to the relationship as “it involves the risk of confiding in others, the responsibility of deeper awareness, and the danger that one's confidences may be breached” (Corcoran & Spencer, 2000, p. 1; see also Baxter, 1988, on self-disclosure and interpersonal relationship dialectics).

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In *The Presentation of Self in Everyday Life* (1959), Erving Goffman used the dramaturgical terms *frontstage* and *backstage* to reflect the manner in which people adjust their *personae* and thus their disclosures to the situation at hand. We reveal our public selves frontstage before an audience and reserve our private selves for backstage with confidantes. In the workplace, the majority of communication is frontstage, and the information we choose to disclose is what is socially comfortable and likely to produce the desired outcome of agency, credibility, and influence within that context. Backstage behavior – or more personally-orientated, private disclosure – is usually reserved for intimate interactions outside of the office, such as the home or a social event, where goals of impression management and relational development may be quite different than in the workplace.

2.2. Self-disclosure, privacy and boundary management

Communication privacy management (CPM) theory was developed to explain the process by which individuals choose to share or disclose private information about themselves with others (Petronio, 2002). CPM has been applied to a variety of interpersonal contexts (family communication, small group communication) and issues (the process of disclosing private information about medical mistakes, HIV/AIDS status, childhood abuse). More recently, CPM has been used by scholars interested in computer-mediated communication; for example, as a framework for understanding the disclosure of financial information at eCommerce sites (Metzger, 2007).

Disclosure is both private and collective, with potential positive and negative consequences for self and others. Once disclosed, information becomes collectively owned and thus subject to multiple sources of coordination and control. Typically people adjust the amount and content of self-disclosure according to whether they are in a frontstage (public self) or backstage (private self) context – that is, they attempt to manage the *permeability of their privacy boundaries*. The term “boundary” is used in CPM as a metaphor for the management of the balance between public and private information.

2.3. Self-disclosure online

A general question raised in researching online disclosures is the extent to which they differ from face-to-face disclosures. Rice and Love, (1987) reviewed theory and research at the time that proposed that due to the lack of richness or social cues of the medium, computer-mediated communication (CMC) disclosures were somewhat limited when compared to face-to-face communication (e.g., see Kiesler, Siegel, & McGuire, 1984). Their analysis of transcripts from a computerized bulletin board for medical professionals revealed, however, that users primarily shared non-personal information, but a considerable amount of socio-emotional content, such as statements showing solidarity, appeared in the postings. More recently, the majority of a sample of MySpace comments also had substantial (about two-thirds) positive emotion (and women gave and received more of them), while a third had negative emotion (Thelwall, Wilkinson, & Uppal, 2010). Similar evidence of CMC fostering socio-emotional as well as innovative communication was also found in other studies (Rice, 1987). For example, CMC increased self-disclosure by patients reporting intimate details of their sexual history, the number of sexual partners and STD symptoms (Robinson & West, 1992). Joinson (2001) observed how strangers involved in task-based discussions via CMC made more personal disclosures than dyads in the face-to-face condition. Further, over-time, blog authors have “increasingly presented themselves by their first name and decreasingly by other means” (e.g., nicknames or pseudonyms) (Herring, Scheidt, Kouper,

& Wright, 2006, p. 12). This represents the apparent comfort people have developed with sharing personal information on the web where anyone can see it, and the diverse ways of doing this. Papacharissi (2013) reviews how the “self” has become more fluid or processual, especially through online social media, which constitute “sites of self presentation and identity negotiation” (p. 207).

2.4. Self-disclosure and social media

Social media such as Internet forums, social networking sites and blogs provide pervasive and continuous opportunities for disclosure, through message content, personal profiles, and shared networks. The percentage of adult Internet users with personal profiles on social networking sites has increased from 8% in 2005 to 65% in 2011 (Pew Internet and American Life, 2011). Nearly 90% describe their desire for friendship (connecting with friends, making plans with friends, making new friends) as their primary motivation. Many have multiple profiles, to help them maintain different boundaries between their personal and professional lives.

Microblogging, or posting short status updates via social media sites such as Twitter.com (which allows only 140 characters or fewer per post), is quickly becoming a popular venue for online, and near-continuous, sharing and often disclosure. As of May 2011, 13% (males slightly more than females) of online adults used Twitter (Pew Internet & American Life Project, 2011). Twitter has become popular with an older, more educated audience, with 62% of its members over the age of 35 years (Quantcast Corp, 2009).

Sharing is one of the fundamental tenets of social media, so in the culture of the Twitterverse, it is expected that messages will be shared and rebroadcast. Boyd (2009) emphasized that while many Twitter postings (*tweets*) may be banal, the purpose is broadly social. Twitter users share varying degrees of private information about their current status. In turn, their followers or other network members may respond to the messages either through the public feed or with a private, direct message. On Twitter, users become the center of a unique social network, one in which reciprocity is invited but not required, and followers of a particular tweeter may range from none to millions.

Microblogging’s asynchronous, one-to-many broadcasting has developed many of the same characteristics of successful online forums and message boards, resulting in an environment which values self-disclosure over privacy. Twitter.com provides each member with their own homepage, and the code to add tweets to a website or blog outside of the Twitter domain. Popular applications have been developed for Facebook and LinkedIn as well, and with the ability to post and receive updates from a mobile phone, Twitter provides continuous awareness of one’s network (O’Reilly & Milstein, 2012; see also (Rice & Hagen, 2010) for a review of this concept, such as perpetual contact, connected presence, continual co-presence, continuous partial attention, etc.). Also, users can update their status on-the-go through mobile phones, and perhaps this may make them more inclined to share information more often.

Microblogging is a relatively new phenomenon and there are few hard and fast rules for using the platform. Even in its short existence Twitter has gone from a toy for social media geeks to an important tool for mainstream media, politicians, corporations, and NGOs, and a central means of keeping in touch with friends and family (O’Reilly & Milstein, 2012). This is illustrated by the changes in the Twitter home page prompt from “What’s happening” to “What are you doing?” to “Find out what’s happening, right now, with the people and organizations you care about”. Thus, gaps may occur between what is technically a public space and how individuals define their personal blogs and social media networking sites as private (Child, Pearson, & Petronio, 2009). Petronio

(2002, Chapter 5) argues that asynchronous communication may disrupt the coordination of privacy management, leading to miscommunication at the time, or later conflict. However, microbloggers with some experience post tweets with a fairly clear understanding of the public, collective nature of their messages. Most Twitter users well understand the asynchronous aspect of tweet communication (although the Twitterverse can diffuse hot topics nearly instantaneously around the world; Kwak, Lee, Park, & Moon, 2010), and may reduce turbulence through threads, retweets, links and other contextualizing factors, though many experience difficulties when first using Twitter or new feeds.

CPM uses the term “private disclosure” instead of “self-disclosure” to draw a distinction from Jourard’s concept, and focuses on the private information disclosed. Thus the content of the tweets sent by microbloggers on Twitter can be considered potential private disclosures. Users have the option to protect or remove their messages from the public feed by changing the settings to private, but most users keep their accounts on the default public setting, while many explicitly include their Twitter hashtag on public “follow” lists. Papacharissi (2013, p. 209) suggests that the varying ways to control, or expose, various aspects of the self through social media allow more user control over the gap between the frontstage and backstage, fostering different types of discussions and impressions. Online disclosures may be employed as tools in crossing boundaries to achieve frontstage impression management (Dominick, 1999; Ellison, Heino, & Gibbs, 2006; Krämer & Winter, 2008; Nardi, Schiano, Gumbrecht, & Swartz, 2004). Social media encourage a higher amount of self-disclosure, and thus more permeable boundaries, than what may be required or socially acceptable in a face-to-face interaction.

Through Twitter, users manage the boundaries of the people and disclosures they want to be exposed to, by following or unfollowing particular other microbloggers. Users with more impermeable boundaries may manage their privacy by being less likely to post tweets that are negative, disclosive, or backstage in nature. Twitter users may construct less permeable boundaries around their messages by selecting the privacy option, limiting who may follow or view their messages, following more people than are following them, and removing their messages from the public feed. They may in turn expose themselves to others’ disclosures by choosing to follow more tweeters. Users who keep the default, public setting have in effect constructed permeable boundaries around their social media self-disclosures. Selecting which feeds to contribute to is also a form of controlling and owning boundary management and related disclosures. Twitter users who broadcast messages in one or more public feeds are making their followers, and the larger public, co-owners of their disclosure, as readers are able to “favorite” or save the messages of those in their network.

Adults using Twitter as a networking tool for professional development, microblogging with their true name and linking to a clearly identifiable blog or website, run the risk of disclosing personal, backstage information to a wide range of unknown others who may access, interpret, share, and respond to that content, in ways that may undermine their efforts to cast themselves in a professional manner. The reader may, on the other hand, be aware of only a small portion of the user’s online publicized self, depending on choice of medium and access to the user’s different social media networks (Papacharissi, 2013).

Likewise, adults using Twitter to facilitate backstage interactions with online peers, such as parent bloggers, or those who microblog incognito, also run the risk of revealing information which may threaten their cloak of anonymity or stimulate judgment from others sharing the same social identity. In studying intimacy on online dating sites, a disclosure topic of a backstage nature, Baker (2005) presented the concept of *hyperhonesty* (or

the large amount of accurate self-disclosure in CMC – a subset of Walther’s, 1996 concept of *hyperpersonal communication*), as her research revealed that many romantic partners felt it easier to share deeply held personal beliefs online. A study of the online dating site Match.com found that people used more self-disclosure and were more honest in their self-disclosure when the other’s identity was known, and that greater amounts, positivity, and intentionality of self-disclosure lead to greater dating success (Gibb, Ellison, & Heino, 2006).

2.5. Self-disclosure, gender, and social media

Derlega et al. (1981) believed that one’s gender plays a role in the content of disclosure, due somewhat to gender stereotypes. They argued that women favor backstage disclosures and the sharing of personal evaluative information about themselves, while men tend to make more frontstage disclosures which facilitate positive impression management. According to Petronio (2002, p. 24), “men and women appear to have distinct sets of rules for judging how revealing and concealing should be regulated. . . . This is not to say that they are precluded from coordinating those rule sets: however, men and women may initially come to an interaction with different visions of how privacy and disclosure work.” Early studies of self-disclosure and gender (Cline, 1986; Cozby, 1973; Rosenfeld, Civikly, & Herron, 1979) reported conflicting findings, as some studies found men disclosed more than women, others observed women disclosing more than men, and still others concluded that men and women disclosed equally. In looking at online romantic relationships, Baker (2005) found that CMC enabled men to feel more comfortable making intimate disclosures to their romantic partners than in face-to-face communication, while women’s disclosures to romantic partners remained relatively the same. Dindia and Allen (1992, p. 117) concluded that there are minor gender differences in amount of self-disclosure, primarily moderated by the gender of the target and by the nature of the relationship or interaction. For example, when women had a relationship with the target, be it romantic or platonic, they disclosed more than men. Although Nosko, Wood, and Molema (2010) found that age and relationship statuses play a role in determining who will disclose, and how much will be disclosed, on Facebook, gender was not a significant influence.

Thelwall et al. (2010) also noted that some blog research found no gender differences, or even opposing results, but their own analysis of MySpace emotional content (2010) concluded that, in general (with variations by context and some cultures), women report stronger emotions, and state them more explicitly, exhibiting more prosocial behavior (Hoffman, 2008), but also more vulnerability-related negative emotions (Brody & Hall, 2008). Particularly relevant is research showing that women are more likely to share their emotions in public spaces (Rime, Mesquita, Philippot, & Boca, 1991). A study of two sets of blogs indicated that the primary subject authored by men is something other than themselves, while women use themselves and their own lives as their subject (e.g., are more self-disclosing; (Herring et al., 2006). (Stern’s 2002) ethnographic content analysis of young women’s (ages 14–17 years old) websites revealed very intimate, backstage disclosures about their lives, including narratives of loneliness, depression, and disappointment, as well as future dreams and hopes. Several feminist scholars see the Internet as uniquely tailored to feminine social interests and communication styles (Plant, 1998; Spender, 1995; Turkle, 1995).

2.6. Disclosure differences by online social identity

Many microbloggers write or blog around particular themes. We consider two social identities (Twitter feeds) that are likely

to differ in influences on disclosure: social media professionals and parents. This variation is particularly important because this study does not analyze a random sample of tweets or Twitter users, but tests a set of hypotheses based on prior research applied to this new context. One recommended approach for reducing the limitations of a small number of cases is selecting cases to “represent the full range of values characterizing X, Y, or some particular X/Y relationship” (Seawright & Gerring, 2008, p. 300). King, Keohane, and Verba (1994, p. 92) recommend avoiding selecting cases on the dependent variable and truncation of the dependent variable, while including variation of the “key causal explanatory variable.” Further, selecting a few such cases is appropriate to provide a more detailed view or a framework for large-sample, more generalizable research (Fearon & Laitin, 2008).

In general, those who microblog about *technology* tend to be early adopters and proficient users of communication technology such as Twitter. In addition *tekhologia*, or the systematic study of technology as defined by the early Greeks, is commonly thought of as impersonal due to its primary focus of applying technology knowledge for practical purposes. A subset of technology specialists, *social media professionals* are well aware that information shared online is widely and publicly available. They would also be more likely to understand that while a tweet may be sent to a specific user or to their network of followers in general, the tweet can be viewed by anyone with access to the Internet now or in the future. Thus it seems reasonable that the social media microblogger who writes about their profession would both be comfortable in using Twitter yet may not disclose as much as other users about some aspects of their career, family, relationships, or self. For example, sharing the trials and tribulations of job hunting might be considered backstage disclosure to be protected from exposure to strangers.

Parent bloggers are a rapidly growing segment drawing particular interest both from other parents interested in learning and sharing their experiences, and from marketers interested in promoting their products through online word of mouth. In 2009, parents made up 43% of Twitter users (Quantcast, 2009). Men and women microblog about their roles as parents and share details of their family life that in most cases would be considered private, backstage information not typically shared with strangers. Unlike professionals, who must worry about their career goals and their professional self-presentation, family bloggers are freer from constraints of how they must appear. Fathers, in the context of their home life where they are focused on child rearing, may have more freedom to share backstage disclosures illustrating the personal, emotional nature of familial relationships than they might in the context of a work, especially technological, environment.

3. Hypotheses

Based on prior research on unmediated and mediated disclosure (especially gender, social identity, boundary permeability, and extent and stage of disclosure), we propose:

H1 (User boundary impermeability). H1a. Males will have greater boundary impermeability than females. H1b. Social media professionals will have greater boundary impermeability than parents. H1c. Male social media professionals will have the highest boundary impermeability.

H2 (Tweet valence). H2a. Tweets by females will have more positive valence than those by males. H2b. Tweets by social media professionals will have more positive valence than parents'. H2c. Backstage tweets will have more negative valence than frontstage ones. H2d. Boundary impermeability will be negatively associated with valence.

H3 (Tweet disclosure). H3a. Females will disclose more than males. H3b. Parent microbloggers will disclose more than social media professionals. H3c. Boundary impermeability will be negatively associated with extent of disclosures.

H4 (Stage of tweet disclosure). H4a. Female microbloggers will make more backstage disclosures than males. H4b. Parent microbloggers will make more backstage disclosures than social media professionals. H4c. Female parent microbloggers will make more backstage disclosures than male social media professionals. H4d. Boundary impermeability will be negatively associated with more backstage disclosure.

4. Methods

4.1. Sample

We sought approximately equal numbers of Twitter users who were male or female, and who had identified themselves as either social media professional or Mom/Dad microblogger. The subjects for the study were identified via WeFollow, the top-ranked user-generated directory of Twitter users, industries and topics. Individual and corporate Twitter users register at www.wefollow.com, or send tweets to @wefollow, with up to three categories for which they would like to register – that is, associating themselves with a public identity, and making their tweets explicitly public. WeFollow represents occupations from nearly every field imaginable, with over one million registered users. It lists registrants' frequency of postings, the number of others who follow their tweets, and the number of others whom the microblogger is following. Seeking comparable samples across the four categories of gender by identity, we used WeFollow to identify the 75 most frequent posters from the “Dad” feed (997 registrants), 75 most frequent from the “Mom” feed (5791), and the 75 most frequent males and 75 most frequent females from the “Social media” (technology professionals) (23019) feed. We explicitly chose the most frequent bloggers within the two main categories as they are the most likely to be comfortable with using Twitter, to understand the implications of social media disclosure, to have the most followers and thus have their disclosures maximally exposed, and to allow analyses that distinguish between user and tweet influences. Note that registrants explicitly chose to identify themselves by their feeds; they may also identify with other feeds, but user names were unique across these two feeds.

Running an online computer script on the Twitter Application Programming Interface, we captured 6705 tweets from the specified microbloggers over the first three days in March, 2010. This period was selected because Twitter traffic increases dramatically during the later part of the month when South by Southwest (SXSW), an international interactive media conference, takes place. Assuming that 5000 tweets would be a substantial sample for hand-coding, a two-thirds random subsample was drawn from this original set, providing 4470 tweets to be analyzed. Several hundred tweets were removed due to unknown errors in the script, duplicates, or incomplete or uninterpretable content, leaving 3751 tweets. Also, because the 300 listed most frequent microbloggers do not send equal numbers of tweets overall, much less by day, these remaining tweets represent 187 unique microbloggers, not evenly distributed across the four (gender by identity) categories.

4.2. Measures

Gender: Male or female microblogger is based on the name and common sense cues in the user's profile page and/or linked

website, as discerned by the user name, photo or common sense information in the bio, user's profile page and/or linked website. **Feed identity** is either **Parent** (Mom/Dad) or **Social media professional**. **Boundary impermeability** is based on the number **Followed** (this tweeter followed by number of others), and the number **Following** (the number of other tweeters this tweeter is following), both obtained from the WeFollow site. Boundary impermeability is the ratio of Followed divided by the sum of Followed and Following. Thus, the higher the percent from 0 to 1, the more boundary impermeability. This measure represents the relative proportional potential of others being exposed to one's disclosures. For example, someone who follows many others but has few followers has a very impermeable boundary, providing proportionally little disclosure to others. Obviously this is not an ideal measure of boundary permeability, which, being personal and contextual, would best be assessed by the sender or even as a relational measure between two people. However, this is not possible in this analysis of Twitter data, though it does take advantage of these system measures provided by WeFollow.

Valence is the general attitudinal tone of the message: **negative** (−1) (dissenting, critical), **neutral** (0), or **positive** (1) (affirming, happy, agreeing). Because valence is not fundamentally a tri- or dichotomous concept, we used the **continuous valence** measure of the mean across coders for each tweet. Presence of **Disclosure** includes **non-disclosure** (0), which does not provide any specific information about the tweeter, while **disclosure** (1) is a disclosure about the self, expressing personal information of a descriptive or evaluative nature. **Stage** involves either **frontstage** disclosure (0), which is a message of impression management, or a message meant to influence how others perceive them, and more public in nature, or **backstage** disclosure (1), which is a message of self-clarification or self-expression, private information of a more intimate nature, including representations of emotional processes, needs, fantasies or self-awareness.

4.3. Coding

We sought to have two sets of two coders code all the sampled tweets, to enable tests for inter-coder reliability and coding of remaining disagreements by consensus. Over two academic terms, we engaged 8 coders, with 97.1% of the tweets coded by 4 coders (the remaining tweets were coded by 1, 2, 3, 5 or 8 coders). This resulted in 14,988 separate codes for the 3751 tweets by the 187 microbloggers. Coders were initially trained biweekly in using and revising the codebook, coding using a separate pilot set of downloaded tweets, and using the specially designed spreadsheet template. Each coder was randomly assigned a proportional number of tweets from each of the 2×2 categories but was not aware of the research questions or hypotheses providing the framework, to avoid bias (Orne, 1975). Subsets of the downloaded tweets in the spreadsheet format were provided to sets of independent coders each week, who then met biweekly to discuss the codes, with ongoing assessment of the coding confusion matrix to clarify coding operationalizations. (If a tweet was "nonoriginal" – that is, those 18% that contained a retweet, link, forwarded query, location update, quotations, or lyrics – and if it included the user's commentary or other text, that portion was coded.)

Table 1 provides example tweets for each coded category. Agreement percent, and 95% confidence interval for the estimated reliability, using the Perreault and Leigh (1989) formula for binary data (as traditional reliability measures are inappropriate for 0/1 codes), for the four hand-coded variables, based on the 97.6% of tweets coded by 4 or more coders, were: Valence (83.8%, 81.0–83.5), Disclosure (88.9%, 87.1–89.3) and Stage (90.9%, 89.1–91.7).

Disagreements were decided by coder majority; in the case of a 50% split, the code was marked as missing.

4.4. Analyses

By the nature of both microblogger behavior and the sampling period, the number of tweets collected varied across individual microbloggers. Thus at the tweet level of analysis, more frequent microbloggers have more tweets in the sample, so for those microbloggers, gender, feed identity, and impermeability ratio have greater influence on the overall relationships and may be auto-correlated. We report descriptive results from both the tweet-level and the user-level. However, we use ANOVAs at the *user level* data for explaining user characteristics (boundary impermeability), and at the *tweet level* for explaining tweet characteristics (valence, disclosure, stage). Each ANOVA includes the hypothesized main, and in some cases interaction or covariate, effects indicated in the respective hypotheses. Because of the possible shared variance within users across their tweets, we also ran multi-level models (using SPSS Mixed Models, ver. 20, with user as the 2nd-level grouping and boundary impermeability as user-mean centered).

5. Results

5.1. Descriptive

Table 2 provides descriptive statistics for the variables, overall and for both genders and for both feed identities. User-level data show that the microbloggers are slightly more women (54.9%) than men, belong largely to the social media professional feed (70.1%), and have slightly over 50% boundary impermeability (a surprisingly even balance). Based on tweet-level data, 35% of the tweets have positive, 57.9% neutral, and 7% negative valence; somewhat less than half (46%) were disclosures; and only 6% were backstage disclosures.

5.2. Hypothesis tests – ANOVAs

As Table 3 shows, over three-quarters (11 of 14) of the hypotheses were supported by ANOVA analyses.

5.2.1. User level of analysis

H1. User boundary impermeability. Both main effects of gender (H1a, men's tweets) and identity (especially H1b, social media tweets), and the interaction (H1c, men's social media tweets), were significant. Because of the significant differences in boundary impermeability, and the relevant hypotheses, the remaining tweet-level analyses include boundary impermeability as a covariate. At the user level, greater boundary impermeability is significantly positively associated with positive valence ($r = .16, p < .05$), but not with disclosure ($r = .05$), or stage ($r = -.05$).

5.2.2. Tweet level of analysis

At the tweet level, greater boundary impermeability is not correlated with valence ($r = -.02$), but is significantly negatively correlated with disclosure ($r = -.14, p < .01$) and stage ($r = -.06, p < .01$). **H2. Tweet valence.** Because of the smaller sample size of tweets including backstage disclosures, we ran two analyses: one without stage, and one with. For the first subanalysis, tweets by females had significantly more positive valence than by males (H2a), but there was no difference by identity (rejecting H2b). Boundary impermeability was unrelated to valence (rejecting H2c). For the second, results were the same for H2a and H2b, but found signifi-

Table 1
Examples of coded tweets.

Valence
Negative valence:

- Displeased with myself today. That is all
- My account has been compromised for 3rd time! Changed PW, but in the event that...well, you know, just disregard:)

Neutral valence:

- I'm curious about Xmarks & if anyone has found benefit from getting reviews on the site?
- Athos, Porthos, Aramis or d'Artagnan? Poet, Pirate, Lover or Dreamer? Which would you be or be enamoured of?

Positive valence:

- Had someone ask how I fixed her broken app so fast and I replied it was magic;-)
- I am so looking forward to eggs dropping from school roofs, HS science projects, and biology!:) #pbskids #gno

Disclosure
Non-disclosure:

- Anyone know which service does auto downsize of basic html site w images 4 mobile users? or ez agent detection/routing script?
- Oregon (or Portland, at least) had specific laws allowing breastfeeding in public

Disclosure:

- Seriously, I think I have to take some Motrin for my arm
- "mean and green" I love the descriptor! <http://bit.ly/dAo2w5> Happy to see Dell pushing the green envelope!:)

Stage
Frontstage:

- Hey @stickergiant? Do y'all have any more of these? It's my fav & I had to carefully xfer it to new laptop <http://twitpic.com/168aqe>
- yum! having some cappuccino chip yummy goodness (@ Kilwin's Ice Cream) <URL>

Backstage:

- Oh Pandora, how you read my mind, how you know just exactly what songs to play. You're whipping up a soundtrack for my aching heart
- Mom arrives today. Need her so badly. Will most likely sob upon seeing her face

cant effects for both impermeability and stage (supporting H2c and H2d).

H3. Tweet disclosure: Tweets included more disclosure by females (H3a), and by social media professionals (rejecting H3b), and with less boundary impermeability (H3c). **H4. Stage of tweet disclosure:** Tweets by females (H4a), but not by parents (rejecting H4b), had more backstage disclosures. Female parent microbloggers made more backstage disclosures than did male social media professionals (H4c), though the actual difference was due to fewer backstage disclosures by male social media microbloggers than the other three categories. Boundary impermeability was not associated with stage (rejecting H4d).

5.3. Hypotheses tests – multi-level models

Results of the multi-level models, Table 4, show that the random intercept was significant in each tweet-level model (e.g., valence with an Intraclass Coefficient of 10.1% or 10.7%, disclosure with 8.0%, and stage with 6.7%). This means that the intercepts of the dependent variables varied across users. Though this amount of variance is small, it did reduce the significance of some of the explanatory variables, so that about half (5 of 11) of the tweet-level hypotheses were supported through this more rigorous approach. The F-ratios in the mixed model results were notably different only in the case of the greater influence of feed identity and boundary impermeability on extent of disclosure in the ANOVAs, and of the significant influence of identity on valence in the mixed model. That is, the influence of feed identity and boundary impermeability on disclosure in tweets is primarily a user-level trait, while the influences on valence and stage are not.

6. Discussion

6.1. Implications

6.1.1. Boundary impermeability

While perhaps not the best measure of microblogger user-controlled boundary impermeability, the followed-to-total ratio indicates that users overall have a fairly even balance between

inward and outward exposure to Twitter disclosures, regardless of their overall level of tweeting. As predicted, males, social media professionals, and especially the combination, have more impermeable boundaries. Impermeability is associated with less disclosure, but not stage (though the number of backstage cases was very low). The less one is relatively open to other tweeters' content, the less disclosing one is. Indeed, one possible explanation for the lack of influence of the user level in the multi-level models – in the form of rather low shared variance among tweets by an individual user and the persistence of many of the significant influence in the ANOVA analyses – may be that variance across tweet contexts is greater than any consistency of individual style (except for extent of disclosure). Indeed, Nguyen, Bin, and Campbell (2012) also rejected any clear relationship between channel and disclosure, arguing for the potential moderating influences of factors such as communicator relationship, communication mode, and interaction context. Analysis of 2009 Pew survey data showed that online trust increased, while perception of privacy risks reduced, the disclosing of personal identifiable information (Mesch, 2012). Suler (2004) identified six major influences on online disclosure (“dissociative anonymity, invisibility, asynchronicity, solipsistic introjection, dissociative imagination, and minimization of authority”, p. 321), as well as personality factors, so it is misleading to claim a simple relationship between being online/offline and disclosure. In general, though, boundary impermeability is a substantively and empirically important factor to consider even in mediated disclosure.

6.1.2. Gender differences

Most of the differences in boundary impermeability, valence, disclosure and stage followed expectations based on prior research and CPM. That is, females had more positive valence, and disclosed more overall and more backstage material. To some extent, then, tweets by females seem to reflect a societal gender role as more nurturing and emotional, whether in the workplace or the living room. Men's role in society may not be as readily accepting of public, especially backstage, disclosures and perhaps this contributes to male differences in patterns of disclosure. Possibly men feel a greater need to manage their professional

Table 2
Descriptive statistics for gender, feed identity, and overall, at user-level and tweet-level.

Variable	User-level						Tweet-level					
	Sex		Feed identity		All		Sex		Feed identity		All	
	M	F	SocMed	Par	Overall	N	M	F	SocMed	Par	Overall	N
Gender	–	–	.50 (.50)	.54 (.50)	.51 (.50)	187	–	–	.49 (.50)	.68 (.47)	.55 (.50)	3746
Male 0	–	–	50.4%	46.4%	49.2%		–	–	50.9%	31.7%	45.1%	
Female 1	–	–	49.8	53.8	50.8		–	–	49.1	68.3	54.9	
Feed identity	.28 (.45)	.32 (.47)	–	–	.30 (.46)	187	.21 (.41)	.38 (.48)	–	–	.30 (.46)	3746
Social media 0	71.7%	68.4%	–	–	70.1		78.8%	62.5%	–	–	69.9	
Parent 1	28.3	31.6	–	–	29.9		21.2	37.5	–	–	30.1	
Boundary – followed					93906.7 (313359.0)	187					128009.7 (387330.7)	3746
Median	–	–	–	–	7035.0		–	–	–	–	9046.0	
Range	–	–	–	–	0–2006845		–	–	–	–	0–2006845	
Boundary – following					6816.8 (7066.6)	187					12994.4 (11748.7)	3746
Median	–	–	–	–	4512.9		–	–	–	–	8275.0	
Range	–	–	–	–	55–44222		–	–	–	–	55–44222	
Boundary impermeability	.62 (.32)	.44 (.28)	.68 (.25)	.19 (.16)	.53 (.32)	187	.63 (.31)	.35 (.25)	.61 (.26)	.16 (.14)	.47 (.31)	3746
Valence (mean of –1, 0, 1)	.19 (.22)	.27 (.28)	.27 (.25)	.15 (.26)	.23 (.26)	186	.17 (.4)	.29 (.49)	.24 (.46)	.22 (.48)	.24 (.47)	3747
Disclosure	.41 (.27)	.56 (.24)	.50 (.26)	.46 (.27)	.48 (.26)	168	.40 (.49)	.50 (.50)	.47 (.50)	.43 (.50)	.46 (.50)	3229
Non-disclosure 0	57.6	44.1	48.9	53.8	50.4		60.3	49.9	52.8	57.5	54.2	
Disclosure 1	42.4	55.9	51.1	46.2	49.6		39.7	50.1	47.4	42.5	45.8	
Stage	.04 (.13)	.09 (.17)	.06 (.14)	.09 (.18)	.06 (.15)	107	.03 (.18)	.08 (.27)	.06 (.23)	.08 (.27)	.06 (.24)	1987
Frontstage 0	94.5	90.9	93.4	89.8	92.3		96.5	92.1	94.3	92.3	93.7	
Backstage 1	5.5	9.1	6.6	10.2	7.7		3.5	7.9	5.7	7.7	6.3	

Note: Cell values are mean, (s.d.), or category percentages. Values for each gender and each feed identity are based on their respective subsample Ns, not on the overall N.

Table 3
Analysis of Variance Results of Effects of Gender and Feed Identity on Boundary Impermeability (User Level), and Valence, Disclosure, and Stage (Tweet Level).

	User level				Tweet level									
	Imperm-eability		Valence		Valence w/stage		Disclosure		Stage					
	F	η^2	F	η^2	F	η^2	F	η^2	F	η^2	F	η^2		
A. ANOVA F-ratios														
Intercept	715.4***	.80	17.8***	.02	1.4	.001	665.0***	.17	24.7***	.01				
Gender	10.6***	.06	61.8***	.02	14.5***	.007	18.9***	.006	6.3*	.003				
Identity	221.7***	.55	1.9	.001	.74	.000	22.6***	.007	3.0	.002				
Inter-action	16.9***	.09	–	–	–	–	–	–	4.4*	.002				
Imperm-eability	–	–	1.4	.000	1.9**	.004	10.6***	.003	.07	.000				
Stage	–	–	–	–	89.1***	.04	–	–	–	–				
Overall F	89.4***	.59	23.6***	.02	28.7***	.06	19.9***	.02	5.4***	.01				
df	3,183	–	4,3728	–	4,1981	–	3,3225	–	4,1982	–				
	User level				Tweet level									
	Imperm-eability		Valence		Valence front stage		Valence back stage		Disclosure		Stage			
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
B. Estimated Marginal Means (and Standard Errors) for ANOVAs														
Social Media	.79 (.03)	.56(.03)	.16 (.02)	.31 (.01)	.30 (.03)	.40 (.02)	–.16 (.05)	–.06 (.05)	.45 (.02)	.53 (.01)	.02 (.01)	.08 (.01)		
Family	.18 (.04)	.21 (.04)	.15 (.03)	.27 (.02)	.27 (.03)	.37 (.03)	–.19 (.05)	–.09 (.05)	.33 (.02)	.41 (.02)	.08 (.02)	.08 (.01)		

* $p < .05$.

** $p < .01$.

*** $p < .001$.

impression by limiting their disclosure, even in a public medium such as Twitter.

6.1.3. Feed identity

However, of the three hypotheses rejected in the ANOVA analyses (H2b, H4b, and H4d) two were related to a lack of differences between the two feed identities on valence and stage. Even though boundary impermeability was higher for social media microbloggers, their tweets were no less positive than those by parents. Further, social media microbloggers disclosed *more* overall than did parent microbloggers, and did *not* provide fewer backstage disclosures (though this is partially due to the small number of backstage disclosures). This may be due to the highly constrained nature of tweets, forcing users to provide focused, novel and even disclosive content, or to the social nature of the technology topics being discussed by social media professionals.

6.2. Limitations

Given our theoretical concerns and constraints on resources, we specifically chose just two feed identities, to represent as maximal as possible theoretical variance in likelihood of kinds of disclosure and interaction with the gender of the user, within a short period of time. Along with the time-specific and frequent-user nature of the microbloggers selected, of course this sample and the results are not generalizable to other feed identities or microbloggers (and perhaps even less so as the nature of Twitter continues to evolve). The usual qualifications about causality might apply, except that gender, feed identity, and boundary impermeability are all either fixed and/or prior user attributes, while valence, content, disclosure and stage are based on tweets produced conceptually subsequent to those attributes.

As the tweets analyzed here come from the public feeds established by their authors – that is, those intending and even advertising a public orientation – they cannot of course reflect influences of or on less public Twitter privacy settings. Therefore the measure of boundary impermeability used here cannot reflect more fundamental distinctions created by various privacy choices. For example, users who allow only close friends to follow them – that is, have the lowest boundary permeability – may well engage in more backstage disclosure, possibly with more negative valence.

Further, this study does not assess how readers *evaluate* or *respond* to the disclosures. We do know, however, that publicly disclosed Facebook content (e.g., status updates and wall posts) seem to generate lower perceptions of message and relational intimacy than do private (private messages) disclosures, and publicly shared intimate disclosures are perceived as less appropriate than privately disclosed tweets (Bazarova, 2012). While, as noted earlier, Twitter has become immensely popular (and in a very short time), its meanings and forms have evolved since its introduction – from interactive conversation to one-way information and mass publishing – and are still in flux (Van Dijck, 2013). Twitter is becoming more and more integrated within and easily linked to and from other media, and conveys more mainstream content (such as news feeds, celebrity updates, mass publishing). Therefore its public/private combinations, uses, and kinds of disclosure may well change too.

6.3. Future research

Larger samples and more detailed coding would allow for description and analysis of types of non-disclosure (e.g., location updates, queries, providing information), frontstage disclosure (e.g., impression management, agency) and backstage disclosure (e.g., emotion and emotional processes, needs, fantasies/dreams/hope, self-awareness). Longer-term data collection would allow for order/sequence effects, such as positive/negative responses (backlash vs. support) to types of prior disclosures. Such over-time data might identify patterns of evolution of online user disclosure. Additional feed identities might provide more insight into levels and types of disclosure. For example, health care providers might be a type of professional category that supports/requires more disclosure in general and more backstage disclosure in particular. A deeper analysis of the application of communication privacy management to mediated, microblog disclosure would involve contacting a random sample of the microbloggers, again stratified by gender and appropriate feed, and surveying them about their perceptions of the boundary suppositions and privacy rule management processes associated with their coded tweets. Finally, there are of course many other influences on men's and women's emotional tendencies, and thus their offline and online disclosure, such as culture and gender-role expectations, linguistic affiliative or

Table 4
Mixed models results of effects of gender and feed identity on valence, disclosure, and stage (tweet level).

	Valence		Valence w/stage		Disclosure		Stage			
	Null	Fixed	Null	Fixed	Null	Fixed	Null	Fixed		
<i>A. Tests of fixed effects, covariance parameters, model Fit</i>										
Fixed										
Intercept	$F = 237.7^{***}$.23 ^{***,a}	$F = 186.8^{***}$.24 ^{***}	$F = 244.6^{**}$.31 ^{***}	$F = 10.6^{***}$ -.13 [*]	$F = 960.0^{***}$.46 ^{***}	$F = 821.3^{***}$.49 ^{***}	$F = 64.4^{***}$.064 ^{***}	$F = 58.3^{***}$.084 ^{***}		
Gender	–	$F = 15.0^{***}$ –	–	$F = 4.7^{*}$	–	$F = 14.6^{***}$	–	$F = 4.2^{*}$		
Identity	–	$F = 3.7$ $p = .06$	–	$F = 5.5^{*}$	–	$F = 1.2$	–	$F = 2.7$		
Interaction	–	–	–	–	–	–	–	$F = .23$		
Interm-eability	–	$F = .02$	–	$F = 1.5$	–	$F = 1.2$	–	$F = .31$		
Stage	–	–	–	$F = 81.8^{***}$	–	–	–	–		
Covariance										
Residual	.196 ^{***}	.196 ^{***}	.26 ^{***}	.25 ^{***}	.23 ^{***}	.23 ^{***}	.056 ^{***}	.056 ^{***}		
Intercept	.022 ^{**}	.019 ^{***}	.031 ^{***}	.027 ^{***}	.02 ^{***}	.017 ^{***}	.004 ^{***}	.003 ^{**}		
Model fit										
df	3,3770	6,3727	3,1983	7,1979	3,3746	6,3747	3,1984	7,1980		
BIC ^b	4712.0	4705.5	3106.4	3021.3	4588.5	4574.3	23.1	20.6		
Diff/df	–	10.1/3 [*]	–	85.1/4 ^{***}	–	9.2/3 [*]	–	2.5/4		
ICC	10.1%	–	10.7%	–	8.0%	–	6.7%	–		
	Valence		Valence front stage		Valence back stage		Disclosure		Stage	
	M	F	M	F	M	F	M	F	M	F
<i>B. Estimated marginal means (and standard errors)</i>										
Social media	.18 (.02)	.30 (.02)	.32 (.03)	.40 (.03)	-.12 (.06)	-.03 (.05)	.42 (.02)	.53 (.02)	.02 (.01)	.08 (.01)
Family	.13 (.03)	.24 (.03)	.22 (.04)	.30 (.04)	-.21 (.06)	-.13 (.06)	.38 (.03)	.49 (.03)	.08 (.02)	.09 (.02)

* $p < .05$.

** $p < .01$.

*** $p < .001$.

^a Estimates of fixed effects shown only for Intercept.

^b BIC: Schwarz's Bayesian Criterion (Schwarz, 1978), which penalizes for more complex models, unlike the -2 restricted log linear measure of model fit.

assertive tendencies, and evolutionary-based language development (Tang & Wang, 2012).

7. Conclusion

The results provide good support for hypotheses about relationships between gender and Twitter feed identity on some mediated disclosure and boundary management issues derived from interpersonal disclosure theory and microblog research. Differences in mediated disclosure may be to some extent influenced by how gender and online identity are socially constructed, and a balance between individual traits and communicative contexts. However, even the very constrained and mediated communication via Twitter reflects interpersonal propositions about disclosure and communication privacy management. Social media provide a rich environment for applying and extending traditional communication theories and research.

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