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Self-disclosure on social media: The role of perceived network responsiveness

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ABSTRACT

Social media sites allow users to instantaneously self-disclose to their entire social network. This creates an opportunity to engage in self-expression that is farther-reaching than ever before, but also a new challenge: managing the risk inherent in self-disclosing to a large and diverse set of people. What guides decisions about how openly to self-disclose in such contexts? Building on theoretical and empirical evidence linking perceived partner responsiveness to open self-disclosure in face-to-face dyadic interactions, we hypothesized that perceptions of a Facebook network's responsiveness would shape people's self-disclosure on Facebook. We also examined whether observers can infer people's perceived network responsiveness from thin-slices of self-disclosure. Across two studies, people who perceived their Facebook network as more (vs. less) responsive self-disclosed more openly on Facebook. Furthermore, observers could infer participants' perceived network responsiveness with some accuracy on the basis of disclosure openness. Implications for the self-disclosure and person perception literatures are discussed.

1. Introduction

People engage in self-disclosure—expressing their thoughts and feelings to other people (Greene, Derlega, & Matthews, 2006; Omarzu, 2000)—at every stage of relationships (Dunbar, Marriott, & Duncan, 1997; Rimé, 2009; Rimé, Finkenauer, Luminet, Zech, & Philippot, 1998). Doing so is intrinsically rewarding (Tamir & Mitchell, 2012), helps mobilize support, and facilitates intimacy development (e.g., Collins & Miller, 1994; Graham, Huang, Clark, & Helgeson, 2008; Reis & Shaver, 1988; Stanton & Low, 2012). Considerable research attention has been devoted to understanding the determinants of self-disclosure. Past work indicates that people tend to self-disclose when they experience emotionally intense events (e.g., Rimé, et al., 1998), when they like their interaction partners (Collins & Miller, 1994), or when their interaction partners have disclosed to them (e.g., Dindia, Fitzpatrick, & Kenny, 1997; Reis & Shaver, 1988).

Theory and research on self-disclosure have traditionally focused on self-disclosure in dyadic contexts (e.g., in face-to-face interactions between pairs of new acquaintances, friends, or romantic partners). However, the advent and growing popularity of social media have changed the landscape in which people can disclose to others (O'Sullivan & Carr, 2018). Facebook is the most pervasive social media website (Greenwood, Perrin, & Duggan, 2016), with over two billion users (Facebook.com, 2019). With the assistance of Facebook, people can—and frequently do—self-disclose instantly to their entire network of "friends" by posting updates (Carr, Schrock, & Dauterman, 2012; O'Sullivan & Carr, 2018). However, much remains to be learned about how features of people's online social environments might influence self-disclosure decisions in such network-level disclosure contexts. Scholars have noted the importance of testing whether existing theory can explain phenomena observed on social media (Anderson, Fagan, Woodnutt, & Chamorro-Premuzic, 2012; Okdie et al., 2014; Wilson, Gosling, & Graham, 2012). Yet, they have also noted that the application of social psychological models to the realm of social media is vastly underrepresented in existing research (Kende, Ujhelyi, Joinson, & Greitemeyer, 2015).

The present investigation draws on key social psychological models of self-disclosure and intimacy development and tests whether people who perceive their Facebook network as more (vs. less) responsive (i.e., attentive to and supportive of their needs; Reis, Clark, & Holmes, 2004) self-disclose more openly to their network in their status updates. By examining whether people's network-level disclosure reflects the perceived responsiveness of the online social context in which they disclose, we seek to contribute to the literatures on self-disclosure and

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social media behavior.

1.1. Network-level self-disclosure

A bourgeoning body of work has begun to examine network-level self-disclosure, often considering how people present themselves on Facebook or why people share personal information (for a review, see Wilson et al., 2012). More generally, there has been broad interest in the ways in which people transmit information through social networks (for a review, see Jalili & Perc, 2017). Past research that has examined network-level self-disclosure behavior has primarily focused on features of disclosers as predictors of Facebook update content. Discloser features that have been examined to date include gender, personality traits (e.g., Marshall, Lefringhausen, & Ferenczi, 2015; Mehdizadeh, 2010; Schwartz et al., 2013), relationship satisfaction (Salsow, Muise, Impett, & Dublin, 2013), motivations for using social media (e.g., Hollenbaugh & Ferris, 2015; Park, Jin, & Jin, 2011), trait self-esteem (e.g., Forest & Wood, 2012) or trait affect (Dupuis, Khadeer, & Huang, 2017). Some work has also investigated how features of disclosers' networks influence the personal information (e.g., hometown, relationship status) that they display on their profile pages. For example, participants exposed to hypothetical profiles that included more (vs. less) information subsequently posted more information on mock profiles they created for themselves (Spottswood & Hancock, 2017). Other work suggests that the privacy restrictions (i.e., selections regarding who can view one's posted information) that network members set for their profile pages are positively associated with the privacy restrictions that people adopt for their own profiles (Lewis, Kaufman, & Christakis, 2008; Spottswood & Hancock, 2017; Utz & Krämer, 2009).

Despite the growing interest in understanding what influences people's social media behavior, almost no work thus far has examined how features of the online social environment shape the content of people's updates (i.e., their network-level disclosures). This is surprising given the wealth of theory and research pointing to the centrality of social context variables in shaping self-disclosure in offline contexts (e.g., Collins & Miller, 1994; Dindia, 1988, 2002; Jourard, 1971; Laurenceau, Barrett, & Pietromonaco, 1998; Omarzu, 2000; Reis, 2017; Reis & Shaver, 1988). In a notable exception, Lin, Tov, and Qiu (2014) demonstrated that people with more (vs. fewer) Facebook friends included more affectively positive words in their Facebook updates, and people with more (vs. less) dense networks included more affectively positive and negative words in their updates. The current research extends previous work by examining whether perceived responsiveness of one's network—a key social context feature and a central determinant of disclosure in offline dyadic interactions—shapes one's disclosure in a social media environment.

1.2. Perceived network responsiveness

We use the term "perceived network responsiveness" (PNR) to refer to the degree to which an individual perceives his/her social network of Facebook friends (i.e., the group of people to whom s/he is connected on social media), as a single entity, to be responsive. To our knowledge, no research to date has measured PNR by asking about one's perceptions of the network of friends as a whole,[1] nor examined whether PNR predicts network-level disclosure behavior. This gap in the literature may exist in part because PNR was not something that people needed to conceptualize until the advent of social networking sites: Before technology enabled people to broadcast self-disclosures to multiple recipients at once, people's perceived responsiveness would have been tied to specific disclosure recipients. Because people can now disclose to their entire group of Facebook network members at once by posting updates, people may now mentally represent and consider their network's responsiveness before disclosing on Facebook.

1.2.1. Why perceived network responsiveness (PNR) might shape disclosure on Facebook

Self-disclosing in offline contexts can be rewarding and intimacy-promoting (e.g., Reis & Shaver, 1988; Sprecher & Hendrick, 2004), but also renders disclosers vulnerable to the possibility that their partner will reject, dismiss, or exploit them (Greene et al., 2006; Wood & Forest, 2016). At high levels of such risk, people limit how openly they express themselves (Omarzu, 2000). However, confidence in a partner's responsiveness or care encourages open self-disclosure, despite the risks associated with self-disclosure (e.g., Clark & Lemay, 2010). For example, correlational and experimental evidence indicates that people express themselves more openly when their partner supportively addresses their needs (e.g., Feeney, 2007; Laurenceau et al., 1998; Lemay & Clark, 2008; Sprecher & Hendrick, 2004; Von Culin, Hirsch, & Clark, 2018; see also Clark, Fitness, & Brissette, 2001 for a review), and when a partner is (Forest & Wood, 2012) or is expected to be (Gaucher et al., 2012; Gillath et al., 2006; McCarthy, Wood, & Holmes, 2017; Ruan, Reis, Clark, Hirsch, & Bink, 2019) responsive.

Similarly, self-disclosing to one's Facebook network can be both rewarding and risky: Posting self-revealing updates gives disclosers the opportunity to feel connected to (Krasnova, Spiekermann, Koroleva, & Hildebrand, 2010; Utz, 2015) and be understood by their network members (Back et al., 2010; Bargh, McKenna, & Fitzsimons, 2002; Orehek & Human, 2017; Tskhay & Rule, 2014; Vazire & Gosling, 2004), but also leaves disclosers at risk of being disliked by others (Forest & Wood, 2012) or getting hurt by others' responses (or lack thereof). Indeed, disclosers' well-being suffers when their network members ignore or reject them (Bevan, Pfyl, & Barclay, 2012; Greitemeyer, Mügge, & Bollermann, 2014; Tobin, Vanman, Verreynne, & Saeri, 2015; Wolf et al., 2015). Thus, just as a responsive offline partner helps people accept the risks of self-disclosure and encourages open self-disclosure to that partner (Clark & Lemay, 2010), a responsive online network should help people accept such risks and encourage open network-level self-disclosure.

Consistent with this possibility, research examining online privacy management suggests that people reveal more about themselves on social media when the perceived benefits of doing so are high and/or the perceived costs are low. For example, when people feel less (vs. more) concerned about how others will use or respond to their self-disclosures, they report populating their profiles with more personal information (Cheung, Lee, & Chan, 2015; Krasnova et al., 2010; Young & Quan-Haase, 2009; Zlatolas, Welzer, Heričko, & Hölbl, 2015) and setting less stringent privacy restrictions for their posted information (Walrave, Vanwesenbeeck, & Heirman, 2012). Moreover, people who trust other Facebook members to refrain from misusing information shared on Facebook perceive greater benefit to disclosing on Facebook, which is, in turn, associated with willingness to share a variety of hypothetical experiences on Facebook (Proudfoot, Wilson, Valacich, & Byrd, 2018). Thus, because perceiving a network as highly responsive should help offset risks or enhance rewards of self-disclosure, we expect that people will determine how openly they disclose in their updates based on their PNR.

1.2.2. Why perceived network responsiveness (PNR) might not shape disclosure on Facebook

At least two bodies of research point to reasons why PNR might not shape self-disclosure on Facebook. First, work on Facebook norms indicates that people perceive self-revealing disclosures as less appropriate when shared publicly (i.e., via wall posts) than when shared privately with a specific network member (i.e., via private messaging; Bazarova,

[1] Some researchers have measured perceived support in online networks, but existing measures typically assess people's beliefs that at least some network members would be supportive if needed (e.g., Frison & Eggermont, 2016; Park et al., 2016) rather than perceptions of the network's supportiveness or responsiveness, as a single entity.

2012). Thus, the risk of appearing inappropriate may lead people to limit the openness of their disclosure in Facebook updates. If so, even people who perceive very responsive networks might refrain from self-disclosing openly via updates. Alternatively, people might disclose quite openly on Facebook even in the face of relatively unresponsive networks. In support of this possibility, past work suggests that people experience more psychological distance when communicating on social networking sites versus in offline contexts (e.g., Hallam & Zanella, 2017; Joshi & Wakslak, 2014; Lim, Cha, Park, Lee, & Kim, 2012). Because psychological distance directs people's attention toward benefits (Lermer, Streicher, Sachs, Raue, & Frey, 2015; Liberman & Trope, 1988; Sagristano, Trope, & Liberman, 2002) and away from costs of behavior (Eyal, Liberman, Trope, & Walther, 2004), Facebook users may weigh the potential benefits of expressing themselves openly (e.g., reducing loneliness or connecting with others; Deters & Mehl, 2013; Utz, 2015) more heavily than the potential cost of rejection, and disclose quite openly regardless of their PNR. Thus, although compelling theory and research examining offline, dyadic interactions suggest that PNR *should* shape how openly people disclose in their Facebook updates, in light of these unique features of disclosing to a network of people online, it is important to examine whether the perceived responsiveness-disclosure link holds up in this context.

1.3. The present studies

In the two studies reported here, we test the hypothesis that people who perceive their Facebook networks as more (vs. less) responsive will self-disclose more openly (i.e., post Facebook updates that are more open and self-revealing). We also investigate a secondary, related, set of questions: Can observers gauge people's PNR on the basis of the Facebook updates they post, without seeing the network's actual responses to those updates? And, if so, what cues within people's updates might inform observers' impressions of people's PNR?

1.3.1. Thin-slice judgments

An exciting body of research on "thin slices" has found that people can make accurate judgments of a variety of dimensions, including personality features (e.g., Carney, Colvin, & Hall, 2007; Tskhay & Rule, 2014) and sexual orientation (e.g., Rule, 2017; Rule & Ambady, 2008), on the basis of remarkably small samples of behavior (see Alaei & Rule, 2016; Ambady, Bernieri, & Richeson, 2000; Ambady & Rosenthal, 1992). Although most work in this area has focused on judging a target's personal qualities, observers can also make inferences about interpersonal variables. For example, people can accurately glean the nature of a pair's relationship (Ambady & Gray, 2002), estimate interpersonal rapport (Bernieri, Gillis, Davis, & Grahe, 1996), and identify people who are cheating on their romantic partner (Lambert, Mulder, & Fincham, 2014) from observing a brief video clip of the dyad's interaction. The present research extends work on thin slices by investigating whether observers can estimate a person's PNR with any degree of accuracy based on just 10 Facebook updates (Study 1) or a single Facebook update (Study 2) without information about the network's responses to those updates.

Several studies have demonstrated that some features of Facebook users—such as their relationship satisfaction (Saslow et al., 2013), age and gender (Schwartz et al., 2013), and personality traits (Marshall et al., 2015)—are associated with their posting behavior. However, few studies have examined whether observers can detect features of users based on update content. Still, a small number of studies have provided evidence suggesting that it may be possible for observers to do so. Back et al. (2010) found modest, positive correlations between Facebook users' Big Five scores and observers' (coders who browsed participants' Facebook profiles, including updates) estimates of those users' personality traits (see also Orehek & Human, 2017; Vazire & Gosling, 2004). In addition, little is known about how observers might glean such insights. If observers can indeed detect people's PNR on the basis of a small subset of their Facebook updates, then these thin slices must contain useful information. Accordingly, if update self-revealingness does reflect PNR, then update self-revealingness may be an important cue that orients observers to the discloser's PNR. We examine this possibility in our studies.

2. Study 1

2.1. Method

2.1.1. Participants

One-hundred and fifty-nine undergraduate Facebook users from a large, northeastern U.S. university participated in a lab study on self-disclosure within social media in exchange for course credit. Most participants (78.62%) reported being from the Northeast region of the U.S., followed by the Midwest (4.40%), South (6.92%), and West (5.66%; 3.77% other; 0.63% unreported). The sample ($M_{age} = 18.84$ years, $SD = 1.99$) comprised 114 women and 43 men (2 self-reported as "other"). On average, participants reported being an active Facebook user for 4.67 years ($SD = 1.29$), having 753.81 Facebook friends ($SD = 520.23$), and spending 11.36 h on Facebook per week ($SD = 8.40$). A sensitivity analysis (G*Power; Faul, Erdfelder, Buchner, & Lang, 2009) indicated that a sample of 159 participants would be sufficient to detect a small population effect size for the path from PNR to update self-revealingness (our primary path of interest) with 80% power ($\alpha = 0.05$).

2.1.2. Procedure

The measures assessed in the current investigation were part of a larger study. Here, we describe only the measures germane to the current investigation. Full materials are available in Online Supplemental Materials (OSM).

Participants answered questions about their Facebook use (see OSM), logged into their Facebook accounts, and provided the ten most recent Facebook updates that they had posted. Next, we assessed participants' PNR using an item similar to that used by Visserman, Righetti, Impett, Keltner, and Van Lange (2017): "How supportive do you perceive your Facebook friends, as a whole, to be?" (1 = *not supportive*, 5 = *very supportive*). We used the term "supportive" rather than "responsive" to assess PNR because we expected "supportive" to be more familiar and easily understood by participants, and to effectively capture responsiveness (see Maisel, Gable, & Strachman, 2008, for similar logic). Indeed, a similar one-item measure with "supportive" language has been used to assess perceived responsiveness in a daily diary context (Visserman et al., 2017) and a "behaved supportively" item has been included in coding schemes for assessing responsiveness in dyadic interactions (e.g., Forest, Kille, Wood, & Holmes, 2014).

Participants then completed scales assessing individual differences and reported their demographic information (see OSM for full materials). Among these scales were measures of individual differences that one might expect to predict open self-disclosure, based on past work conducted in offline contexts (for citations, see Miller, 2015; Wood & Forest, 2016): trait self-esteem (Rosenberg, 1965), attachment anxiety and avoidance (Fraley, Waller, & Brennan, 2000), and gender.

Following data collection, three undergraduate coders, who were blind to hypotheses, rated each participant's set of ten updates. Coders estimated each participant's PNR using a modified version of the item that we used to assess participants' PNR: "How supportive does this person perceive his/her Facebook friends, as a whole, to be?" (1 = *not at all*, 9 = *extremely*). After PNR estimates were completed for the full sample, coders read each participant's set of updates again and rated each set for self-revealingness. Following an approach employed in past work examining disclosure self-revealingness in offline disclosures (e.g., Rubin, 1975; Wortman, Adesman, Herman, & Greenberg, 1976), coders rated the self-revealingness of participants' posts using one item: "How open and self-revealing are these posts (i.e., how much do they tell

others about the person who wrote them)?" (1 = *none/not at all*, 9 = *extremely*). This update self-revealingness item is also similar to an item included in Gaucher, Wood, Stinson, Forest, Holmes, and Logel's (2012) 7-item coder-rated measure of open self-disclosure. We conducted coding in this order (i.e., PNR coding followed by self-revealingness coding) to limit the possibility that our drawing attention to update self-revealingness might then lead to coders' using this self-revealingness information in ways they might not otherwise have done when making their PNR judgements. Coders also rated participants' sets of updates on other dimensions that are not germane to the current hypotheses (see OSM).

2.1.3. Data analytic strategy

We conducted analyses using structural equation modeling (SEM) with maximum-likelihood estimation (Kline, 2011) in M*plus* (Version 8.1; Muthén & Muthén, 1998–2017). Because latent factors extract the shared variance across their indicators—thereby accounting for measurement error from each indicator—we constructed latent factors for update self-revealingness and coder-estimated responsiveness; coders' ratings served as indicators. To account for rater effects, we allowed the same coder's residual variances to covary across latent factors. For model identification purposes, each latent factor was scaled by fixing the factor loading of one coder's rating to one. We evaluated model fit based on Hu and Bentler (1999) recommendations and compared model fit between nested models using the chi-square difference test.

2.2. Results

No data were excluded from analyses, but some data were missing across two coders (one datum point per coder). Table 1 displays descriptive statistics and correlations for key study variables. Overall, participants perceived their network as relatively responsive: The mean PNR rating ($M = 3.46$ on a 5-point scale, $SD = 0.29$) was significantly higher than the midpoint of the scale, $M_{difference} = 0.46$, 95% CI [0.298, 0.621], $t(158) = 5.58$, $p < .001$. Coders rated updates as moderately self-revealing (coder Ms = 4.21–5.71 on a 9-point scale, SDs = 1.54–1.76).

A confirmatory factor analysis suggested adequate latent factors for update self-revealingness and coder-estimated responsiveness (βs = 0.60 - 0.70 and 0.55 - 0.83, respectively). Thus, we constructed the model displayed in Fig. 1 to test our hypotheses. We estimated the direct paths from PNR to update self-revealingness and coder-estimated responsiveness and the indirect path from PNR to coder-estimated responsiveness through update self-revealingness. This model demonstrated excellent fit, χ^2 (9, N = 159) = 10.78, $p = .291$, RMSEA = 0.04, 90% CI [0.00, 0.10], CFI = 0.99, SRMR = 0.04.

2.2.1. Update self-revealingness

Before testing our main path of interest (PNR to update self-revealingness), we first examined whether any of the following individual differences were associated with update self-revealingness: trait self-esteem (α = 0.89), attachment anxiety (α = 0.92), attachment avoidance (α = 0.95), and gender. We tested each of these individual differences as a predictor of update self-revealingness in separate models. We planned to include any of these individual difference variables that significantly predicted update self-revealingness as covariates in the final model that we would use to conduct our hypothesis test. None of these variables significantly predicted update self-revealingness, $ps > .10$. Therefore, none were included in the final model, which is displayed in Fig. 1 (see Becker et al., 2016).

As shown in Fig. 1, the hypothesized positive link between PNR and update self-revealingness emerged, β = 0.33, $b = 0.31$, $SE = 0.17$, 95% CI = [0.130, 0.492], $p < .001$. Consistent with findings obtained in offline dyadic contexts, Facebook users who perceived their networks as more (vs. less) responsive self-disclosed more openly in their updates.

2.2.2. Coder-estimated perceived network responsiveness

To examine whether coders could gauge how responsive participants found their networks on the basis of 10 Facebook updates—and, if so, whether the self-revealingness of participants' updates may have informed coders' estimates—we examined the path coefficients from PNR to coder-estimated responsiveness and from update self-revealingness to coder-estimated responsiveness. First, we examined whether coders were able to infer participants' PNR with some degree of accuracy. To do so, we constrained the path from update self-revealingness to coder-estimated responsiveness to zero (i.e., blocked the indirect path from PNR to coder-estimated responsiveness through update self-revealingness in Fig. 1). This enabled us to estimate the direct path from PNR to coder-estimated responsiveness. PNR positively predicted coder-estimated responsiveness, β = 0.26, $b = 0.23$, $SE = 0.09$, 95% CI = [0.048, 0.409], $p = .013$. However, this constrained model demonstrated poor fit, χ^2 (10, N = 159) = 29.78, $p < .001$, RMSEA = 0.11, 90% CI [0.07, 0.16], CFI = 0.91, SRMR = 0.11. Indeed, the constrained model fit the data worse than the unconstrained (Fig. 1) model, $\Delta\chi^2_{(1)} = 19.00$, $p < .001$. This suggests that update self-revealingness should be included in the model as a potential mediator of the link between PNR and coder-estimated responsiveness.

Next, we tested the paths in the unconstrained model to examine whether update self-revealingness, in fact, mediated the path from PNR to coder-estimated PNR. As Fig. 1 illustrates, when the path from update self-revealingness to coder-estimated responsiveness was freed, the direct path from PNR to coder-estimated responsiveness was no longer significant, β = 0.09, $b = 0.09$, $SE = 0.10$, 95% CI = [-0.104, 0.285], $p = .362$, and update self-revealingness positively predicted coder-estimated responsiveness, β = 0.54, $b = 0.61$, $SE = 0.17$, 95% CI = [0.284, 0.943], $p < .001$. A mediation analysis using bias-corrected bootstrapping with 5000 resamples (MacKinnon, Lockwood, & Williams, 2004) revealed a significant indirect effect of PNR on coder-estimated responsiveness via update self-revealingness, suggesting mediation, β = 0.18, $b = 0.19$, $SE = 0.09$, bias-corrected 95% CI = [0.058, 0.403]. Thus, coders were able to glean some insight into participants' PNR, and were seemingly able to do so based on how openly participants disclosed in their updates.

These findings provide initial evidence that the link between perceived responsiveness and self-disclosure described in models developed for dyadic interactions (Clark & Lemay, 2010; Reis, 2017; Reis & Shaver, 1988) extends to online disclosures made to one's entire social network. In addition, observers gained insight into participants' PNR based on just 10 Facebook updates. Moreover, we identified a mechanism for this thin-slice effect: The degree to which people's updates are open and self-revealing seems to orient observers to their PNR.

3. Study 2

3.1. Overview

In Study 2, we sought to replicate Study 1's findings in a non-student sample using a paradigm that enabled us to examine whether observers could gauge PNR based on just one Facebook update. Study 2 included an experimental manipulation intended to enhance (vs. diminish) participants' state PNR.[2] After this manipulation, we asked participants to log into Facebook and post a new update, which coders later rated for self-revealingness. We predicted that participants in the high (vs. low) PNR condition would perceive their networks as more responsive and

[2] In this first investigation of PNR and network-level self-disclosure, we were less concerned about whether enhanced state PNR might increase self-revealingness and/or whether diminished state PNR might decrease self-revealingness, compared to a neutral, "pure" control condition. We therefore designed a state PNR manipulation that was intended to create two comparison groups (high versus low state PNR), rather an experimental condition and control condition.

Table 1
Descriptive statistics and correlations between study 1 variables.

Variable	*M* (*SD*)	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Perceived network responsiveness	3.46 (1.04)	–						
2. Coder 1 update self-revealingness	4.62 (1.54)	.23**	–					
3. Coder 2 update self-revealingness	4.21 (1.76)	.22**	.42***	–				
4. Coder 3 update self-revealingness	5.71 (1.56)	.21**	.44***	.44***	–			
5. Coder 1 estimated responsiveness	4.80 (1.94)	.19*	.50***	.29***	.23**	–		
6. Coder 2 estimated responsiveness	4.95 (1.84)	.20*	.34***	.33***	.17*	.48***	–	
7. Coder 3 estimated responsiveness	5.57 (2.04)	.16*	.14	.22**	.01	.27***	.49***	–

Note. *$p < .05$. **$p < .01$. ***$p \leq .001$.

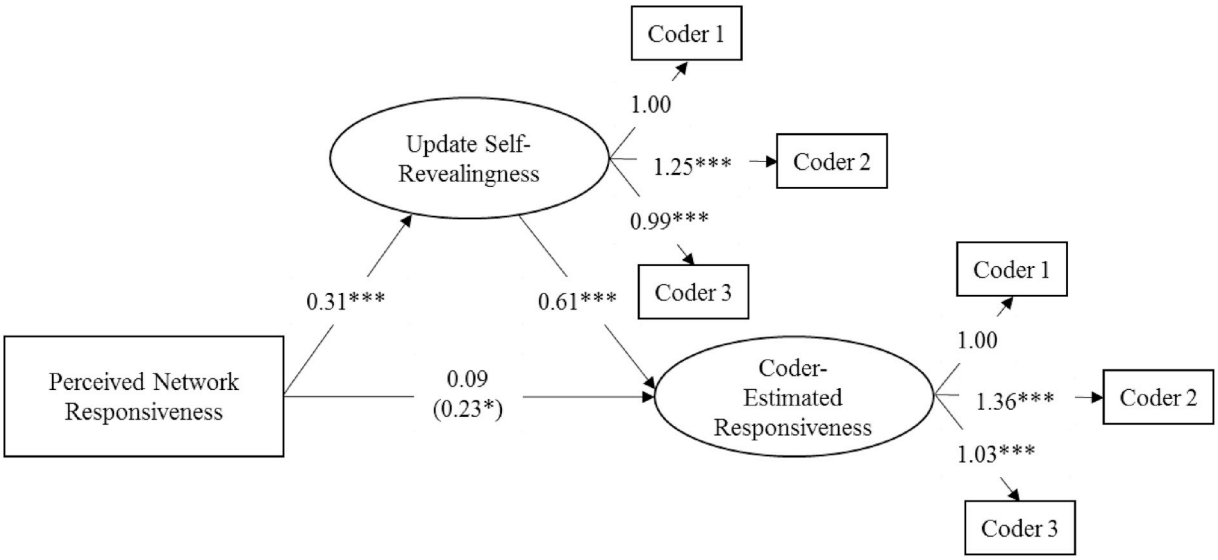

Fig. 1. Model used to test hypotheses in Study 1. Path coefficients are unstandardized. Update self-revealingness mediated the positive relation between perceived network responsiveness and coder-estimated responsiveness: Perceived network responsiveness was positively associated with update self-revealingness, which in turn positively predicted coder-estimated responsiveness. The coefficient in parentheses is derived from a model in which the path from update self-revealingness to coder-estimated responsiveness was fixed to zero. Covariances between residual variances for coders' ratings are omitted from the figure. Factor loadings for Coder 1 were fixed to one for model identification purposes, and therefore were not tested for significance. *$p < .05$. **$p < .01$. ***$p \leq .001$.

would therefore post more self-revealing updates. We also asked coders to estimate participants' network responsiveness (this time on the basis of just the one update that each participant posted following the state PNR manipulation). We expected that coders would rate the networks of participants in the high (vs. low) PNR condition as more responsive, and that they would use the self-revealingness of the update as a cue for making such inferences.

3.2. Method

3.2.1. Participants

We posted 250 HITs on Amazon Mechanical Turk to recruit participants for a brief online study. Two-hundred seventy-seven adults (164 female, 112 male, 1 not reported) participated in exchange for $0.40.[3] Participants reported being American (94.95%), Asian (2.53%), and European (2.17%; 0.36% unreported). Compared to Study 1's sample, the sample drawn for Study 2 was older ($M_{age} = 34.43$ years, $SD = 12.10$), had fewer Facebook friends ($M = 288.69$, $SD = 272.47$), and spent less time on Facebook per week ($M = 8.89$ h, $SD = 10.26$). Participants reported posting an average of 5.75 Facebook updates each week ($SD = 15.31$) and indicated their relationship status as single (24.55%), married (32.49%), engaged (7.22%), cohabiting (9.39%), exclusively dating (19.49%), causally dating (6.50%), or other (0.36%). Most participants (69.00%) reported that their Facebook page displayed their relationship status.

3.2.2. Procedure

The data reported here are drawn from a larger study on Facebook communication. We describe only variables that are relevant to the present investigation (see OSM for full materials).

Participants first answered questions about themselves and their Facebook use (see OSM). This series of questionnaires included measures of the same individual differences that we considered as potential covariates in Study 1—trait self-esteem (Rosenberg, 1965), attachment anxiety and avoidance (Wei, Russell, Mallinckrodt, & Vogel, 2007), and gender—as well as a measure of extraversion (Gosling, Rentfrow, & Swann, 2003.). Participants also completed an attention check, which was embedded within these questionnaires. The attention check asked participants to select a specific number on a Likert scale.

We then randomly assigned participants to one of two PNR conditions (high vs. low PNR). The PNR manipulation involved asking participants to recall a time in which their Facebook network had responded to one of their posts in a way that either affirmed or undermined their perception of their network's interest in and care for them—two dimensions of perceived responsiveness that have been established in dyadic contexts (e.g., Caprariello & Reis, 2011; Reis, 2017). In the high PNR condition, participants were asked to recall a time when they posted something on Facebook to which their networks responded in a way that let them "know that they [participants' networks] were interested and that they cared." In the low PNR condition,

[3] The number of participants exceeds the number of HITs posted, suggesting that some respondents did not request remuneration on MTurk.

participants were asked to recall a time when they posted something on Facebook to which their networks responded in a way that made them "feel uncertain about whether they [participants' networks] were interested and whether they cared." All participants were then asked to write about the instance they recalled, describing what happened and how their network's response made them feel either assured (high PNR condition) or uncertain about their network's care (low PNR condition).

Next, participants logged into Facebook, posted an update, and transferred that update to the online survey. Participants then responded to a state PNR manipulation check item ("How supportive would you say that your own Facebook network is?" 1 = *not at all*, 9 = *extremely*) and answered questions about the update that they had posted (see OSM). Lastly, participants indicated whether they actually posted the update they reported on their Facebook page.

Following data collection, three trained coders—different coders from the coders involved with Study 1—who were blind to PNR condition and to hypotheses independently rated each participant's single update for self-revealingness using the same item used in Study 1. Coders also estimated each participant's network responsiveness based solely on his/her single Facebook update ("How supportive would you guess that this person's Facebook network is?" 1 = *not at all*, 9 = *extremely*). These items were embedded in a larger set of coding items (see OSM).

3.2.3. Statistical procedures

We followed the same data analytic plan described for Study 1, but we also modelled condition as an exogenous variable (0 = low PNR condition, 1 = high PNR condition).

3.3. Results

Several steps were taken to ensure high quality data from participants who paid attention and followed instructions in this online study. Eighty-seven participants (high PNR condition $n = 30$; low PNR condition $n = 57$) did not write about the type of experience that their condition instructions described. Four other participants failed the attention check (high PNR condition $n = 1$; low PNR condition $n = 3$), and 15 participants (high PNR condition $n = 9$; low PNR condition $n = 6$) reported that they did not actually post an update on Facebook. Thus, we excluded data from these participants in analyses reported here. (The pattern of results for all non-experimental pathways held in analyses that included data from these participants, with one exception involving a direct path from state PNR to coder-estimated responsiveness that we describe in a footnote). Thus, the final sample comprised 171 participants who passed the attention check and followed instructions (high PNR condition $n = 106$; low PNR condition $n = 65$).

Coders were unable to rate 19 updates (high PNR condition $n = 10$; low PNR condition $n = 9$) for various reasons (e.g., participants did not report their update or reported an unintelligible or non-text update). Thirteen of these participants also did not report their state PNR, resulting in missing data on all endogenous variables. According to a sensitivity analysis (G*Power; Faul et al., 2009) and findings from simulation studies on bias-corrected bootstrap tests of mediated effects (Fritz & MacKinnon, 2007), the final sample included in analyses (N = 158) met the necessary requirements to detect small to medium effects of condition on update self-revealingness directly and indirectly via state PNR (power = .80; $\alpha = 0.05$).

Table 2 displays descriptive statistics and correlations for key study variables. Participants, on average, perceived their networks as relatively responsive: The mean state PNR rating ($M = 6.10$, $SD = 2.07$) was significantly higher than the midpoint of the 9-point scale, $M_{difference} = 1.10$, 95% CI [0.771, 1.420], $t(156) = 6.62$, $p < .001$. Overall, each coder rated update self-revealingness as relatively low (Ms = 2.46–3.55 on a 9-point scale, SDs = 1.68–1.79).

A confirmatory factor analysis revealed that all coder-rated items loaded significantly onto their relevant factors (update self-revealingness βs = 0.63-0.75; coder-estimated responsiveness, βs = 0.42-0.79). We therefore ran the model displayed in Fig. 2, which fit the data well, χ^2 (13, N = 158) = 13.52, $p = .408$, RMSEA = 0.02, 90% CI [0.00, 0.08], CFI = 1.00, SRMR = 0.03.

3.3.1. State perceived network responsiveness

As shown in Fig. 2, a main effect of condition emerged on state PNR, $\beta = 0.51$, $b = 1.06$, $SE = 0.34$, 95% CI = [0.404, 1.717], $p = .002$. As expected, participants in the high PNR condition perceived their networks as more responsive ($M = 6.48$, $SD = 2.12$) than participants in the low PNR condition ($M = 5.41$, $SD = 1.80$), Cohen's $d = 0.52$.

3.3.2. Update self-revealingness

Following the approach we used in Study 1, we first ran separate models involving trait self-esteem ($\alpha = 0.93$), attachment anxiety ($\alpha = 0.81$), attachment avoidance ($\alpha = 0.78$), gender, and extraversion, ($r[170] = 0.59$, $p < .001$) as predictors of update self-revealingness to determine which (if any) covariates to retain in the final model. As in Study 1, none of these variables emerged as significant predictors of update self-revealingness, $ps > .05$. Thus, none were included in the final model.

As shown in Fig. 2, no direct effect of condition emerged on update self-revealingness, $\beta = -0.20$, $b = -0.25$, $SE = 0.25$, 95% CI = [-0.739, 0.239], $p = .316$. However, an indirect effect of condition on update self-revealingness through state PNR did emerge, $\beta = 0.05$, $b = 0.13$, $SE = 0.08$, bias-corrected 95% CI = [0.011, 0.360]. The high (vs. low) PNR condition increased state PNR, $\beta = 0.51$, $b = 1.06$, $SE = 0.34$, 95% CI = [0.404, 1.717], $p = .002$, which, in turn, positively predicted update self-revealingness, $\beta = 0.20$, $b = 0.12$, $SE = 0.06$, 95% CI = [0.004, 0.241], $p = .043$. Thus, although we did not find a direct effect of condition on update self-revealingness as we had anticipated, we did find an indirect effect of condition on update self-revealingness via state PNR. In addition, the association between state PNR and update self-revealingness is consistent with findings from Study 1.

3.3.3. Coder-estimated perceived network responsiveness

Also paralleling Study 1, participants' state PNR positively predicted coder-estimated responsiveness in a model that was identical to that presented in Fig. 2, except that the path from update self-revealingness to coder-estimated responsiveness was constrained to zero, $\beta = 0.30$, $b = 0.06$, $SE = 0.03$, 95% CI = [0.010, 0.108], $p = .019$. Blocking the indirect path from state PNR to coder-estimated responsiveness through update self-revealingness resulted in a poor-fitting model, χ^2 (14, N = 158) = 68.85, $p < .001$, RMSEA = 0.16, 90% CI [0.12, 0.20], CFI = 0.80, SRMR = 0.16. Model fit for this constrained model was significantly worse than model fit for the less constrained (Fig. 2) model, $\Delta\chi^2_{(1)} = 55.33$, $p < .001$.

As shown in Fig. 2, when the path from update self-revealingness to coder-estimated responsiveness was freed (i.e., when the indirect path from state PNR to coder-estimated responsiveness through update self-revealingness was no longer blocked), the path between state PNR and coder-estimated responsiveness became nonsignificant, $\beta = 0.11$, $b = 0.03$, $SE = 0.02$, 95% CI = [-0.011, 0.062], $p = .176$, and update self-revealingness positively predicted coder-estimated responsiveness, $\beta = 0.76$, $b = 0.29$, $SE = 0.08$, 95% CI = [0.139, 0.432], $p < .001$.[4] A serial mediation analysis revealed a significant indirect effect of condition on coder-estimated responsiveness via state PNR and update self-revealingness (in that order), $\beta = 0.08$, $b = 0.04$, $SE = 0.03$, bias-

[4] Analyses using data from the full sample (i.e., without performing the exclusions described in text) showed that the direct path from state PNR to coder-estimated responsiveness remained significant in the final (Fig. 2) model, but was reduced in magnitude relative to the constrained model in which the path from update self-revealingness to coder-estimated responsiveness was fixed to zero.

Table 2
Descriptive statistics and correlations between study 2 variables.

Variable	*M* (*SD*)	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. State perceived network responsiveness	6.10 (2.07)	–						
2. Coder 1 update self-revealingness	2.46 (1.68)	.21*	–					
3. Coder 2 update self-revealingness	2.77 (1.68)	.05	.44***	–				
4. Coder 3 update self-revealingness	3.55 (1.79)	.09	.54***	.49***	–			
5. Coder 1 estimated responsiveness	3.46 (1.11)	.11	.24*	.28***	.28***	–		
6. Coder 2 estimated responsiveness	5.06 (0.83)	.20*	.41***	.31***	.37***	.25**	–	
7. Coder 3 estimated responsiveness	4.68 (1.51)	.16*	.50***	.31***	.66***	.32***	.54***	–

Note. *$p < .05$. **$p < .01$. ***$p \leq .001$.

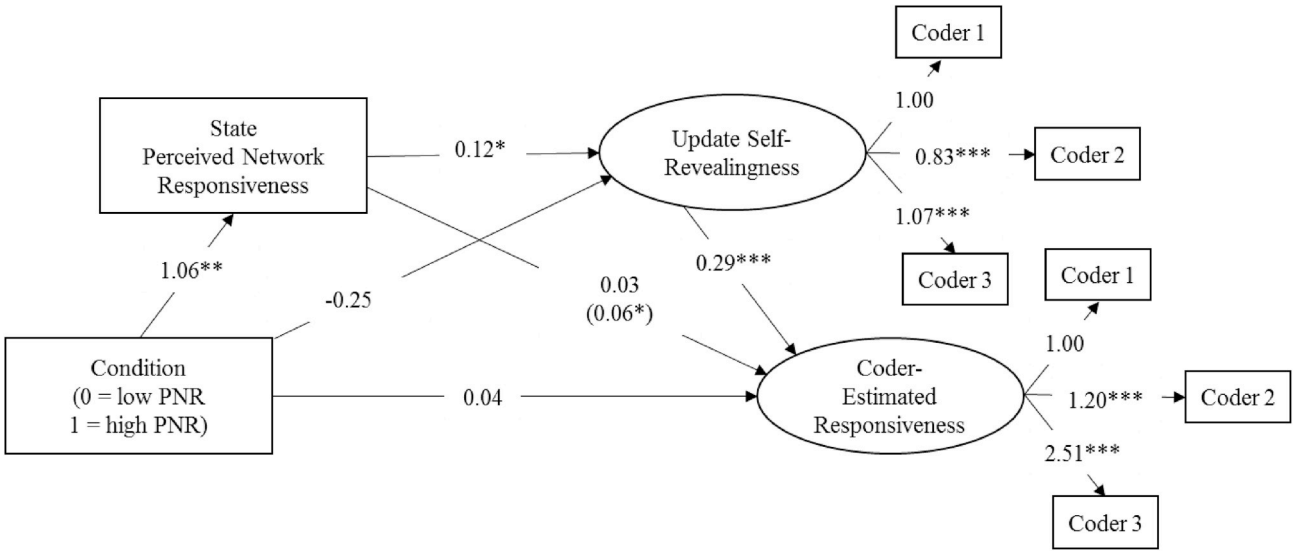

Fig. 2. Model used to test hypotheses in Study 2. Path coefficients are unstandardized. The high (vs. low) PNR condition increased state perceived network responsiveness, which in turn predicted more update self-revealingness. Update self-revealingness, in turn, positively predicted coder-estimated responsiveness. The coefficient in parentheses is derived from a model in which the path from update self-revealingness to coder-estimated responsiveness was fixed to zero. Covariances between residual variances for coders' ratings are omitted from the figure. Factor loadings for Coder 1 were fixed to one for model identification purposes, and therefore were not tested for significance. PNR = perceived network responsiveness. *p < .05. **p < .01. ***p ≤ .001.

corrected 95% CI = [0.005, 0.111]. Participants in the high (vs. low) PNR condition perceived their networks as more responsive, which in turn was associated with posting a more self-revealing update; and the degree to which participants' updates were self-revealing was positively associated with coder-estimated responsiveness. No other indirect effects emerged (specific indirect effect via state PNR, $\beta = 0.06$, $b = 0.03$, $SE = 0.02$, bias-corrected 95% CI = [-0.004, 0.092]; specific indirect effect via update self-revealingness, $\beta = -0.15$, $b = -0.07$, $SE = 0.07$, bias-corrected 95% CI = [-0.269, 0.044]). Thus, observers—who were given even thinner slices of participants' behavior than observers in Study 1—were able to make inferences about participants' network responsiveness on the basis of just one update, and appear to have used that update's self-revealingness to inform their estimates.

4. General discussion

When navigating the social media landscape, people must manage the risks and rewards inherent in disclosing to their entire network at once (Greene et al., 2006; Marwick & Boyd, 2011.). Prominent social psychological models of self-disclosure predict that confidence in a partner's responsiveness promotes open, self-revealing self-disclosure, even though self-revelation renders disclosers vulnerable to rejection (e.g., Clark & Lemay, 2010; Omarzu, 2000; Reis & Shaver, 1988). Yet, such models have typically been developed and tested in the context of dyadic, in-person interactions. In the current work, we tested the hypothesis that perceptions of a *network's* responsiveness guide network-level disclosure on Facebook. Across two studies, people who viewed their Facebook network as more (vs. less) responsive posted more open, self-revealing status updates. These findings suggest that a key tenet of Reis and Shaver's (1988) interpersonal model of intimacy extends to a social media environment: Just as perceived *partner* responsiveness promotes self-revealing disclosure at the dyadic level (e.g., Gable & Reis, 2006; Reis & Shaver, 1988), perceived *network* responsiveness is associated with self-revealing disclosure at the network-level. Thus, our findings provide evidence for Gable and Reis's (2006) assertion that processes related to perceived responsiveness should operate similarly in contexts involving individual partners and larger, social groups. More generally, our social psychological approach to understanding self-disclosure on social media answers recent calls (e.g., Anderson et al., 2012; Kende et al., 2015; Okdie et al., 2014; Wilson et al., 2012) to consider how psychological processes typically studied offline unfold on social media.

By demonstrating that people who viewed their network as more (vs. less) responsive posted more self-revealing updates, the present work makes important contributions to the social media literature. Prior research on the antecedents of network-level disclosure has typically focused on relations between features of disclosers (e.g., gender and personality traits; Schwartz et al., 2013) or structural characteristics of disclosers' social networks (e.g., size and density; Lin et al., 2014) and Facebook update content. We extend these findings by underscoring the relations between a subjective, functional characteristic of disclosers' online networks and the openness of their online disclosure. Moreover, work on online privacy management contends that appraisals of the costs and rewards associated with revealing personal information online

contribute to self-disclosure on social media (e.g., Dinev & Hart, 2006; Gao, Liu, Guo, & Li, 2018). Most of this work relies on participants' self-report behavior (e.g., Cheung et al., 2015) or disclosure inclinations (e.g., Proudfoot et al., 2018). Our findings provide evidence linking perceptions of a responsive network with actual self-disclosure behavior on social media.

As a secondary aim, we examined whether and how disclosers' PNR is evident to observers who read their network-level disclosures. Observers were able to detect participants' PNR with some degree of accuracy from just 10 (Study 1) or one single (Study 2) update. Mediation analyses suggested that disclosure openness/self-revealingness informed observers' judgements. These findings may be seen as lending further support to our hypothesis that PNR contributes to how openly disclosers express themselves to their network (for a similar argument, see Furley, Schweizer, & Memmert, 2018): Observers' ability to infer participants' PNR via the self-revealingness of their update(s) suggests that the degree to which disclosers openly express themselves to their networks is, indeed, a valid cue for their PNR.

Our findings also add to a growing literature on person-perception and thin-slice judgements. Past work has emphasized people's ability to infer personal characteristics from traces of in-person, videotaped, or social media behavior (e.g., Rule & Ambady, 2008; Tskhay & Rule, 2014). Some work has also revealed that observers can detect features of people's dyadic experiences (e.g., interpersonal rapport; infidelity; relationship quality; Bernieri et al., 1996; Emery, Muise, Alpert, & Le, 2015; Lambert et al., 2014) from watching brief video clips of their social interactions. Our findings suggest that thin slices of text-based behavior (i.e., Facebook updates) also offer observers some insight into disclosers' social experiences with their network members. Moreover, by demonstrating that update self-revealingness mediated the link between participants' PNR and observers' network responsiveness judgements, our findings shed light on an important aspect of person-perception that has thus far remained unclear: the cues through which accurate thin-slice judgements arise on social media (Schmid Mast, Murphy, & Hall, 2006; Van Der Heide, D'Angelo, & Schumaker, 2012). Future work might explore whether accurate thin-slice PNR judgements also emerge from other types of self-expression (e.g., posted photos; "check-ins" at visited places offline), and whether the degree to which people openly reveal themselves through these channels similarly orients observers to their PNR. Further, future research might explore whether thin-slice PNR judgments can also be made with any degree of accuracy on other social media platforms, such as Twitter, Instagram, Snapchat, and Sina Weibo.

In our studies, observers did not know participants. However, network-level self-disclosure on social media may also reveal disclosers' PNR to their own network members. Familiarity with a specific individual increases the accuracy of observers' social judgements (Nater & Zell, 2015) and the relevance that a judged dimension has for observers enhances how "visible" that dimension is to observers (McArthur & Baron, 1983; Zebrowitz & Collins, 1997). Accordingly, disclosers' PNR level may be particularly evident to individuals who are the targets of these perceptions (i.e., disclosers' network members). If so, broadcasting one's PNR via disclosure self-revealingness may confer some advantages for the observer and discloser. For example, inferring a discloser's PNR may help inform observers' decisions about whether and/or how to interact with the discloser (e.g., to enhance support extended toward disclosers who feel relatively unsupported by their network, or to reduce support efforts extended toward disclosers who already feel highly supported). Relatedly, making network-level disclosures that hint at their own PNR may help disclosers elicit their desired level of responsiveness. However, observers' ability to judge a discloser's PNR could also undermine observers' responsive behavior when their motivation to care for the discloser is low (Winczewski, Bowen, & Collins, 2016). At a broader level, understanding the implications and potential applications of network responsiveness judgments will be an important area for future research.

Although the current research focused on PNR as a predictor of self-disclosure on Facebook, other factors may also shape network-level disclosure behavior. To begin to consider this possibility, we examined several individual difference variables—namely, trait self-esteem, attachment anxiety, attachment avoidance, gender, and (in Study 2) extraversion—as predictors of update self-revealingness. Whereas past work has often found links between these variables and self-disclosure, none of these variables significantly predicted update self-revealingness in our studies. The lack of associations between these individual difference variables and open Facebook disclosure observed in the present studies may suggest that these individual difference predictors operate differently in online disclosure contexts. Past work provides support for this possibility with regard to self-esteem: Although people with low self-esteem (LSEs) are typically cautious and disclose less openly than people with high self-esteem (HSEs) in face-to-face contexts (Wood & Forest, 2016), LSEs report finding Facebook a particularly safe place to express themselves (Forest & Wood, 2012). This may explain why we observed no differences between LSEs and HSEs in the openness of disclosure on Facebook in the present studies. Future work should aim to replicate our findings and develop a fuller understanding of the ways in which disclosure and its predictors differ across contexts. Future studies should also examine whether individual difference variables predict other features of online disclosure beyond openness/self-revealingness (e.g., valence).

4.1. Future directions

4.1.1. Perceived network responsiveness

Our findings raise some additional questions about the development and maintenance of PNR. Given the robust link between network responsiveness perceptions and network-level self-disclosure, future research should investigate how these perceptions emerge. In dyadic contexts, perceptions of a partner's responsiveness depend on actual support transactions with a partner and dispositional factors that bias one's perceptions of a partner's responsiveness (e.g., attachment style and trait self-esteem; Lemay & Clark, 2015; Collins & Feeney, 2004). Similarly, PNR may arise from both accurate appraisals of a network's responsiveness (i.e., responses disclosers receive from their network members) and dispositional factors that bias perceptions of a network's responsiveness. Even the actual responses that disclosers receive from others may be governed by more than their network's tendency to be responsive: People's own decisions about what to disclose likely contribute to the responses they receive (e.g., Barak & Gluck-Ofri, 2007; Bareket-Bojmel, Moran, & Shahar, 2016; Forest & Wood, 2012). Social media algorithms that determine which network members see disclosers' updates might also affect the responses that disclosers receive, and consequently shape disclosers' PNR. Future research could also explore whether network-level responsiveness perceptions are formed by averaging all members' responsiveness levels or by weighting certain members' responsiveness levels (e.g., members who are the most or least responsive, most vocal, or to whom disclosers feel closest) more heavily than others members'.

Once established, one's PNR may be in part self-perpetuating. Our findings suggest that people who perceive their network as relatively unresponsive may limit how openly they express themselves to their network. Given that reticence hinders a network's ability and/or motivation to behave supportively (High, Oeldorf-Hirsch, & Bellur, 2014; Huang, 2016), disclosers' PNR may ultimately elicit responses from their network that affirm existing beliefs about that network's responsiveness through a self-fulfilling prophecy (see Snyder & Stukas, 1999). In a similar vein, researchers might investigate whether and how people attempt to regulate their network responsiveness and with what consequences. For example, curating one's network (e.g., unfriending members who contribute to lower levels of PNR) may help disclosers create a "safe" space for open self-disclosure, but might also deprive disclosers of important information about their relational value (Leary,

Tambor, Terdal, & Downs, 1995) or the desirability of their social behavior.

4.1.2. Broadcasting network responsiveness perceptions

Our finding that people's Facebook updates gave coders insight into their PNR is particularly interesting in light of growing concerns about privacy breaches on social media (Raine, 2018). A recent Facebook privacy breach that affected more than 50 million users (Lee, 2018), for example, spurred calls for enhanced protection of users' data. Our findings suggest that Facebook users broadcast potentially sensitive information about themselves in their status updates, such that strangers can detect how users feel about their online social networks by reading a small set of their updates. Future research should investigate whether people recognize that their network-level disclosures leak information about their perceptions of their network to others, and how such awareness might affect self-disclosure decisions. The finding that people broadcast their PNR through their Facebook updates might also open the door for work that explores socially responsible applications of thin-slice PNR judgments. Past work has demonstrated that smartphone applications that collect information about people's behavior in physical space may assist crowd management efforts aimed at averting social problems (Helbing et al., 2015). Similarly, thin-slice PNR judgments might represent a means to collecting information from self-disclosure behavior in cyberspace that could be used to promote Facebook users' well-being. For example, the ability for strangers to detect low PNR might be leveraged to help people who could benefit from social interventions. Future studies might investigate this possibility.

5. Conclusions

In recent years, social media sites have become ubiquitous contexts for interpersonal communication. It is thus critical to understand the degree to which social psychological theories developed to explain dyadic, in-person communication hold up in this new context. Our findings provide the first evidence that a key determinant of self-disclosure that has been identified at the dyadic level (e.g., Laurenceau et al., 1998; Omarzu, 2000; Reis & Shaver, 1988) is also associated with self-disclosure at the network level. To the extent that people perceive their social media networks as responsive, they self-disclose more openly to those networks. The openness of people's network-level disclosures also appears to offer observers insight into those people's network responsiveness perceptions. Thus, the degree to which people openly express themselves in their Facebook updates may reflect those people's network responsiveness perceptions, and also reveal these perceptions to others.

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Declaration of competing interest

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Appendix A. Supplementary data

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