

**Emotional Disclosure on Social Networking Sites: The role of Network Structure and
Psychological Needs**

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1 **Emotional Disclosure on Social Networking Sites: The Role of Network Structure and**
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4 **Psychological Needs**

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8 **Abstract**

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10 We conducted three studies to understand how online emotional disclosure is
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12 influenced by social network structure on Facebook. Results showed that emotional
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14 disclosure was associated with both the density and size of users' personal network.
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16 Facebook users with denser networks disclosed more positive and negative emotions, and the
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18 relation between network density and emotional disclosure was mediated by stronger need
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20 for emotional expression. Facebook users with larger networks on Facebook disclosed more
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22 positive emotions, and the relation between network size and emotional disclosure was
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24 mediated by a stronger need for impression management. Our study extends past research by
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26 revealing the psychological mechanisms through which personal social network structure
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28 influences emotional disclosure. It suggests that social network size and density are
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30 associated with different psychological needs, which in turn lead to different patterns of
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32 emotional disclosure.
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1. Introduction

Emotional disclosure occurs naturally in everyday life (Moreno, et al., 2011; Rimé, 2009; Rimé, Finkenauer, Luminet, Zech, & Philippot, 1998; Rimé, Mehdizadeh, Philippot, & Boca, 1991; Rimé, Philippot, Boca, & Mesquita, 1992). People frequently disclose their positive and negative emotions (Rimé, et al., 1991), because self-disclosure is intrinsically rewarding (Csibra & Gergely, 2011; Tamir & Mitchell, 2012; Tomasello, 2009) and can improve interpersonal intimacy (Derlega, Winstead, Wong, & Greenspan, 1987; Laurenceau, Barrett, & Pietromonaco, 1998; Laurenceau & Kleinman, 2006). Nowadays, with the widespread use of social networking sites (SNSs) such as Facebook, people can easily share their emotions with a wide audience (Boyd & Ellison, 2007; Köbler, Riedl, Vetter, Leimeister, & Krcmar, 2010). Research has shown that emotional expressions are ubiquitous on SNSs (Carr, Schrock, & Dauterman, 2012; Facebook, 2010; Kivran-Swaine & Naaman, 2011; Naaman, Boase, & Lai, 2010), and their overall pattern matches seasonal mood changes (Golder & Macy, 2011). However, it remains unclear what factors influence users' emotional disclosure on SNSs. Studies have explored the relation between online network structure and emotional disclosure. The density of one's personal network was found to predict the amount of time spent on Facebook and the number of messages posted (Park, Lee, Kim, 2012). Network size was found to be negatively correlated with the number of emotion words in Facebook status updates (Facebook, 2010). However, it was found that network density negatively and network size positively predicted emotion words in tweets (Kivran-Swaine & Naaman, 2011). These inconsistent findings prompt for more research on why and how social network structure influences emotional disclosure.

1 Self-disclosure has been considered as a function of contextual properties such as
2
3 relationship quality and communication context (e.g., Haythornthwaite, 2005; Park, Lee, &
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5 Kim, 2012; Walther, 1996, 2007), as well as a function of psychological motives and
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7 characteristics (e.g., Gross & John, 1995; Kring, Smith, & Neale, 1994). Furthermore, the
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9 relation between communication partners can influence communication needs
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11 (Haythornthwaite, 2005) and communication style including the breadth, length, and depth of
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13 self-disclosure (Omarzu, 2000). It is possible that users' network structures on Facebook
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15 influence their communication needs and affect their emotional disclosure pattern.
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21 Research has shown that Facebook communication is likely driven by two
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23 motivational forces. First, individuals use Facebook to maintain and improve social
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25 relationships (Ellison, Steinfield, & Lampe, 2007). Since emotional disclosure can foster
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27 interpersonal connectedness (Sheldon, Abad, & Hinsch, 2011), individuals are motivated to
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29 express their emotions to maintain their relatedness to others. Second, Facebook is a platform
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31 for self-presentation (Mehdizadeh, 2010; Papacharissi, 2011). Users are motivated to use
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33 impression management strategies to create socially desirable self-images (Ellison, Heino, &
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35 Gibbs, 2006; Qiu, Lin, Leung, & Tov, 2012; Siibak, 2009; Strano, 2008; Zhao, Grasmuck, &
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37 Martin, 2008). Therefore, emotional disclosure on Facebook is likely to be influenced by the
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39 need for emotional expression and need for impression management.
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45 In this research, we investigate the underlying mechanisms of how social network
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47 structure influences the need for emotional expression and the need for impression
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49 management, and lead to the pattern of emotional disclosure. Findings from this research are
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51 expected to shed light on the influence of social network structure on user behavior and
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53 enrich the knowledge of the social processes of emotional disclosure. First, we compare the
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55 pattern of emotional disclosure on Facebook with disclosure in a less social context to reveal
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57 how the presence of a familiar audience affects emotional disclosure. Second, the link
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1 between contextual factors on Facebook and emotional disclosure will be highlighted
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3 quantitatively. Most importantly, the motivational factors will be uncovered and
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5 disentangled, so that the socio-psychological meaning of the social network context can be
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7 better understood.
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10 **2. Literature review**

11 *2.1. Emotional Disclosure on Facebook*

12 While emotional sharing is self-rewarding (Csibra & Gergely, 2011; Tamir &
13 Mitchell, 2012; Tomasello, 2009), the theory of social sharing of emotion suggests that it can
14 also stimulate social interaction and improve interpersonal connection (Laurenceau, et al.,
15 1998; Moscovici, 1984; Rimé, 2009; Rimé, et al., 1998; Rimé, et al., 1991). Both positive
16 and negative emotion are frequently shared in daily life (Gable, Reis, Impett, & Asher, 2004;
17 Rimé, 2009; Rimé, et al., 1998; Rimé, et al., 1991; Rimé, et al., 1992; Sedikides, Skowronski,
18 & Gaertner, 2004). Positive emotional sharing elicits positive feedback from others (Diener,
19 2000) and facilitates social interactions (Augustine, Mehl, & Larsen, 2011). It allows one to
20 re-experience and enhance the positive emotion (Langston, 1994; Rimé, 2007, 2009). This
21 capitalization of positive emotions has been found to produce prolonged hedonic feelings
22 (Mauss, et al., 2011; Tugade & Fredrickson, 2007), higher levels of somatic activity and
23 amusement (Gross & Levenson, 1997), and better life satisfaction and interpersonal
24 relationships (Gable & Reis, 2010; Gable, et al., 2004).
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47 Negative emotional sharing may reduce the intensity of fear (Langens, 2005), traumatic
48 stress (Greenberg & Stone, 1992), and depression (Radcliffe, Lumley, Kendall, Stevenson, &
49 Beltran, 2010). It can also relieve the stress of suppressing negative feelings and allow
50 reappraisal of the negative experience (Pennebaker, 1997; Pennebaker & Beall, 1986; Rimé,
51 2009). In addition, sharing negative emotions can improve relational intimacy by reinforcing
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1 the discloser's trust in others and eliciting social support, alternative perspectives, and advice
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4 from listeners (Graham et al., 2008; Sedikides, et al., 2004).
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6 Although the above research has highlighted the social motivation underlying
7
8 emotional sharing, few studies have compared emotional disclosure to a familiar and
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10 responsive audience like that on Facebook, with disclosure to an unfamiliar audience. This is
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12 an important comparison to make because some of the purported benefits of social sharing
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14 (e.g., reinforcing trust and intimacy) imply the need for an audience that is familiar and
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16 responsive, whereas other benefits (e.g., reliving positive experiences and relief from
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18 suppressing negative feelings) do not. Thus, one could argue that the motivation for social
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20 sharing of emotion is purely hedonic and “nonsocial”—in which case, emotional disclosures
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22 on Facebook would be no different from disclosures to strangers or even those made
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24 privately as in a journal. We provide such a comparison in the present paper to examine the
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26 difference between emotional disclosure on Facebook and in a more restricted social context
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28 in which participants shared their experiences with an unfamiliar audience (i.e., a small team
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30 of researchers), with no expectation of a response or reaction. According to the theories of
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32 social sharing of emotion, one would expect more emotional disclosure on Facebook than in
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34 a more restricted context (H1). However, if the motivation for sharing emotions is purely
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36 hedonic, one would expect little difference between the two.
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45 2.2. *Social Network Analysis: Size and Density* 46

47 Social network analysis has long been recognized as an important tool to understand
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49 how social network structures influence socio-psychological behaviors (Borgatti, Mehra,
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51 Brass, & Labianca, 2009; Hogan, 2007). It has been applied in a number of social science
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53 domains including organizational behavior (Zou, Ingram, & Higgins, 2010), sociology (e.g.,
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55 Burt, 2001b), communication (Garton, Haythornthwaite, & Wellman, 1997), economics (e.g.,
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57 Burt, 2001a), and psychology (Leavitt, 1951).
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1 Ego-centered network analysis is commonly used in the study of personal social
2 networks (Johnson, 1994). It focuses on a focal individual known as the “ego” and analyzes
3 the network connections of the individual. Two key variables in ego-centered network
4 analysis are network size and network density (Borgatti, Jones, & Everett, 1998). Network
5 size refers to the total number of members in a network (e.g., the total number of friends one
6 has on Facebook). It reflects the quantity of connections and is related to the amount of
7 resources one can gain from the network (Hanneman & Riddle, 2005).

8 Network density represents the extent to which members in a social network are
9 connected to each other. It indicates the quality of interpersonal relations in the network
10 (Hogan, 2009). Network density is calculated by dividing the total number of existing
11 connections between all nodes in the network over all possible connections. The value of
12 network density approaches ‘0’ in extremely sparse networks where few members are
13 connected, and ‘1’ in extremely dense networks where everyone is connected to each other.
14 According to the principle of triadic closure (Granovetter, 1973), for three persons, A, B, and
15 C, if A is closely connected to B and C, B and C are likely to be closely connected as well.
16 This suggests that in a dense network, members are more likely to be close friends and know
17 each other, creating a socially coherent community (Marsden, 1990; Reagans & McEvily,
18 2003). They are likely to have more bonding social capital such as social support and trust
19 from each other (Kilburn, 2011; Lin, 1999).

20 Past research has shown that network structure can predict individual attitudes and
21 behaviors (Golubović, 2009). Greater network density of a team is associated with managers’
22 poorer performance (Burt, 2001b). Network size predicts trust between strangers (Macy &
23 Skvoretz, 1998), frequency of telephone, email, and instant messaging use (Dimmick et al.,
24 2007), and probability of blog use for relationship maintenance (Stefanone & Jang, 2007).
25 One’s social network on Facebook typically includes close friends, average friends, and mere
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1 acquaintances (Leung, 2002). Users usually do not direct their postings to a particular group
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3 of people, making their information available to a mixed audience. The publicness, non-
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5 directness, and mixing of social circles make Facebook a complex social environment
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8 (Bazarova, Taft, Choi, & Cosley, 2013). As research has long recognized that communicative
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10 contexts can influence communication style (Culnan & Markus, 1987; Gasiorek, Giles,
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12 Holtgraves, & Robbins, 2012; Walther, 1992, 2012), it is likely that users' social network
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14 structure on Facebook will influence their emotional disclosure.
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17 18 2.3. *Underlying Motivational Needs* 19 20

21 Network characteristics have been found to be associated with the communication
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23 needs of Facebook users (Park, Lee, & Kim, 2011). Users who have low relational intimacy
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25 among their friends in their networks tend to lurk without self-disclosure (Rau, Gao, & Ding,
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27 2008). In contrast, those who have close social connections actively share their experiences to
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29 further strengthen their ties (Köbler et al., 2010; Sheldon, Abad, & Hirsch, 2011). As
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31 emotional disclosure has been found to be associated with the need to share and the motive to
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33 conform to inhibitory display rules (Parkinson, 2005), we hypothesize that network
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35 characteristics influence emotional disclosure via two psychological needs, the need for
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37 emotional expression and the need for impression management. Need for emotional
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39 expression refers to the tendency to share emotions with others (Fridlund, 1991a, 1991b,
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41 1994; Rimé et al., 1991). Need for impression management refers to the motivation to convey
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43 a favorable self-image to others (Leary, Allen, & Terry, 2011; Leary & Kowalski, 1990;
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45 Martin, Leary, & Rejeski, 2000).
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52 2.3.1. *Network Density and Need for Emotional Expression* 53 54

55 A dense social network usually consists of close friends who are interconnected and
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57 know each other (Burt, 2000; Burt, 2001a). Members in denser networks receive more social
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59 support (Wellman, Carrington, & Hall, 1997) and long-term assistance (Walker, Wasserman,
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1 & Wellman, 1994), and their interpersonal communication is more intimate (Burt, 2001b).
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4 Not only might members feel more comfortable initiating disclosures, they might also be
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6 induced to *reciprocate* the disclosures they receive from other members (Cozby, 1973). It has
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8 been found that members of a denser network share more information (Reagans & McEvily,
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10 2003) and post more messages on Facebook (Park, Lee, & Kim, 2012). They are likely to
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12 have a stronger need to share emotions to maintain interpersonal connection and improve
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14 social support and trust. Sparse networks, on the contrary, are comprised of diverse social
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16 circles with distinct social roles (Burt, 1992). Members may not know each other well and
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18 may not have a strong need to share their personal feelings to a diverse audience. Therefore,
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20 we hypothesized that Facebook users with denser personal networks disclose more emotions
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22 (both positive and negative) (H2), and the relation between network density and emotional
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24 disclosure is mediated by stronger need for emotional expression (H3).
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30 2.3.2. *Network Size and Need for Impression Management*

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33 Past research has shown that that individuals are concerned about impression
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35 management when they are in public (Leary & Kowalski, 1990). Those with larger social
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37 networks have more impression management concerns (Hogan, 2010b), because a large
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39 network is likely to contain a variety of members ranging from close to distant friends, and
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41 distant friends are more sensitive to inappropriate behaviors than close friends (Buck, Losow,
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43 & Murphy, 1992). As social network size increases, overall satisfaction with social
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45 networking decreases due to higher levels of social constraint (Burt, 2001a; Izquierdo &
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47 Hanneman, 2006; Wasserman & Faust, 1994), greater interpersonal stress (Riley &
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49 Eckenrode, 1986), and an increasing need to adjust one's behaviors to meet the desired
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51 expectations of the audience (Stokes, 1983).
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57 To maintain a good public image, Facebook users have been found to use the lowest
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59 common denominator principle by sharing information that is acceptable to all members of
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1 their network (Bazarova, et al., 2012). Emotional disclosure can be used as a strategy for
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3 impression management. Sharing positive emotion can lead viewers to have a good
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5 impression of one's emotional well-being, while sharing negative emotion may harm self-
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7 image because the general public prefers positive over negative emotions (Ekman & Friesen,
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9 1975). Frequent display of negative emotion may also lead to the impression that one is
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11 incapable of self-control and emotion regulation (Gross, Richards, & John, 2006). Therefore,
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13 Facebook users with a larger number of friends are expected to disclose more positive and
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15 less negative emotion for impression management. Therefore, we predict that users with a
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17 larger social network on Facebook disclose more positive and less negative emotions (H4),
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19 and the relation between network size and emotional disclosure is mediated by stronger need
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21 for impression management (H5).
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27 2.4. *Overview of the current research*

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29 We conducted three studies to investigate the above hypotheses. First, we tested a
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31 basic prediction from social sharing of emotion theories that people are *socially* motivated to
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33 disclose emotions by comparing Facebook status updates with a writing sample where
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35 participants reported to researchers about their daily experiences (Study 1). Second, we
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37 examined two fundamental characteristics of social networks on Facebook, size and density,
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39 and their association with emotional disclosure (Study 2). Finally, we examined more closely
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41 our prediction that the relation of network size and density with emotional disclosure is
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43 mediated by different psychological mechanisms (Study 3).
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50 3. Study 1

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52 Study 1 aims to understand how the social context of Facebook affects users'
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54 emotional disclosure by comparing Facebook status updates with brief daily diary entries. A
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56 comparison between the two writing samples could shed light on how the social context of
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58 Facebook influences emotional disclosure.
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3.1. Method

3.1.1. Participants and procedure

Participants were 441 undergraduate students from two large universities. The Facebook sample consisted of 230 students (68 males, 162 females; mean age = 20.96, $SD = 1.64$) who consented to share their Facebook status updates for research participation credits. We used a Facebook application called “I told you” (<https://apps.facebook.com/itoldyou/>) to download their Facebook status updates. The daily diary sample consisted of 211 students (88 males, 123 females; mean age = 21.60, $SD = 1.68$). Participants logged into a website and reported two experiences to researchers that occurred during the day for 21 days.

3.1.2. Measures

We used Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, & Francis, 2007) — a text analysis software—to examine emotional disclosure in our writing samples. LIWC was initially developed to understand contents in expressive writing and has been intensively validated (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007). It is now widely used to capture a wide variety of psychological constructs from writing samples by counting the number of words in predefined categories (Tausczik & Pennebaker, 2010). These word categories were developed based on psychological measurement scales and thesauruses, and validated by independent judges (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007). Two word categories, positive emotions (e.g., love, nice, sweet) and negative emotions (e.g., hurt, ugly, nasty), contain words indicate the expression of positive and negative emotion respectively. They had a sensitivity value of 0.88 and specificity value of 0.97 (Bantum & Owen, 2009), and have been found to predict self-reported emotional experiences (Tov, Ng, Lin, & Qiu, 2013). Studies have used positive and negative emotion word categories to measure emotional expressions in Facebook status updates to estimate gross national happiness (Kramer, 2010) and emotional contagion (Kramer, Guillory, &

Hancock, 2014), and in tweets to understand temporal mood patterns (Golder & Macy, 2011) and compare the mood between Christians and atheists (Ritter, Preston, & Hernandez, 2014).

3.2. Results

A total of 73,594 words were collected in the diary sample. Each diary participant generated an average of 348.79 words with 8.30 words per entry. The Facebook participants differed in the total amount of status updates they posted. As LIWC counts the percentage of word occurrence over the *total* word count, its result can be greatly influenced by the total word count of a writing sample. Therefore, to make the total word count in the Facebook sample comparable to the diary sample, we randomly selected 28 status updates from each Facebook user. This resulted in a total number of 74,039 words, with an average of 321.91 words per person and 11.80 words per status update, similar to the diary sample. LIWC codings of the subset correlated strongly with the entire set of Facebook status updates, $r(228)$'s = .84 and .82 for positive emotion and negative emotion respectively ($p < .05$). We also applied LIWC analysis to the diary sample.

A repeated-measured analysis was carried out with emotion valence (positive vs. negative) as a within-subject factor and writing condition (Facebook vs. diary) as a between-subject factor. As Figure 1 illustrates, emotion valence had a significant main effect on word frequency, $F(1, 439) = 342.28, p < .001, \eta^2 = .44$, with participants disclosing more positive emotion ($M = 5.82, SD = 2.90$) than negative emotion in both samples ($M = 3.13, SD = 1.96$). There was also a main effect of the writing condition, with greater emotional disclosure in Facebook status updates ($M = 5.34, SD = 2.45$) than daily diary entries ($M = 3.53, SD = 2.44$), $F(1, 439) = 122.14, p < .001, \eta^2 = .22$. The interaction effect between emotion valence and writing condition was not significant, $F(1, 439) = 1.58, p = .21, \eta^2 = .004$. Univariate analysis showed that Facebook status updates contained more positive emotion words ($M =$

1 6.78, $SD = 3.15$) than diary entries ($M = 4.78$, $SD = 2.17$), $F(1, 439) = 59.35$, $p < .001$, $\eta^2 =$
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4 .12. Status updates also contained more negative emotion words ($M = 3.91$, $SD = 2.10$) than
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6 diary entries ($M = 2.28$, $SD = 1.35$), $F(1, 439) = 92.61$, $p < .001$, $\eta^2 = .17$.
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9 Demographic differences may confound the results, as prior studies on daily
10 expression suggests that women express emotions more often than men do (LaFrance &
11 Banaji, 1992). To rule out this possibility, gender was added into the analysis as a between-
12 group factor. We observed no effects of gender, neither did gender interact with valence or
13 writing conditions (p 's $> .05$).
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21 Thus, the above results suggested that overall emotional disclosure was greater on
22 Facebook than in the diary entries. This effect did not vary by the valence of emotion and
23 was independent of gender. These results are consistent with Hypothesis 1: participants
24 disclosed more positive *and* negative emotion to familiar friends on Facebook than to
25 unfamiliar strangers. This supports the notion that emotional disclosure is socially motivated
26 and not purely hedonic.
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35 36 **4. Study 2**

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38 Study 1 suggested that emotional disclosure on Facebook may serve a social function.
39 However, it remains unclear how the social structure on Facebook influences emotional
40 expression. In Study 2, we examined the relation between users' emotional disclosure and
41 their social network characteristics.
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47 *4.1. Method*

48 *4.1.1. Participants and Procedure*

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51 We recruited 101 undergraduate students (32 males; mean age = 20.93, $SD = 1.77$) to
52 participate in our study in exchange for course credits. To ensure participants had sufficient
53 numbers of status updates and network connections, only those who had used Facebook for
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1 more than one year and had more than 50 Facebook friends were eligible to participate. All
2 participants granted us permission to download their status updates and social connections on
3 Facebook.
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8 9 4.1.2. *Measures*

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11 *Emotional disclosure.* We retrieved participants' 100 most recent status updates using
12 the software in Study 1, and applied LIWC analysis to these status updates to generate the
13 frequency of positive and negative emotional words.
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19 *Network properties.* We downloaded participants' Facebook friends and the
20 connections among them into a text file using NameWebGen, a Facebook application
21 developed at the Oxford Internet Institute for downloading Facebook users' friends and their
22 ties to each other for standard social network analysis (Hogan, 2010a). We then used
23 UCINET 6 (Borgatti, Everett, & Freeman, 2002), a popular software tool that can perform
24 standard social network analysis on a given network dataset, to calculate each users'
25 egocentric network size and density using the information contained in the text file.
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35 4.2. *Results*

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38 Table 1 presents the descriptive statistics and bivariate correlations between all the
39 variables. Network size was positively correlated with positive emotion ($r = .29, p = .007$),
40 while network density was positively correlated with negative emotion ($r = .22, p = .03$).
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42 Since size and density were moderately and negatively correlated ($r = -.54, p < .001$), the two
43 variables were mean-centered and entered into the regression model to predict positive and
44 negative emotion, respectively. The interaction between mean-centered size and density was
45 also included in the regression models. As shown in Table 2, network size predicted positive
46 emotion ($\beta = .37, p = .001$), while network density predicted both positive ($\beta = .28, p = .02$).
47 and negative emotion ($\beta = .32, p = .02$). These results suggest that Facebook users with
48 denser network disclosed more positive and negative emotional disclosure, supporting
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1 hypothesis H2. Users with larger social network disclosed more positive emotion, partially
2 supporting hypothesis H4. There were no gender effects on either positive or negative
3 emotional disclosure, and gender did not interact with size or density to predict emotional
4 disclosure (all p 's > .05).
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10 **5. Study 3**

11 Study 2 provided initial support for our hypotheses: both network size and density
12 were associated with increased emotional disclosure. However, it remained unclear why the
13 contextual properties of personal networks were associated with emotional disclosure. Study
14 3 was designed to test the underlying psychological mechanism more directly. We measured
15 the needs for emotional expression and impression management, and examined their
16 mediating role in the relation between network properties and emotional disclosure. The
17 previous studies used computerized emotion codings, which provided an objective measure
18 of emotional disclosure. However, individuals may disclose their emotion through other
19 means such as posting photos, videos, and comments. Therefore, in Study 3, we used a self-
20 reported survey to ask participants how likely they would disclose their positive and negative
21 emotions on Facebook.
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40 *5.1. Method*

41 *5.1.1. Participants*

42 A total of 164 undergraduate students (56 males; mean age = 21.09, $SD = 1.65$)
43 participated in our study in exchange for course credits. All participants had used Facebook
44 for more than a year and had more than 100 Facebook friends.
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52 *5.1.2. Measures*

53 *Network properties.* We obtained participants' Facebook network size and density as
54 in Study 2.
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1 *Emotional Disclosure.* Participants were asked how likely they would disclose
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 4 positive and negative emotional experiences on Facebook, respectively, on a 7-point Likert
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 6 scale (1=*very unlikely*, 7=*very likely*).
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8 *Need for emotional expression.* We adapted Kring et al.'s (1994) scale of emotional
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 10 expression to the Facebook context (Cronbach's $\alpha = .82$; $M = 2.60$, $SD = .68$). The survey
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 12 contained seven items, including "I want friends on Facebook to be able to read my
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 14 emotions" and "Even if I am feeling very emotional I don't want to let others on Facebook
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 16 know my feelings" (reversely scored). Participants indicated to what extent they agreed with
 17
 18 each item on a 5-point Likert Scale (1 = *Strongly disagree*, 5 = *Strongly agree*).
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23 *Need for Impression Management.* We adapted Rioux and Penner's (2001) scale
 24
 25 measuring the need for impression management to the Facebook context (Cronbach's $\alpha = .85$
 26
 27 ; $M = 2.79$, $SD = .69$). The scale contained ten items. Example items were "I want to avoid
 28
 29 looking bad on Facebook" and "I want compliments from others on Facebook". Participants
 30
 31 indicated to what extent that they agreed with each item on a 5-point Likert Scale (1 =
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 33 *Strongly disagree*, 5 = *Strongly agree*).
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38 5.2. *Results*

39
 40 A path analysis was conducted with IBM SPSS AMOS 21.0. The paths were drawn
 41
 42 according to the two hypotheses presented above. Results of the analysis revealed a
 43
 44 satisfactory model fit to the data: $\chi^2(8) = 6.42$, $p = .60$ and $\chi^2/df = .80$ (less than the criteria of
 45
 46 3; Kline, 2011). Further, the comparative fit index (CFI) = 1.00, the Goodness-of-Fit Index
 47
 48 (GFI) = 0.99, adjusted goodness of fit index (AGFI) = 0.97, and normed fit index (NFI) =
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 50 0.94, all exceeded the critical value of 0.90 (Kline, 2011). The non-normed fit index (NNFI)
 51
 52 = 1.03 was greater than 0.95, larger than the cutoff for a good model fit (Hu & Bentler,
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 54 1999). Root mean square error of approximation (RMSEA) = 0.00 meets the guideline of less
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 56 than 0.05 (McDonald & Ho, 2002).
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2 As shown in Figure 2, all estimated paths were significant at $p < .05$, except the path
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4 from impression management need to negative emotion ($\beta = -0.11, p = 0.10$). Inspection of
5
6 the standardized residuals for the model indicated that the model adequately explained the
7
8 observed variance, suggesting additional paths would not significantly improve model fit
9
10 (Kline, 2011). Direct paths from network size and network density to positive emotion and
11
12 negative emotion disclosure were not significant, $\Delta\chi^2(2) = 4.03, ns$. The inclusion of these
13
14 direct paths in the model did not improve the model fit, or alter the coefficients of the
15
16 hypothesized paths, suggesting the possibility of full mediation. Adding the path from
17
18 network size to need for emotional expression, and the path from network density to
19
20 impression management were not significant as well, $\Delta\chi^2(2) = 1.20, ns$.

25
26 To further test the mediation, indirect effects were estimated by using 95% bias-
27
28 corrected accelerated confidence intervals (CIs) with 5,000 bootstrapping resamples
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30 (Preacher & Hayes, 2008). This procedure is more suitable for small-to-moderate sample size
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32 than the Sobel test (Shrout & Bolger, 2002). Consistent with H3, the indirect effect of
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34 network density on positive emotional disclosure through need for emotional expression was
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36 significant (indirect effect = 1.09, CI [0.38, 2.21], excluding zero). However, the indirect
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38 effect of density on negative emotional disclosure was not significant (indirect effect = 2.55,
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40 CI [-0.39, 4.78], including zero). Finally, the indirect effect of network size on positive
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42 emotion through need for impression management was significant (indirect effect = 0.0003,
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44 CI [0.00005, 0.0007], excluding zero), supporting H5. There were no gender effects on either
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46 positive or negative emotional disclosure. Also, gender did not interact with size or density
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48 to predict emotional disclosure (all p 's $> .05$).

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55 Together, the path analysis largely supported our hypotheses. The need for emotional
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57 expression is related to social network density, which in turn is associated with greater
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59 positive emotional disclosure. Although the indirect effect of density on negative emotional
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1 disclosure was not significant, the constituent paths (from density to need and from need to
2 disclosure) were significant. The lack of significant indirect effects in this case could be due
3 to low statistical power. In contrast, the need for impression management is related to social
4 network size, which in turn is also associated with positive emotional disclosure.
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10 While our results suggest that social network structure influences psychological needs
11 and subsequently the emotional disclosure pattern, it is also possible that individuals'
12 psychological needs influence their network structure. People who have greater need for
13 emotional expression may develop denser networks, and those who have greater need for
14 impression management may construct larger networks. We tested this alternative model by
15 reversing the original paths between the psychological needs and network properties. Results
16 showed a poor model fit: $\chi^2(8) = 75.52$, $\chi^2/df = 9.44 > 3$; CFI = 0.32, GFI = 0.87, NFI = 0.34,
17 AGFI = 0.67, NNFI = -.28, all are smaller than 0.9, and RMSEA = 0.24 < 0.05. In addition,
18 the AIC for the alternative model (102.58) is much larger than that of the original model
19 (AIC = 33.97), suggesting the alternative model is a poorer model. This rules out the
20 possibility of reversed causal links and provides more support for our hypothesized path from
21 network properties to psychological needs.
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40 **6. Discussion**

41 Past research has emphasized the importance of understanding communication
42 behaviors and their associated psychological processes by studying how communicative
43 contexts influence individuals' communication styles (Culnan & Markus, 1987; Gasiorek,
44 Giles, Holtgraves, & Robbins, 2012; Walther, 1992, 2012; Yzer & Southwell, 2008). Our
45 study contributes to existing research by showing that social network size and density are
46 associated with different psychological needs and lead to different emotional disclosure
47 patterns. It is the first to reveal the underlying psychological mechanism of how social
48 network properties influence emotional disclosure.
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6.1. *Facebook networks and patterns of emotional disclosure*

Facebook, a novel communication environment, offers an opportunity to study emotional disclosure that may be different from disclosure in traditional contexts. Study 1 shows that Facebook status updates contained more emotional expressions than communications in more restricted social contexts. This provided preliminary evidence that emotional disclosure on Facebook is socially motivated. Studies 2 and 3 further identified the contextual correlates and motives underlying emotional disclosure.

Specifically, individuals with a denser social network have a stronger need for emotional expression, which in turn is associated with more positive and negative emotional disclosure. This is consistent with past finding that individuals in a denser network value and share more information (Sohn, 2014). It is likely that individuals are more personally attached to a dense network made up of close friends, and the network provides trusting relationships that encourage emotional disclosure. Meanwhile, mutual social interaction is needed to maintain and improve social trust and attachment. Therefore, individuals are motivated to disclose more emotions to strengthen their social ties. This supports previous finding that social interaction is a strong motivation for emotional disclosure (Jakobs et al., 2001, 1999a, 1999b; Rimé, 2009; Rimé et al., 1998; Rimé et al., 2011).

As for network size, our results indicate that individuals with larger social networks were more concerned about their self-image and disclosed more positive (but not negative) emotions. This supports previous finding that when individuals communicate with a larger audience, they have a stronger need to present a positive image (Barasch & Berger, 2014; Riley & Eckenrode, 1986). It offers new evidence of users selectively presenting favorable information as a strategy of impression management on social networking sites (e.g., Ellison, Heino, & Gibbs, 2006; Gibbs, 2006; Jung et al., 2007; Ong et al., 2011). Interestingly, the need for impression management is not related to less disclosure of negative emotions. It

1 suggests that impression motivation on Facebook is manifested in a positively enhancing
2 rather than a negatively inhibiting manner. A recent study also found that users' self-
3 presentational concerns were associated with the frequency of positive but not negative
4 emotion words in status updates (Bazarova et al., 2012). Past literature has identified two
5 distinct types of impression management in self-presentation, acquisitive and protective
6 (Arkin, Lake, & Baumgardner, 1986). Acquisitive impression management refers to the
7 action of gaining social approval by presenting oneself in a favorable fashion (Brown,
8 Collins, & Schmidt, 1988). In contrast, the protective type involves efforts to avoid social
9 disapproval by distancing themselves from negative events and creating merely “safe”
10 images (Arkin, Lake, & Baumgardner, 1986). Individuals in everyday life engage in
11 protective impression management more frequently than in acquisitive impression
12 management (Baumeister et al., 2001). Nevertheless, this seems not to be the case on
13 Facebook. It is possible that the display rule on Facebook is somewhat different from that in
14 real life. While positive emotions are still favorable, negative emotions may be more
15 acceptable on Facebook than in real life. Future research can further explore the difference in
16 norms and attitudes towards negative emotion in online and offline environments.

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41 Our study focuses on emotional disclosure and social network structure on Facebook.
42 It is possible that our findings may not hold on other social networking platforms. First,
43 research has shown that people choose different media for sharing different types of
44 emotional experiences (Choi & Toma, 2014), and they may have different motives for social
45 sharing on different platforms (Qiu et al., 2010). Second, different platforms have different
46 social network structures. Social networks on Facebook mainly contain one’s real-life friends
47 (Ellison, Steinfield, & Lampe, 2007). However, platforms such as Instagram or Twitter allow
48 users to connect with others without consent, resulting in many strangers in the network.
49 Furthermore, users can remain anonymous without revealing their true identity. The
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2 anonymity and loose social network structure may reduce the need for impression
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4 management and lead to free expression of emotions. Another social networking site,
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6 LinkedIn, has networks mainly containing professional connections. Users refrain from
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8 sharing their personal feelings to appear rational and professional, regardless of their network
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10 properties. Future research can further explore the pattern of emotional disclosure on these
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12 platforms.
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15 16 6.2. *Implications and future direction*

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18 Our study addresses the underlying motives of emotional disclosure by highlighting
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20 and distinguishing the need for emotional expression and need for impression management,
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22 and demonstrates how they are contingent on the social context. It illustrates that network
23
24 size and density are distinctive metrics associated with different psychological meanings.
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26 Taken together, this research opens a venue for future exploration. It would be intriguing to
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28 examine how other potential moderators such as interpersonal goals and dispositional
29
30 expressivity play a role in the emotional disclosure process. Furthermore, research can
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32 investigate the social consequences of emotional disclosure in social networks. Studies have
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34 shown that people are more likely to be happy if they are surrounded by happy friends due to
35
36 the dynamic spread of happiness (Fowler & Christakis, 2008). Future research can investigate
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38 how the emotional disclosure pattern of members in the social network affects their well-
39
40 being. In addition, our study used ego-centered network analysis and focused on two network
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42 characteristics, size and density. Future work can consider other network features such as the
43
44 duration and heterogeneity of network ties, or use whole network analysis (Garton, et al.,
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46 1997) to examine all connections within a community (e.g., the entire social network of a
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48 company). Although whole network analysis can be difficult when the community is very
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50 large and hard to define, it can be useful to understand how network position may influence
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1 self-disclosure. Answers to these questions will generate a complete picture of the
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4 psychological motives and consequences of emotional disclosure in social networks.
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6 Our findings provide useful insights for designers and users of social network
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8 platforms. Designers need to be aware that individuals with different social network
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10 properties have different psychological needs, and their needs may vary when their social
11
12 network changes. To better satisfy user needs, social networking sites may estimate user
13
14 needs based on their social network properties and provide appropriate functions. Users also
15
16 need to understand that others' underlying motives for disclosing emotions may be different
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18 in different types of social networks. Individuals in large social networks are likely to
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20 disclose positive emotions for impression management, while those in dense networks may
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22 do so for social connection.
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27 **7. Conclusion**

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29 The current research demonstrates that emotional disclosure on Facebook is socially
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31 motivated and different from disclosure in private settings. In particular, the need for
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33 emotional expression and need for impression management mediate the relationship between
34
35 social network structure and emotional disclosure. The need for emotional expression is
36
37 enhanced in dense networks, leading to greater positive and negative emotional disclosure.
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39 The need for impression management is promoted in large networks, leading to greater
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41 disclosure of positive emotion. These findings fill up a research gap in emotional disclosure
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43 by explicitly and empirically addressing its relation to social network structure, and enriches
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45 the understanding of emotional disclosure as a strategy of impression management and a
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47 means for social connection.
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Table 1.

Descriptive statistics and bivariate correlation between variables in Study 2.

	1	2	3	4
1. Network size	519.25 (192.64)			
2. Network density	-.54***	.09 (.03)		
3. Positive emotion	.29**	-.03	.06 (.02)	
4. Negative emotion	.02	.22*	.17	.03 (.01)

Note. Means are indicated in the main diagonal with standard deviations indicated in

parentheses. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 1.

Regress network properties on positive and negative emotional expression.

Predictor	β	<i>t</i>
<i>Positive emotion</i>		
Network size	.37	3.29**
Network density	.28	2.21*
Network size \times network density	.22	1.94
<i>Negative emotion</i>		
Network size	.19	1.63
Network density	.32	2.44*
Network size \times network density	.01	.04

Note. Network size and density are mean-centered. * $p < .05$, ** $p < .01$.

Figure 1

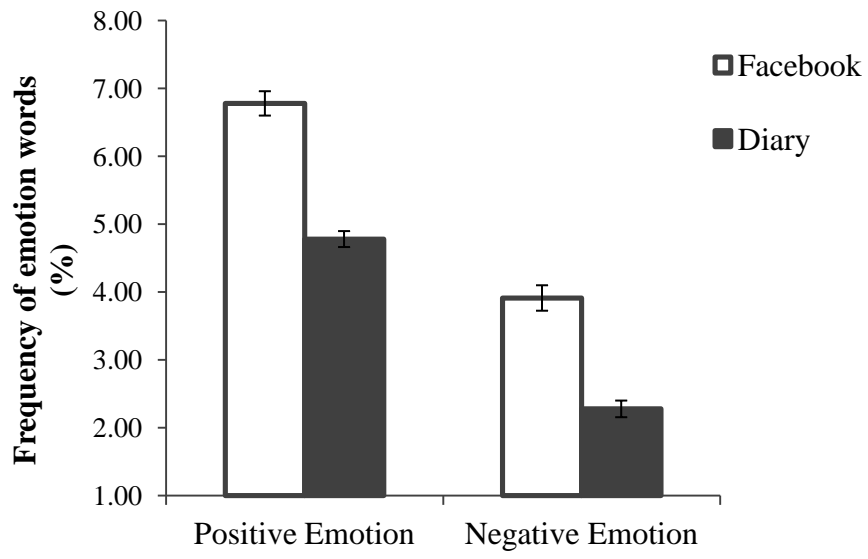


Figure 1. Frequency of emotional words in Facebook status updates and diary sample.

Figure 2

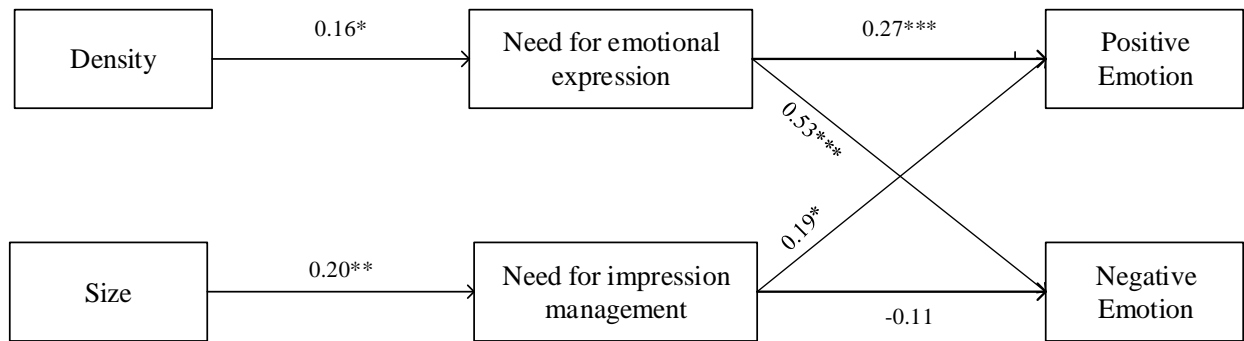


Figure 2. Coefficients representing effects of network size and density on mediators and positive and negative emotion (Study 3). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.