A New Perspective on the Social Functions of Emotions: Gratitude and the Witnessing Effect

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Abstract

We propose a novel theoretical and empirical approach to studying group-level social functions of emotions and use it to make new predictions about social consequences of gratitude. Here, we document the *witnessing effect*: In social groups, emotional expressions are often observed by 3rd party witnesses—family members, co-workers, friends, and neighbors. Emotional expressions coordinate group living by changing 3rd party witnesses' behavior toward 1st party emotion expressers and toward 2nd party people to whom emotion is expressed. In eight experiments (N = 1,817), we test this for gratitude, hypothesizing that 3rd party witnesses will be more helpful and affiliative toward a 1st party who expressed gratitude to a 2nd party, as well as toward the 2nd party, and why. In Experiments 1-3, participants who witnessed a "thank you" in one line of text, expressed to someone who previously helped the grateful person, were themselves more helpful toward the grateful person. In Experiment 4, witnesses of gratitude expressed to someone else via video recording subsequently self-disclosed more to the grateful person, and in Experiment 5 wanted to affiliate more with the grateful person *and with* the person toward whom gratitude was expressed. Experiments 6-8 used within-subjects designs to test hypothesized behavioral and social-perceptual mechanisms for these effects, with videos of real gratitude expressions. Gratitude may help build multiple relationships within a social network directly and simultaneously. By specifying proximal interpersonal mechanisms for reverberating consequences of one person's communicated emotion, the present work advances theory on the group-level functions of emotions.

Keywords: social functions of emotions; gratitude; emotion expression; affiliation; helping

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Emotions serve several functions in guiding responses to problems and opportunities. Most emotion research has focused on examining the *intra*personal functions of emotions. For example, within a person, emotions involve the organization of appraisal, experience, expression, biological responses, and behavior to respond to problems and opportunities (Mauss et al., 2005; Scherer, 1984, 2005). However, emotions are also theorized to serve several classes of *social* functions (Keltner & Haidt, 1999; see also Frank, 1988; Frijda & Mesquita, 1994; Fischer & Manstead, 2008; Niedenthal & Brauer, 2012; Van Kleef, De Dreu, & Manstead, 2010), which have been characterized at various levels of analysis. At the *individual* level, emotions inform the person experiencing the emotion about and coordinate responses to problems and opportunities that arise in social interaction. For example, experiencing shame informs the self about one's devalued status in the eyes of others (Sznycer et al., 2016). At the *dyadic* level, emotions coordinate responses within meaningful interpersonal relationships. Empirical work at this level has focused on the effects of one person's (i.e., the 1st party's) emotion on the person toward whom that emotion is directed (i.e., the 2nd party). For example, anger promotes actions that lead dyadic partners to change undesired behaviors (Fischer & Roseman, 2007). At the *group* level, emotions convey information that helps coordinate interactions among group members. Emotions often occur in the context of group living, yet the group level of analysis has received the least empirical investigation and support.

As we detail below, most work on group-level functions of emotion focuses on (a) how group membership influences emotion, or (b) emotion contagion among group members (Niedenthal & Brauer, 2012). In this paper, we make a theoretical and empirical case for a third

type of group-level social function of emotions, proposing that emotional expressions can shift *interpersonal dynamics* in groups, and that they do so by systemically influencing *multiple group members simultaneously*. These shifts should be observable in specific relationship-relevant behaviors of group members (e.g., ostracism, helping), which can be theoretically derived for a given type of emotion. Key to our theorizing is that predictable shifts in group members' behavior should be observable not only in the behavior of the 2nd party person toward whom the emotion is expressed—as prior research on the dyadic social functions of emotion has shown—but also in the behavior of any number of *3rd party witnesses* to the emotion. Through shifts in interpersonal dynamics over time among multiple group members, our theorizing leads to the conclusion that an emotion—via expression—can have reverberating effects on *relationships* throughout a social network. That emotional expressions could impact the overall interpersonal dynamics of a group is itself a new group-level effect of emotion (see Barsade & Gibson, 1998, 2012, for a bottom-up, compositional conceptualization of group-level outcomes as the sum of an individual-level outcome among a set of group members). However, as we explain below, these effects are distinct from emotion contagion effects. Ultimately, these systematic shifts in group relationships should also influence other downstream group outcomes. In eight experiments, we demonstrate the potential of this new theorizing by examining relationship-relevant behaviors of 3rd party witnesses.

The emotion of gratitude serves as our testing ground. The present paper makes contributions to the literatures of both emotion generally and gratitude specifically by presenting new theorizing about the group-level social functions of gratitude, generating eight key hypotheses based on this new theorizing, and testing these next-generation hypotheses in eight experiments using novel paradigms that focus on behavioral outcomes. Specifically, we predict

that 3rd party witnesses to someone expressing gratitude toward a benefactor will be more helpful and affiliative toward the grateful person as well as toward the benefactor.

Gratitude as a Test Case for New Theorizing on the Social Functions of Emotions

Gratitude is a positive emotion that can be experienced when a person appraises that another person (i.e., the "benefactor") has done something notable to intentionally benefit the self (Algoe & Haidt, 2009; Ortony, Clore, & Collins, 1988). This natural dyad of grateful person and their benefactor has led to hypothesis tests about each member of the social dyad and, in turn, this body of research has helped to advance theorizing about the *dyadic-level social functions* of emotion in recent years. The emotion of gratitude helps solve a central problem of human survival by identifying potential high-quality relationship partners and binding people into relationships with those individuals (Algoe, 2012; Algoe, Haidt, & Gable, 2008). That is, of all emotions, gratitude is uniquely suited to *promote high-quality relationships.* In the present paper, we build on what has been learned about the dyadic-level social functions of emotions to argue that the social functions of gratitude extend beyond the dyad to include the group. We propose that expressions of gratitude can promote high-quality relationships with multiple group members simultaneously, via influences on 3rd party witnesses.

Although most emotion research has focused on intrapersonal effects, Keltner and Haidt (1999) pushed researchers to consider the importance of *social* functions at the individual, dyadic, and group levels of analysis.[1] Building on Wilson (1998), Keltner and Haidt (1999) argued for consilience across levels of analysis; that is, the functions of an emotion at one level of analysis may simultaneously support functions at other levels of analysis for related reasons. Thus, understanding the social functions of a given emotion at the individual and dyadic levels of

[1] They also discussed the cultural level of analysis, which we do not address here.

analysis will be instrumental in making predictions about the social functions of that emotion at the group level of analysis. We begin with an overview of the latest evidence regarding individual social functions and dyadic social functions of gratitude.

The Social Functions of Gratitude at the Individual and Dyadic Levels of Analysis

At the *individual level*, experiencing gratitude informs the experiencer about the relationship potential of the person who is the object of the emotion. Gratitude calls forth (a) spontaneous thoughts about the good qualities of the benefactor and (b) motivation to acknowledge the positive behaviors of the benefactor, which often gives rise to (c) a gratitude *expression* (Algoe & Haidt, 2009). Critically, individuals do not experience gratitude by default when someone does something to (objectively) benefit them, but only when they perceive that benefactor's action in a specific way (e.g., Algoe, Haidt, & Gable, 2008; Tesser, Gatewood, & Driver, 1968; Wood, Brown, & Maltby, 2011). Algoe's (2012) *find-remind-and-bind* theory of gratitude synthesized this evidence to propose that gratitude alerts the individual to a certain kind of opportunity: A good social partner has just been revealed. This can occur regardless of whether the benefactor is a stranger, acquaintance, or close relationship partner (Algoe, 2012). Thus, gratitude helps *find* new people or *reminds* the individual of current people who would make good social relationship partners. In turn, within the individual, gratitude is thought to coordinate a response—changes in mind, body, and behavior—that help promote the bond with the benefactor, ultimately drawing the grateful person into the relationship. That is, gratitude helps *bind* the grateful person more closely with this particular benefactor.

At the *dyadic level*, gratitude strengthens the relationship between grateful person and benefactor (Algoe, 2012). In the short term, gratitude sets the stage for subsequent high-quality interactions between the grateful person and his or her benefactor (e.g., Bartlett & DeSteno,

2006; Williams & Bartlett, 2015) and, through repeated interactions between the two people, gratitude can grow the relationship over the long term (e.g., Algoe et al., 2008; Algoe, Fredrickson, & Gable, 2013). Several prospective dyadic studies linking one person's gratitude with the benefactor's future evaluations of relationship quality now provide support for this hypothesis (Algoe et al., 2008, 2013; Algoe & Zhaoyang, 2016). That is, not only does the 1st party grateful person feel better about the relationship down the line, but so does the 2nd party benefactor, who originally performed the kind action.[2]

Thus, at the individual and dyadic levels of analysis, evidence has been accumulating to support the *find-remind-and-bind* theory's (Algoe, 2012) claim that gratitude fast-tracks the development of a high-quality relationship between the 1st party grateful person and 2nd party benefactor. In the next section, we build on this evidence to propose that gratitude can fast-track relationships with other members of the group as well—namely, relationships between 1st party grateful people and 3rd party witnesses of gratitude (which was originally expressed from the 1st to the 2nd party). In doing so, we detail the novel theoretical lens and empirical strategy we believe will most efficiently foster a comprehensive understanding of the group level functions of gratitude, with implications for studying the group level functions of emotions more generally.

[2] Prior to the *find-remind-and-bind* theory (Algoe, 2012; Algoe, Haidt, & Gable, 2008), other theorists had discussed possible social consequences from gratitude, including the opportunity to establish trusting relationships (e.g., McCullough et al., 2001). Because those theories and evidence were foundational and are widely cited (as we do in several places here), it bears noting that the *find-remind-and-bind* theorizing brought in more recent evidence regarding positively-valenced emotions (e.g., Fredrickson, 1998; 2003), distinctions between communal and exchange relationships (e.g., Clark & Mills, 2011), and consideration of approach-oriented interpersonal motivations (Gable & Reis, 2001), which collectively set up related but meaningfully different predictions about how gratitude functions in social life that now form the basis of the present theorizing.

The Group Level Social Functions of Gratitude: Effects on 3rd Party Witnesses

Our perspective on group-level social functions emerges from a consideration of spontaneous everyday experiences of emotion, which are often accompanied by a communicative display. A critical piece of our theorizing acknowledges that these displays—such as an expression of gratitude from a grateful person to his or her benefactor—often occur and likely evolved in social contexts: in front of other family members, co-workers, friends, and neighbors. As such, emotional expressions provide information to *3rd party witnesses* about people and actions (see Figure 1).

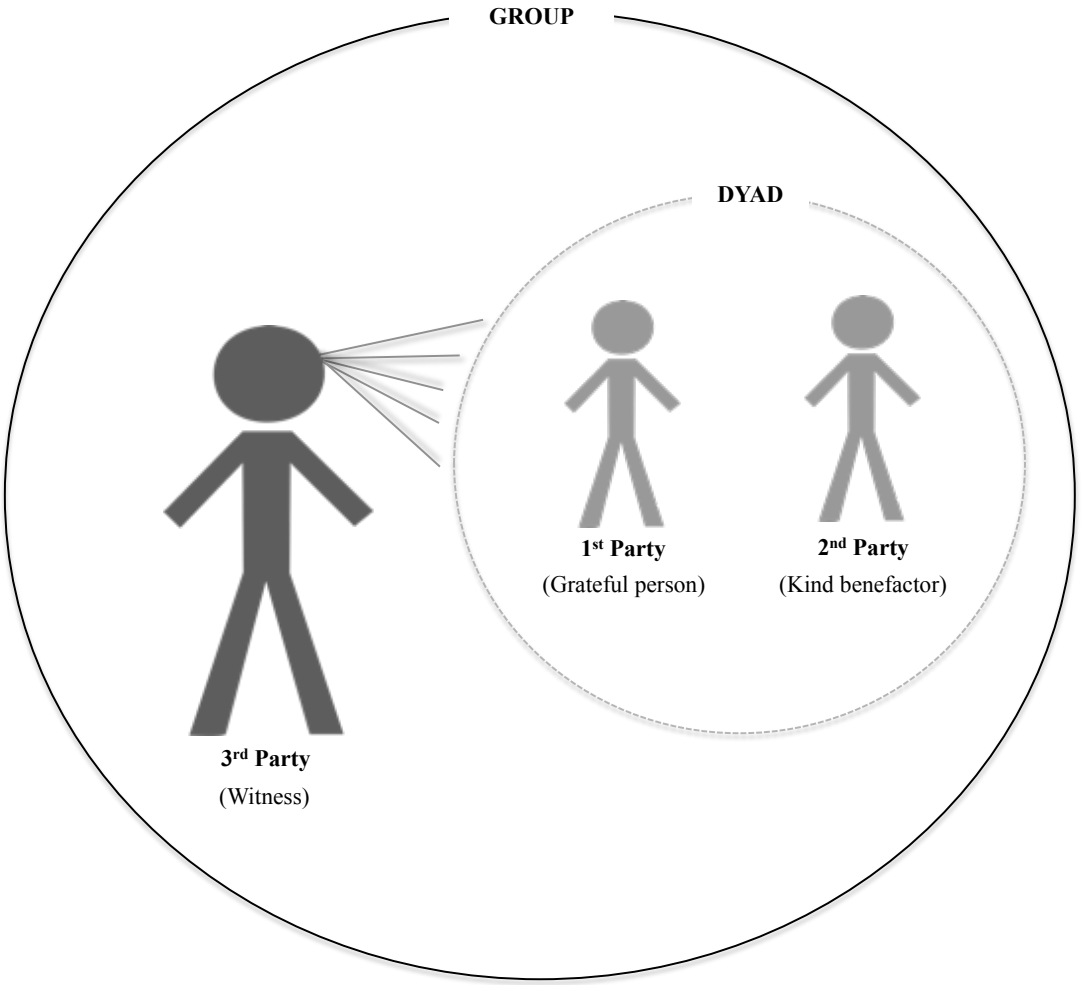

Figure 1. Our approach focuses on how a single expression of gratitude can influence the behavior of multiple group members directly and simultaneously. This paper tests the first set of hypotheses regarding how an emotional expression from 1st party to 2nd party can elicit helpful and affiliative behavior from 3rd party witnesses to the 1st party grateful person.

Moreover, the 3rd party witness and 1st party expresser are often part of the same group; this means that (a) subsequent social interactions are likely, and (b) what the witness learns should influence his or her future behavior toward the 1st and 2nd party. Consistent with the idea of consilience across levels of analysis, and consistent with the *find-remind-and-bind* theory of gratitude (Algoe, 2012), we theorize that gratitude—with communicative signaling as a proximal mechanism—should lead to tighter bonds among *multiple* members of the group in which the grateful person is embedded. Thus, at the group level of analysis, we propose that gratitude expressions function to more tightly weave together the fabric of a social network; that is, gratitude expressions should produce the group-level outcome of strengthened relational quality among group members. Consistent with evidence for the value of being embedded within high-quality networks (Holt-Lunstad et al., 2010), gratitude's impact on relationships could ultimately lead to enhanced overall well-being and a higher-functioning, perhaps healthier group.

Here, we focus on the first assumption of our theorizing: that in the same way a communicated emotion can influence the 2nd party's behavior toward the 1st party (Van Kleef, 2009; Williams & Bartlett, 2015), so too should it shift the behavior of a 3rd party witness to that emotion expression (see Figure 1). Moreover, we focus on the witness's shifting behavior toward two different members of the group: the 1st as well as the 2nd party toward whom the emotion is directed. In the case of gratitude, we propose that the behavioral relationship-building effects on 3rd party witnesses will broadly parallel the behavioral relationship-building effects observed in 2nd party benefactors (e.g., Grant & Gino, 2010; Williams & Bartlett, 2015); specifically, we expect 3rd party witnesses of gratitude expressions to be more helpful and affiliative toward a 1st party grateful person as well as toward the 2nd party benefactor toward whom gratitude is expressed. An expression of gratitude, then, may not merely result in the building of a single

relationship between grateful person and benefactor; instead, a single gratitude expression may carry the power to build relationships with multiple observers of the same expression, with both members of the original dyad. If true that one person's emotional expression may influence multiple members of the group *directly* and *simultaneously*, these multiple routes of emotional influence would likely combine to influence the overall functioning of the group over time.

It bears noting how this general prediction of ours differs from prior theorizing on the group-level social functions of emotions: Whereas conceptualizations of the individual and dyadic levels of analysis are similar across major theories of social functions of emotions, there is not consensus in the conceptualization of the group level of analysis (see Fischer & Manstead, 2016; Niedenthal & Brauer, 2012, for reviews). Some streams of research focus on how group membership influences emotions (Cikara, Botvinick, & Fiske, 2011; Cikara, Bruneau, Van Bavel, & Saxe, 2014; Fischer & Manstead, 2016; Frijda & Mesquita, 1994; Goldenberg, Halperin, van Zomeran, & Gross, 2016; Smith & Mackie, 2015; Yzerbyt & Kuppens, 2009). Other research focuses on emotional contagion (Barsade, 2002; Barsade & Gibson, 2012; Hatfield, Cacioppo, & Rapson, 1993; Sy, Côté, & Saavedra, 2005). This latter theorizing—on emotional contagion—bears some similarities to our present theory, so it is important to clarify the ways in which our ideas are new, and thus how they advance scholarship on emotion.

The present theory is different from work on emotional contagion, which is concerned with the transfer of moods and emotions within groups (Barsade, 2002; Barsade & Gibson, 2012; Elfenbein, 2014; Hatfield, Cacioppo, & Rapson, 1993, 1994). For example, work on contagion examines whether we catch others', particularly leaders', emotions (e.g., Sy, Cote, & Saavedra, 2005). In contrast, our new theorizing is not concerned with how emotional expressions influence the *emotions* of others; rather, our new theorizing is concerned with how emotional

expressions influence *interpersonal dynamics* within a group. We theorize that emotion expressions can influence various forms of interpersonal dynamics, and that the particular type of interpersonal dynamic influenced depends on the type of emotion expressed. For example, we theorize that gratitude *strengthens relationship quality* between the 1st party grateful person and witnessing group members, and between the 2nd party benefactor and witnessing group members; the focal proximal behaviors that would rapidly promote the quality of relationships are helping and affiliative behaviors and cognitions. Other emotions may impact other forms of interpersonal dynamics beyond relationship strength (for example, power and status perceptions and affordances, social ostracizing or distancing behavior, and perceptions of relational intent, to name a few). Effects of witnessing gratitude on helping and affiliation toward the 1st and 2nd party should not be accounted for by mere emotional contagion, an alternative hypothesis that we test in Experiment 8. (Of course, contagion effects could occur in parallel with the effects that we hypothesize.)

Like the previous two approaches to group-level social functions of emotions, our model is concerned with how emotions influence group outcomes. However, inspired by the concept of consilience across levels of social functional analysis for a given emotion, we present a different route for understanding how emotions produce group-level outcomes. A core difference in our approach is its assumption that social information (e.g., Scarantino, 2017; Van Kleef, 2009) is conveyed to 3rd party witnesses of an emotion, and its focus on *how* that information guides group members' person-to-person behaviors in emotion-specific ways. For example, as we explain below, we expect the social information gratitude conveys about a grateful person to be different than the information it conveys about the person toward whom gratitude is expressed. In turn, our model assumes that behavioral consequences of witnessing the emotion are proximal

mechanisms by which, through repeated interactions over time, group-level effects occur. In this way, our new perspective may add fresh insights about how emotional expressions can have reverberating effects throughout a social network (Brady, Wills, Jost, Tucker, & Van Bavel, 2017; Fowler & Christakis, 2008; Kramer, Guillory, & Hancock, 2014).

Here, we present the first empirical tests of our new theorizing, focusing first on whether an expression of gratitude to a benefactor influences a 3rd party witness' behavior toward the expresser and the person toward whom gratitude is expressed, then on why. We focus on these questions, in part, because we believe predictions naturally follow from the body of research that has accumulated regarding how gratitude influences the benefactor's behavior toward the expresser. In turn, documenting the processes through which one person's gratitude influences witnesses' perceptions of and behavior toward both the person expressing the emotion and person toward whom the emotion is directed would provide initial evidence for how one person's emotion could cumulatively influence group-level outcomes over time. Our theorizing generates the following hypotheses, focusing first on predictions about behaviors toward the expresser, and why (Hypotheses 1-4), then on predictions about behaviors toward the person toward whom gratitude is expressed, and why (parallel Hypotheses 5-8):

Hypothesis 1: Gratitude will increase *helping behaviors* from 3rd party witnesses to 1st party gratitude expressers. Several field experiments now document that 2nd party benefactors toward whom gratitude is expressed are more likely to help the expresser in the future (e.g., Grant & Gino, 2010). In this body of research, the expression of gratitude has been anything from a thank you note (e.g., Clark, Northrup, & Barkshire, 1988) to a simple handwritten "Thanks!" from a waitress (Rind & Bordia, 1995). Compared to not receiving a "thank you", people were more likely to perform a desirable behavior, such as social workers

making a home visit (Clark et al., 1988) or customers leaving a larger tip for a waitress (Rind & Bordia, 1995). Some of the earliest psychological theorizing on gratitude called attention to this robust set of findings to suggest that expressed gratitude acts as positive reinforcement of the desirable behavior (McCullough et al., 2001).

An expression of gratitude for one person's behavior draws attention to behavior that is valued by the expresser. A 3rd party witness who will have subsequent interactions with that expresser should pick up the same cue as the person toward whom the thanks is directed. Thus, when given a chance to perform the same helpful behavior for which the benefactor was thanked, we predict 3rd party witnesses will be more likely to help the grateful person.

Hypothesis 2: Gratitude will increase *affiliative behaviors* from 3rd party witnesses to 1st party gratitude expressers. Benefactors toward whom gratitude is expressed are more likely to be affiliative toward the expresser in the future (Williams & Bartlett, 2015). Affiliative behaviors—behaviors that promote closeness in particular—provide clear support for the *find-remind-and-bind* theory (Algoe, 2012) emphasis that gratitude promotes the growth of *high-quality* (not merely tit-for-tat) relationships. Because affiliative behaviors offer the most direct route to the strengthening of relationships, studying them adds strength to the investigation that is unique from the value of studying helping behaviors. A recent experiment showed that 2nd party benefactors who were thanked for their help (versus those who were not thanked) were more likely to spontaneously leave contact information for the 1st party gratitude expresser in a written note (Williams & Bartlett, 2015). This implies increased affiliative motive in the benefactor and an interest in a relationship with the gratitude expresser.

An expression of gratitude conveys that the grateful person is the kind of person who acknowledges another's good deeds. This should make the grateful person a more attractive

relationship partner, not only to the benefactor who originally did the good deed, but also to a 3rd party witness. We predict that witnessing an expression of gratitude will make the 3rd party witness engage in more affiliative behavior toward the 1st party expresser.

Hypothesis 3: The other-praising feature of gratitude is a key mechanism for effects on 3rd party witnesses' behaviors toward 1st party gratitude expressers. Gratitude involves two key converging attributions: (1) that one got an outcome one wanted, (2) due to another person's notable actions (Algoe et al., 2008; Ortony, Clore, & Collins, 1988). That is, a self-oriented attribution is accompanied by an other-oriented attribution. As implied in the prior two predictions, taking the opportunity to call out the praiseworthy actions of the benefactor—even simply through a "thank you"—drives important aspects of the signal value of expressed gratitude. Broadly, this other-focused aspect of gratitude is expected to produce helping and affiliation (Hypotheses 1 and 2) even compared to positive emotional expressivity more generally (a key alternative explanation that we address in the next section).

More precisely than other-focus, recent research provided evidence that the degree to which a gratitude expression involves *other-praising*—calling out the positive behavior of the benefactor—is the active ingredient in driving dyadic gratitude effects (Algoe, Kurtz, & Hilaire, 2016). Specifically, behavioral coding of video-recorded expressions of gratitude to a romantic partner revealed a moderate positive association between the extent to which the expresser discussed how praiseworthy the benefactor's actions were (e.g., that the benefactor went above and beyond) and the benefactor's perceived quality of the interaction. Critically, ruling out the alternative explanation that expressed positivity *in general* would draw the romantic partner in to the relationship, the extent to which the grateful person expressed positivity about the benefit to

the self (e.g., "It made me happy") was not significantly associated with the benefactor's perceived interaction quality.

These data provide evidence that unique features of a gratitude expression—calling out the praiseworthiness of another person's actions, as opposed to a more general expression of positivity—drive the 2nd party effects of gratitude.[3] We expect that the other-focused nature of gratitude will similarly drive its 3rd party effects. Critically, in everyday-life experiences and expressions of gratitude, this other-focused *praising* feature would be observed by a 3rd party witness as part and parcel of a gratitude expression. Hence, the more general version of the hypothesis is addressed in Experiments 2, 4, and 5, where we compare a gratitude expression to an expression of positivity. However, in the final three experiments, we amplify this signal by manipulating the degree to which a grateful person praises the benefactor's actions when expressing gratitude, predicting that greater other-praising behavior toward a benefactor will increase a 3rd party witness's willingness to help and affiliate with the grateful person.

Hypothesis 4: Perceiving gratitude expressers as responsive is a key social perceptual mechanism for effects on 3rd party witnesses' behavior toward expressers. At the individual and dyadic levels of analysis, gratitude "runs on the relational currency" of a construct called *perceived responsiveness* (Algoe, 2012): Perceiving a benefactor's responsiveness to the self can lead to gratitude (e.g., Algoe et al., 2008; Algoe & Stanton, 2012), and in turn, when benefactors perceive responsiveness in a person who is grateful to them, this hooks the benefactor further into the relationship (Algoe et al., 2013; Algoe & Zhaoyang, 2016). That is,

[3] We note that, in many literatures, praise is considered a behavioral reinforcer (Henderlong & Lepper, 2002), so this line of reasoning is consistent with the robust body of evidence reviewed above that documents links between expressed gratitude and a benefactor's future helping behavior (e.g., McCullough et al., 2001, 2008). We reason that, in modern Western society, even a simple "thank you" has become shorthand for this recognition.

whereas the behavioral expression that acknowledges the benefactor's action (such as greater praise) creates a bridge *to* the benefactor, the benefactor's subsequent perception that the expresser was responsive to the self makes the benefactor more likely to cross the bridge back to the grateful person again, thus completing the connection.

Recent research on the social interaction itself provides empirical support for these hypotheses. In the study examining other-praising behavior noted above (Algoe et al., 2016), the primary indicator of the quality of the interaction was how responsive the grateful expresser was perceived to be by the benefactor. As predicted, the grateful person's degree of other-praising positive expressive behavior (but not degree of self-benefit positive expressive behavior) was significantly and robustly positively associated with the key outcome of the benefactor's ratings of expresser responsiveness (Algoe et al., 2016). Thus, we hypothesize that 3rd party witnesses of gratitude expressions will also see gratitude expressers who are more other-praising as more responsive—that is, more caring, understanding, and validating of the benefactor (see Reis, Clark, & Holmes, 2004 for conceptualization of responsiveness through these criteria). This matters because responsiveness is a signal that the person might be a good *relationship partner* (e.g., someone who, if a bond were formed, might "have the witness's back" in the future; Algoe, 2012). We test perceived expresser responsiveness as a social perceptual mechanism for the effects of expressed gratitude in the final three experiments.

Hypotheses 5 and 6: Gratitude will increase *helping* (Hypothesis 5) and *affiliation* (Hypothesis 6) toward 2nd party benefactors toward whom gratitude is expressed. Whereas predictions about witness behavior toward the person expressing gratitude naturally build on prior evidence for the behavior of the person toward whom gratitude is directed (e.g., Grant & Gino, 2010; Williams & Bartlett, 2015), our novel predictions about witness behavior toward the

person toward whom gratitude is directed (i.e., the 2nd party benefactor) stem from a consideration of the social information conveyed by an expression of gratitude. In short, when one person expresses gratitude to another, it identifies the 2nd party benefactor as the kind of person who is willing to go out of their way to benefit another person (e.g., Tesser, Gatewood, & Driver, 1968), and as enacting behavior that is valued by the (expresser's) group (Algoe & Haidt, 2009; Heinrich & Gil-White, 2001). At a fundamental level, people like this are more obviously worth one's own investment of time and efforts than are people about whom we do not have such information. We predict witnesses will be more willing to help people to whom gratitude is expressed (Hypothesis 5). Moreover, helpful and kind people are interpersonally attractive, so we expect that witnesses will also be more interested in affiliating with people to whom gratitude is expressed (Hypothesis 6).

Hypothesis 7: The other-praising feature of gratitude is a key mechanism for effects on 3rd party witnesses' behaviors toward 2nd party benefactors toward whom gratitude is expressed. Building on the logic above, the other-focused feature of a gratitude expression—compared to an expression of joy for the same outcome, for example—is what provides the signal about the benefactor's value. Therefore, in the same way that benefactors themselves calibrate their responses to hearing an expression of gratitude based on the degree of praise that is present (Algoe et al., 2016; Algoe, Kurtz, & Grewen, 2017), we predict that witnesses, too, will use other-praising behavior within the gratitude expression as a signal. Specifically, witnesses may use this information as a signal about the value of the benefactor's actions and, by extension, about the value of the benefactor. As such, we predict witnesses who observe *greater other-praising gratitude expressions* will be more willing to help benefactors, which we test in Experiment 8.

Hypothesis 8: Perceiving benefactors to whom gratitude is expressed as (morally) good people is a key social perceptual mechanism for effects on 3rd party witnesses' behavior toward benefactors. As indicated previously, an expression of gratitude, at minimum, identifies the benefactor as someone who has done something noteworthy to benefit the grateful person. Moreover, the benefactor's action is typically at least perceived as *voluntary* and the grateful person believes the benefactor *intended* to benefit them (Lane & Anderson, 1976; Tesser, Gatewood, & Driver, 1968; Weiner, Russell, & Lerman, 1979). That voluntary provision of a benefit marks the benefactor as *beneficent*—someone who produces good (from the Latin bene facere, "to do good").

People who are morally good are perceived as more deserving of positive outcomes (Lupfer & Gingrich, 1999) and they in fact receive greater cooperation from others (Delgado, Frank, & Phelps, 2005). Determination of one's moral character is a fundamental aspect of person perception in that it carries more weight than other widely-studied social evaluations (Goodwin, Piazza, & Rozin, 2014; Wojciszke, Bazinska, & Jaworski, 1998), and it quickly influences social-cognitive processing (Lindeberg, Craig, & Lipp, 2018); researchers have measured moral *goodness*, in particular, with the following adjectives: considerate, honest, helpful, generous, sincere, fair, and/or dependable (Barriga, Morrison, Liau, & Gibbs, 2001). We suspect laypeople do not explicitly think about whether someone is "moral", but they do make judgments of whether someone is a "good person". So, we stick to the label, "good person", throughout the manuscript as we predict that, for example, after seeing Tom thank Harry for doing something kind for him, witnesses will perceive greater goodness in Harry.

We acknowledge that witnesses might also pick up on the fact that a benefactor was caring, understanding, or validating toward the grateful person and their particular situation—

that is, that Harry was responsive to the particular needs of Tom. However, a witness may lack situational information about the event that caused the gratitude to understand the degree to which the benefactor's gesture was responsive to the needs of the grateful person at that time, whereas we suspect the expression of gratitude for another's beneficent gesture should readily mark the benefactor as a good person. We test the hypothesized good person social perceptual mechanism for witness' willingness to help a benefactor in Experiment 8.

Addressing key alternative explanations: positive expressivity, warmth, and emotional contagion. Notably, there is a strong alternative explanation for our prediction that expressed gratitude will lead 3rd party witnesses to help and (especially) to affiliate with grateful people: People who express positivity in general are more interpersonally attractive and may therefore elicit more affiliation. In a recent review of the relatively small literature on the effects of expressing positivity, Clark and Monin (2014) concluded that, on average, people with positive expressions are perceived to possess more desirable attributes compared to people with neutral expressions, including more attractiveness, more likeability, and more warmth; other research suggests that greater positivity is associated with greater perceived competence (Chang, Algoe, & Chen, 2016). In turn, such effects may also be expected to produce greater helping and interest in affiliating with generally positive (i.e., happy) people (Telle & Pfister, 2012). Despite this, we would still expect people expressing gratitude to elicit greater affiliation from a 3rd party witness than those expressing more general positivity, based on prior research examining social outcomes of gratitude compared to other positive emotions like happiness (Algoe & Haidt, 2009; Algoe et al., 2008; Algoe, Kurtz, & Hilaire, 2016; Bartlett & DeSteno, 2006; Jia, Lee, & Tong, 2015; Ng, et al., 2017). Thus, a key part of our empirical approach was to address whether positive expressivity could account for observed gratitude expression effects. We include a

positive expression control condition in our helping studies to test the prediction that observed effects are specific to gratitude, and we include a positive expression control conditions in our affiliation studies to additionally address these affiliation-specific concerns.

Moreover, the broader social psychological literature focuses on two fundamental dimensions of social perception—warmth and competence (Abele & Wojciszke, 2007; Fiske, Cuddy, & Glick, 2007). We noted in the previous paragraph that these have been linked to positive expressivity; in addition, warmth and competence have also been tested as potential explanations for dyadic-level effects of expressed gratitude on a benefactor's affiliative behavior toward the grateful person (Williams & Bartlett, 2015). However, building on the *find-remind-and-bind* theory of gratitude (Algoe, 2012) as well as preliminary evidence from a study that measured benefactors' perceptions of both expresser warmth as well as expresser responsiveness (Algoe et al., 2016), we see perceptions of warmth as providing general (useful) social information about a person, but perceptions of responsiveness as providing the more specific information about how that person might act in a relationship. Given that the core theorized utility of gratitude is to identify people who could be high-quality relationship partners (Algoe, 2012), we expect perceptions of expresser responsiveness to be a robust mediator of our theorized effects on witness behavior toward grateful expressers. We do not expect perceived warmth of the expresser to account for the hypothesized mediating effect of perceived expresser responsiveness (Hypothesis 4) for either outcome, so in Experiments 6 and 7, we control for perceived warmth in additional exploratory analyses that test Hypothesis 4. From another angle, scholars have sometimes asserted that grateful people—perhaps because they needed help with a task, which triggered their gratitude—are seen as less competent (e.g., Chaudhry & Loewenstein, in press). However, our reading of the literature suggests people who express gratitude will be

seen as more competent (e.g., Chang et al., 2016). Despite this prediction and the fact that competence is interpersonally attractive (e.g., Todorov, Mandisodza, Goren, & Hall, 2005), for reasons stated above we do not expect perceived competence of the expresser to account for the hypothesized mediating effect of perceived expresser responsiveness (Hypothesis 4) for either outcome, so in Experiments 6 and 7, we control for perceived competence in additional exploratory analyses that test Hypothesis 4.

Finally, as noted, our theorizing suggests that emotions impact group-level interpersonal dynamics through informational mechanisms that subsequently influence behavior. In contrast, an affect *contagion* account (e.g., Barsade, 2002; Barsade & Gibson, 2012; Elfenbein, 2014; Hatfield, Cacioppo, & Rapson, 1993, 1994) would predict that seeing gratitude expressed causes the witness to *feel more grateful*; as such, any differences in the behavior of witnesses of gratitude expressions would be predicted by contagiously-experienced gratitude. Thus, in Experiment 8, we address this alternative explanation for our proposed mediator for effects on willingness to help both the expresser (perceived responsiveness; Hypothesis 4) and the benefactor (good person; Hypothesis 8) by controlling for witness-experienced gratitude.

The Present Studies

We conducted eight experiments as the first tests of hypotheses arising from our novel theorizing about the group-level social functions of gratitude, focusing on the key proximal mechanisms through which gratitude coordinates group-level functions. Our model suggests that gratitude expressions should strengthen relationships between witnesses and 1st party expressers, as well as 2nd party benefactors toward whom gratitude is expressed, and 3rd party witnesses. To test this proposition, we focus on how gratitude expressions lead 3rd party witnesses to perform two key behaviors toward 1st party expressers and toward 2nd party benefactors: helping and

affiliation. In each experiment, participants are witnesses to a grateful person's expression of gratitude toward a benefactor. If it is indeed the case that 3rd party witnesses are spontaneously more helpful and affiliative toward gratitude expressers and toward benefactors, these data would provide direct evidence for the proximal effects specified in our theoretical model. That is, they would document the interpersonal processes among group members that would cumulatively influence group-level functioning, over time.

To provide the most conservative test of our hypotheses, the studies reported in this manuscript focus on 3rd party witnesses *who are not involved in the original situation that caused the gratitude*. That is, they do not know the 1st or 2nd party and did not participate in the social interaction for which gratitude was expressed. In Experiments 1-3 and Experiments 7-8, we examine whether 3rd party witnesses of gratitude expressions help 1st party gratitude expressers. In Experiments 4-7, we examine whether gratitude expressions influence 3rd party witnesses' affiliation toward 1st party gratitude expressers. Experiments 5 and 8 examine witnesses' affiliation and helping, respectively, toward *benefactors*. Experiments 6-8 test whether the other-praising feature of gratitude expressions is a key mechanism of gratitude's 3rd party effects (i.e., the critical active ingredient of gratitude expressions) by manipulating this potential mechanism. Experiments 6-8 also examine key social perceptual mechanisms of gratitude's 3rd party effects: Experiments 6-8 focus on perceived responsiveness of expresser as an explanation for witnesses' behavior toward expressers, and Experiment 8 focuses on perception of the benefactor as a good person as an explanation for witnesses' behavior toward benefactors. Across studies, to aid in conclusions about generalizability, gratitude expressions are operationalized in three ways: as simple "thank you's" (Experiments 1-3), through the video-recorded expressions of actors (Experiment 4-5), and through the video-recorded, unscripted

expressions of actual romantic couples (Experiments 6-8). The outcomes of helping and affiliation are each operationalized in two different ways, with one of each being behavioral. We use high-powered samples (total N = 1,817), including within-subject designs in Experiments 6-8. Across these studies we attempt to rule out potential confounds and important alternative explanations.

Experiment 1: Gratitude Expressed to a Benefactor Increases 3rd Party Witnesses' Helping Behavior Toward the Expresser

For this first test, we focused on a behavioral finding that is quite robust for the 2nd party: People who are thanked for a desirable behavior are more likely to perform the same desirable behavior for the grateful person again (McCullough, et al., 2001). Here, we test whether people who *witness someone else get thanked* will also be more likely to perform the desirable behavior for the grateful person. To do so, we introduce a new paradigm for studying helping behavior. Participants are given one task to perform but have seen an example of a prior helper (i.e., 2nd party benefactor) going beyond the task instructions for the benefit of the 1st party. To test our hypothesis, we examine whether 3rd party participants are more likely to perform the same helping behavior if the 1st party thanked the 2nd party for doing it previously (compared to a control condition in which the 2nd party was not thanked). Notably, the 1st party never asks the 3rd party participant to perform the additional task. Because modeling alone influences prosocial behavior (e.g., Spivey & Prentice-Dunn, 1990; Wilson & Petruska, 1984), helping behavior is modeled for participants in both conditions for a more conservative test of our hypothesis.

Method

Participants. Participants were 220 U.S. Amazon Mechanical Turk (MTurk) workers with a 95% approval rate or higher and at least 100 Human Intelligence Tasks (HITs) approved; they received $1.00 for their participation. Participants were recruited to complete a study

ostensibly about personality and communication styles, and were informed before accepting the HIT that both Microsoft Word and the "track changes" feature were needed. Five participants were excluded for failing an attention check, and six were excluded because the participant did not upload the correct document or submitted a second document, leaving a final sample of 209 participants (M_{age} = 32.79 years, SD_{age} = 10.09, range = 18-65; 90 males, 118 females, 1 self-identified as other; 166 White/Caucasian, 14 Black/African-American, 13 Hispanic, 12 East Asian, 6 South Asian, 4 American Indian, 7 reported another race). Without a point of reference to estimate effect size, we aimed to have useable data from 100 people per condition; incidentally, this would give 95% power to detect a medium effect size, according to the program G*Power.

Design. Participants were randomly assigned to the gratitude expression or control condition in a between-subjects design.

Procedure (see Figure 2). After completing a personality questionnaire, participants learned they would be completing the *bolding and underlining movie review task*, in which they would identify useful sentences for a movie review author. Participants were then shown an example movie review in which a previous MTurk worker had completed the bolding and underlining task for the author. This example constituted the experimental manipulation: In addition to completing the assigned task, the previous MTurk worker had modeled spontaneous helping behavior by correcting typos within the document; in the *gratitude expression condition* only, the author (1st party) expressed gratitude to the previous MTurk worker (2nd party) for correcting the typos, thereby making participants 3rd party witnesses to the expression. After viewing the example, our participant-witnesses completed their own bolding and underlining movie review task, with a different movie review. Upon submission of their completed work, we

measured whether participants had engaged in spontaneous helping behavior by correcting typos we had embedded within the review. To be clear, neither the participant (3rd party) nor the previous MTurk worker (2nd party) was ever asked to correct typos.[4]

Participants learned their task and viewed a previous participant's example. Participants learned they would be reading a movie review for its author and bolding the most useful sentences and underlining the least useful sentences (we verified participant comprehension of these instructions before they were allowed to proceed). Then, purportedly to give them a better idea of how to complete the task, participants were shown an example movie review ostensibly bolded and underlined by a prior MTurk worker. Critically, the prior MTurk worker had gone beyond the instructions to correct a few typos, visible via the "track changes" feature in Microsoft Word (the corrections stood out in a different color [red] and it was obvious that the typo had been corrected). Thus, all participants saw the potential helping behavior modeled.

Experimental manipulation of gratitude expression vs. control. The example movie review also included comments from the author of the movie review that served as the

[4] In Experiments 1-4 of this paper, we report data from the behavioral tasks participants performed (i.e. spontaneous helping behavior of correcting typos while reading documents and affiliative behavior of self-disclosure when asked to tell a story about the self). Additional self-report measures not relevant to the present investigation were collected later in the session and are listed in the online supplemental material. In these experiments, because we assumed some portion of participants may not follow the procedure required to assess behavior (e.g., successfully upload their movie review), we deliberately overenrolled for our recruitment goal by a fixed amount (e.g., 110 per condition when aiming for 100).

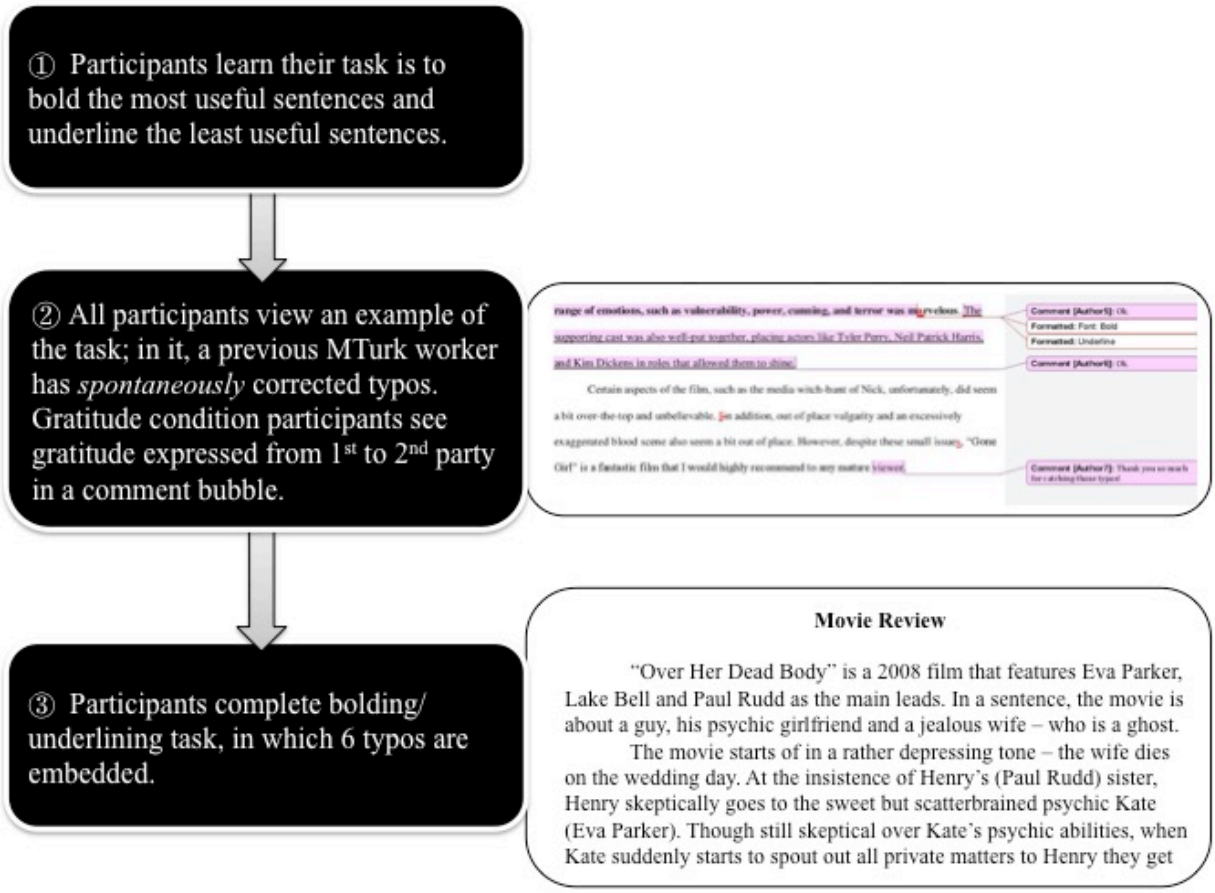

Figure 2. Overview of Experiment 1 procedure. This figure displays partial depictions of actual stimuli; these are not full screenshots (see Appendix A for full stimuli).

experimental manipulation. In both the gratitude expression and control conditions, the author acknowledged the prior MTurk worker's work through several comment bubbles saying "Ok" (see Appendix B). In the gratitude expression condition, there was simply one extra comment from the author of the movie review at the end of the document, saying "Thank you so much for catching those typos!" The control condition did not include an extra comment.[5]

[5] Across Experiments 1-3, we compared the effect of the expressed gratitude condition with a no-comment control (Experiments 1-2), expressed positivity (Experiment 2), and a typo control (Experiment 3). See online supplementary material for validation study documenting that the

Helping behavior: Did the participant spontaneously correct typos? After viewing the example, participants downloaded a different movie review to their computer and completed their own bolding and underlining task, ostensibly for the same 1st party who had expressed gratitude (or not) to the prior MTurk worker. Critically, we embedded six typos in this movie review to test whether participants would go above and beyond their assigned work by correcting typos (see Appendix C). That is, did they engage in spontaneous helping behavior for the 1st party? Once done with the task, the participant uploaded their completed movie review.

Each movie review was scored from 0 to 6, based on the number of typos participants corrected. To do this, the second and third authors arbitrarily split the sample of uploaded movie reviews in half (unaware of condition), and each scored their respective halves. A third coder scored a randomly selected subset of 30% to assess agreement. (See online supplemental material for specific scoring instructions used.) Indeed, given the objective nature of the coding, there was high agreement [ICC (2,2) = .864]. Fifty-four out of 209 participants (25.8%) corrected at least one of the six typos.

Please see Online Supplemental Material for documentation that correcting more typos on this task is seen as more helpful by naïve observers.

Results: 3rd Party Witnesses Were More Helpful Toward 1st Party Gratitude Expressers

A linear regression using bootstrapped estimates of the confidence interval was conducted to test the hypothesis using the continuous helping measure. Results demonstrated that condition significantly predicted how many typos participants corrected: Participants in the gratitude expression condition (M = 1.40, SD = 2.02) corrected more typos than those in the

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author in the gratitude condition was perceived as more grateful than the author in any other condition, and that the author was not perceived as being grateful in the expressed positivity condition.

control condition (M = 0.41, SD = 1.18; B = .99, SE = .23, t = 4.36, p < .001, 95% bootstrapped CI [0.547, 1.434], R^2 = .084). The bootstrapped estimate of the confidence interval for the predictor, using 1,000 repetitions, indicates that it does not include zero, thereby supporting the hypothesis (see Figure 3).

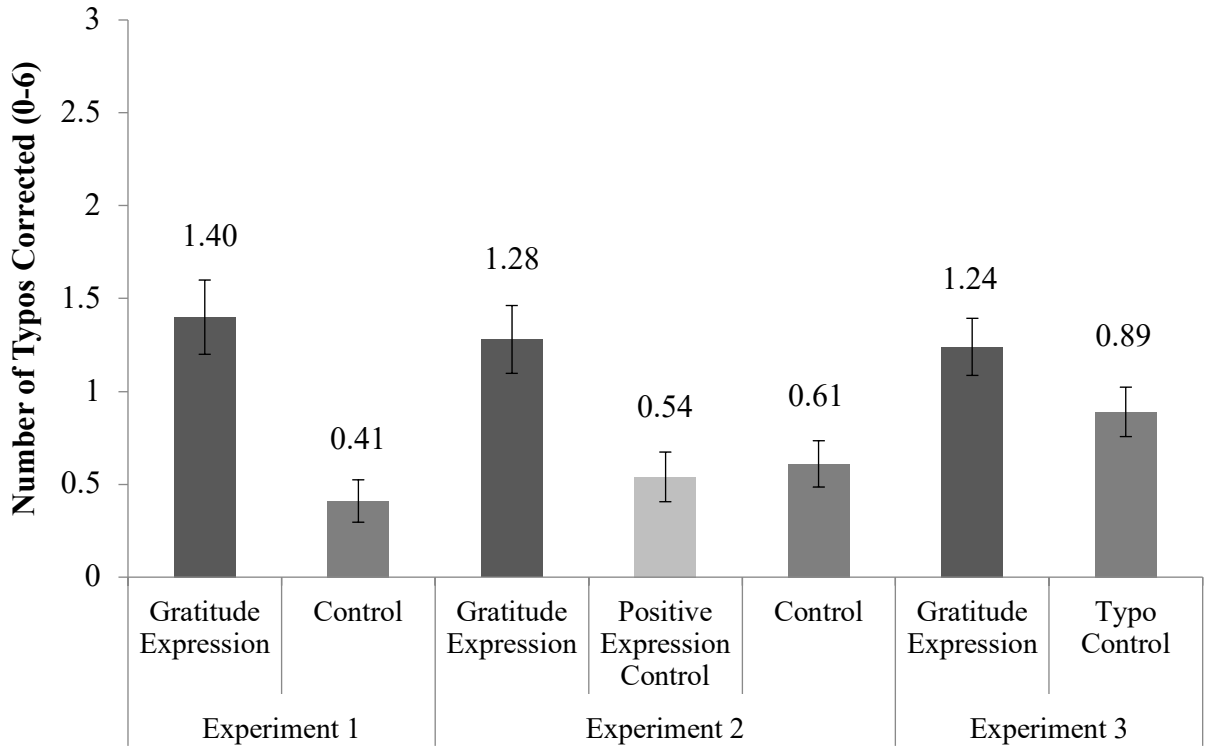

Figure 3. 3rd party witnesses' spontaneous helping behavior toward 1st party grateful people in Experiments 1-3. Error bars signify standard errors.

Experiment 2: Testing an Alternative Explanation: A Positively-Valenced Expression

Experiment 1 provides the first evidence that merely witnessing a gratitude expression increases the witness' helping behavior toward the expresser. Consistent with prior literature on the 2nd party effects of gratitude expressions (e.g., Algoe et al., 2016), we believe the most likely mechanism for this effect is that the expression of gratitude acknowledges the benefactor's praiseworthy actions. However, other experimental evidence documents that expressing positivity in general elicits others' self-reported willingness to help (Telle & Pfister, 2012). To address the possibility that helping behavior in the gratitude condition was due to a positively-valenced expression, Experiment 2 uses the same method as Experiment 1, but adds a second control condition in which the 1st party expresser (author) expresses another situationally-appropriate positively-valenced expression: warm congratulations for finishing the task.

Method

Participants. Participants were 349 U.S. MTurk workers recruited with the same procedures described in Experiment 1; they received $1.50 for their participation. Twenty-eight participants were excluded for failing an attention check, and six participants were excluded for not uploading the correct documents, or uploading a duplicate document, leaving a final sample of 315 participants (M_{age} = 32.78 years, SD_{age} = 10.78, range = 18-72; 137 males, 174 females, 2 self-identified as other, 2 did not report; 257 White/Caucasian, 20 Black/African-American, 16 Hispanic, 16 East Asian, 8 South Asian, 1 American Indian, 1 Pacific Islander, 11 reported another race). Given the effects found in Experiment 1, we determined that our recruitment goal of at least 100 participants per condition provided appropriate power to detect the effects of this manipulation, while allowing a robust estimate of the true effect size, so we maintained that target for the present experiment.

Design. Participants were randomly assigned to one of three conditions in a between-subjects design: gratitude expression, positive expression control, control.

Procedure. Experiment 2 was a direct replication of the procedures of Experiment 1, with an added positive expression control condition. The movie review that participants viewed in the positive expression control condition was identical to that in the gratitude condition, except that rather than expressing gratitude at the end of the document, the author instead stated, "Congratulations on finishing the editing!"

Spontaneous helping behavior. Helping was coded using the same approach as in Experiment 1, again with high coder agreement [ICC (2,2) = .885]. Similar to Experiment 1, participants corrected between 0 and 6 typos, with 85 out of 315 participants (27.0%) correcting at least one typo.

Results: 3rd Party Witnesses of Gratitude Expressions Were More Helpful Toward 1st Party Expressers

We tested our hypothesis about the effect of expressed gratitude on witnesses' helping behavior by conducting a one-way analysis of variance on the continuous helping measure using planned contrasts. The overall analysis of variance was statistically significant, F (1,313) = 9.45, p = .002. Planned contrasts (coded as gratitude = 2, positive expression control = -1, and control = -1) showed that those in the gratitude condition (M = 1.28, SD = 1.78) corrected significantly more typos compared to those in the positive expression control (M = 0.54, SD = 1.41) and control conditions combined (M = 0.61, SD = 1.30; F (1,312) = 14.81, $p < .001$, R^2 = .045). The bootstrapped estimate of the confidence interval for the contrast, using 1,000 repetitions, indicates that it does not include zero (95% CI = [0.108, 0.370]), thereby supporting our hypothesis. Planned contrasts conducted for exploratory purposes (coded as gratitude = 0,

positive expression control = -1, and control = 1), showed that there was no difference in correcting typos between the positive expression control and control condition, F (1,312) = .14, p = .716, R^2 = .000. The bootstrapped estimate of the confidence interval for the predictor, using 1,000 repetitions, indicates that it does include zero (95% CI = [-0.140, 0.208]). In sum, Experiment 2 documents that participants corrected more typos after witnessing an expression of gratitude compared to participants in the other two conditions, and there was no difference in how many typos participants corrected between the positive and neutral control conditions.

Experiment 3: Testing the Word "Typo" as a Potential Confound

In Experiments 1 and 2, participants in all conditions saw helping behavior modeled by a prior MTurk worker, who had gone above and beyond the task instructions to correct typos. Even though participants in all conditions were exposed to potential modeling effects, participants who saw someone *express gratitude* for that behavior were substantially more likely to do it themselves. An alternative explanation for these findings is that the expressed gratitude condition uses the word "typo", thereby calling extra attention to the prior worker's behavior. The current experiment uses the same method but the control condition now also includes the word "typo". We hypothesized that although the effect size may shrink, the expressed gratitude condition would still lead to a greater likelihood of helping.

Method

Participants. Participants were 338 U.S. MTurk workers recruited with the same restrictions and procedures described in Experiment 1; they received $1.50 for their participation. Twenty-one participants were excluded for failing an attention check, and four participants were excluded for not uploading the correct document, leaving a final sample of 313 participants (M_{age} = 35.22 years, SD_{age} = 10.58, range = 18-71; 113 males, 198 females, 2 did not report; 246

White/Caucasian, 25 Black/African-American, 20 Hispanic, 16 East Asian, 5 South Asian, 5 American Indian, 2 Pacific Islander, 12 reported another race). Given the more conservative control condition in the present experiment (described next), we assumed the effect size may become attenuated, so we increased our targeted recruitment to at least 150 per condition; G*Power indicated that we had greater than 95% power to detect a medium effect.

Design. Participants were randomly assigned to one of two conditions in a between-subjects design: gratitude expression vs. control.

Procedure. Experiment 3 was exactly the same as Experiment 1, except that in the control condition movie review example, the author commented, "I didn't realize there were so many typos." The scoring procedure was identical to Experiments 1 and 2, except the third coder coded the entire sample instead of a subset. Coder agreement was again high (ICC (2,2) = .959). As in Experiments 1 and 2, participants corrected between 0 and 6 typos; in Experiment 3, 97 out of 313 participants (31.0%) corrected at least one typo.

Results

A linear regression using bootstrapped estimates of the confidence interval was conducted to test the hypothesis using the continuous helping measure. Although the hypothesis was not supported at $p < .05$, the effect was trending in the hypothesized direction to suggest that participants in the gratitude condition ($M = 1.24$, $SD = 1.87$) corrected more typos than participants in the control condition ($M = 0.89$, $SD = 1.71$; $B = .35$, $SE = .20$, $t = 1.74$, $p = .083$, 95% CI [-.046, .751], $R^2 = .009$). The bootstrapped estimate of the confidence interval for the predictor, using 1,000 repetitions, indicates that it does include zero (95% CI = [-0.043, 0.748]).

Meta-Analysis of Experiments 1-3

As one would anticipate, across the three experiments, participants who witnessed expressions of gratitude varied in their helpfulness. To determine the average effect of witnessing the gratitude expression on correcting typos, we meta-analyzed the results of Experiments 1-3 using fixed effects. The mean effect size (i.e., mean correlation) was weighted by sample size. We first converted our t-statistics into Pearson's correlation for ease of analyses. All correlations were then Fisher's z transformed for analyses and converted back to Pearson correlations for presentation. Overall, the effect was midway between small and medium by conventional standards (M r = .19), and it was significant (Z = 5.59, $p < .001$, two-tailed), such that witnessing expressions of gratitude, compared to control conditions, led to increased helping.

Brief Discussion of Experiments 1-3: Helping Behavior

These three experiments are the first to document that people who thank someone for a behavior are elicit the same helpful behavior from others who witness the expression of gratitude. The experiments demonstrate this using a subtle manipulation of expressed gratitude: Participants witnessed gratitude expressions that were written, embedded in a single line of text in a comment bubble. The effect is robust to three critical alternative explanations: seeing the prosocial behavior modeled by another person (Experiment 1, 2, and 3), the expresser's use of a positively-valenced expression (Experiment 2), and drawing attention to the helping behavior of interest (Experiment 3). Notably, our participants were being paid to do a different task; they were not asked to help. Even still, across studies, 38.8% went above and beyond to help the author when the author expressed gratitude to someone else.

It is well established that gratitude expressions reinforce the behavior of the person toward whom they are expressed (see review and hypothesis in McCullough et al., 2001, as well as subsequent field experiments by researchers including Grant & Gino, 2010). We meaningfully extended this finding by considering gratitude's social value for group living. Specifically, we relied on practical considerations of how emotions unfold in everyday life, theory about the communicative value of expressed emotions and about group-level social functions of emotions (Keltner & Haidt, 1999), and recent theory about the social functions of gratitude in particular (Algoe, 2012). This set up our hypothesis that people who express gratitude for someone's actions would also elicit the desirable behavior from 3rd party witnesses to the expression. To the extent that a 3rd party witness is more likely to go out of their way to help the grateful person in the future, one person's gratitude sets up the opportunity for the grateful person to have stronger bonds with multiple people in the network: the 2nd party *as well as* any 3rd party witnesses. We more fully consider these findings in the General Discussion; for now, in Experiments 4 through 6, we turn to another behavior uniquely tied to theorizing about expressed gratitude as a social binding agent (Algoe, 2012): *affiliation*.

Experiment 4: Gratitude Expressed to a Benefactor Increases a Form of Affiliative Behavior from 3rd Party Witnesses Toward the Expresser: Self-Disclosure

This experiment makes two substantive shifts from Experiments 1-3. First, the prior experiments used minimal information to convey gratitude—gratitude was expressed with just one line of text. In the current study, we wanted to add more channels of communication that a witness might encounter in everyday life: dynamic facial expressions, voice, and words. To do so, we developed and validated novel video stimuli depicting a person sending a webcam message to their romantic partner. Witnesses in this experiment viewed a videorecorded

expression of gratitude to the romantic partner, disclosure to the romantic partner about the expresser's positive feelings about a personal accomplishment, or an emotionally neutral description of the same event, and then were given a chance to tell the person in the video something about themselves, in writing.

This writing task facilitated the second key shift in this experiment: We switched to a new class of outcomes, *affiliative behavior*, that would provide a different test of our broader hypothesis that witnesses may be more likely to develop high-quality relationships with grateful people (Hypothesis 2). Specifically, in this first study in the series, we focus on a particular and important type of affiliative behavior, *self-disclosure*: We tested the extent to which 3rd party witnesses self-disclosed to the gratitude expressers when given the opportunity to write a message to the expresser. Researchers agree that self-disclosure means more than simply telling another person *anything*, or anything about the self. Instead, self-disclosure reveals details that expose who one is at one's core. Rather than stating mere surface facts (e.g., "I rode the bus"), self-disclosure is characterized by more deeply discussing one's feelings ("riding the bus made me nervous"), things that are important or meaningful to the person, or otherwise being vulnerable in discussion (e.g., Derlega, Metts, Petronio, & Margulis, 1993; Jourard, 1964). In turn, these intimate disclosures about the self have been shown to foster stronger relationships and liking (Altman & Taylor, 1973; Collins & Miller, 1994; Sprecher & Hendrick, 2004). Regarding our broader theory, then, being more disclosing in this experimental context is affiliative: If the interaction played out it would increase the likelihood of a better social connection.

Method

Participants. Participants were 369 U.S. MTurk workers recruited with the same restrictions and procedures described in Experiment 1; they received $1.00 for their participation. Twelve participants were excluded for failing an attention check, leaving a final sample of 357 participants: M_{age} = 35.12 years, SD_{age} = 10.94, range = 18-74; 165 males, 190 females, 2 did not report; 282 White/Caucasian, 28 Black/African-American, 29 Hispanic, 23 East Asian, 6 South Asian, 2 Pacific Islander, 14 reported another race. Again without a point of reference for this initial study, our recruitment goal was to have useable data from at least 100 participants per emotion condition; this would provide at least 95% power to detect a medium effect, the most common in the literature, and would provide a robust estimate of that effect. We set the enrollment cap at 360 people on MTurk.

Design. Participants were randomly assigned to one of six conditions in a 3 (gratitude expression, positive expression control, emotionally neutral expression control) x 2 (female expresser, male expresser) between-subjects design.

Procedure (see Figure 4). Participants first watched a video depicting a (purportedly) prior participant's webcam message to their romantic partner; this video constituted the experimental manipulation. Then, participants were given the opportunity to share some information about themselves with the person in the video via written text. Coders later rated this writing for level of self-disclosure, the measure of affiliative behavior.

Video stimuli manipulation. Participants viewed a 30-second video that depicted either a male or female who had recorded a message to their romantic partner via webcam. There were three videos of the male and three videos of the female; participants saw one of these six videos.

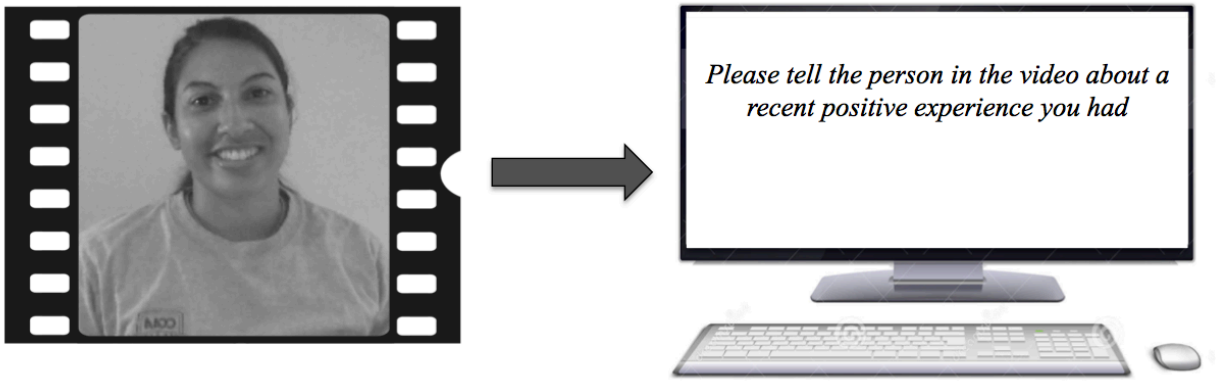

Figure 4. Overview of Experiment 4 procedure. Participants saw either a male or female expresser.

In all videos, the person in the video (ostensibly a prior participant, actually an actor) discussed their participation in a local running race. In the "emotionally neutral expression control" videos, the expresser described the route taken, mentioning people cheering along the sidelines, but without conveying positive or negative emotion. In the "positive expression control" videos, the expresser described feelings of pride and accomplishment experienced about completing the race, expressed positive affect (e.g., smiles, activation), and also mentioned people cheering along the sidelines. In the "gratitude expression" video, the expresser called attention to the fact that their romantic partner was waiting at the end of the race and how much they appreciated that, while expressing positive affect (e.g., smiles, activation). In each video, the torso and head of the expresser were visible while they addressed the camera. Validation of video stimuli is described next.

Development, selection, and validation of video stimuli. Several criteria were critical in the generation and testing of the video stimuli. First, the gratitude expressers needed to be perceived as at least moderately expressive and as feeling a great deal of gratitude. Second, in order to have an effective positive expression control condition, the gratitude expressers and positive control expressers would need to be seen as (a) equally expressive in general and (b) of positivity in particular; the gratitude expressers, in turn, would need to be seen as (c) feeling more gratitude than the positive expressers. Third, the emotionally neutral expressers would need to be seen as (a) less positive than the gratitude expressers and positive control expressers, (b) less grateful than the gratitude expressers, and (c) not displaying high levels of positive or negative affect.

The author team and actors were all experts in emotion. The final six videos were selected, in part, for their author-judged equivalence on video quality, sociality, and (for the gratitude and positive expression videos) expressivity and positivity. Video stimuli, and more information on the video creation and selection process, are available in the online supplemental material.

This validation study also offered an opportunity to test questions about the extent to which expressing gratitude in particular and positivity in general would make the expressers more interpersonally attractive. Participants rated the person in the video on attractiveness, likeability, warmth, and competence—previous work (reviewed above) shows that these social perceptions are influenced by expressed positivity. Below, we provide an overview of the method and results of this validation study (see online supplemental material for more details).

Video stimuli validation study methods. Validation study participants were 371 U.S. MTurk workers who were randomly assigned to view one of six videos in a 3 (gratitude

expression, positive expression control, emotionally neutral expression control) x 2 (female expresser, male expresser) between-subjects design. Participants watched a video of a target person, and then rated the target person on the following dimensions: how much *positivity* the person in the video expressed (1 = *extremely low amount*, 9 = *extremely high amount*); the extent to which the following words described the person in the video: *expressive*, *likeable*, *attractive*, *warm*, and *competent* (0 = *not at all*, 8 = *very much*); the extent to which the person in the video felt *happy* (i.e., excited, happy, joyful; α = .94), *grateful*, *proud*, and *sad* using the same scale.

Video stimuli validation study results. Expresser gender did not significantly interact with expression condition to predict any outcome (see online supplemental material, Table S4), so we collapsed across gender in all further analyses. Participants saw the gratitude expressers and positive expression control expressers as more expressive, more expressive of positivity, and experiencing more general positive emotion (i.e., happiness) than emotionally neutral expression control expressers; the gratitude and positive expression control conditions did not differ on these three dimensions. In contrast, as predicted, participants saw gratitude expressers as experiencing significantly more gratitude than expressers in the other two conditions, and saw the positive expression control expressers as experiencing significantly more pride than expressers in each of the other conditions. See online supplementary material, Table S2, for means and standard deviations for each condition.

In addition to validating the videos, we also learned novel information about several factors previously studied in relation to expressed positivity in general. One-sample t-tests using the scale midpoint (4) as the comparison revealed that participants saw actors in the emotionally neutral expression control condition as significantly above the midpoint of the scale on likeable, attractive, warm, and competent (*ps* < .001; see online supplemental material). However, the

same actors in the gratitude and positive expression control conditions were rated as significantly higher on these dimensions (see Figure 5). Additionally, and consistent with prior research on expressed positivity, participants viewed expressers in the gratitude and the positive expression control conditions as equivalently likeable, attractive, warm, and competent. In other words, expressing positive emotion causes others to see one as more interpersonally attractive. Ratings of sadness were included for discriminant information; as expected, ratings were low and did not differ between the two positive expression conditions.

Behavioral measure of self-disclosure (main study). After watching the video, participants were provided the opportunity to share something about themselves with the person in the video. They were told, "Now that you've gotten an impression of the person in the video, imagine meeting them. Since they shared something about their life, we would now like for you to share something about yours." We asked participants to write about a recent positive experience they had, as if they were writing an email to that person.

Three trained coders, naïve to hypotheses and unaware of participant condition, coded the writing samples for three self-disclosure indicators. Each was rated with greater scores indicating greater exposure of the core self (e.g., deeper feelings) rather than mere facts. The first two, *information* (1 = *indicating only routine information without any personal reference*, 2 = *statements providing general information about the writer*, 3 = *statements revealing personal information*; ICC = .301; $M = 2.07$, $SD = 0.37$) and *feelings* (1 = *no expression of feelings*, 2 = *expression of some mild feelings*, 3 = *expression of deep feelings*; ICC = .431, $M = 1.99$, $SD = 0.52$), followed Barak and Gluck-Ofri's scales (2007, found in Table 1, p. 410). The third indicator was an author-derived code of how *intimate* the response was (1 = *not at all/superficial*, 5 = *very much/meaningful*; ICC = .521; $M = 3.00$, $SD = 0.84$). All ICC estimates are within

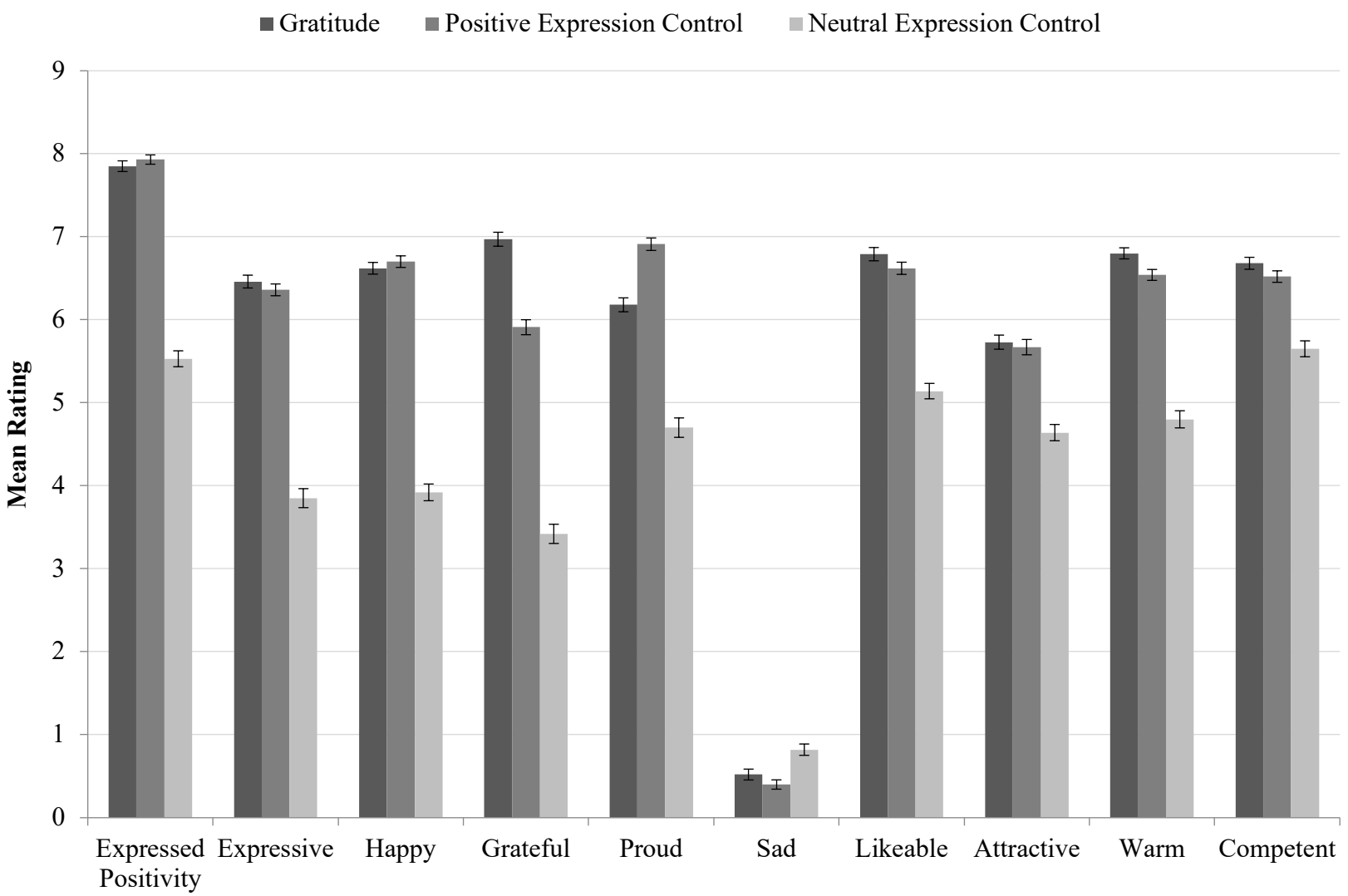

Figure 5. Mean rating of videos in video stimulus validation study.

the expected range and imply acceptable levels of agreement (James, 1981). Coder ratings were averaged for a given code; each coded variable was standardized, and the three standardized scales were averaged to create one behavioral index of *self-disclosure* (α = .78), with higher scores representing higher self-disclosure. As a point of comparison, each coder also rated each writing response for *volume*, or simply *how much* the participant shared in terms of details and quantity (1 = *very little*, 5 = *a lot*; ICC = .745; *M* = 2.72, *SD* = 0.96).

Results (Main Study)

Expresser gender was manipulated to increase generalizability and we had no prediction that it would interact with expression condition to predict self-disclosure. Nonetheless, we first conducted exploratory tests of whether expresser gender interacted with expression condition to predict any outcomes (see online supplemental material for results). No significant interactions were found, so we collapsed across gender in all further analyses.

We found no evidence that the expression manipulation influenced the volume of writing. We predicted that witnessing an expression of gratitude would influence *how* participants wrote to the gratitude expresser, but it was also important to establish whether this was confounded by *how much* participants wrote to the expresser. Thus, we first examined whether witnessing gratitude influenced the volume of writing by conducting a planned contrast to compare these groups. The contrast sequence was coded as gratitude = 2, positive control = -1 and neutral control = -1. Results showed that there was no difference in *how much* participants wrote (i.e., volume) in the gratitude expression condition (*M* = 0.09, *SD* = 0.93) compared to the two control conditions combined (positive expression control: *M* = 0.04, *SD* = 0.94; emotionally neutral expression control: *M* = -0.07, *SD* = 1.09); *t*(353)= 0.93, 95% CI [-.228, .640], *p* = .351, *d* = 0.10. An exploratory contrast analysis, where gratitude = 0, positive control = 1, and neutral

control = -1, revealed that witnesses did not write more to the expressers in the positive emotion control condition compared to the emotionally neutral control condition; $t(353)= 0.86$, 95% CI [-.144, .367], $p = .39$, $d = 0.11$.

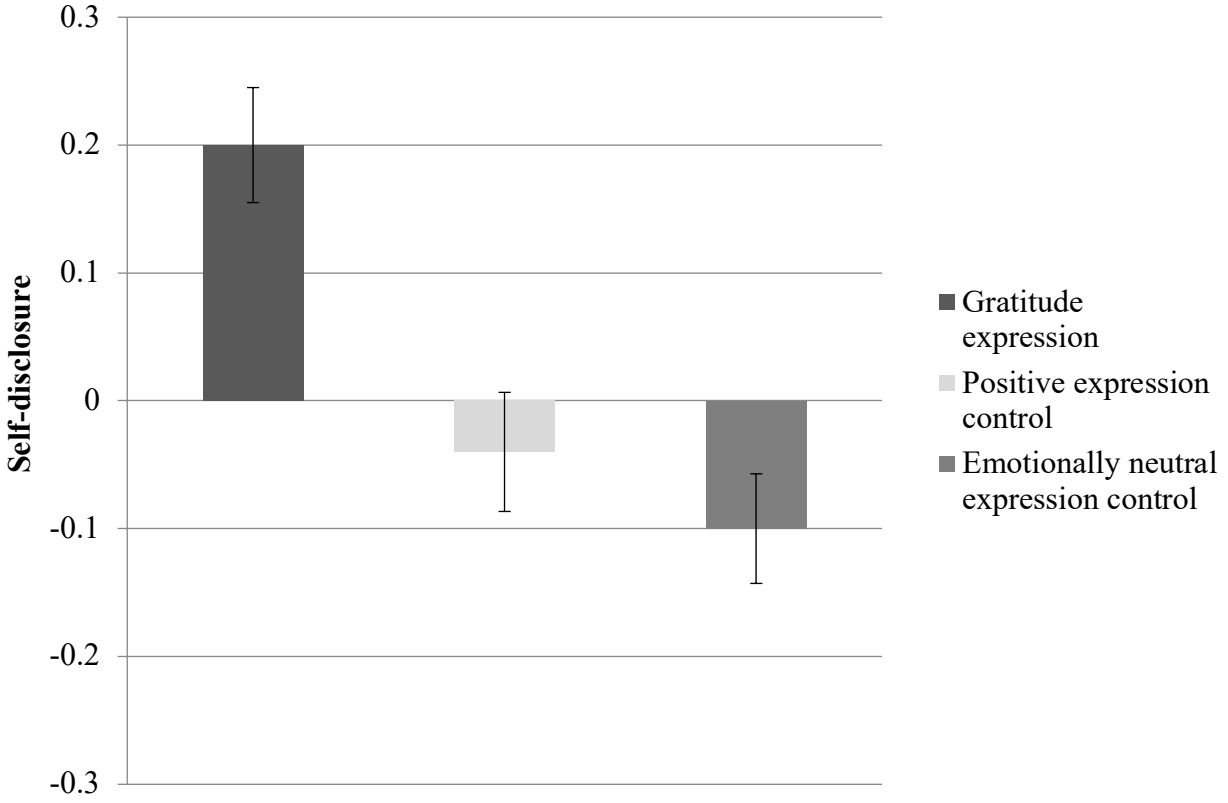

Figure 6. 3rd party witnesses' self-disclosure toward 1st party grateful people, as coded by outside raters (Experiment 4).

3rd party witnesses of gratitude expressions self-disclosed more to gratitude expressers. As predicted, participants who witnessed a gratitude expression self-disclosed more to the expresser ($M = 0.20$, $SD = 0.85$) than did participants in either the positive expression control ($M = -0.04$, $SD = 0.88$) or emotionally neutral expression control ($M = -0.10$, $SD = 0.81$) conditions (see Figure 6). To test our *a priori* hypothesis that witnesses would self-disclose more

to the gratitude expressers, we conducted a planned contrast, coded as gratitude = 2, positive control = -1 and neutral control = -1. Results, displayed in Figure 6, showed that witnesses self-disclosed more to expressers of gratitude compared to the other two conditions combined; $t(353)= 2.89$, 95% CI [.174, .915], $p = .004$, $d = 0.32$. An exploratory contrast analysis, where gratitude = 0, positive control = 1, and neutral control = -1, reveals that witnesses did not self-disclose more to the expressers in the positive emotion control condition compared to the emotionally neutral control condition; $t(353)= 0.54$, 95% CI [-.158, .278], $p = .588$, $d = 0.07$.

Brief Discussion of Experiment 4

People who saw someone express gratitude to a 2nd party were more affiliative toward the grateful person, by self-disclosing more. Specifically, when given an opportunity to tell the grateful person a personal story, they revealed greater feeling and more intimate information. Such disclosures can be a bid for intimacy and would increase the likelihood of more positive interpersonal connection with the grateful person (e.g., Reis & Shaver, 1988; Sprecher & Hendrick, 2004). Critically, these effects were found in comparison to an emotionally neutral expression condition as well as a more conservative control condition: positive expressive behavior.

Experiment 5: Affiliation Toward the Expresser as well as the Benefactor

This experiment is designed as a conceptual replication as well as a substantial extension of Experiment 4. First, using the same stimuli, we use a new dependent measure that more broadly assesses affiliation. Specifically, how much the witness thinks they would enjoy meeting and spending time with the 1st party expresser, and whether they can see themselves being friends with the 1st party expresser, comprises the measure of *desire to affiliate* with the expresser. This construct should directly signal the potential for relationship-building. If

witnesses show a greater desire to affiliate with grateful expressers, we would conceptually replicate the support for Hypothesis 2 documented in Experiment 4.

Second, we conduct the first test of our theorizing about the effects of witnessing emotions on the potential to change behavior toward the *2nd party benefactor* toward whom the emotion is expressed. Specifically, we test Hypothesis 6: Do witnesses think they would enjoy spending time with and could become friends with people to whom gratitude is expressed? That is, do they want to affiliate with the *benefactor*, too? Notably, in Experiment 5, witnesses never see the person receiving the video message. Even so, we predict that the social information conveyed by an expression of gratitude will meaningfully increase witnesses' desire to affiliate with the benefactor, relative to witnesses' desire to affiliate with the partner of someone who shares their positive feelings or emotionally neutral expressions of factual information. This experiment, including hypotheses and analysis plan, was pre-registered (http://aspredicted.org/blind.php?x=zf8dx2).

Method

Participants. Participants were 360 U.S. MTurk workers recruited with the same restrictions and procedures described in Experiment 1; they received $0.50 for their participation. Twenty-two participants were excluded for failing attention checks, leaving a final sample of 338 participants: M_{age} = 35.23 years, SD_{age} = 11.42, range = 18-86, median = 33 years; 200 males, 138 females; 252 White/Caucasian, 41 Black/African-American, 25 Hispanic, 31 East Asian, 3 South Asian, 1 Pacific Islander, 4 reported another race. A power analysis using G*Power revealed that with 323 participants we would have 95% power to detect a medium effect.

Design and procedure. As in Experiment 4, participants were randomly assigned to one of six between-subjects conditions, including emotion expressed (3 levels: gratitude expression,

positive expression control, emotionally neutral expression control) and expresser gender (2 levels: female expresser, male expresser; we again had no prediction for this second factor, which was included to increase generalizability.) Additionally, there was a within-subjects factor of target being rated (2 levels: person speaking, person being spoken to), making this a mixed-factor design.

Thus, participants watched a video of a person recording a webcam message to their romantic partner. Then, participants were asked how interested they were in affiliating with the person speaking in the video (i.e., expresser hypothesis 2, as in Experiment 4), as well as how interested they were in affiliating with the person being spoken to (i.e., benefactor hypothesis 6); order of responding about the speaker versus the spoken-to was counterbalanced across participants.

Video manipulation. Participants were randomly assigned to view one of the six videos used in Experiments 4.

Desire to affiliate. The desire to affiliate with the speaker (i.e., expresser hypothesis) and with the person being spoken to (i.e., benefactor hypothesis) were each assessed with the same 3-item scale, which ranged from 0 (*not at all true*) to 6 (*very true*). When rating the speaker, participants read, *"I would enjoy spending time with the person in the video"*, *"I would enjoy meeting the person in the video"*, and *"I can see myself being friends with the person in the video"*. When rating the person being spoken to, participants read, *"I would enjoy spending time with the individual who the person in the video was speaking to"*, *"I would enjoy meeting the individual who the person in the video was speaking to"*, and *"I can see myself being friends with the individual who the person in the video was speaking to"*. The average of these items

were computed; once for desire to affiliate with the speaker (α = .95) and once for desire to affiliate with the person being spoken to (α = .96).

Results

We used planned contrasts to test the two hypotheses that witnesses would be more interested in affiliating with the grateful expresser (Hypothesis 2) as well as with his or her benefactor (Hypothesis 6), compared to control conditions. Expresser gender was manipulated to increase generalizability and we had no prediction that it would interact with expression condition to predict desire to affiliate with either expresser or with benefactor. Nonetheless, we first conducted exploratory tests of whether expresser gender interacted with expression condition to predict any outcomes (see online supplemental material for results). No significant interactions were found, so we collapsed across gender in all further analyses.

3rd party witnesses wanted to affiliate more with grateful people. To test our *a priori* hypothesis that witnesses would report a stronger desire to affiliate with the gratitude expressers than with those who expressed a positive or neutral emotion, we conducted a planned contrast. The contrast sequence was coded as gratitude = 2, positive control = -1 and neutral control = -1. Results, displayed in Figure 7, showed that witnesses reported the most desire to affiliate with expressers of gratitude compared to the other two conditions combined; $t(335)= 3.23$, 95% CI [.377, 1.548], $p = .001$, $d = 0.37$. An exploratory contrast analysis, where gratitude = 0, positive control = 1, and neutral control = -1, reveals that witnesses were not more interested in affiliating with the expressers in the positive emotion control condition compared to the emotionally neutral control condition; $t(335)= 1.91$, 95% CI [-.009, .668], $p = .057$, $d = 0.26$.

3rd party witnesses wanted to affiliate more with benefactors of grateful people. The same analysis, this time with reports of desire to affiliate with the person being spoken to,

revealed that, as predicted, witnesses reported the most desire to affiliate with partners of people who are grateful to them, compared to partners of people who share their positive feelings with them or who share factual information with them, combined; $t(335)= 6.07$, 95% CI [1.185, 2.321], $p < .001$, $d = 0.70$. Results are displayed in Figure 7. An exploratory contrast analysis, where gratitude = 0, positive control = 1, and neutral control = -1, reveals that witnesses were not more interested in affiliating with the people whose partner shared positive feelings with them compared to people whose partner shared factual information with them; $t(335)= -0.46$, 95% CI [-.405, .252], $p = .646$, $d = -0.06$.

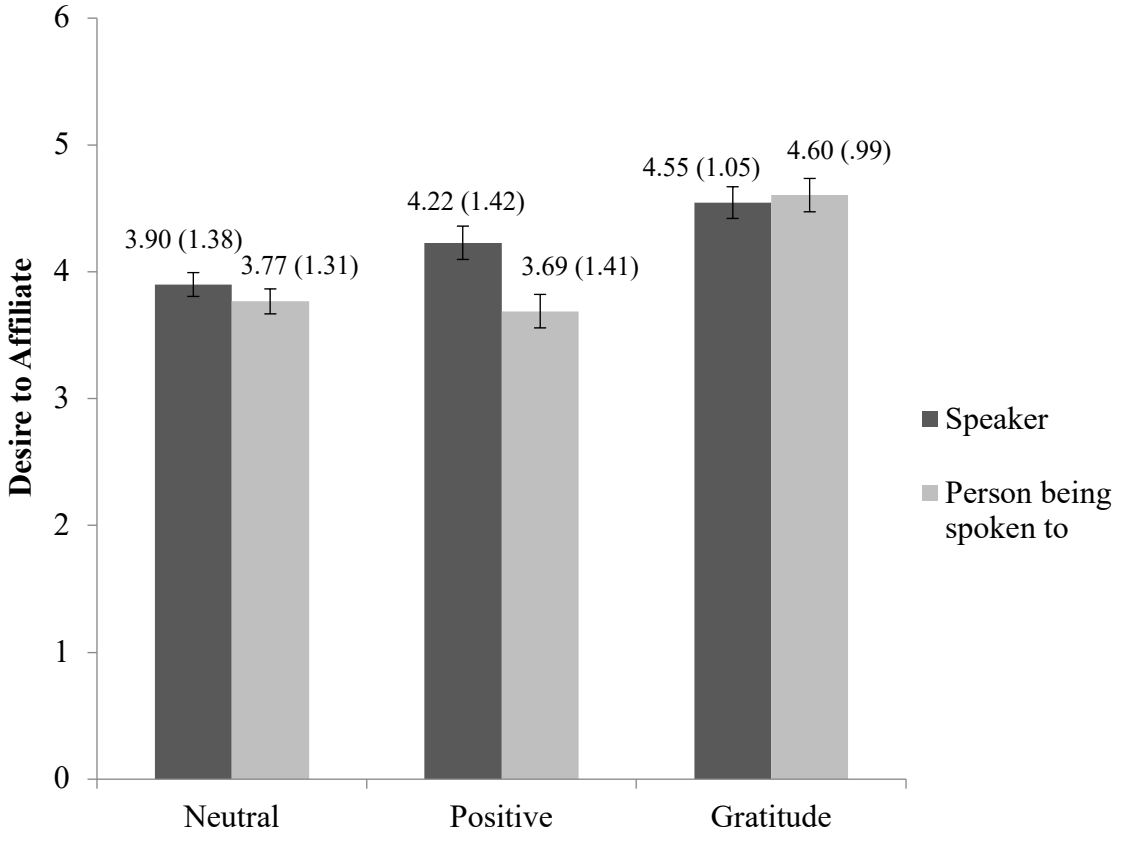

Figure 7. Gratitude expressions increase 3rd party witnesses' desire to affiliate with both the 1st party speaker and the 2nd party person being spoken to (Experiment 5).

Ancillary analyses: Does the effect for expressers differ from the effect for benefactors? We conducted an exploratory test of the interaction between the within-subjects factor, desire to affiliate, and the between-subjects factor of expression condition. The overall interaction term of the general linear model reveals a significant interaction, $F(2,307) = 9.33$, $\eta_p^2 = .057$, $p < .001$. Figure 7 makes it clear that witnesses were most interested in affiliating with both grateful expressers and their benefactors. However, an exploratory probe of the interaction using pairwise comparisons within each condition shows that witnesses in the positive emotion control condition were significantly more interested in affiliating with expressers than with the person to whom they were expressing: $F(1,307) = 29.28$, mean difference of the estimated marginal means for affiliation = -0.52, $SE = .09$, $\eta_p^2 = .087$, 95% CI [-.702, -.327], $p < .001$.

Brief Discussion of Experiment 5

Consistent with the behavior observed in Experiment 4, witnesses of gratitude expressions were also more interested in meeting, spending time with, and becoming friends with the grateful person: They wanted to affiliate with grateful people. For the first time, we also documented that witnesses are more interested in affiliating with the person toward whom gratitude is directed, too. This study provides the first evidence that expressions of gratitude influence the motivations of witnesses with respect to both the 1st and 2nd party, simultaneously. Critically, consistent with predictions stemming from the *find-remind-and-bind* theory of gratitude, the evaluation—interest in affiliating—is a spark that would increase the likelihood of forming a friendship over time.

The next three experiments focus on testing our hypothesized mechanisms for the social effects of expressed gratitude on witnesses, starting with mechanisms for the hypothesized influence on behavior toward the expresser (Experiments 6 and 7). Then, building on the results

of Experiments 5-7, the final experimental design is expanded to include tests of theory regarding mechanisms for the hypothesized influence on behavior toward the benefactor (Experiment 8).

Experiment 6: Other-Praising Behavior, Perceived Expresser Responsiveness, and Affiliation toward the Expresser

The stimulus validation study described in the Experiment 4 method revealed that expressions of gratitude and the positive expression control *both* caused 3rd party witnesses to see the expresser as more interpersonally attractive: likeable, warm, competent, and actually "attractive". Even so, in Experiment 4 (main study) and 5, only expressed gratitude caused greater self-disclosure from the witness toward the expresser as well as greater desire to affiliate with the expresser. While this implies that grateful people are perceived as better potential relationship partners by 3rd party witnesses, the mechanisms for these effects remain untested. As noted in the general Introduction, we believe that these effects are due to two types of mechanisms, behavioral (the other-focused nature of a gratitude expression; Hypothesis 3) and social perceptual (viewing the expresser as a better potential relationship partner; Hypothesis 4); that is, we assume that in Experiments 4 and 5, the gratitude expression (but not the positivity expression) acknowledged the positive actions of someone else, which signaled that the grateful person might make a good relationship partner. Experiments 6-8 are designed to test our hypotheses regarding both the active behavioral mechanism for the expresser and the active social perceptual mechanisms for the witness.

Specifically, we zoom in tightly on these mechanistic questions by using a within-subjects design in which participants *only* witness expressions of gratitude. Here, we amplify the other-focused mechanism by experimentally manipulating the degree of *other-praising behavior*

within the gratitude expressions participants witness. In Experiment 6, all witnesses viewed a video, made via webcam, in which someone expressed gratitude to their romantic partner. Rather than actors (as in Experiments 4 and 5), these are actual videos made by prior participants who were involved in romantic relationships, who expressed gratitude for real behaviors those partners enacted. In other words, this design adds ecological validity. At the same time, because we were able to *a priori* categorize the videos on the degree of positive expressive behavior focused on other-praising or self-benefit, the design also allowed us to experimentally manipulate the degree to which the 3rd party witness viewed an expression that used other-praising behavior (high vs. low) and a positive expression control of self-benefit behavior (high vs. low). After watching each video, participants indicated their desire to affiliate with the expresser. We hypothesized that greater other-praising behavior would cause greater desire to affiliate with the expresser. To be clear, based on prior literature reviewed in Experiment 4, we expected that greater expression of general positivity—here operationalized as expression of positivity about benefits to the self—would also cause greater interest in affiliating. However, we expected the other-praising behavior to drive affiliation from witnessing expressed gratitude due to its role in signaling that the grateful person would make a good relationship partner.

Whereas the other measures we studied in the Experiment 4 stimulus validation study (attractiveness, likeability, warmth, and competence) fall under a broader category of interpersonally attractive or desirable traits, responsiveness is more narrowly about *relationship* potential—that is, how the person might actually behave toward the witness in the future. As such, because we predict that a 3rd party witness will be drawn to a grateful expresser not merely for his or her attractive/desirable traits, but for high-quality relationship-partner potential, we hypothesize that greater perceived expresser responsiveness will statistically mediate the link

between experimentally manipulated other-praising behavior and interest in affiliating with the grateful person. We measure and later control for perceived general positive affect, warmth, and competence to address these alternative explanations to our hypothesized mediator.

Method

Participants. Participants were 123 undergraduates at a large public university in the Southeastern United States who were recruited for a study on first impressions. Due to technical issues, two participants were not able to view all eight videos and so they were not included in analyses. There were also four participants who got the attention check wrong. This left a final sample of 117 participants (M_{age} = 21.65 years, SD_{age} = 6.03, range = 18-71; 48 males, 68 females, 1 self-described; 71 White/Caucasian, 18 Black/African-American, 6 Hispanic, 12 East Asian, 10 South Asian, 6 reported another race). Participants were compensated with $4.00. Although G*Power indicated that this design would only require 36 participants to detect medium-sized effects at 80% power, this was a convenience sample and we therefore tested all available participants; in turn, the larger sample increases inferences regarding generalizability of effects (e.g., across gender of witness).

Design and procedure. Participants watched videos of people expressing gratitude to their romantic partners in a 2 (other-praising: high, low) X 2 (self-benefit: high, low) within-subjects design. Participants viewed eight videos, presented in random order, depicting four different male and four different female expressers; that is, participants saw one male and one female expresser per condition. After viewing each expression, participants completed the following measures: perceived expresser emotions, perceived responsiveness of the expresser, desire to affiliate with the expresser, and social perceptions of the expresser.

Stimuli. The videos were a selection of webcam recordings made by participants in a previous study who were asked to think of something nice their romantic partner had recently done for them, for which they felt grateful, and to record an expression of gratitude. As part of data analysis for that earlier study, two teams of four coders—one for each behavior—watched each video, with sound, and rated the recorded expression on the two dimensions of interest, namely other-praising behaviors and self-benefit behaviors, on 1 (*no or minor use of the behavior*) to 5 (*excellent example or major use of the behavior*) scales (see Algoe et al., 2016 for coder training and scale information).

Eighty-seven of those videos were considered for the present study because the prior participants provided consent for their video to be viewed by participants in future studies and video ratings fell into the bottom and top quartiles according to the following conditions: low other-praising/low self-benefit, low other-praising/high self-benefit, high other-praising/low self-benefit, and high other-praising/high self-benefit. The eight videos used as stimuli were selected such that each condition included videos of both male and female expressers within the same age range, and so that all videos were of approximately the same length and had good sound quality.

Measures. See online supplemental material for the means, standard deviations, scale reliabilities, and correlations among these measured variables (Table S5).

Perceived general positive affect of expresser. Based on theoretical considerations emphasized in Experiments 3-5, we wanted to take into account perceptions of the expresser's *general* positive affect. Participants were asked, "*How much did the person in the video express the following emotions?*"; nine emotion terms were presented in random order and participants rated each on a scale from 0 (*not at all*) to 6 (*very much*). We embedded three synonyms for "happiness" within the list to use as a control variable (i.e., happy, pleased, joyful).

Perceived responsiveness of the expresser. Participants were asked to indicate how responsive the person in the video appeared using three items drawn from Reis, Maniaci, Caprariello, Eastwick, and Finkel's (2011) Perceived Responsiveness Scale. Specifically, they were asked to rate the extent to which the person in the video "*seemed to understand the other person*", "*expressed liking and encouragement for the other person*", and "*seemed to value the other person's abilities and opinions*". Each item was rated on a scale from 0 (*not at all*) to 6 (*very true*), and the mean of these items was computed to form a "perceived responsiveness" score. This was our hypothesized mediator.

Desire to affiliate with the expresser. Desire to affiliate with the expresser was measured the same way as in Experiment 6 and serves as the primary dependent measure for this study.

Social perceptions of the expresser. Participants were asked to indicate the extent to which they viewed the person in the video as "warm/friendly", and "competent/capable" using a scale from 1 (*disagree strongly*) to 5 (*agree strongly*). These were included as potential alternative explanations for our hypothesized mediator and will be used as control variables.

Results

Expresser gender was manipulated to increase generalizability and we had no prediction that it would interact with either expression condition to influence desire to affiliate with the expresser. Nonetheless, we first conducted exploratory tests of whether expresser gender interacted with condition to predict any outcomes (see online supplemental material for results). No significant interactions were found, so we collapsed across gender in all further analyses.

3rd party witnesses wanted to affiliate more with other-praising gratitude expressers. We used multi-level modeling, with trial nested within participant, to test the influence of each factor on desire to affiliate with the person in the video. The model included

the two manipulated expression factors—other-praising behavior and self-benefit behavior—and their interaction. This model accounted for 6.9% of the variance in desire to affiliate. Results produced a main effect of other-praising behavior as well as self-benefit behavior, such that participants displayed higher desire to affiliate with expressers when expressers used more other-praising behavior, $B = 0.34$, $SE = .04$, 95% CI [.271, .417], $p < .001$, as well when expressers used more self-benefit behavior, $B = 0.11$, $SE = .04$, 95% CI [.038, .191], $p = .003$. These main effects were qualified by a significant interaction between the two types of behavior, $B = -0.22$, $SE = .04$, 95% CI [-.286, -.144], $p < .001$. See Figure 8.

The simple slopes help to test our central hypothesis about other-praising behavior. Consistent with our hypothesis, in both conditions of self-benefit, greater other-praising behavior from the expresser to the romantic partner led to the participant's significantly greater interest in affiliating with the expresser: Within the low self-benefit condition, high other-praising expressers elicited significantly more desire to affiliate than low other-praising expressers, $B = 1.12$, $SE = .10$, 95% CI [.917, 1.319], $p < .001$; similarly, within the high self-benefit condition, high other-praising expressers elicited significantly more desire to affiliate than low other praising expressers, $B = 0.26$, $SE = .10$, 95% CI [.056, .459], $p = .012$.

The hypothesized effect of other-praising gratitude expressions on affiliation is independent from perceived general positive affect. To address the possible alternative explanation that the other-praising effects could be explained solely by positive valence, we ran the same analysis as above while controlling for perceived general positive affect, $B = 0.64$, $SE = .03$, 95% CI [.585, .686], $p < .001$; this model accounted for 41.1% of the variance in desire to affiliate.

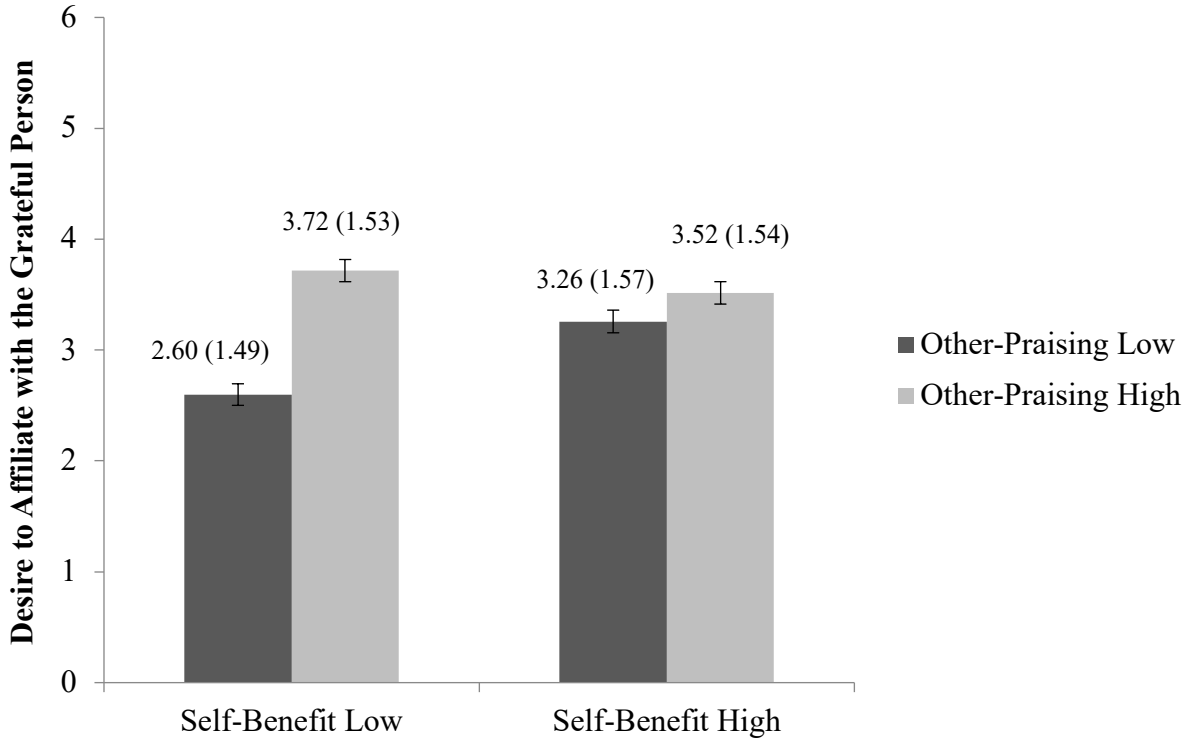

Figure 8. Gratitude expressions with high other-praising behavior increase 3rd party witnesses' desire to affiliate with the 1st party grateful person (Experiment 6).

The interaction (B = 0.02, SE = .03, 95% CI [-.041, .075], p = .56) and main effect of self-benefit condition (B = -0.03, SE = .03, 95% CI [-.082, .030], p = .368) were no longer significant. However, the main effect of other-praising behavior on desire to affiliate remained significant, B = 0.14, SE = .03, 95% CI [.084, .199], p < .001, such that videos containing greater other-praising behavior made participant-witnesses more interested in affiliating with the expresser. Thus, with the hypothesized main effect of other-praising behavior on affiliation robust and intact, we next proceeded to try to understand *why* other-praising behavior has a causal positive effect on 3rd party witnesses' desire to affiliate.

Perceived responsiveness of the expresser fully mediated the effect of other-praising gratitude expressions on 3rd party witnesses' desire to affiliate with the expresser. We

further reduced the model to test the hypothesis of interest, whether the main effect of other-praising is mediated by perceived responsiveness of the expresser (see Figure 9). First, we ran the pared-down model that included only the other-praising manipulation to document the causal influence of other-praising behavior on desire to affiliate, $B = 0.34$, $SE = .04$, 95% CI [.271, .417], $p < .001$, $R^2 = .046$. Next, a regression testing the effect of other-praising behavior on perceived expresser responsiveness was significant, such that expressers using more other-praising were perceived as more responsive ($M = 4.91$, $SD = 1.06$) than were expressers using relatively less other-praising behavior ($M = 3.92$, $SD = 1.38$), $B = 0.50$, SE = .03, 95% CI [.429, .561], $p < .001$, $R^2 = .139$. Then, adding perceived expresser responsiveness to the model predicting desire to affiliate from the experimental manipulation of other-praising behavior eliminated the direct effect of the manipulation, $B = 0.02$, $SE = .03$, 95% CI [-.051, .083], $p = .641$, $R^2 = -.002$, whereas perceived expresser responsiveness had a significant direct effect on desire to affiliate with the expresser, $B = 0.66$, $SE = .03$, 95% CI [.603, .723], $p < .001$, $R^2 = .344$.

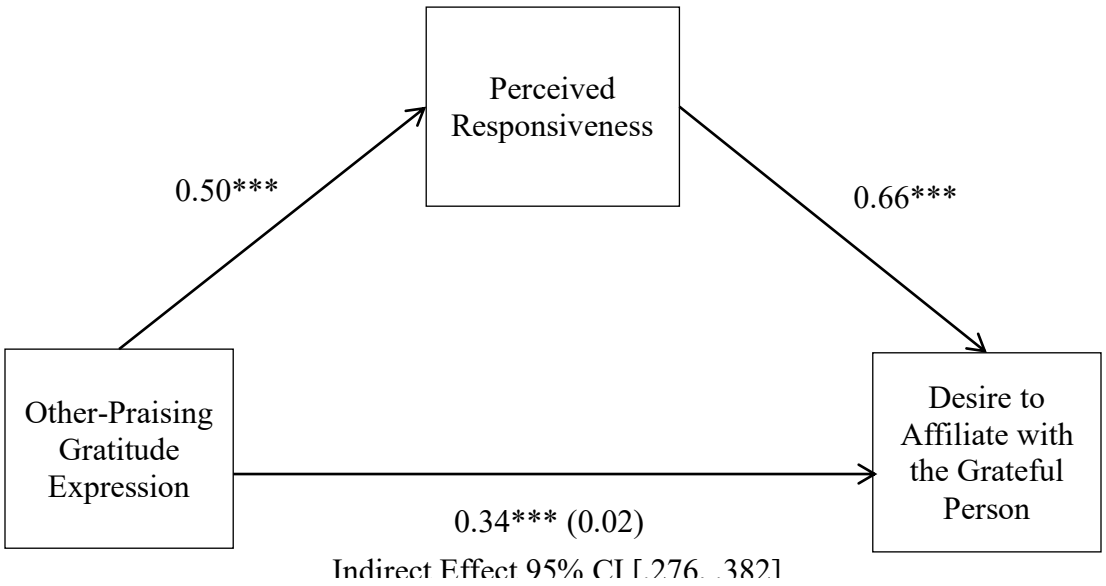

Figure 9. Perceived responsiveness mediated the effect of other-praising gratitude expressions on 3rd party witnesses' desire to affiliate with the 1st party grateful person (Experiment 6). ***$p < .001$.

Finally, we formally tested the mediation hypothesis using the Monte Carlo Method for Assessing Mediation (MacKinnon, Lockwood, & Williams, 2004) with an online macro recommended by Selig and Preacher (2008; http://quantpsy.org/medmc/medmc.htm). The simulated estimate of the confidence interval for the indirect effects, using 20,000 repetitions, indicates that it does not include zero (95% CI [0.276, 0.382]), thereby supporting the hypothesized mediation.

Addressing alternatives: Perceived expresser responsiveness remains robust after accounting for perceived warmth, competence, or perceived general positive affect. It is the case that greater other-praising increased perceived warmth (B = 0.27, SE = .03, 95% CI [.205, .332], $p < .001$, R^2 = .059), competence (B = 0.19, SE = .03, 95% CI [.131, .243], $p < .001$, R^2 = .033), and perceived general positive affect of the expresser (B = 0.32, SE = .04, 95% CI [.241, .398], $p < .001$, R^2 = .049). However, as documented in online supplemental material, Table S6, using null models that include both condition and any given alternative explanation (e.g., warmth), then adding perceived responsiveness to the full model, reduced the effect of condition to nonsignificance (from ps < .001 in the null models) while maintaining robust independent effects of perceived responsiveness on interest in affiliating: perceived responsiveness explained an additional 9.8% of the variance in interest in affiliating using warmth in the null model, an additional 16.2% of the variance using competence in the null model, and an additional 8.1% of the variance using positive affect in the null model. In short, this evidence continues to provide support for our hypothesized social perceptual mechanism, perceived expresser responsiveness. Table S7 also documents the unstandardized coefficients of condition, perceived responsiveness, and the alternative explanation control variable in each full model.

Brief Discussion of Experiment 6

In a high-powered within-subjects experimental design, the other-praising feature of gratitude expressions increased 3rd party witnesses' desire to affiliate with the gratitude expresser. Mediation analysis revealed that this happens because other-praising in gratitude expressions sends a signal that the grateful person is responsive to the benefactor. We posit this makes the grateful person a more viable high-quality relationship partner.

Critically, the effect of greater other-praising on affiliation was independent from perceiving greater general positive affect, greater warmth, or greater competence in the expresser. The prior literature on expression of general positivity suggests these are all viable alternative explanations for our theorized subjective psychological mechanism for the proposed effects, perceived expresser responsiveness. Indeed, both types of expressiveness—discussing the benefit to the self as well as the praiseworthiness of the benefactor's actions—caused greater perceived general positive affect, warmth, and competence in conditions where witnesses saw greater use of those behaviors.[6] Even still, when this experiment amplified the unique signal of a gratitude expression relative to other kinds of positive emotion expression by manipulating other-praising within the expression, the perception of expresser's understanding, validation, and caring robustly explained the effects on affiliation. The other-focused feature of gratitude signals a person's potential value as a relationship partner.

[6] The benefit-to-self manipulation increased perceived warmth (B = 0.19, SE = .03, 95% CI [.122, .252], $p < .001$, R^2 = .028), competence (B = 0.09, SE = .03, 95% CI [.042, .157], p = .001, R^2 = .009), and perceived general positive affect of the expresser (B = 0.22, SE = .04, 95% CI [.141, .301], $p < .001$, R^2 = .023).

Experiment 7: Other-Praising Behavior, Perceived Expresser Responsiveness, Affiliation, and Helping

One limitation of Experiment 6 is that there were only two videos in each of the four experimental conditions. This concern is mitigated in our key hypothesis tests of high compared to low other-praising conditions, where there were four videos in each condition. Nonetheless, given that the videos in each condition were about idiosyncratic events, it is possible that some unobserved factor rather than the other-praising nature of the gratitude expressions drove the observed effects. Thus, in Experiment 7, we tripled the number of stimuli per condition—to six in each of four conditions (and 12 in each condition of the critical high versus low other-praising contrasts)—to increase confidence in the generalizability of our effects.

In Experiment 7, we also included a second dependent measure: willingness to help. If it is the case that positively acknowledging another person's behavior causes grateful people to be perceived as better potential relationship partners, in addition to being more affiliative, then a 3rd party witness might be more willing to enact a broader array of prosocial behaviors toward the grateful person. Here, we test the witness's willingness to help the expresser, in general. This is a somewhat different prediction than the helping behavior we tested in Experiments 1-3, because there the specific behavior—correcting typos—had been positively reinforced; here, we suggest a more general prosocial motive toward the grateful person may be at play. Such evidence would speak to a greater potential opportunity for relationship-building between the 3rd and 1st party.

Method

Participants. Participants were 175 undergraduates at a large public university in the Southeastern United States who were recruited for a study on first impressions. Participants received course credit. Three individuals did not complete all measures for each of the eight

videos and an additional four participants did not get the attention check correct, leaving a final sample of 168 participants (M_{age} = 20.15 years, SD_{age} = 1.02, range = 18-27; 84 males, 82 females, 1 not reported, 1 missing; 125 White/Caucasian, 5 Black/African-American, 8 Hispanic, 18 East Asian, 8 South Asian, 2 American Indian, 1 Pacific Islander, 9 reported another race). Power considerations, recruitment goals, and stopping rules were the same as in Experiment 6.

Design and procedure. As in Experiment 6, participants watched videos of people expressing gratitude to their romantic partners in a 2 (other-praising: high, low) X 2 (self-benefit: high, low) within-subjects design. Participants once again viewed a total of eight videos (one male and one female expresser per condition), presented in random order. However, to increase generalizability, each of the eight videos was randomly selected from three that represented the category—that is, each participants saw 8 videos from a 24-video stimulus set. After viewing each gratitude expression, participants completed the following measures: expresser emotions, perceived responsiveness of the expresser, desire to affiliate with the expresser, willingness to help the expresser, and social perceptions of the expresser.

Stimuli. Twenty-four videos were selected from the corpus described in Experiment 6, using the same procedures. The final set consisted of three male and three female expressers in each of the four conditions: low other-praising/low self-benefit, low other-praising/high self-benefit, high other-praising/low self-benefit, and high other-praising/high self-benefit.

Measures. The measures in Experiment 7 were identical to those used in Experiment 6, with one addition: willingness to help. Participants' willingness to help was assessed using three items drawn from Sarason, Levine, Basham, and Sarason's (1983) Social Support Questionnaire. Specifically, they were asked to indicate their willingness to help the person in the video in the following situations: "*if someone whom they thought was a good friend insulted them and told*

them that they didn't want to see them again", "*if they were in a crisis situation, even though you would have to go out of your way to do so*", and "*if a good friend of theirs had been in a car accident and was hospitalized in serious condition*".[7] Participants provided their ratings for each item on a scale from 1 (*definitely not)* to 9 (*definitely*), which were averaged to form a "willingness to help" score for each video (α = .93). See online supplemental material, Table S7 for means, standard deviations, scale reliabilities, and correlations among the measured variables.

Results

We used multi-level modeling, with trial nested within participant, to test the influence of each factor on desire to affiliate with and willingness to help the person in the video. Expresser gender was manipulated to increase generalizability and we had no prediction that it would interact with either expression condition to predict desire to affiliate with or willingness to help the expresser. Nonetheless, we first conducted exploratory tests of whether expresser gender interacted with expression to predict any outcomes (see online supplemental material for results). No significant interactions were found, so we collapsed across gender in all further analyses.

Replicating the effect: 3rd party witnesses wanted to affiliate more with other-praising gratitude expressers. The model included the two manipulated expression factors—other-praising behavior and self-benefit behavior—and their interaction; it accounted for 11.6% of the variance in desire to affiliate. This model produced a main effect of other-praising behavior as well as self-benefit behavior, such that participants displayed higher desire to affiliate with expressers when expressers used more other-praising behavior, $B = 0.50$, $SE = .03$,

[7] We selected these items because they referred to helping in specific situations rather than general supportive behaviors like listening to, caring about, and comforting.

95% CI [.432, .564], $p < .001$, as well as when expressers used more self-benefit behavior, $B = 0.17$, $SE = .03$, 95% CI [.100, .232], $p < .001$. These main effects were qualified by a significant interaction between the two types of behavior, $B = -0.09$, $SE = .03$, 95% CI [-.158, -.026], $p = .006$. See Figure 10.

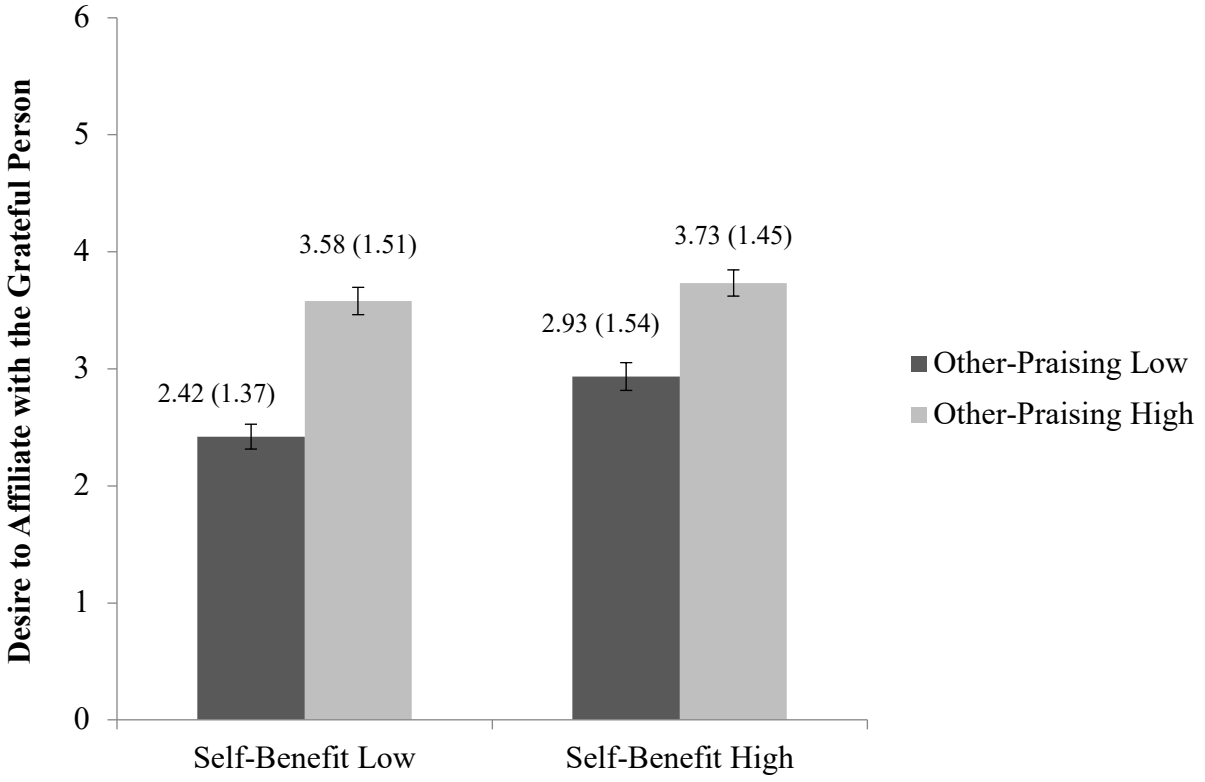

Figure 10. Gratitude expressions with high other-praising behavior increase 3rd party witnesses' desire to affiliate with the 1st party grateful person (Experiment 7).

As in Experiment 6, the simple slopes help to test our central hypothesis about other-praising behavior. Consistent with our hypothesis, in both conditions of self-benefit, greater other-praising behavior from the expresser to the romantic partner led to the participant's significantly greater interest in affiliating with the expresser: Within the low self-benefit condition, high other-praising expressers elicited significantly more desire to affiliate than low other-praising expressers, $B = 1.18$, $SE = .09$, 95% CI [.994, 1.367], $p < .001$; similarly, within

the high self-benefit condition, high other-praising expressers elicited significantly more desire to affiliate than low other-praising expressers, $B = 0.81$, $SE = .09$, 95% CI [.626, .999], $p < .001$.

The hypothesized effect of other-praising gratitude expressions on affiliation is independent from perceived general positive affect. Again, we attempted to address whether this overall interaction pattern may be driven by the fact that participants differentially perceive general expression of positive affect across the four conditions. Indeed, when controlling for perceived general positive affect, $B = 0.67$, $SE = .02$, 95% CI [.626, .716], $p < .001$, the overall model accounts for 44.4% of the variance in desire to affiliate and the interaction is no longer significant ($B = 0.01$, $SE = .03$, 95% CI [-.036, .066], $p = .568$). However, the main effect of self-benefit behavior on desire to affiliate remains significant, $B = 0.11$, $SE = .03$, 95% CI [.057, .159], $p < .001$, as does the effect of other-praising behavior, $B = 0.20$, $SE = .03$, 95% CI [.149, .258], $p < .001$: Videos containing greater use of either behavior made people more interested in affiliating with the expresser. With the hypothesized main effect of other-praising robust and intact, we next address *why* other-praising behavior has a causal positive effect on 3rd party witnesses' desire to affiliate.

Replicating the mechanism: Perceived responsiveness of the expresser fully mediated the effect of other-praising gratitude expressions on 3rd party witnesses' desire to affiliate with the expresser. We further reduced the model to test the hypothesis of interest, whether the main effect of other-praising is mediated by perceived responsiveness of the expresser (see Figure 11). First, we ran the pared-down model that included only the other-praising manipulation to document the causal influence of other-praising behavior on desire to affiliate, $B = 0.50$, $SE = .03$, 95% CI [.432, .565], $p < .001$, $R^2 = .102$. Next, a regression testing just the effect of other-praising behavior on perceived expresser responsiveness was significant,

such that expressers using more other-praising were perceived as more responsive (M = 4.75, SD = 1.26) than were expressers using relatively less other-praising behavior (M = 3.47, SD = 1.50, B = 0.65, SE = .03, 95% CI [.586, .707], $p < .001$, $R^2 = .171$. Then, adding perceived expresser responsiveness to the model predicting desire to affiliate from the experimental manipulation of other-praising behavior eliminated the direct effect of the manipulation, B = 0.04, SE = .03, 95% CI [-.020, .095], $p = .201$, $R^2 = .001$, whereas perceived expresser responsiveness had a significant direct effect on desire to affiliate with the expresser, B = 0.71, SE = .02, 95% CI [.669, .756], $p < .001$, $R^2 = .427$.

Finally, we formally tested the mediation hypothesis using the same technique as in Experiment 6 (Selig & Preacher, 2008). The simulated estimate of the confidence interval for the indirect effects, using 20,000 repetitions, indicates that it does not include zero (95% CI [0.411, 0.514]), thereby supporting the hypothesized mediation.

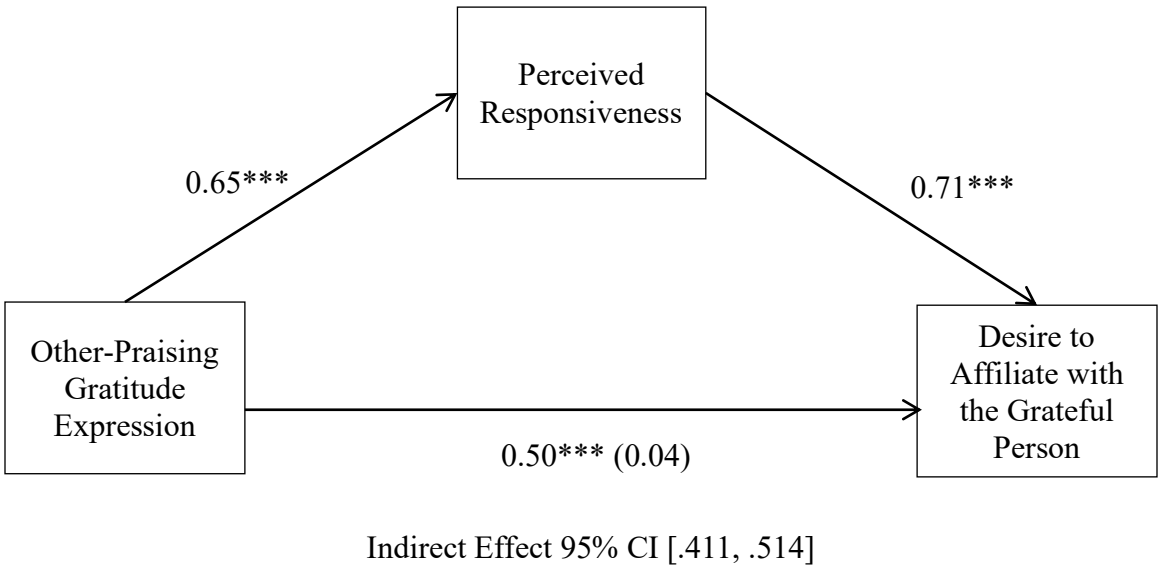

Figure 11. Perceived responsiveness mediated the effect of other-praising gratitude expressions on 3rd party witnesses' desire to affiliate with the 1st party grateful person (Experiment 7), replicating the findings of Experiment 6. ***$p < .001$.

Addressing alternatives: Perceived expresser responsiveness remains robust after accounting for perceived warmth, competence, or perceived general positive affect. As in Experiment 6, it is the case that greater other-praising caused greater perceived warmth (B = 0.40, SE = .03, 95% CI [.350, .456], $p < .001$, $R^2 = .107$), competence (B = 0.31, SE = .02, 95% CI [.263, .357], $p < .001$, $R^2 = .077$), and general positive affect (B = 0.44, SE = .03, 95% CI [.378, .502], $p < .001$, $R^2 = .088$). However, as documented in online supplemental material, Table S8, using null models that include both condition and any given alternative explanation (e.g., warmth), then adding perceived responsiveness to the full model, reduced the effect of condition to nonsignificance (from ps < .001 in the null model) while maintaining robust independent effects of perceived responsiveness on interest in affiliating: perceived responsiveness explained an additional 11.3% of the variance in interest in affiliating when using warmth in the null model, 18.9% of the variance when using competence in the null model, and 14.6 % of the variance when using positive affect in the null model. In short, this evidence continues to provide support for our hypothesized social perceptual mechanism, perceived expresser responsiveness. Table S8 also documents the unstandardized coefficients of condition, perceived responsiveness, and the alternative explanation control variable in each full model.

3rd party witnesses reported greater willingness to help other-praising gratitude expressers. As with affiliation, we tested the two-way interaction between the two types of expressive behavior on willingness to help the expresser. This model accounted for 4.1% of the variance in willingness to help and produced a main effect of other-praising behavior as well as self-benefit behavior. Participants were more willing to help the expresser when the expresser used more other-praising behavior, B = 0.42, SE = .04, 95% CI [.346, .489], $p < .001$, as well as when the expresser used more self-benefit behavior, B = 0.09, SE = .04, 95% CI [.022, .164], p =

.011. These main effects were qualified by a significant interaction between the two types of behavior, B = -0.08, SE = .04, 95% CI [-.150, -.008], p = .03. See Figure 12.

Again, the simple slopes help to test our central hypothesis about other-praising behavior. Consistent with our hypothesis, in both conditions of self-benefit, greater other-praising behavior from the expresser led to the participant's significantly greater willingness to help the expresser: Within the low self-benefit condition, high other-praising expressers elicited significantly more willingness to help than low other-praising expressers, B = 0.99, SE = .10, 95% CI [.792, 1.196], p < .001; similarly, within the high self-benefit condition, high other-praising expressers elicited significantly more willingness to help than low other-praising expressers, B = 0.68, SE = .10, 95% CI [.476, .879], p < .001.

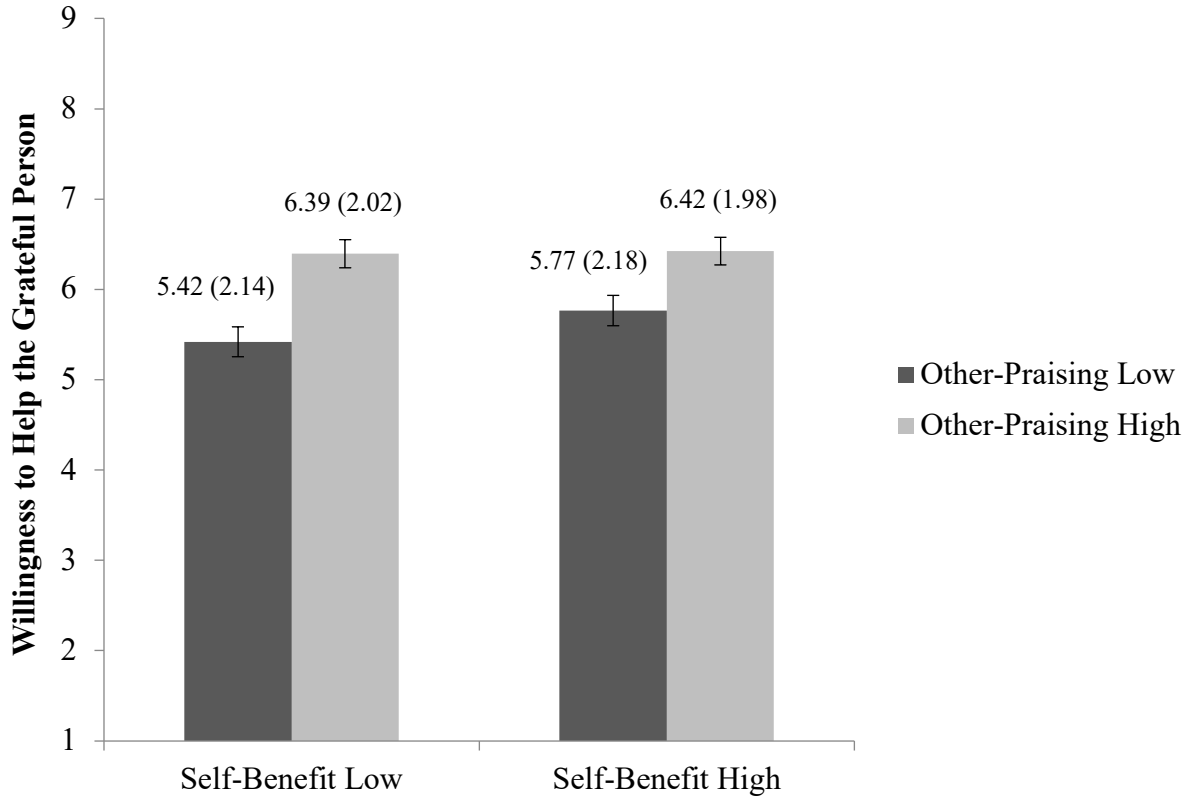

Figure 12. Gratitude expressions with high other-praising behavior increase 3rd party witnesses' willingness to help the 1st party grateful person (Experiment 7).

The hypothesized effect of other-praising gratitude expressions on helping is independent from perceived general positive affect. Again, we attempted to address whether this overall interaction pattern may be driven by the fact that participants differentially perceive general expression of positive affect across the four conditions. Indeed, when controlling for perceived general positive affect, $B = 0.59$, $SE = .03$, 95% CI [.542, .654], $p < .001$, this model accounts for 20.6% of variance in willingness to help, and the interaction ($B = 0.02$, $SE = .03$, 95% CI [-.046, .078], $p = .606$) and main effect of self-benefit behavior ($B = 0.04$, $SE = .03$, 95% CI [-.019, .103], $p = .185$) are no longer significant. However, the main effect of other-praising behavior on willingness to help remains significant, $B = 0.15$, $SE = .03$, 95% CI [.089, .221], $p < .001$, such that videos containing greater other-praising behavior made people more willing to help the expresser.

Perceived responsiveness fully mediated the effect of other-praising gratitude expressions on 3rd party witnesses' willingness to help the expresser. We further reduced the model to test the hypothesis of interest, whether the main effect of other praising is mediated by perceived responsiveness of the expresser (see Figure 13). First, we ran the pared-down model that included only the other-praising manipulation to document the causal influence of other-praising behavior on willingness to help, $B = 0.42$, $SE = .04$, 95% CI [.346, .489], $p < .001$, $R^2 = .038$. Then, adding perceived expresser responsiveness to this model eliminated the direct effect of the manipulation, $B = -0.00$, $SE = .04$, 95% CI [-.073, .066], $p = .921$, $R^2 = -.000$, whereas perceived expresser responsiveness had a significant direct effect on willingness to help, $B = 0.65$, $SE = .03$, 95% CI [.597, .707], $p < .001$, $R^2 = .236$.

Finally, we formally tested the mediation hypothesis using the same technique as in Experiment 6 (Selig & Preacher, 2008). The simulated estimate of the confidence interval for the

indirect effects, using 20,000 repetitions, indicates that it does not include zero (95% CI [.369, .477]), thereby supporting the hypothesized mediation.

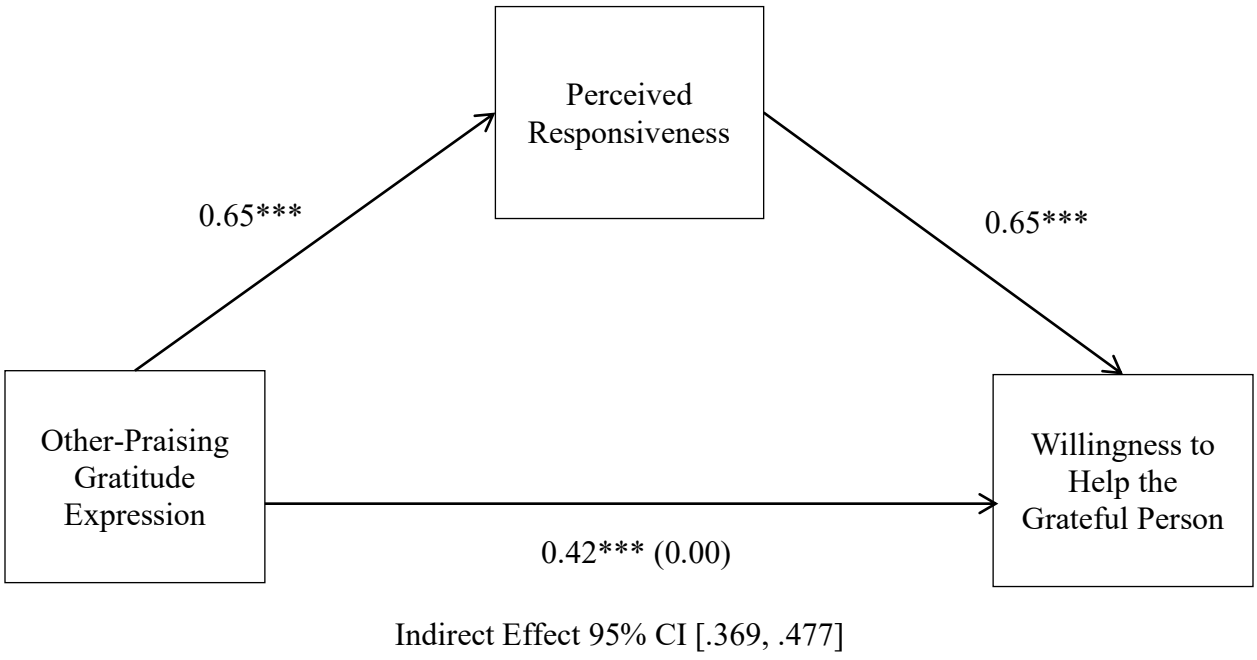

Figure 13. Perceived responsiveness mediated the effect of other-praising gratitude expressions on 3rd party witnesses' willingness to help the 1st party grateful person (Experiment 7). ***$p < .001$.

Addressing alternatives: Perceived expresser responsiveness remains robust after accounting for perceived warmth, competence, or perceived general positive affect. The effect of greater other-praising on perceived warmth, competence, and perceived general positive affect was documented above. Despite these associations, as documented in online supplemental material, Table S9, using null models that include both condition and any given alternative explanation (e.g., warmth), then adding perceived responsiveness to the full model, reduced the effect of condition to nonsignificance (from *p*s < .001 in the null model) while maintaining robust independent effects of perceived responsiveness on willingness to help: perceived responsiveness accounted for an additional 6.9% of the variance when using warmth in the null

model, 10.3% of the variance when using competence in the null model, and 8.3% of the variance when using positive affect in the null model. In short, this evidence continues to provide support for our hypothesized social perceptual mechanism, perceived expresser responsiveness. Table S9 also documents the unstandardized coefficients of condition, perceived responsiveness, and the alternative explanation control variable in each full model.

Brief Discussion of Experiment 7

Experiment 7 conceptually replicated and meaningfully extended the findings from Experiment 6. Using a variety of actual expressions of gratitude to actual benefactors, tested in a high-powered within-subjects experiment, we confirmed that the other-praising feature of a gratitude expression causes greater interest in affiliating with the expresser from an incidental 3rd party witness. It also causes the witness's greater willingness to help the expresser by providing support in tough situations. Both of these effects were due to the fact that the witnesses perceived greater responsiveness—understanding, validation, and care—in the grateful expressers using greater other-focused behavior. The effects held above and beyond the potential influence of more general indicators of interpersonal attractiveness, including perceived positive affect, warmth, and competence; this more specific construct—perceived responsiveness—signals the person's *potential as a high-quality relationship partner*. The increase in general willingness to help meaningfully extends the results from Experiments 1-3 because, beyond reinforcement of desirable behaviors, it opens the door to a wider variety of ways in which grateful expressers may elicit generosity and prosocial behavior from not only the person toward whom they are grateful (e.g., Grant & Gino, 2010; Williams & Bartlett, 2015), but now from other group members who incidentally witness the interaction as well.

In sum, the evidence from Experiments 6 and 7 suggests for the first time *why* gratitude may incidentally facilitate several relationships throughout the network simultaneously: Gratitude expressions involve a behavioral signal—*other-praising*—that indicates that the grateful person is a *more responsive person*. This signal is perceived not only by the original benefactor, but also by 3rd party witnesses, thus enabling the facilitation of multiple relationships simultaneously. In the final experiment, we expand the design to test the hypothesis that other-praising is also a key behavioral mechanism for witnesses' prosocial motives toward the 2nd party person to whom such gratitude is expressed.

Experiment 8: Other-Praising Behavior and Mechanisms of Helping Expresser and Benefactor

Experiment 8 includes a test for conceptual replication of the effect of other-praising behavior on willingness to help the expresser, and extends tests of our theorizing in two critical ways. First, building on findings from Experiment 5, we focus on a witness's actions toward the person toward whom gratitude is directed, this time testing the hypothesis that, in addition to being more willing to help the expresser (replicating Experiment 7 findings), witnesses will be more willing to help the benefactor (Hypothesis 5). Second, we test a potential proximal social perceptual mechanism for this effect: that the witness judges the benefactor to be a (morally) good person—considerate, honest, helpful, generous, sincere, fair, dependable (Barriga, Morrison, Liau, and Gibbs; 2001; Hypothesis 8).

This study also allowed us to address the independence of our theoretical explanation for potential group level effects from expressed emotion from alternative pathways suggested by prior evidence in this domain. Specifically, we address emotion contagion as an alternative explanation for our proposed effects. The specific form of the emotion contagion alternative

hypothesis that would be required to explain our prior evidence, given the positive emotion control conditions we use, is that, in the gratitude conditions, participants themselves experience more gratitude, and thus participant gratitude explains the effect of their behavior toward the expresser. In the current experiment, this emotion contagion prediction would be that higher other-praising behavior from expressers predicts greater witness-experienced gratitude. We are open to the possibility that this may happen. However, we predict that if included as a control variable, our proposed social perceptual mechanisms—that is, information about the expresser and about the benefactor—would independently predict the theorized outcome of willingness to help. We measure participants' experience of gratitude to facilitate this exploratory test. This experiment, including hypotheses and analysis plan, was pre-registered (http://aspredicted.org/blind.php?x=9ua9at).

Method

Participants. Participants were 189 undergraduates at a large public institution in the Southeastern United States who were recruited for a study on first impressions; they received 1 course credit for participation. Due to procedural issues, two participants were excluded from data analyses because they were not able to use their headphones during the session, and five participants were excluded for failing an attention check. This left a final sample of 182 participants (M_{age} = 20.59 years, SD_{age} = 1.71, range = 18-37; 100 males, 82 females; 141 White/Caucasian, 8 Black/African-American, 14 Hispanic, 19 East Asian, 15 South Asian, 1 Pacific Islander, 4 reported another race). A power analysis indicated that we would need only 24 participants to detect a medium effect at 80% power. However, like the previous two experiments conducted in the laboratory setting, this was a convenience sample. To take advantage of the opportunity to increase generalizability, we tested all available participants.

Design and procedure. This study used the same stimuli as Experiment 7, though because Experiments 6 and 7 documented the main effect of other-praising regardless of self-benefit, here to simplify the design and reduce participant burden we only included videos from the low self-benefit condition that were used in prior experiments; the within-subjects factor was degree of other-praising (high versus low). Participants thus watched 4 total videos (one male and one female expresser per other-praising condition), presented in random order. Similar to Experiment 7, to increase generalizability, each of the four videos was randomly selected from three that represented the category. That is, participants saw four videos from a 12-video stimulus set. In addition to the within-subjects factor, there was a between-subjects factor: Participants were randomly assigned to answer questions about the expresser (the person speaking in the video) or about the benefactor (the person being spoken to). We will refer to this as the *rating target* factor in the methods and results. After watching each video, participants completed the following measures[8]: willingness to help the rating target, perceived responsiveness of the rating target, the degree to which the rating target is a good person, and self-reported emotions.

Stimuli. Stimuli consisted of twelve videos from the 24-video corpus described in Experiment 7; specifically, to hold the self-benefit factor constant, we retained all videos in the previous low self-benefit condition to focus our test on the manipulation of other-praising. The 12 videos therefore consisted of three male and three female expressers (six videos) in each of two conditions: low other-praising, high other-praising.

Measures. See online supplemental material, Tables S11-S12 for means, standard

[8] The perceived responsiveness and good person measures were presented in random order for every stimulus video.

deviations, scale reliabilities, and correlations among these measured variables.

Willingness to help. The three items were identical to those used in Experiment 7. Participants rating the expresser read the same instructions as in Experiment 7: "*Would you be willing to help the person in the video if…*". Participants rating the benefactor read, "*Would you be willing to help the person who was being spoken to if…".* For willingness to help the expresser and willingness to help the benefactor, the three-item scale alphas were both $\alpha = .87$.

Perceived responsiveness of expresser. The three items were identical to those used in Experiment 7; the scale alpha was $\alpha = .95$.

Good person. To assess the degree to which the benefactor was perceived as a morally good person, we used seven items embedded within a 15-item scale. The theorizing and scale were adapted from Barriga, Morrison, Liau, and Gibbs (2001). Participants rated 15 items, presented in random order, for the extent to which the item described the benefactor on a scale ranging from 0 (not at all) to 6 (extremely). All were positive attributes, yet some were previously theorized to represent moral goodness; these 7 items were: considerate, honest, helpful, generous, sincere, fair, and dependable.[9] As distractor items, participants also rated: imaginative, industrious, outgoing, athletic, funny, logical, independent, and energetic. The good person items had a high Cronbach's alpha ($\alpha = .93$); the average of these seven items was used to test our hypotheses. We had no hypotheses about distractor items, so we do not consider them further.

Witness-experienced gratitude. To address the emotion contagion alternative explanation, we wanted to take into account the participant's experienced gratitude after

[9] The Barriga, Morrison, Liau, and Gibbs (2001) scale included one additional "morally good" item, sympathetic, but we did not ask participants to rate this because its relevance to morality seemed ambiguous in this context; we do not have data on this item.

watching each video. Participants were asked, “How much did you feel any of the following emotions while watching the video?”; nine emotion terms were presented in random order and participants rated each on a scale from 0 (*not at all*) to 6 (*very much*). We embedded three synonyms for “gratitude” within the list (i.e., grateful, appreciative, thankful). The alpha for these three items was the same, no matter if participants reported their experienced gratitude after answering questions about the expresser or the benefactor ($\alpha = .97$).

Results

We used multi-level modeling, with trial nested within participant, to test the influence of the other-praising factor on willingness to help the person in the video (the grateful expresser); the same model was used for the dependent measure of willingness to help the person being spoken to (the benefactor). Expresser gender was manipulated to increase generalizability and we had no prediction that it would interact with either expression condition to predict willingness to help either the expresser or the benefactor. Nonetheless, we first conducted exploratory tests of whether expresser gender interacted with expression to predict any outcomes (see online supplemental materials for results). No significant interactions were found, so we collapsed across gender in all further analyses. Ancillary analyses, presented at the end of this section, used mixed-factor models to explore differences in the size of the predicted within-subjects effects of the other-praising condition by the between-subjects factor of rating target (i.e., expresser vs. benefactor).

Replicating the effect: 3rd party witnesses of gratitude expressions reported more willingness to help other-praising gratitude expressers. Consistent with our hypothesis and with the results of Experiment 7, greater other-praising behavior from the expresser led to the

participant's significantly greater willingness to help the expresser, $B = 1.00$, $SE = .11$, 95% CI [.788, 1.212], $p < .001$, $R^2 = .072$.

Replicating the mechanism: Perceived responsiveness of the expresser fully mediated the effect of other-praising gratitude expressions on 3rd party witnesses' willingness to help the expresser. As in Experiments 6 and 7, and consistent with our predictions, expressers using more other-praising behavior were perceived as more responsive ($M = 4.84$, $SD = 1.19$) than were expressers using relatively less other-praising behavior ($M = 3.27$, $SD = 1.25$), $B = 1.57$, $SE = .11$, 95% CI [1.356, 1.775], $p < .001$, $R^2 = .291$. Adding perceived expresser responsiveness to the model predicting willingness to help the expresser from the experimental manipulation of other-praising behavior eliminated the direct effect of the manipulation, $B = 0.02$, $SE = .12$, 95% CI [-.207, .248], $p = .858$, $R^2 = -.003$, whereas perceived expresser responsiveness had a significant direct effect on willingness to help the expresser, $B = 0.63$, $SE = .05$, 95% CI [.532, .719], $p < .001$, $R^2 = .300$.

We formally tested the hypothesized mediation using the same technique as in Experiments 6 and 7 (Selig & Preacher, 2008). The simulated estimate of the confidence interval for the indirect effects, using 20,000 repetitions, indicates that it does not include zero (95% CI [.789, 1.18]), thereby supporting the hypothesized mediation. See Figure 14.

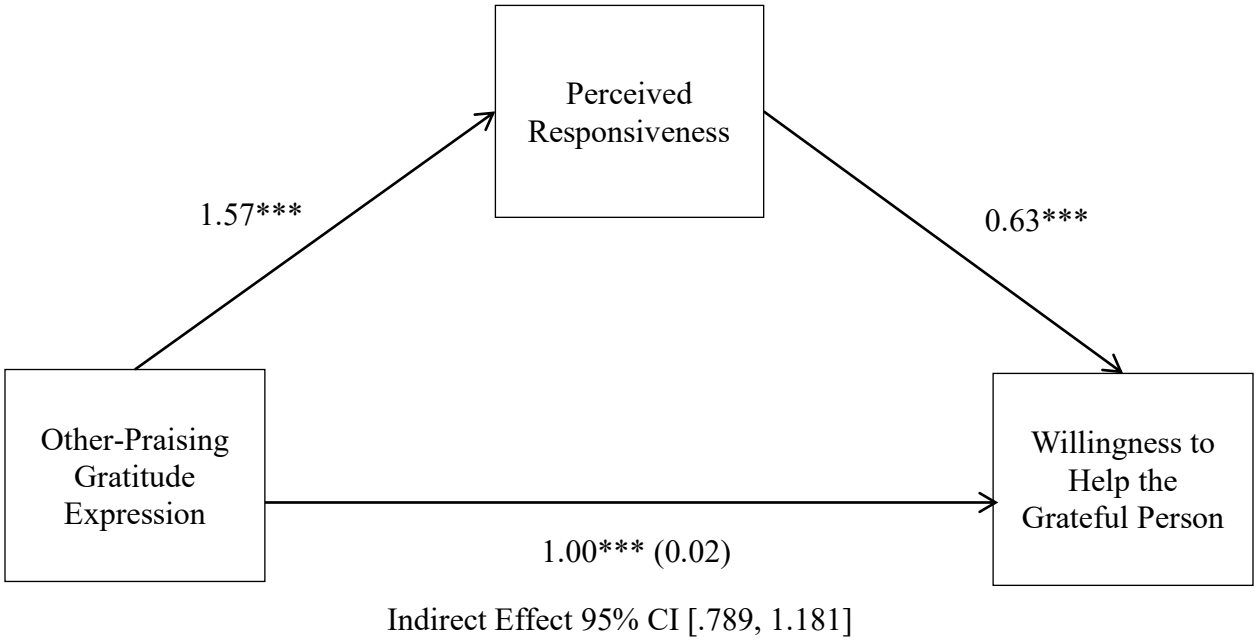

Figure 14. Perceived expresser responsiveness mediated the effect of other-praising gratitude expressions on 3rd party witnesses' willingness to help the 1st party grateful person (Experiment 8). ***$p < .001$.

Exploratory analysis of a theoretical alternative: Catching gratitude. Greater other-praising behavior from the expresser led to the participant's significantly greater personal feelings of gratitude from watching the videos ($M = 2.72$, $SD = 1.83$), relative to those who saw relatively less other-praising behavior within the gratitude expression ($M = 1.73$, $SD = 1.55$), $B = 0.98$, $SE = .12$, 95% CI [.741, 1.227], $p < .001$, $R^2 = .076$.[10] However, as documented in online supplemental material, Table S12, using a null model that included both condition and witness-experienced gratitude, then adding perceived responsiveness to the full model, reduced the effect

[10] This analysis was conducted only for participants who responded to questions about the expresser (N = 92), to compare coefficients relevant to the exploratory mediation analysis presented in this section. However, in practice all participants answered this question (N = 182); results of the same analysis using the full sample provides the same conclusion: Greater other-praising behavior from the expresser led to the participant's significantly greater personal feelings of gratitude from watching the videos ($M = 2.64$, $SD = 1.88$), relative to those who saw relatively less other-praising behavior within the gratitude expression ($M = 1.69$, $SD = 1.55$), $B = 0.95$, $SE = .08$, 95% CI [.786, 1.116], $p < .001$, $R^2 = .069$.

of condition to nonsignificance (from $p < .001$ in the null model) while producing a robust independent effect of perceived responsiveness on willingness to help the expresser: Perceived responsiveness explained an additional 25.8% of the variance in willingness to help the expresser when using experienced gratitude in the null model. In short, this evidence continues to provide support for our hypothesized social perceptual mechanism, perceived expresser responsiveness. Table S12, also documents the unstandardized coefficients of condition, perceived responsiveness, and experienced gratitude in the full model.

3rd party witnesses of gratitude expressions reported more willingness to help the *benefactors* of other-praising gratitude expressers. Consistent with our hypotheses, for the first time we show that greater other-praising behavior from the expresser led to the participant's significantly greater willingness to help the benefactor, $B = 1.13$, $SE = .12$, 95% CI [.901, 1.358], $p < .001$, $R^2 = .091$. See Figure 15.

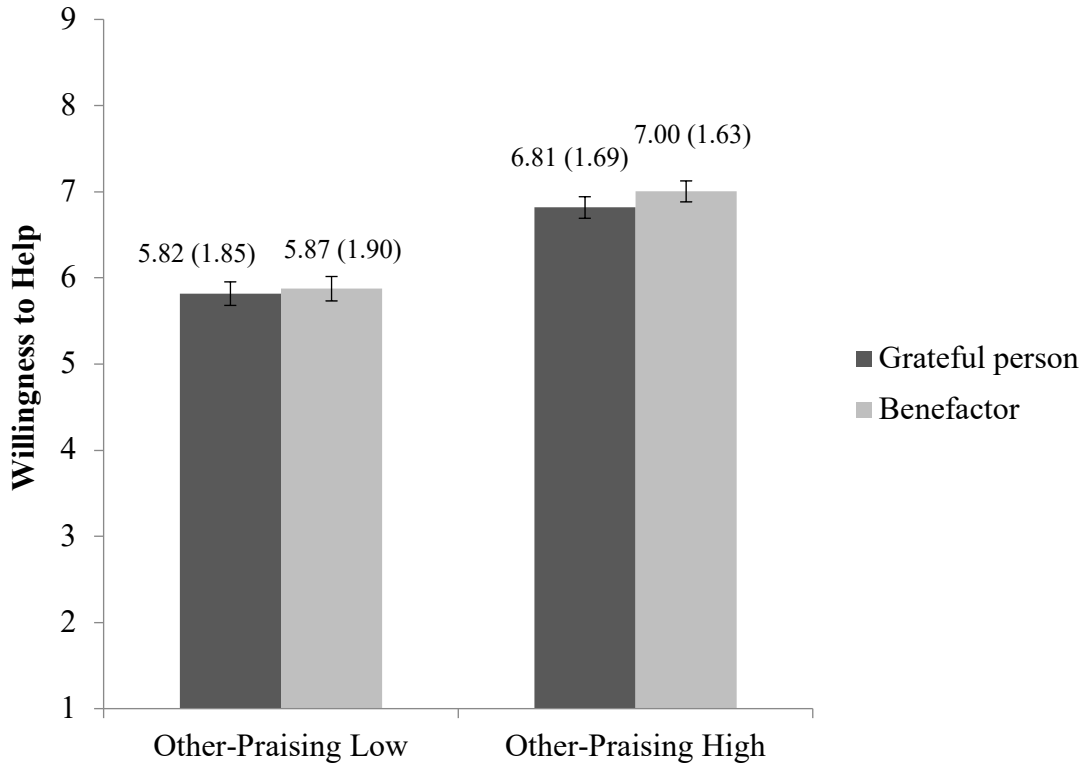

Figure 15. Gratitude expressions with high other-praising behavior increase 3rd party witnesses' willingness to help the 1st party grateful person and the 2nd party benefactor (Experiment 8).

Testing the mechanism: Perceiving the benefactor as a good person partially mediated the effect of gratitude expressions on 3rd party witnesses' willingness to help the benefactor. Consistent with our predictions, when expressers used more other-praising behavior, witnesses had greater perceptions that person to whom gratitude was expressed was a good person (M = 4.72, SD = .83) than when expressers used relatively less other-praising behavior (M = 3.66, SD = 1.17), B = 1.06, SE = .08, 95% CI [.898, 1.226], $p < .001$, $R^2 = .213$. Adding perceptions of the benefactors' goodness to the model predicting willingness to help the benefactor from the experimental manipulation of other-praising behavior appears to reduce (from B = 1.13 in the original model) but did not eliminate the direct effect of the manipulation,

B = 0.44, SE = .13, 95% CI [.183, .693], p = .001, R^2 = -.004, while perceived benefactor goodness had a significant positive effect on willingness to help the benefactor, B = 0.65, SE = .07, 95% CI [.511, .791], $p < .001$, R^2 = .207.

We formally tested the hypothesized mediation using the same technique as in Experiments 6 and 7 (Selig & Preacher, 2008). The simulated estimate of the confidence interval for the indirect effects, using 20,000 repetitions, indicates that it does not include zero (95% CI [.517, .882]), thereby supporting the hypothesized mediation. See Figure 16.

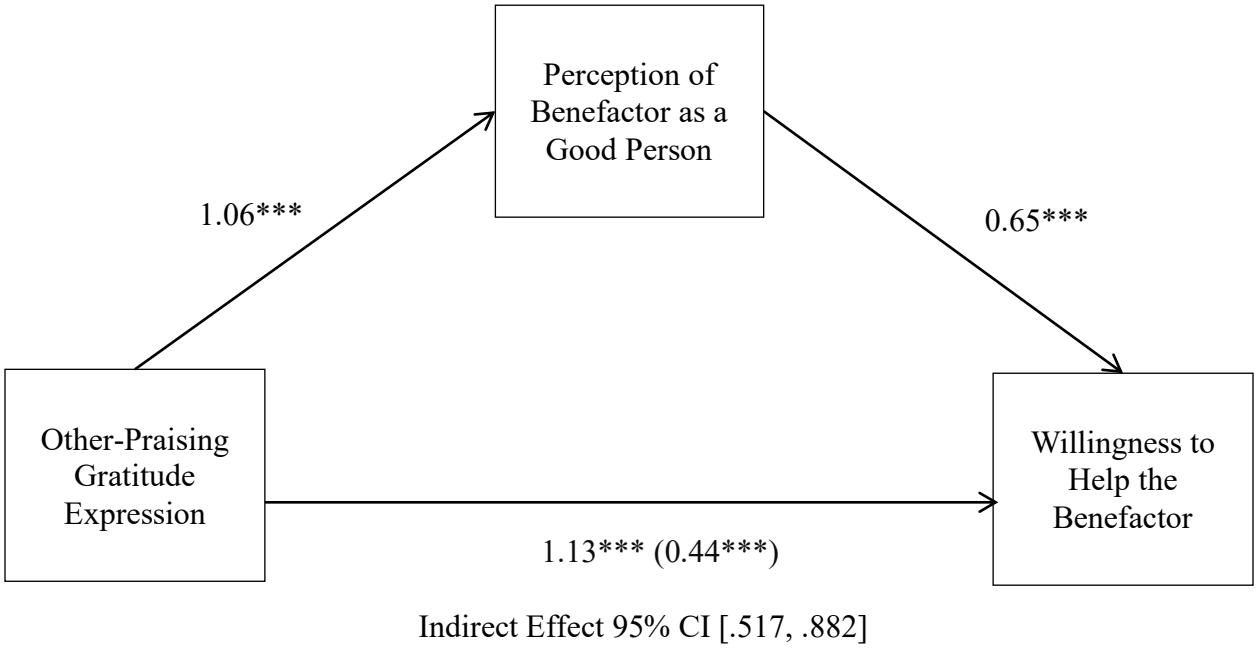

Figure 16. Perceptions of benefactor as a good person mediated the effect of other-praising gratitude expressions on 3rd party witnesses' willingness to help the 2nd party benefactor (Experiment 8). ***$p < .001$.

Exploratory analysis of a theoretical alternative: Gratitude contagion. As with participants who responded to questions about the expresser, those who answered questions about the benefactor also showed that greater other-praising behavior from the expresser led to

the participant's significantly greater personal feelings of gratitude from watching the videos (M = 2.56, SD = 1.93), compared to those who saw relatively less other-praising behavior within the gratitude expression (M = 1.65, SD = 1.55), B = 0.92, SE = .11, 95% CI [.693, 1.141], $p < .001$, R^2 = .063. However, as documented in online supplemental material, Table S13, using a null model that included both condition and witness-experienced gratitude, then adding the good person measure to the full model, resulted in an independent effect of perceptions of the benefactor as a good person on willingness to help the benefactor, and that effect was robust: Good person explained an additional 15.1% of the variance in willingness to help the benefactor when using experienced gratitude in the null model. In short, this evidence continues to provide support for our hypothesized social perceptual mechanism, the goodness of the benefactor. Table S13, also documents the unstandardized coefficients of condition, perceived responsiveness, and experienced gratitude in the full model.

Ancillary analyses: Is the effect of other-praising behavior on willingness to help the expresser different from the effect of other-praising behavior on willingness to help the benefactor? An exploratory test of the interaction between other-praising condition and target rating revealed that the effect of high other-praising on willingness to help was not moderated by whether the person who would be helped was the grateful expresser or the (generous) benefactor, B = -0.03, SE = .04, 95% CI [-.110, .045], p = .410, R^2 = .001.

General Discussion

Eight high-powered experiments provide robust support for the hypotheses that gratitude expressed to a benefactor would make a witness to that expression more helpful and affiliative toward the grateful person, as well as toward the grateful person's benefactor. In each of the eight studies, we focused on a particularly conservative type of test of these hypotheses in which

participants were *incidental* witnesses to gratitude expressions; that is, they were not involved in the initial gratitude-inducing situation, and had no relationship to the grateful person or their benefactor. Across the experiments, witnesses saw gratitude expressed from a 1st party (grateful person) to a 2nd party (kind benefactor) in a variety of ways—via the minimal information of one line of text, via multiple communicative channels available in video-recorded expressions of gratitude, via standardized topics and expressers (i.e., actors), or via ecologically valid expressions of gratitude from people who actually received a kind action from a benefactor. The measures of helping and affiliation were each operationalized in two ways: as behavior and self-report. The experiments used conservative comparison conditions, including expressions of other positive emotions and even other expressions of gratitude with less of the hypothesized active relational ingredient (i.e., other-praising behavior) in the expression.

The results supported four hypotheses regarding the behavioral and social perceptual mechanisms of gratitude's influence on 3rd party witnesses' behavior. First, we found support for the hypotheses that the key to gratitude's unique social consequences lies in its other-focused nature (Hypotheses 3 and 7). Specifically, by manipulating the mechanism of other-praising behavior embedded within gratitude expressions, in Experiments 6-8 we found that increased other-praising behavior drives gratitude's influence on helping and affiliation. Second, we found support for two hypothesized social-perceptual mechanisms through which gratitude influences the 3rd party (Hypotheses 4 and 8). Regarding Hypothesis 4, consistent with the *find-remind-and-bind* theory's emphasis on the role of gratitude in promoting high-quality relationships via the relational currency of perceived partner responsiveness (Algoe, 2012), Experiments 6-8 documented that the social effects of higher other-praising within an expression of gratitude were driven by the witness's perception that the grateful person was responsive (Hypothesis 4).

Beyond other interpersonally attractive perceptions, such as warmth and competence, or even the witness's own experience of gratitude, this evaluation of the person's potential for high-quality relationship behavior that drove the social effects of witnessing gratitude. Regarding Hypothesis 8, consistent with our theorizing that an expression of gratitude identifies the benefactor as beneficient, Experiment 8 documented that the social effects of higher other-praising within an expression of gratitude were significantly accounted for by the witness's perception that the benefactor was *a good person* (Hypothesis 8), even beyond the witness's own experience of gratitude after seeing it expressed.

Collectively, these eight experiments are the first tests of our novel theorizing about the proximal mechanisms through which gratitude may ultimately influence group-level social functioning: by promoting high-quality relationships with *multiple* people in the social network directly and simultaneously. Next, we discuss the relevance of the findings to the literature on the social functions of gratitude, and for theorizing about the group-level social functions of emotions more generally.

Group-Level Functions of Gratitude: Consilience and Implications

In our theorizing, building on Keltner and Haidt (1999), we argued for consilience across levels of analysis regarding the social functions of gratitude. As such, in this novel approach to the group-level functions of gratitude, we began by examining theory and evidence for the social functions of gratitude at the individual and dyadic levels, leaning heavily on the *find-remind-and-bind* theory of gratitude (Algoe, 2012). Assuming that expressive signaling affects multiple people in the social network simultaneously and directly, our findings for witnesses' behavior toward grateful people build directly on key previously-established effects of gratitude on *benefactors*: Benefactors are drawn to the relationship with the grateful person, showing greater

effort on their behalf (e.g., Grant & Gino, 2010) and greater likelihood of affiliative gestures (Williams & Bartlett, 2015), and this may be due to the fact that grateful people demonstrate that they are more responsive to the benefactor (Algoe et al., 2016). In parallel, our new experiments show that *3rd party witnesses* are drawn to the grateful person: They show greater likelihood of and willingness to help (Experiments 1-3, 7-8), as well as greater interest in affiliating and actual affiliative behavior (Experiments 4-7). Our control conditions (Experiments 2, 4-8) suggest this is due to the other-focused nature of a gratitude expression which, in turn, makes the expresser seem like a more responsive potential relationship partner (Experiments 6-8). These effects of one person's gratitude on the behavior of a 3rd party witness to the gratitude expression stand alone as a contribution to the gratitude literature for their novelty and consistency across studies.

A group-level social functional account of any given emotion should ultimately consider how the emotional response may coordinate interactions among group members, and so our initial findings for a witness's interest in affiliating with and willingness to help *people toward whom gratitude is expressed* represent a substantial addition to the evidence: Expressing gratitude identifies people in the group who are good—that is, who go above and beyond on behalf of others—and these benefactors are incidentally rewarded by witnesses' greater interest in affiliating with (Experiment 5) and willingness to help them in the future (Experiment 8). Our control conditions suggest this is due to the other-focused nature of a gratitude expression which, in turn, is a key signal of the benefactor's value, or moral goodness.

Together, these findings represent the first major tests of the propositions of our theorizing about the group-level effects of gratitude, which focuses on how gratitude can promote group-level outcomes. Myriad strains of evidence suggest that cooperation, affiliation, and other-regard among group members contribute to high-functioning groups (e.g., Akcay, Van

Cleve, Feldman, & Roughgarden, 2009; Campion, Papper, Medsker, 1996; Kraus, Huang, & Keltner, 2010). Our overarching prediction is that gratitude helps improve the quality of relationship ties among group members. The present results firmly support one critical mechanism through which gratitude may facilitate such a group-level outcome: Public expressions of gratitude can influence multiple individuals in the network directly and simultaneously, including both the benefactor and any number of witnesses.

It is important to acknowledge other theories and evidence about how gratitude could influence group-level social functions. For example, if one can't repay the person one feels grateful to (i.e., benefactor), the grateful person will "pay it forward" to other members of the group (Bartlett & DeSteno, 2006; see Nowak & Roch, 2007, on "upstream reciprocity"), and gratitude toward a representative of a group (e.g., older sister in the sorority one just joined) may make one feel more integral to the group (Algoe et al., 2008).[11] These are viable mechanisms for group-level consequences from gratitude, though they focus on the grateful person's own thoughts and behavior. The distinguishing feature of our theorizing is its reliance on the social information conveyed by emotional expression (e.g., Abu-Lughod & Lutz, 1990; Brady et al., 2017; Chapman, Kim, Susskind, & Anderson, 2009; Darwin, 1872; Ekman, 1993; Fridlund, 1992; Keltner, 1995; Keltner & Haidt, 2003; Lindquist, Gendron, Barrett, & Dickerson, 2014; Rychlowska et al., 2017; Sauter, 2014; Sauter, Eisner, Ekman, & Scott, 2010; Shariff & Tracy, 2011; Tracy & Robins, 2004; Tracy, Randles, & Steckler, 2015; Van Kleef, 2009), and the influence of that expression on a 3rd party witness.

[11] We note that our definition of gratitude is that it is directed at another individual rather than a group. However, a recent analysis suggests that if gratitude is felt *toward* a group, perhaps one would be more submissive to it (e.g., holding back criticism; Eibach, Wilmot, & Libby, 2015).

Methodologically, our approach goes beyond and strengthens prior dyadic approaches to studying gratitude in several ways. First, we used multiple methods for participants to witness gratitude expressions—in addition to (a) a simple written "thank you" as used in classic field experiments (e.g., Rind & Bordia, 1995), we (b) created, validated, and used standardized video stimuli, which offer a methodological contribution toward future scholarship on gratitude, and (c) used ecologically valid video-recordings of real gratitude expressions. This multi-method approach adds confidence to the generalizability of the present findings. Second, our experiments considered important alternative explanations not typically addressed in the literature on the dyadic social functions of gratitude, including seeing the desired behavior modeled by someone else (Experiments 1-3; see Spivey & Prentice-Dunn, 1990; Wilson & Petruska, 1984), seeing another situationally-relevant positive expression from the expresser (Experiments 2, 4-8; see Clark & Monin, 2014), and even directly acknowledging the behavior of the 2nd party benefactor (Experiments 3, 6-8). Finally, Experiments 4 and 5, in which the same expressers elicited different behavior when expressing gratitude versus another positive emotion, despite the fact that in both positive expressive states the person was seen as having several interpersonally desirable attributes, offered insights on the specificity of gratitude's role in social life: Like many positive emotions, gratitude greases the wheels for smoother social interactions (e.g., Lount, 2010; Telle & Pfister, 2012; Waugh & Fredrickson, 2006; Whelan & Zelenski, 2012); uniquely, gratitude promotes good relationships, drawing in benefactors and witnesses alike.

Our findings regarding perceived responsiveness sharpen evidence for theory regarding gratitude's unique social consequences and contribute to the literature on interpersonal relationships. Perceiving responsiveness in a partner is the bedrock of intimacy and the mechanistic glue that produces better downstream outcomes for dyad members (Reis, 2013; Reis

et al., 2004). The *find-remind-and-bind* theory of gratitude (Algoe, 2012) has focused on the value of gratitude for promoting meaningful communal relationships, in which a person is not merely there to exchange favor for favor, but rather is invested and interested in the welfare of another person (Clark & Mills, 1979; 1993; 2011). Demonstrating responsiveness—showing one's understanding, care, or validation of another human—behaviorally shows one's ability and/or motivation to be invested in that person. Thus, although warmth and competence provide useful dimensions on which to categorize people in ways that predict behavior toward those people (Fiske, Cuddy, & Glick, 2007; Fiske, Cuddy, Glick, & Zu, 2002), perceiving others as responsive is likely more relevant and useful for assessing whether they might be good potential social partners.

Critically, though prior research has documented the role of perceived expresser responsiveness in a romantic partner's outcomes from gratitude (e.g., Algoe et al., 2013), these are the first studies to document the mediating role of perceived expresser responsiveness on a stranger's outcomes from gratitude. This is consistent with the research on perceived partner responsiveness in the broader literature: Although many studies involve demonstrably close and established relationships (e.g., romantic partners; Bar-Kalifa, Hen-Weissberg, & Rafaeli, 2015; Birnbaum, Reis, Mizrahi, Kanat-Maymon, Sass, & Granovski-Milner, 2016b; Gable, Gonzaga, & Strachman, 2006; Monin, Clark, & Lemay, 2008; Segal & Fraley, 2016), responsiveness can be perceived by strangers in theoretically predictable patterns (e.g., Reis, Maniaci, Caprariello, Eastwick, Finkel, 2011); it can even be perceived in robots (Birnbaum, et al., 2016b). In turn, in the broader literature, responsiveness predicts behavior toward the responsive other (Reis & Clark, 2013), such as approach behaviors (e.g., physical proximity, leaning) and greater self-disclosure (Birnbaum et al, 2016a). Of course, these are precisely the types of behaviors we

predict will be (and have been shown to be, in Experiment 4) elicited by someone's gratitude. In short, the construct of perceived responsiveness is not limited in its utility for theory testing, regardless of relationship classification, because perceived responsiveness is at the heart of fostering high-quality relationships. In summary, consistent with the logic of consilience across levels of analysis (Keltner & Haidt, 1999; Wilson, 1998), research at the individual (Algoe et al., 2008), dyadic (Algoe et al., 2013), and now group level of analysis highlights the value of perceived partner responsiveness for understanding the social functions of gratitude.

Our theorizing and initial findings regarding moral goodness of the person toward whom gratitude is expressed underscore the fascinating complexities of interpersonal dynamics when considering the group level functions of emotion, and thus the generative nature of our theoretical approach. Specifically, when Harry does something nice for Tom, it is the expression of gratitude that provides a rich signal about Harry. At a fundamental level, the witness learns that Harry voluntarily spent time or effort to do something on Tom's behalf that Tom values. We proposed and found that witnesses would be more interested in affiliating with a person like Tom (Experiment 5). In addition, we proposed and tested the possibility that this signal would reveal Tom to be a morally good person; indeed, we found that benefactors who were more praised by grateful people were seen as more good which, in turn, predicted greater willingness to help them (Experiment 8). Although our evidence comes from one study, we believe this is a promising avenue for future research: prior research documents that people quickly judge others' moral goodness (Lindeberg, Craig, & Lipp, 2018) and it carries greater weight than warmth or competence in some settings (Goodwin, Piazza, & Rozin, 2014; Wojciszke, Bazinska, & Jaworski, 1998).

A New Perspective on the Group-Level Functions of Emotions

Our new theorizing and findings represent useful advances for scholarship on the social functions of emotions. Keltner and Haidt's (1999) theoretical integration and review, while generative, only loosely defined the group level of analysis. As noted in the Introduction, resulting research has largely organized around two superordinate streams: the study of contagion processes, which is concerned with how moods and emotions spread within a group, and the study of group-based emotion, which is concerned with how group membership influences how and which emotions are experienced (see Niedenthal & Brauer, 2012). Like these two approaches, our model is concerned with how emotions influence group outcomes; here, however, inspired by the concept of consilience across levels of social functional analysis for a given emotion, we present a different route for understanding how emotions produce group-level outcomes.

Specifically, we have proposed that emotions influence the interpersonal dynamics of a group, and from these changes in interpersonal dynamics, group-level outcomes emerge. In focusing on group-level *process* (i.e. systematic changes in interpersonal dynamics), we can better understand and predict the emergence of downstream group outcomes in the wake of particular emotional expressions. For example, with gratitude, our studies demonstrate that group interpersonal dynamics of the quality of relational ties would be systematically altered by public expressions of gratitude. Gratitude expression improve the quality of three types of relationships: the expresser-benefactor dyad (from previous dyadic data), the witness-expresser dyad, and the witness-benefactor dyad. Our findings provide direct process insight into how group-level outcomes can emerge from emotional expressions. Most directly, our findings suggest that gratitude expressions should improve the overall strength of relational ties within a group—that is, following compositional approaches to group outcomes (e.g., Barsade & Gibson, 1998), the

sum of relationship strength within the group. Further downstream, our research enables researchers to make predictions about other types of group-level outcomes that are likely facilitated by enhanced overall relationship strength, such as cohesion. Similarly, the approach will aid researchers of other emotions in making precise predictions about the downstream effects of emotional expressions. Here, we have formalized an approach and conceptual model through which researchers can get concrete about hypotheses regarding proximal mechanisms that would contribute to group-level hypotheses for any given emotion. To be clear, we do not expect all emotions to facilitate high-quality relationships as we predict for gratitude, but hypotheses about downstream outcomes for the group should logically follow from the theorized social functions of the particular type of emotion at the individual and dyadic levels of analysis.

As such, the present work establishes a conceptual template for thinking about not only gratitude but also other emotions, and an experimental approach that should generalize well across several potential target emotions—studying the effects of emotion expressions on witnesses. According to our conceptual template, researchers of other emotions should consider (a) whether 1st party emotional expressions might influence the behavior of 3rd party witnesses, (b) which specific behaviors should be influenced, (c) potential behavioral-expressive mechanisms (i.e., what about the emotional expression drives the hypothesized effects on witnesses), and (d) social perceptual mechanisms (i.e., how does the 3rd party's view of the 1st party and 2nd party change due to the emotional expression). Three broad considerations may be helpful: First, is the 1st party's emotion observable? If so, under what conditions? For example, because the displayed emotional response is central to our model, researchers should consider how emotion regulation processes might interact with and operate alongside the proposed effects of expressed emotion; emotion regulation (specifically expressive suppression) of the 1st party

experiencer exerts direct dyadic (2nd party) influences on affiliation (Butler et al., 2003; Impett et al., 2012), and regulatory efforts may exert direct 3rd party effects, as well. Second, researchers should consider whether an emotion might influence the 3rd party's behaviors toward the 1st party, the 2nd party, other group members, or none of the above. Third, it is important to consider the temporal component of 3rd party witness effects—that is, given that emotions are typically experienced and expressed in the context of ongoing relationships (e.g., family, friends, co-workers), theorists should consider how consequences from one person's emotions might emerge over time through repeated interactions among group members.

Caveats and Opportunities for Additional Theorizing

While the present studies were conducted in the service of theorizing about gratitude's group-level social functions, it is worth acknowledging that they examine how 3rd party witnesses behave toward strangers rather than people who are explicitly members of one's own group. This approach was dictated by our desire to experimentally control as many aspects of the investigation as possible. We believe that finding these effects even for strangers, who theoretically should have no investment in one another, yet do demonstrate helping and affiliation, is a strength of the approach. Nonetheless, to test the potential group-level functions, over time, researchers will need to test hypotheses in groups where relational dynamics can unfold. This will often involve groups of people who already know one another.

There are two additional theoretical considerations regarding mechanism – grounded in prior literature on gratitude – that our data do not directly address but are worth drawing attention to here. First, in their seminal review and theoretical integration of gratitude as a moral affect, McCullough and colleagues (2001) proposed that gratitude expressions demonstrate to the recipient that the grateful person is *trustworthy*, and the kind of person who would *reciprocate*

the gesture in the future. In an updated review of the literature and new theorizing, Algoe (2012) proposed that, while this might be one signal, and could foster exchange-based relationships, ultimately gratitude is in the service of a qualitatively different type of relationship that helps to foster survival – communal alliances (see Clark & Mills, 2011). In Experiments 1-3, the witness may have presumed that the grateful person ("Thank you for catching those typos!") was trustworthy, which is itself a signal that the person is a good relationship partner (our proposal); Experiments 7 and 8 more clearly overcome the reciprocity alternative explanation for the hypothesized effects because all witnesses saw an expression of gratitude, thereby signaling that the grateful person is trustworthy. Nonetheless, our experiments were not designed to compare the two explanations, so this might be of interest in future research. In addition, there is an intriguing additional mechanism for potential effects of expressed gratitude on witness' helping behavior that merits future research: seeing the social reward another person receives for doing good may indirectly motivate the witness to do good. Our data do not address this complementary path toward some of the helping effects we document, but logically follow from our theorizing.

It also bears acknowledging that while there are *many* conceivable ways of demonstrating one's gratitude, we opted to use a signal that is commonly used in Western culture—the verbal "thank you"—because it is observable and can be operationalized in a wide variety of contexts. It remains to be seen if 3rd party witnesses—in particular contexts—might decode a 1st party's gratitude from other cues and act in similar ways toward the grateful person (i.e., more helpful and affiliative). We do not believe this observation undermines our current findings, given that explicit acknowledgement of others' kind actions is widespread across many cultures and at least in Western culture is associated with experienced gratitude. Nonetheless, it raises intriguing

considerations for future research. For example, from our perspective, the demonstrated gratitude represents a certain set of assumptions about what just happened in the situation (Scarantino, 2017). As such, in some relational or cultural contexts an expression of gratitude may be unwelcomed by or offensive to the benefactor. For example, whereas in American culture parents may want to hear their children's gratitude (e.g., Rothenberg, et al., 2017), in other cultures a child expressing gratitude to a parent may seem strange due to expected social roles; and whereas in American culture an expression of gratitude appears to enhance romantic relationships (Algoe & Zhaoyang, 2016), in other cultures a romantic partner expressing gratitude to another may be offensive because it implies a *lack* of intimacy in the relationship. Regardless, expressions of gratitude are likely to convey information about relationships and cultural norms to witnesses; future research can illuminate if and how cultural context moderates their impact on witnesses.

This brings us to a final point about consilience across levels of analysis. Keltner and Haidt (1999) also discussed the *cultural level of analysis* regarding the social functions of emotions, one aspect of which is considering how emotions shape cultural norms. Our conceptual model of gratitude may also contribute to considerations at this level of theorizing; for example, might expressions of gratitude reinforce culturally valued behaviors in the 2nd party and 3rd party witnesses? More generally, we expect that 3rd party witness effects play a key role in the emergence of emotional culture within a group (see Barsade & O'Neill, 2014; Grant, Dutton, & Rosso, 2008 on a culture of compassion); the present results and conceptual model enable future work examining this and related hypotheses.

Conclusion

Humans experience and express emotions while embedded within rich social networks. These social networks involve complex configurations of relationships that connect, reconnect, and reorganize over time; emotions coordinate those interactions and reconnections. Here, we have proposed a new pathway through which this happens: *witnessing* emotional responses of others changes the behavior of the witness in theoretically predictable ways. Whether witnessing the emotional response of a family member, a co-worker, or even someone at the neighborhood grocery store, emotions dictate the likelihood of and behavior within subsequent interactions. As such, one emotion-fueled social interaction can set the stage for the next. Multiply such relationship-potentiating moments by repeated experience and expression of gratitude and multiple group members, and even with these two proximal mechanisms—3rd party witnesses' behavior toward the expresser and toward the benefactor —one can see the potential value of gratitude for group-level social outcomes, through an improved relational culture of the community.

References

Abele, A. E., & Wojciszke, B. (2007). Agency and communion from the perspective of self versus others. *Journal of Personality and Social Psychology*, *93*(5), 751.

Abu-Lughod, L., & Lutz, C. A. (1990). Introduction: Emotion, discourse, and the politics of everyday life. In C. Lutz & L. Abu-Lughod (Eds.), *Language and the politics of emotion* (pp. 1-23). New York: Cambridge University Press.

Akçay, E., Van Cleve, J., Feldman, M. W., & Roughgarden, J. (2009). A theory for the evolution of other-regard integrating proximate and ultimate perspectives. *Proceedings of the National Academy of Sciences*, pnas-0904357106.

Algoe, S. B. (2012). Find, remind, and bind: The functions of gratitude in everyday relationships. *Social and Personality Psychology Compass, 6*(6)*,* 455-469. doi.org/10.1111/j.1751-9004.2012.00439

Algoe, S. B., Fredrickson, B. L., & Gable, S. L. (2013). The social functions of the emotion of gratitude via expression. *Emotion, 13*(4), 605. doi.org/10.1037/a0032701

Algoe, S. B., & Haidt, J. (2009). Witnessing excellence in action: The "other-praising" emotions of elevation, gratitude, and admiration. *Journal of Positive Psychology, 4*(2)*,* 105-127. doi.org/10.1080/17439760802650519

Algoe, S. B., Haidt, J., & Gable, S. L. (2008). Beyond reciprocity: Gratitude and relationships in everyday life. *Emotion, 8*(3)*, 425*. doi.org/10.1037/1528-3542.8.3.425

Algoe, S. B., Kurtz, L. E., & Grewen, K. (2017). Oxytocin and social bonds: the role of oxytocin in perceptions of romantic partners' bonding behavior. *Psychological Science*, *28*(12), 1763-1772.

Algoe, S. B., Kurtz, L. E., & Hilaire, N. M. (2016). Putting the "You" in "Thank You":

Examining other-praising behavior as the active relational ingredient in expressed gratitude. *Social Psychological and Personality Science*, *7*(7), 658-666. doi.org/10.1177/1948550616651681

Algoe, S. B., & Stanton, A. L. (2012). Gratitude when it is needed most: Social functions of gratitude in women with metastatic breast cancer. *Emotion*, *12*(1), 163–168. doi.org/10.1037/a0024024

Algoe, S. B., & Zhaoyang, R. (2016). Positive psychology in context: Effects of expressing gratitude in ongoing relationships depend on perceptions of enactor responsiveness. *Journal of Positive Psychology, 11*(4)*,* 399-415. doi.org/10.1080/17439760.2015.1117131

Altman, I., & Taylor, D. A. (1973). *Social penetration: The development of interpersonal relationships*. Holt, Rinehart & Winston.

Bar-Kalifa, E., Hen-Weissberg, A., & Rafaeli, E. (2015). Perceived partner responsiveness mediates the association between social anxiety and relationship satisfaction In committed couples. *Journal of Social and Clinical Psychology*, *34*(7), 587-610.

Barak, A., & Gluck-Ofri, O. (2007). Degree and reciprocity of self-disclosure in online forums. *CyberPsychology & Behavior*, *10*(3), 407-417.

Barriga, A. Q., Morrison, E. M., Liau, A. K., & Gibbs, J. C. (2001). Moral cognition: Explaining the gender difference in antisocial behavior. *Merrill-Palmer Quarterly, 47*(4), 532-562.

Barsade, S. G. (2002). The ripple effect: Emotional contagion and its influence on group behavior. *Administrative Science Quarterly, 47*(4)*,* 644-675. doi.org/10.2307/3094912

Barsade, S. G., & Gibson, D. E. (1998). Group emotion: A view from top and bottom.

Barsade, S. G., & Gibson, D. E. (2012). Group affect: Its influence on individual and group outcomes. *Current Directions in Psychological Science*, *21*(2), 119-123.

Barsade, S. G., & O'Neill, O. A. (2014). What's love got to do with it? A longitudinal study of the culture of companionate love and employee and client outcomes in a long-term care setting. *Administrative Science Quarterly*, *59*(4), 551-598.

Bartlett, M. Y., & DeSteno, D. (2006). Gratitude and prosocial behavior : Helping when it costs you. *Psychological Science*, *17*(4), 319-325. doi.org/10.1111/j.1467-9280.2006.01705

Birnbaum, G. E., Mizrahi, M., Hoffman, G., Reis, H. T., Finkel, E. J., & Sass, O. (2016a). What robots can teach us about intimacy: The reassuring effects of robot responsiveness to human disclosure. *Computers in Human Behavior, 63, 416-423*. doi.org/10.1016/j.chb.2016.05.064

Birnbaum, G. E., Reis, H. T., Mizrahi, M., Kanat-Maymon, Y., Sass, O., & Granovski-Milner, C. (2016b). Intimately connected: The importance of partner responsiveness for experiencing sexual desire. *Journal of Personality and Social Psychology*. doi.org/10.1037/pspi0000069

Brady, W. J., Wills, J. A., Jost, J. T., Tucker, J. A., & Van Bavel, J. J. (2017). Emotion shapes the diffusion of moralized content in social networks. *Proceedings of the National Academy of Sciences*, *114*(28), 7313–7318. doi.org/10.1073/pnas.1618923114

Butler, E. A., Egloff, B., Wlhelm, F. H., Smith, N. C., Erickson, E. A., & Gross, J. J. (2003). The social consequences of expressive suppression. *Emotion*, *3*(1), 48.

Campion, M. A., Papper, E. M., & Medsker, G. J. (1996). Relations between work team characteristics and effectiveness: A replication and extension. *Personnel Psychology*, *49*(2), 429-452.

Champely, S. (2018). Pwr: Basic functions for power analysis. R package version 1.2. https://CRAN.R-project.org/package=pwr

Chang, Y.-P., Algoe, S. B., & Chen, L. H. (2016). Affective valence signals agency within and between individuals. *Emotion*, *17*(2), 296–308. doi.org/10.1037/emo0000229

Chapman, H. A., Kim, D. A., Susskind, J. M., & Anderson, A. K. (2009). In bad taste: Evidence for the oral origins of moral disgust. *Science, 323*(5918), 1222-1226. doi.org/10.1126/science.1165565

Cikara, M., Botvinick, M. M., & Fiske, S. T. (2011). Us versus them: Social identity shapes neural responses to intergroup competition and harm. *Psychological Science*, *22*(3), 306-313. doi.org/10.1177/0956797610397667

Cikara, M., Bruneau, E., Van Bavel, J. J., & Saxe, R. (2014). Their pain gives us pleasure: How intergroup dynamics shape empathic failures and counter-empathic responses. *Journal of Experimental Social Psychology, 55,* 110-125. doi.org/10.1016/j.jesp.2014.06.007

Clark, M. S., & Mills, J. (1979). Interpersonal attraction in exchange and communal relationships. *Journal of Personality and Social Psychology, 37*(1), 12. doi.org/10.1037/0022-3514.37.1.12

Clark, M. S., & Mills, J. (1993). The difference between communal and exchange relationships: What it is and is not. *Personality and Social Psychology Bulletin*, *19*(6), 684-691.

Clark, M. S., & Mills, J. (2011). A theory of communal (and exchange) relationships. *Handbook of Theories of Social Psychology*, *2*, 232-250.

Clark, M. S., & Monin, J. (2014). Turning the tables: How we react to others' happiness. In J. Gruber & J. T. Moskowitz (Eds.), *Positive emotion: Integrating the light sides and dark sides* (pp. 323–344). New York, NY: Oxford University Press.

Clark, H. B., Northrop, J. T., & Barkshire, C. T. (1988). The effects of contingent thank-you notes on case managers' visiting residential clients. *Education and Treatment of Children, 11,* 45–51.

Collins, N. L., & Miller, L. C. (1994). Self-disclosure and liking: A meta-analytic review. *Psychological Bulletin*, *116*(3), 457.

Darwin, C. (1872). *The descent of man, and selection in relation to sex* (Vol. 2). D. Appleton.

Delgado, M. R., Frank, R. H., & Phelps, E. A. (2005). Perceptions of moral character modulate the neural systems of reward during the trust game. *Nature Neuroscience*, *8*(11), 1611.

Derlega, V. J., Metts, S., Petronio, S., & Margulis, S. T. (1993). *Self–disclosure*. Newbury Park, CA: Sage.

Eibach, R. P., Wilmot, M. O., & Libby, L. K. (2015). The system-justifying function of gratitude norms. *Social and Personality Psychology Compass, 9*(7), 348-358. doi.org/10.1111/spc3.12184

Ekman, P. (1993). Facial expression and emotion. *American Psychologist*, *48*(4), 384.

Elfenbein, H. A. (2014). The many faces of emotional contagion: An affective process theory of affective linkage. *Organizational Psychology Review*, *4*(4), 326-362.

Fischer, A. H., & Manstead, A. S. (2008). Social functions of emotion. In M. Lewis, J. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotions* (3rd ed., pp. 456-468). New York, NY: Guilford Press.

Fischer, A. H., & Manstead, A. S. R. (2016). Social functions of emotion and emotion regulation. In L. F. Barrett, M. Lewis, & J. M. Haviland-Jones (Eds.), *Handbook of emotions* (4th ed., pp. 424–439). New York, NY: Guilford Press.

Fischer, A. H., & Roseman, I. J. (2007). Beat them or ban them: The characteristics and social

functions of anger and contempt. *Journal of Personality and Social Psychology, 93*(1), 103. doi.org/10.1037/0022-3514.93.1.103

Fiske, S. T., Cuddy, A. J. C., & Glick, P. (2007). Universal dimensions of social cognition: warmth and competence. *Trends in Cognitive Sciences, 11*(2), 77-83. doi.org/10.1016/j.tics.2006.11.005

Fiske, S. T., Cuddy, A. J. C., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: Competence and warmth respectively follow from perceived status and competition. *Journal of Personality and Social Psychology, 82*(6), 878. doi.org/10.1037/0022-3514.82.6.878

Fowler, J. H., & Christakis, N. A. (2008). Dynamic spread of happiness in a large social network: Longitudinal analysis over 20 years in the Framingham Heart Study. *British Medical Journal*, *337*, a2338.

Frank, R. H. (1988). *Passions within reason: The strategic role of the emotions*. WW Norton & Co.

Fredrickson, B. L. (1998). What good are positive emotions?. *Review of General Psychology*, *2*(3), 300.

Fredrickson, B. L. (2003). The value of positive emotions. *American Scientist, 91,* 330-335.

Fridlund, A. J. (1992). The behavioral ecology and sociality of human faces. In M. S. Clark (Ed.), *Emotion*. Newbury Park, CA: Sage.

Frijda, N.H., & Mesquita, B. (1994). The social roles and functions of emotions. In S. Kitayama & H. Marcus (Eds.), *Emotion and culture: Empirical studies of mutual influenced* (pp. 51-87). Washington, DC: American Psychological Association.

Gable, S. L., Gonzaga, G. C., & Strachman, A. (2006). Will you be there for me when things go

right? Supportive responses to positive event disclosures. *Journal of Personality and Social Psychology*, *91*(5), 904. doi.org/10.1037/0022-3514.91.5.904

Gable, S. L., & Reis, H. T. (2001). Appetitive and aversive social interaction. In J. Harvey & A. Wenzel (Eds.), *Close romantic relationships: Maintenance and enhancement* (pp. 169-194). Mahwah, NJ: Erlbaum.

Grant, A. M., Dutton, J. E., & Rosso, B. D. (2008). Giving commitment: Employee support programs and the prosocial sensemaking process. *Academy of Management Journal*, *51*(5), 898-918.

Grant, A. M., & Gino, F. (2010). A little thanks goes a long way: Explaining why gratitude expressions motivate prosocial behavior. *Journal of Personality and Social Psychology*, *98*(6), 946. doi.org/10.1037/a0017935

Goldenberg, A., Halperin, E., van Zomeren, M., & Gross, J. J. (2016). The process model of group-based emotion. *Personality and Social Psychology Review, 20*(2), 118-141. doi.org/10.1177/1088868315581263

Goodwin, G. P., Piazza, J., & Rozin, P. (2014). Moral character predominates in person perception and evaluation. *Journal of Personality and Social Psychology*, *106*(1), 148.

Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1993). Emotional contagion. *Current Directions in Psychological Science*, *2*(3), 96-100.

Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1994). *Emotional contagion*. Paris: Cambrdige University Press.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis methodology: A regression-based approach.* New York, NY: Guilford Press

Henrich, J., & Gil-White, F. J. (2001). The evolution of prestige: Freely conferred deference as a mechanism for enhancing the benefits of cultural transmission. *Evolution and Human Behavior*, *22*(3), 165-196.

Henderlong, J., & Lepper, M. R. (2002). The effects of praise on children's intrinsic motivation: a review and synthesis. *Psychological Bulletin*, *128*(5), 774.

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: A meta-analytic review. *PLoS Medicine, 7*(7), e1000316.

Impett, E. A., Kogan, A., English, T., John, O., Oveis, C., Gordon, A. M., & Keltner, D. (2012). Suppression sours sacrifice: Emotional and relational costs of suppressing emotions in romantic relationships. *Personality and Social Psychology Bulletin*, *38*(6), 707-720.

Jia, L., Lee, L. N., & Tong, E. M. W. (2015). Gratitude facilitates behavioral mimicry. *Emotion*, *15*(2), 134–138. doi.org/10.1037/emo0000022

Jourard, S. M. (1964). *The transparent self: Self-disclosure and well-being* (No. 17). Princeton, NJ: Van Nostrand.

Keltner, D. (1995). Signs of appeasement: Evidence for the distinct displays of embarrassment, amusement, and shame. *Journal of Personality and Social Psychology*, *68*(3), 441.

Keltner, D., & Haidt, J. (1999). Social functions of emotions at four levels of analysis. *Cognition and Emotion*, *13*(5), 505-521. doi.org/10.1080/026999399379168

Keltner, D., & Haidt, J. (2003). Approaching awe, a moral, spiritual, and aesthetic emotion. *Cognition and Emotion*, *17*(2), 297-314. doi.org/10.1080/02699930302297

Kramer, A. D., Guillory, J. E., & Hancock, J. T. (2014). Experimental evidence of massive-scale emotional contagion through social networks. *Proceedings of the National Academy of Sciences*, *111*(24), 8788-8790.

Kraus, M. W., Huang, C., & Keltner, D. (2010). Tactile communication, cooperation, and performance: An ethological study of the NBA. *Emotion*, *10*(5), 745.

Lane, J., & Anderson, N. H. (1976). Integration of intention and outcome in moral judgment. *Memory & Cognition*, *4*(1), 1-5.

Lindeberg, S., Craig, B. M., & Lipp, O. V. (2018). You look pretty happy: Attractiveness moderates emotion perception. *Emotion.* doi.org/10.1037/emo0000513

Lindquist, K. A., Gendron, M., Barrett, L. F., & Dickerson, B. C. (2014). Emotion perception, but not affect perception, is impaired with semantic memory loss. *Emotion*, *14*(2), 375. doi.org/10.1037/a0035293

Lount, R. B. (2010). The impact of positive mood on trust in interpersonal and intergroup interactions. *Journal of Personality and Social Psychology*, *98*(3), 420. doi.org/10.1037/a0017344

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research*, *39*(1), 99-128.

Mauss, I. B., Levenson, R. W., McCarter, L., Wilhelm, F. H., & Gross, J. J. (2005). The tie that binds? Coherence among emotion experience, behavior, and physiology. *Emotion*, *5*(2), 175. doi.org/10.1037/1528-3542.5.2.175

McCullough, M. E., Kilpatrick, S. D., Emmons, R. A., & Larson, D. B. (2001). Is gratitude a moral affect?. *Psychological Bulletin*, *127*(2), 249.

McCullough, M. E., Kimeldorf, M. B., & Cohen, A. D. (2008). An adaptation for altruism: The social causes, social effects, and social evolution of gratitude. *Current Directions in Psychological Science*, *17*(4), 281-285.

Monin, J. K., Clark, M. S., & Lemay, E. P. (2008). Communal responsiveness in relationships with female versus male family members. *Sex Roles*, *59*(3-4), 176. doi.org/10.1007/s11199-008-9420-8

Ng, J. W. X., Tong, E. M. W., Sim, D. L. Y., Teo, S. W. Y., Loy, X., & Giesbrecht, T. (2017). Gratitude facilitates private conformity: A test of the social alignment hypothesis. *Emotion, 17*(2), 379. doi.org/10.1037/emo0000249

Niedenthal, P. M., & Brauer, M. (2012). Social functionality of human emotion. *Annual Review of Psychology, 63,* 259-285. doi.org/10.1146/annurev.psych.121208.131605

Nowak, M. A., & Roch, S. (2007). Upstream reciprocity and the evolution of gratitude. *Proceedings of the Royal Society B: Biological Sciences*, *274*(1610), 605–610. doi.org/10.1098/rspb.2006.0125

Ortony A, Clore GL, Collins A. (1988). *The cognitive structure of emotion.* New York: Cambridge University Press.

Reis, H. T. (2013). Relationship well-being: The central role of perceived partner responsiveness. In C. Hazan & M. I. Campa (Eds.), *Human bonding: The science of affectional ties* (pp. 283- 307). New York, NY: Guilford Press.

Reis, H. T., Aron, A., Clark, M. S., & Finkel, E. J. (2013). Ellen Berscheid, Elaine Hatfield, and the emergence of relationship science. *Perspectives on Psychological Science*, *8*(5), 558-572.

Reis, H. T., Clark, M. S., & Holmes, J. G. (2004). Perceived partner responsiveness as an organizing construct in the study of closeness and intimacy. In D. J. Mashek & A. Aron (Eds.), *Handbook of closeness and intimacy* (pp. 201–225). Mahwah, NJ: Erlbaum.

Reis, H. T., Maniaci, M. R., Caprariello, P. A., Eastwick, P. W., & Finkel, E. J. (2011). Familiarity does indeed promote attraction in live interaction. *Journal of Personality and Social Psychology, 101*(3), 557-570. doi.org/10.1037/a0022885

Reis, H. T., & Shaver, P. (1988). Intimacy as an interpersonal process. *Handbook of Personal Relationships*, *24*(3), 367-389.

Rind, B., & Bordia, P. (1995). Effect of server's "Thank You" and personalization on restaurant tipping. *Journal of Applied Social Psychology, 25*(9), 745-751. doi.org/10.1111/j.1559-1816.1995.tb01772

Rothenberg, W. A., Hussong, A. M., Langley, H. A., Egerton, G. A., Halberstadt, A. G., Coffman, J. L., Mokrova, I., & Costanzo, P. R. (2017). Grateful parents raising grateful children: Niche selection and the socialization of child gratitude. *Applied Developmental Science*, *21*(2), 106-120.

Rychlowska, M., Jack, R. E., Garrod, O. G. B., Schyns, P. G., Martin, J. D., & Niedenthal, P. M. (2017). Functional smiles: Tools for love, sympathy, and war. *Psychological Science, 28*(9), 1259-1270. doi.org/10.1177/0956797617706082

Sarason, I. G., Levine, H. M., Basham, R. B., & Sarason, B. R. (1983). Assessing social support: The social support questionnaire. *Journal of Personality and Social Psychology*, *44*(1), 127.

Sauter, D. A., Eisner, F., Ekman, P., & Scott, S. K. (2010). Cross-cultural recognition of basic emotions through nonverbal emotional vocalizations. *Proceedings of the National Academy of Sciences, 107*(6), 2408-2412. doi.org/10.1073/pnas.0908239106

Sauter, D. A., McDonald, N. M., Gangi, D. N., & Messinger, D. S. (2014). Nonverbal expressions of positive emotions. In M. M. Tugade, M. N. Shiota, & L. D. Kirby (Eds.), *Handbook of positive emotions* (pp. 179-198). New York: Guilford Press.

Scarantino, A. (2017). Do emotions cause actions, and if so how?. *Emotion Review*, *9*(4), 326-334.

Scherer, K. R. (1984). Emotion as a multicomponent process: A model and some cross-cultural data. *Review of Personality & Social Psychology*.

Scherer, K. R. (2005). What are emotions? And how can they be measured?. *Social Science Information*, *44*(4), 695-729.

Segal, N., & Fraley, R. C. (2016). Broadening the investment model: An intensive longitudinal study on attachment and perceived partner responsiveness in commitment dynamics. *Journal of Social and Personal Relationships*, *33*(5), 581–599. doi.org/10.1177/0265407515584493

Selig, J. P., & Preacher, K. J. (2008). Monte Carlo method for assessing mediation: An interactive tool for creating confidence intervals for indirect effects [Computer software]. Available from http://quantpsy.org/.

Shariff, A. F., & Tracy, J. L. (2011). What are emotion expressions for?. *Current Directions in Psychological Science*, *20*(6), 395-399.

Smith, E. R., & Mackie, D. M. (2015). Dynamics of group-based emotions: Insights from intergroup emotions theory. *Emotion Review, 7*(4), 349-354. doi.org/10.1177/1754073915590614

Spivey, C. B., & Prentice-Dunn, S. (1990). Assessing the directionality of deindividuated behavior: Effects of deindividuation, modeling, and private self-consciousness on

aggressive and prosocial responses. *Basic and Applied Social Psychology*, *11*(4), 387-403. doi.org/10.1207/s15324834basp1104_3

Sprecher, S., & Hendrick, S. S. (2004). Self-disclosure in intimate relationships: Associations with individual and relationship characteristics over time. *Journal of Social and Clinical Psychology*, *23*(6), 857-877.

Sy, T., Côté, S., & Saavedra, R. (2005). The contagious leader: Impact of the leader's mood on the mood of group members, group affective tone, and group processes. *Journal of Applied Psychology*, *90*(2), 295. doi.org/10.1037/0021-9010.90.2.295

Sznycer, D., Tooby, J., Cosmides, L., Porat, R., Shalvi, S., & Halperin, E. (2016). Shame closely tracks the threat of devaluation by others, even across cultures. *Proceedings of the National Academy of Sciences, 113*(10), 2625-2630. doi.org/10.1073/pnas.1514699113

Telle, N. T., & Pfister, H. R. (2012). Not only the miserable receive help: Empathy promotes prosocial behaviour toward the happy. *Current Psychology, 31*(4), 393-413. doi.org/10.1007/s12144-012-9157-y

Tesser, A., Gatewood, R., & Driver, M. (1968). Some determinants of gratitude. *Journal of Personality and Social Psychology*, *9*(3), 233.

Todorov, A., Mandisodza, A. N., Goren, A., & Hall, C. C. (2005). Inferences of competence from faces predict election outcomes. *Science*, *308*(5728), 1623-1626.

Tracy, J. L., Randles, D., & Steckler, C. M. (2015). The nonverbal communication of emotions. *Current Opinion in Behavioral Sciences*, *3*, 25-30. doi.org/10.1016/j.cobeha.2015.01.001

Tracy, J. L., & Robins, R. W. (2004). Putting the self into self-conscious emotions: A theoretical model. *Psychological Inquiry*, *15*(2), 103-125.

Van Kleef, G. A. (2009). How emotions regulate social life: The emotions as social information (EASI) model. *Current Directions in Psychological Science*, *18*(3), 184-188.

Van Kleef, G. A., De Dreu, C. K. W., & Manstead, A. S. R. (2010). An interpersonal approach to emotion in social decision making. *Advances in Experimental Social Psychology.* doi.org/10.1016/S0065-2601(10)42002

Waugh, C. E., & Fredrickson, B. L. (2006). Nice to know you: Positive emotions, self–other overlap, and complex understanding in the formation of a new relationship. *The Journal of Positive Psychology*, *1*(2), 93-106. doi.org/10.1080/17439760500510569

Weiner, B., Russell, D., & Lerman, D. (1979). The cognition–emotion process in achievement-related contexts. *Journal of Personality and Social Psychology*, *37*(7), 1211.

Whelan, D. C., & Zelenski, J. M. (2012). Experimental evidence that positive moods cause sociability. *Social Psychological and Personality Science*, *3*(4), 430-437. doi.org/10.1177/1948550611425194

Williams, L. A., & Bartlett, M. Y. (2015). Warm thanks: Gratitude expression facilitates social affiliation in new relationships via perceived warmth. *Emotion*, *15*(1), 1. doi.org/10.1037/emo0000017

Wilson, E. O. (1998). Consilience: The unity of knowledge. *Issues in Science and Technology*, *15*(1), 90.

Wilson, J. P., & Petruska, R. (1984). Motivation, model attributes, and prosocial behavior. *Journal of Personality and Social Psychology*, *46*(2), 458–468.

Wojciszke, B., Bazinska, R., & Jaworski, M. (1998). On the dominance of moral categories in impression formation. *Personality and Social Psychology Bulletin*, *24*(12), 1251-1263.

Wood, A. M., Brown, G. D. A., & Maltby, J. (2011). Thanks, but I'm used to better: A relative

rank model of gratitude. *Emotion*, *11*(1), 175. doi.org/10.1037/a0021553

Yzerbyt, V., & Kuppens, T. (2009). Group based emotions: The social heart in the individual head. In S. Otten, K. Sassenberg, & T. Kessler (Eds.), *Intergroup relations: The role of motivation and emotion* (pp. 143–161). New York, NY: Psychology Press.

Appendix A

Participant Instructions in Experiments 1-3

In a moment, you will be asked to read a movie review and indicate your opinions about its contents. When reading the movie review, please consider which sentences you think are the most useful to help you decide whether to see the movie.

Specifically, we will ask you to complete the following steps:

1. You will download the movie review provided in this survey.

2. Open the document in Microsoft Word.

3. Within Microsoft Word, please turn on 'track changes'.

4. Read through the movie review.

5. Select the sentences you think are the most useful by **bolding** those sentences

6. Select the sentences you think are the least useful by underlining those sentences.

7. Save your document and upload it to this survey.

Now that you've seen the example, we would like you to begin the editing task by reading another movie review written by the same author. Again, here are the steps you should follow:

1. You will download the movie review provided in this survey.

2. Open the document in Microsoft Word.

3. Within Microsoft Word, please turn on 'track changes'.

4. Read through the movie review.

5. Select the sentences you think are the most useful to help you decide whether to see the movie by **bolding** those sentences.

6. Select the sentences you think are the least useful to help you decide whether to see the movie by underlining those sentences.

7. Save your document and upload it to this survey.

Appendix B

Stimuli: Example Movie Review that Comprised the Experimental Condition in Experiments 1-3

Movie Review

"Gone Girl" is a psychological thriller that tells the story of Nick Dunne and his wife, Amy. The plot comes from the book written by Gillian Flynn. On their fifth anniversary, Amy mysteriously goes missing, and the corresponding evidence and ensuing media frenzy, caused by Amy's fame and her husband's apparent apathy, place Nick as the primary suspect. **What follows is a dark, twisted mystery that keeps the viewer clutching to the sides of their seat.**

Director David Fincher goes above and beyond with many aspects of this film. The use of flashbacks, as shown through the diary entries of Amy, coincide perfectly with the present day storyline, helping to arouse interest and suspicion in several characters, while also keeping the viewers on their feet. At no point in the film was I confused as a result of the directing or the time shuffle. Any uncertainty stemmed from the constant twists and turns of the plot.

The casting of "Gone Girl" was excellent as well. **Ben Affleck was a perfect choice for Nick, providing a performance that was able to find the perfect medium of passionate and expressionless.** Rosamund Pike's portrayal of Amy was award-worthy. She presented all the intricacies and secrets of Amy with dazzling color and zeal. **Her ability to depict such a wide range of emotions, such as vulnerability, power, cunning, and terror was marvelous**. The supporting cast was also well-put together, placing actors like Tyler Perry, Neil Patrick Harris, and Kim Dickens in roles that allowed them to shine.

Certain aspects of the film, such as the media witch-hunt of Nick, unfortunately, did seem a bit over-the-top and unbelievable. In addition, out of place vulgarity and an excessively exaggerated blood scene also seem a bit out of place. However, despite these small issues, "Gone Girl" is a fantastic film that I would highly recommend to any mature viewer.

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Appendix C[12]

Stimuli: Movie Review Evaluated by Participants in Experiments 1-3

Movie Review

"Over Her Dead Body" is a 2008 film that features Eva Parker, Lake Bell and Paul Rudd as the main leads. In a sentence, the movie is about a guy, his psychic girlfriend and a jealous wife – who is a ghost.

The movie starts of in a rather depressing tone – the wife dies on the wedding day. At the insistence of Henry's (Paul Rudd) sister, Henry skeptically goes to the sweet but scatterbrained psychic Kate (Eva Parker). Though still skeptical over Kate's psychic abilities, when Kate suddenly starts to spout out all private matters to Henry they get closer and start to date. Kate doesn't see any ghosts of Ashley (Lake Bell) the wife – at least not yet. Henry's sister gives Kate a diary of Ashley's through which Kate gets her information from. all seems well till Ashley shows up.

Through a not so hilarious series of events, we see Henry and Kate's relationship progress, halt, and break as a result of Ashley's interference. Finally, Ashley has a change of heart and reunites Henry and Kate. The basic plot line is not bad and the movie could have been much better with only a little effort Though it has its moments, the movie is filled with clichés (why is spilling mustard on yourself funny?), not so deep betrayals, and more places where you have to ask – what was the director thiking?

One point where the movie scores is its lead actors. All of the actors emote very well and are sardonically funny. yet, no matter how well they try, the movie fails to connect to the audience. Hopefully, the director learns to no use so many clichés and good luck for the next time! Don't cross the movie of your list – if you have nothing else to do, it's a slightly funny time passer.

[12] The highlights indicate the 6 embedded typos in the movie review. The highlighted typos on the movie review here are for display purposes only; participants downloaded and evaluated a blank version of this movie review by bolding and underlining sentences, as instructed. The dependent measure was whether the participant corrected any of these six typos.

Online Supplementary Materials Table of Contents

Scoring Procedure for Experiments 1-3

Six typos were embedded in the movie review that participants evaluated. Each participant's uploaded movie review was scored as to the number of typos corrected. A typo was scored as being corrected if (1) the participant edited the text of the movie review so as to correct the typo OR (2) the participant underlined the typo but not the surrounding text OR (3) the participant inserted a comment that called attention to the typo.

Helping Behavior Validation

We used the feedback participants provided in Experiment 1 – that is, the documents they uploaded – to test whether correcting typos is a valid measure of helping behavior. To do so, four naïve coders, unaware of hypothesis and condition, were asked to rate all uploaded movie reviews in Experiment 1. They were told that "the author of a movie review asked for feedback from several people about the sentences within the movie review that were most useful to help a person decide whether to see the movie". The coders were told that the people giving feedback had been asked to use bold font and to underline the most useful and least useful sentences, respectively, then send it back to the author; coders were also told that though this was all that was asked, incidentally the document contained six typos.

Coders saw the actual feedback provided on the movie reviews by participants in this study. For each participant's work, coders answered the following question: *Beyond completing the bolding and underlining task, how much did this person make an effort to help the author of the movie review?* They gave a response on a 0 (*this person made no effort to help the author*) to 6 (*this person made a great effort to help the author*) scale. Coders had high agreement among them [ICC (2,4) = .903], and their scores were averaged to create one composite measure of perceived helping.

A linear regression using bootstrapped estimates of the confidence interval indicates that participants who corrected more typos in the movie review were seen by the coders as more helpful (B = .42, SE = .03, t = 15.47, p < .001, 95% bootstrapped CI [0.368, 0.474], R^2 = .534).

Additional Descriptive Information About Helping Behavior in Experiments 1-3

Experiment 1. Participants were 173% more likely to engage in helping behavior after witnessing an expression of gratitude: Whereas 15/107 (14.0%) participants helped in the control condition, 39/102 (38.2%) participants helped in the gratitude expression condition.

Experiment 2. Participants were 116% more likely to help in the gratitude expression condition than in the combined control conditions: 43.2% (41/95) of participants helped the expresser after witnessing an expression of gratitude, whereas only 20.0% (44/222) of participants helped in the combined control conditions. Decomposing the control conditions, 15.3% (17/111) helped in the positive expression control condition, and 24.8% (27/109) helped in the control condition.

Experiment 3. Here, 26.1% (43/165) of participants in the control condition helped. Nevertheless, participants were still 40% more likely to help after witnessing an expression of gratitude: 36.5% (54/148) of participants helped in the gratitude expression condition.

Movie Review Stimuli Validation Study

After conducting Experiments 1-3, we conducted an additional study to test the validity of the experimental manipulation. That is, we tested whether the movie review author expressing gratitude to the prior participant was perceived as experiencing more gratitude than the authors in the other conditions used across Experiments 1-3.

Method

Participants, Design, and Procedure

Participants were 392 individuals (78 males, 314 females; M_{age} = 40.57 years, SD_{age} = 14.09, range = 18 to 75; 327 White/Caucasian, 32 Black/African-American, 24 Hispanic, 17 East Asian, 10 South Asian, 2 Pacific Islander, 10 reported another race) who were recruited from a University listserv to complete a brief study about a movie review. Participants were told that it would take them about 2-minutes to complete, for an entry into a $50 chance drawing. According to a power analysis conducted in R (Champely, 2018), a sample size of at least 137 was needed in order to obtain a medium effect size with 95% power. We aimed to have usable data from 100 people per condition.

After consenting, participants were asked to read instructions, then viewed one movie review example and reported on perceived author emotion. The example movie review they saw was randomly assigned from four possibilities in a between-subjects design.

Manipulation and Measures

Participants were given the following instructions: "The author of a movie review asked for feedback about the sentences within the movie review that were most useful to help a person decide whether to see the movie. The person giving the feedback was asked to use **bold font** to

indicate the sentences in the movie review they thought were most useful and to underline the sentences they thought were least useful, then send it back to the author. They were not asked to do anything else." On the following screen, participants randomly saw one of the four movie review documents used as stimuli in Experiments 1-3, which contained the requested feedback to the author (i.e., bolding and underlining) as well as follow-up comments from the author who received the feedback. The follow up comments comprised the experimental manipulation, as participants were randomly assigned to see the example containing "Thank you so much for catching those typos!" (gratitude expression condition; Experiments 1-3), no additional comment (control condition; Experiments 1 and 2); "Congratulations on finishing the editing!" (positive expression control condition; Experiment 2); or "I didn't realize there were so many typos." (typo control condition; Experiment 3). After reviewing the document, participants were asked to indicate the extent to which they thought the author of the movie review felt grateful after receiving feedback (0 = *not at all*, 6 = *very much so*).

Results and Conclusions of Movie Review Validation Study

We tested the validity of the experimental manipulation used in Experiments 1-3 by conducting a one-way analysis of variance on perceived gratitude. A planned contrast (coded as gratitude = 3, positive expression control = -1, typo control = -1, and neutral control = -1) showed that the overall analysis of variance was statistically significant [F (3,388) = 13.24, $p <$ .001], and that the author who expressed gratitude was perceived as significantly more grateful (M = 3.32, SD = 1.28) than were the authors in the positive (M =2.63, SD = 1.76), typo control (M = 2.14, SD = 1.71), or neutral control (M = 2.05, SD = 1.58) conditions combined, F (1,388) = 32.07, $p < .001$, $R^2 = .076$. The bootstrapped estimate of the confidence interval for the

contrast, using 1,000 repetitions, indicates that it does not include zero (95% CI = [0.193, 0.348]), thereby supporting our hypothesis.

Video Stimulus Validation Study Conducted Prior to Experiment 4

As indicated in the main text, videos present more complex stimuli than the one-sentence stimuli used in Experiments 1-3. In creating the videos, our goal was to have a strong positive expressivity control condition—that is, people in the expressed gratitude and expressed positivity condition would be seen as equally expressive in general and of positivity in particular, and that both would be seen as greater on these measures than in the emotionally neutral control condition. At the same time, given the multiple channels of communication, prior to conducting Experiment 4 we wanted to ensure that participants were still seeing more *gratitude* in the expressed gratitude condition and more self-focused positive emotion in the expressed positivity control condition than in the other two conditions. Would there be dissociation? After creating the stimuli, we obtained ratings from a large sample to validate the videos on these dimensions prior to conducting the experiment.

This validation study also offered an important opportunity to test previously untested assumptions about the extent to which expressing gratitude in particular and positivity in general would make the expressers generally more interpersonally attractive. Participants rated the person in the video on traits that have been shown in previous work (reviewed in the main text) to increase upon seeing expressed positivity in general: how attractive, likeable, warm, and competent. The expected similarities between the two positively valenced video conditions (i.e., gratitude expression and positive expression control) on these dimensions, compared to an emotionally neutral expression condition, help address potential explanations for differences in Experiment 4 behavioral effects that may come up in the minds of readers. Experiment 4 was not designed to address our own theoretically-derived hypothesis about mechanisms, which we carefully establish and test in Experiments 6, 7, and 8.

Method

Participants, Design, and Procedure

Participants were 371 U.S. MTurk workers (145 males, 186 females, 1 gender queer, 39 did not report; M_{age} = 36.71 years, SD_{age} = 11.03, range = 19 to 69; 274 White/Caucasian, 31 Black/African-American, 20 Hispanic, 13 East Asian, 1 South Asian, 1 Pacific Islander, 8 reported another race, 39 missing) who were randomly assigned to view and report on one of six videos in a 3 (gratitude expression, positive expression control, emotionally neutral expression control) x 2 (female expresser, male expresser) between-subjects design. They were compensated $0.25 for their participation. Without a point of reference to estimate effect size, we aimed to have useable data from 100 people per condition; this would give 95% power to detect a medium effect size, according to the program G*power. We set the enrollment cap at 360 people on MTurk.

Participants were recruited to complete a study about first impressions. After agreeing to participate, they were asked to watch a video about a person who they would be forming impressions of. Each participant watched only one video and was asked to rate the person in the video (the target person) on a number of dimensions.

Manipulation and Measures

Video manipulation. The male and female actors in the videos were both Ph.D. students with expertise in emotion; approximate scripts were created by the first, second, and third authors, and the actors were asked to create several versions of videos. The author team, all experts in emotion, reviewed the videos for visual quality as well as accurate amounts of expressivity, sociality, and positivity in each video. When needed, actors created additional videos based on feedback, which the author team reviewed again. Once the authors agreed on a

final set of six videos, they conducted this validation study. Video stimuli are available for download here within the Supplementary Materials.

In each video, the torso and head of the person (who was purportedly a previous participant) were visible, and the person addressed the camera while telling his/her romantic partner (purportedly the recipient of this video) about some aspect of participating in a local running race. In the "emotionally neutral expression control" video, the actor described the route taken, mentioning people cheering along the sidelines, but without conveying positive or negative emotion. In the "positive expression control" video, the actor described feelings of pride and accomplishment experienced about completing the race, expressed positive affect (e.g., smiles, activation), and also mentioned people cheering along the sidelines. In the "gratitude expression" video, the actor called attention to the fact that their romantic partner was waiting at the end of the race and how much they appreciated that, while expressing positive affect (e.g., smiles, activation).

Measures. After watching the video, participants were asked how much *positivity* the person in the video expressed (1 = *extremely low amount*, 9 = *extremely high amount*), and to indicate the extent to which they thought the following words described the person in the video: *expressive*, *likeable*, *attractive*, *warm*, and *competent* (0 = *not at all*, 8 = *very much*). Participants were also asked to report the extent to which they thought the person in the video felt *happy* (i.e., excited, happy, joyful; $\alpha = .94$), *grateful*, *proud*, and *sad* using the latter scale (adjectives were presented to participants in an arbitrary order). The three "happiness" items were included to assess perceptions of general positive emotion, whereas "grateful" and "proud" were included to test for dissociation between the two positive expressivity conditions (i.e., gratitude expression

and positive expression control). "Sad" was included to provide discriminant evidence and a reference point for the negative affective content of the videos.

Results and Conclusions of Stimulus Validation Study

Table S1 presents overall scale alphas, means and standard deviations, as well as correlations among measured variables. Table S2 presents the mean and standard deviation of ratings within each condition. It also displays the results of analyses that compare the conditions to one another, using a one-way ANOVA. We explored whether expression condition interacted with expresser gender to predict any of the outcomes, but these analyses produced no significant interaction effects, so actor gender is not considered further (see Table S4).

The results of these tests validate these videos for use in Experiments 4 and 5. Participants saw the actors in the expressed gratitude as well as positive expression control condition as being more expressive in general, more expressive of positivity, and experiencing more general positive emotion (i.e., happiness) than when the actors were simply discussing the race route, but they did not see differences between the two positive conditions on these three dimensions. In contrast, as predicted, participants saw the actors in the gratitude expression condition as experiencing significantly more gratitude than the actors in the other two conditions, and they saw the actors in the positive expression control condition as experiencing significantly more pride than the actors in either other condition (see Table S3).

We also learned more about several factors previously studied in relation to expressed positivity in general. One-sample t-tests using the scale midpoint (4) as the comparison revealed that participants saw actors in the emotionally neutral expression control condition as being significantly above the midpoint on likeable [$t(122) = 7.05$, 95% CI [.82, 1.46], $p < .001$], attractive [$t(122) = 3.76$, 95% CI [.30, .98], $p < .001$], warm [$t(122) = 4.48$, 95% CI [.45, 1.16], p

< .001], and competent [$t(122) = 9.91$, 95% CI [1.32, 1.98], $p < .001$]. However, in this condition, those actors were still significantly lower on these dimensions than when they—the same people—were witnessed expressing gratitude or positive expressivity. At the same time, consistent with prior research on expressed positivity, participants viewed actors expressing either gratitude or general positivity as equivalently likeable, attractive, warm, and competent. In other words, expressing positive emotion causes others to see one as more interpersonally attractive.

We note that these data contribute to the relatively small body of evidence on the effects of expressing positive emotion (see review in Clark & Monin, 2014) and they do so in a comprehensive way, by measuring several dimensions of interpersonal attractiveness. In addition, we deliberately employed a community sample, used both a male and female actor, and included appropriate power to detect medium-sized effects, in case future researchers would find the videos useful in their own studies.

Table S1.
Mean, SD, Alpha, and Correlations Among all Variables in Video Stimulus Validation Study

Measures	1	2	3	4	5	6	7	8	9	10
1. Expressed positivity	—									
2. Expressive	.77**	—								
3. Happy	.81**	.82**	—							
4. Grateful	.64**	.66**	.78**	—						
5. Proud	.65**	.67**	.80**	.67**	—					
6. Sad	-.34**	-.25**	-.28**	-.14**	-.23**	—				
7. Likeable	.67**	.75**	.76**	.61**	.62**	-.36**	—			
8. Attractive	.49**	.54**	.53**	.39**	.42**	-.21**	.68**	—		
9. Warm	.72**	.73**	.78**	.70**	.64**	-.26**	.82**	.64**	—	
10. Competent	.53**	.57**	.65**	.54**	.59**	-.33**	.74**	.63**	.70**	—
Mean	7.11	5.56	5.75	5.44	5.93	.58	6.19	5.35	6.05	6.29
SD	1.81	2.10	2.03	2.39	2.02	1.23	1.75	1.84	1.79	1.60
Alpha	—	—	.94	—	—	—	—	—	—	—

Note. *$p < .05$, **$p < .01$

Table S2.
Means and Standard Deviations in Video Stimulus Validation Study

	Gratitude	Positive Control	Neutral
Expressed Positivity	7.85 (1.24) [1]	7.93 (1.08) [1]	5.53 (1.85) [2]
Expressive	6.46 (1.49) [1]	6.36 (1.37) [1]	3.85 (2.20) [2]
Happy	6.62 (1.36) [1]	6.70 (1.34) [1]	3.92 (1.94) [2]
Grateful	6.97 (1.62) [1]	5.91 (1.74) [2]	3.42 (2.23) [3]
Proud	6.18 (1.61) [1]	6.91 (1.45) [2]	4.70 (2.25) [3]
Sad	0.52 (1.26) [1]	0.40 (1.08) [1]	0.82 (1.32) [2]
Likeable	6.79 (1.54) [1]	6.62 (1.41) [1]	5.14 (1.79) [2]
Attractive	5.73 (1.64) [1]	5.67 (1.78) [1]	4.64 (1.89) [2]
Warm	6.80 (1.29) [1]	6.54 (1.27) [1]	4.80 (1.99) [2]
Competent	6.68 (1.39) [1]	6.52 (1.33) [1]	5.65 (1.85) [2]

Note. Different superscripts indicate significant differences between those conditions at $p < .05$, using a one-way ANOVA with Tukey's post-hoc analysis. Gratitude $N = 124$; Positive Expression Control $N = 124$; Neutral Expression Control $N = 123$.

Table S3.

Video Stimulus Validation Study Results of Independent Samples t-tests

		t	*p*	CI lower	CI upper
Expressed Positivity	Grat vs. Pos	0.55	.584	-0.209	0.371
	Grat vs. Neu	-11.60	.000	-2.712	-1.925
	Pos vs. Neu	-12.48	.000	-2.778	-2.020
Expressive	Grat vs. Pos	-0.53	.595	-0.455	0.261
	Grat vs. Neu	-10.93	.000	-3.085	-2.143
	Pos vs. Neu	-10.80	.000	-2.977	-2.058
Happy	Grat vs. Pos	0.52	.605	-0.249	0.426
	Grat vs. Neu	-12.70	.000	-3.118	-2.281
	Pos vs. Neu	-13.17	.000	-3.205	-2.371
Grateful	Grat vs. Pos	-4.95	.000	-1.477	-0.636
	Grat vs. Neu	-14.30	.000	-4.033	-3.057
	Pos vs. Neu	-9.79	.000	-2.989	-1.988
Proud	Grat vs. Pos	3.77	.000	0.350	1.117
	Grat vs. Neu	-5.94	.000	-1.969	-0.988
	Pos vs. Neu	-9.19	.000	-2.686	-1.738
Sad	Grat vs. Pos	-0.81	.418	-0.415	0.173
	Grat vs. Neu	1.81	.071	-0.026	0.620
	Pos vs. Neu	2.73	.007	0.116	0.720
Likeable	Grat vs. Pos	-0.90	.367	-0.539	0.200
	Grat vs. Neu	-7.79	.000	-2.070	-1.234
	Pos vs. Neu	-7.23	.000	-1.887	-1.079
Attractive	Grat vs. Pos	-0.30	.767	-0.492	0.363
	Grat vs. Neu	-4.84	.000	-1.536	-0.648
	Pos vs. Neu	-4.39	.000	-1.488	-0.566
Warm	Grat vs. Pos	-1.58	.114	-0.579	0.063
	Grat vs. Neu	-9.33	.000	-2.415	-1.572
	Pos vs. Neu	-8.16	.000	-2.154	-1.317
Competent	Grat vs. Pos	-0.88	.377	-0.495	0.188
	Grat vs. Neu	-4.94	.000	-1.437	-0.617
	Pos vs. Neu	-4.27	.000	-1.277	-0.470

Note. Conclusions about between condition differences presented in text are based on one-way ANOVAs and Tukey post-hoc tests. The information provided in this table is to maximize information in the service of future research. Degrees of freedom for all variables in gratitude vs. positive tests = 246. Degrees of freedom for all variables in gratitude vs. neutral and positive vs. neutral tests = 245.

Table S4.

Video Stimulus Validation Study Gender Interaction Results

	B	*SE*	*t*	*p*	CI lower	CI upper
Expressed Positivity						
Grat vs. Pos X Gender	0.35	0.37	0.93	0.352	-0.387	1.084
Grat vs. Neu X Gender	-0.35	0.31	-1.14	0.255	-0.962	0.256
Expressive						
Grat vs. Pos X Gender	0.07	0.45	0.16	0.874	-0.805	0.946
Grat vs. Neu X Gender	0.36	0.38	0.96	0.337	-0.379	1.105
Happy						
Grat vs. Pos X Gender	0.21	0.42	0.52	0.607	-0.604	1.033
Grat vs. Neu X Gender	-0.01	0.34	-0.03	0.973	-0.675	0.652
Grateful						
Grat vs. Pos X Gender	0.48	0.52	0.93	0.354	-0.539	1.503
Grat vs. Neu X Gender	-0.48	0.42	-1.13	0.258	-1.302	0.35
Proud						
Grat vs. Pos X Gender	0.42	0.42	1.01	0.315	-0.4	1.238
Grat vs. Neu X Gender	-0.16	0.40	-0.39	0.694	-0.946	0.631
Sad						
Grat vs. Pos X Gender	0.13	0.27	0.48	0.635	-0.402	0.657
Grat vs. Neu X Gender	-0.24	0.27	-0.89	0.373	-0.768	0.288
Likeable						
Grat vs. Pos X Gender	-0.14	0.37	-0.38	0.703	-0.872	0.589
Grat vs. Neu X Gender	0.45	0.34	1.31	0.191	-0.223	1.114
Attractive						
Grat vs. Pos X Gender	-0.45	0.39	-1.13	0.259	-1.22	0.329
Grat vs. Neu X Gender	0.28	0.38	0.74	0.459	-0.468	1.035
Warm						
Grat vs. Pos X Gender	0.19	0.38	0.49	0.623	-0.556	0.927
Grat vs. Neu X Gender	-0.26	0.33	-0.77	0.44	-0.909	0.396
Competent						
Grat vs. Pos X Gender	0.23	0.34	0.68	0.498	-0.443	0.909
Grat vs. Neu X Gender	-0.13	0.33	-0.39	0.693	-0.783	0.521

Note. The above statistics are from regression models that included the interaction terms. Degrees of freedom for all variables in gratitude vs. positive and gratitude vs. neutral tests = 3,367.

Means, Standard Deviations, Correlations, and Reliabilities Among Measured Variables in Experiment 6

Table S5.
Means, Standard Deviations, Alphas, and Correlations Among Measured Variables in Experiment 6

Measures	1	2	3	4	5
1. Affiliation	—				
2. Perceived Responsiveness	.62**	—			
3. Expresser Emotion- Happiness	.64**	.70**	—		
4. Expresser- Warm	.66**	.65**	.74**	—	
5. Expresser- Competent	.56**	.59**	.59**	.64**	—
Mean	3.27	4.41	3.89	3.70	3.68
SD	1.59	1.33	1.44	1.09	1.02
Alpha	.969	.918	.907	—	—

Note. $^{**}p < .01$

Full Report of Alternative Explanations for Hypothesized Mediator from Experiment 6

Table S6.
Testing Alternative Explanations for the Hypothesized Mediator of Interest in Affiliating with the Grateful Person

	Coefficient	CI Lower	CI Upper	*t*	*p*	Effect size
HYPOTHESIZED MAIN EFFECT						
NULL						0.046
Intercept	3.27	3.065	3.479	31.34	0.000	
Other-praising	0.35	0.271	0.417	9.24	0.000	
HYPOTHESIZED MEDIATION						
FULL						0.344
Intercept	0.35	0.036	0.659	2.19	0.029	
Other-praising	0.02	-0.051	0.083	0.47	0.641	
Perceived Responsiveness	0.66	0.603	0.723	21.72	0.000	
ALTERNATIVE EXPLANATION: POSITIVE AFFECT						
NULL						0.382
Intercept	0.84	0.588	1.084	6.63	0.000	
Other-praising	0.15	0.087	0.201	4.95	0.000	
Happiness	0.63	0.579	0.674	26.10	0.000	
FULL						0.081
Intercept	0.14	-0.149	0.425	0.95	0.345	
Other-praising	0.05	-0.014	0.105	1.51	0.133	
Happiness	0.46	0.396	0.516	14.94	0.000	
Perceived Responsiveness	0.31	0.237	0.379	8.54	0.000	
ALTERNATIVE EXPLANATION: WARMTH						
NULL						0.408
Intercept	0.25	-0.018	0.514	1.83	0.068	
Other-praising	0.13	0.070	0.179	4.47	0.000	
Warmth	0.82	0.762	0.874	28.60	0.000	
FULL						0.098
Intercept	-0.34	-0.629	-0.058	-2.36	0.019	
Other-praising	0.03	-0.026	0.088	1.06	0.288	
Warmth	0.63	0.562	0.699	18.02	0.000	
Perceived Responsiveness	0.29	0.226	0.356	8.77	0.000	

Table S6 continued.
Testing Alternative Explanations for the Hypothesized Mediator of Interest in Affiliating with the Grateful

		Coefficient	CI Lower	CI Upper	*t*	*p*	Effect size
ALTERNATIVE EXPLANATION: COMPETENCE							
NULL							0.293
	Intercept	0.55	0.230	0.866	3.38	0.001	
	Other-praising	0.21	0.143	0.268	6.46	0.000	
	Competence	0.74	0.667	0.812	20.07	0.000	
FULL							0.162
	Intercept	-0.41	-0.736	-0.091	-2.52	0.012	
	Other-praising	0.03	-0.029	0.095	1.04	0.301	
	Competence	0.45	0.375	0.531	11.38	0.000	
	Perceived Responsiveness	0.46	0.391	0.524	13.56	0.000	

Note. The hypothesized main effect model – the first model presented in the table -- was always used as the null for the effect size reported in the "null" model for each alternative explanation. Thus, the effect size reported in the subsequent "null" models are the effects of adding the one particular variable (i.e., happiness, warmth, or competence) to the condition effect. In turn, these three null models (as noted in the first column of the table) are used to test the effect of adding the hypothesized mediator – perceived responsiveness – beyond the alternative explanation.

Means, Standard Deviations, Correlations, and Reliabilities Among Measured Variables in Experiment 7

Table S7.

Means, Standard Deviations, Alphas, and Correlations Among Measured Variables in Experiment 7

Measures	1	2	3	4	5	6
1. Affiliation	—					
2. Helping	.62**	—				
3. Perceived Responsiveness	.69**	.52**	—			
4. Expresser Emotion- Happiness	.64**	.45**	.75**	—		
5. Expresser- Warm	.71**	.50**	.72**	.72**	—	
6. Expresser- Competent	.63**	.46**	.65**	.63**	.70**	—
Mean	3.17	6.00	4.11	3.77	3.54	3.48
SD	1.56	2.12	1.53	1.46	1.17	1.08
Alpha	.969	.931	.945	.924	—	—

Note. ** $p < .01$

Full Report of Alternative Explanations for Hypothesized Mediator from Experiment 7

Table S8.
Testing Alternative Explanations for the Hypothesized Mediator of Interest in Affiliating with the Grateful Person

	Coefficient	CI Lower	CI Upper	*t*	*p*	Effect size
HYPOTHESIZED MAIN EFFECT						
NULL						0.102
Intercept	3.18	3.044	3.319	45.70	0.000	
Other-praising	0.50	0.432	0.565	14.66	0.000	
HYPOTHESIZED MEDIATION						
FULL						0.427
Intercept	0.24	0.033	0.450	2.27	0.023	
Other-praising	0.04	-0.020	0.095	1.28	0.201	
Perceived Responsiveness	0.71	0.669	0.756	31.95	0.000	
ALTERNATIVE EXPLANATION: POSITIVE AFFECT						
NULL						0.376
Intercept	0.63	0.425	0.829	6.08	0.000	
Other-praising	0.20	0.146	0.256	7.19	0.000	
Happiness	0.68	0.632	0.720	29.85	0.000	
FULL						0.146
Intercept	-0.11	-0.320	0.095	-1.07	0.286	
Other-praising	0.04	-0.016	0.092	1.40	0.163	
Happiness	0.37	0.314	0.424	13.09	0.000	
Perceived Responsiveness	0.46	0.404	0.516	16.10	0.000	
ALTERNATIVE EXPLANATION: WARMTH						
NULL						0.449
Intercept	0.13	-0.079	0.335	1.21	0.226	
Other-praising	0.15	0.098	0.205	5.56	0.000	
Warmth	0.86	0.810	0.911	33.24	0.000	
FULL						0.113
Intercept	-0.46	-0.669	-0.259	-4.44	0.000	
Other-praising	0.01	-0.041	0.061	0.37	0.710	
Warmth	0.55	0.487	0.609	17.71	0.000	
Perceived Responsiveness	0.41	0.359	0.462	15.62	0.000	

Table S8 continued.

Testing Alternative Explanations for the Hypothesized Mediator of Interest in Affiliating with the Grateful Person

		Coefficient	CI Lower	CI Upper	*t*	*p*	Effect size
ALTERNATIVE EXPLANATION: COMPETENCE							
NULL							0.354
	Intercept	0.28	0.041	0.523	2.30	0.022	
	Other-praising	0.24	0.183	0.298	8.18	0.000	
	Competence	0.83	0.769	0.892	26.37	0.000	
FULL							0.189
	Intercept	-0.56	-0.783	-0.331	-4.83	0.000	
	Other-praising	0.02	-0.036	0.070	0.63	0.529	
	Competence	0.46	0.392	0.520	13.98	0.000	
	Perceived Responsiveness	0.52	0.471	0.569	20.84	0.000	

Note. The hypothesized main effect model – the first model presented in the table -- was always used as the null for the effect size reported in the "null" model for each alternative explanation. Thus, the effect size reported in the subsequent "null" models are the effects of adding the one particular variable (i.e., happiness, warmth, or competence) to the condition effect. In turn, these three null models (as noted in the first column of the table) are used to test the effect of adding the hypothesized mediator – perceived responsiveness – beyond the alternative explanation.

Table S9.
Testing Alternative Explanations for the Hypothesized Mediator of Willingness to Help the Grateful Person

		Coefficient	CI Lower	CI Upper	*t*	*p*	Effect size
HYPOTHESIZED MAIN EFFECT							
NULL							0.038
	Intercept	6.03	5.775	6.282	46.95	0.000	
	Other-praising	0.42	0.346	0.489	11.46	0.000	
HYPOTHESIZED MEDIATION							
FULL							0.236
	Intercept	3.34	3.018	3.659	20.47	0.000	
	Other-praising	0.00	-0.073	0.066	-0.10	0.921	
	Perceived Responsiveness	0.65	0.597	0.707	23.22	0.000	
ALTERNATIVE EXPLANATION: POSITIVE AFFECT							
NULL							0.174
	Intercept	3.76	3.449	4.081	23.41	0.000	
	Other-praising	0.15	0.089	0.220	4.60	0.000	
	Happiness	0.60	0.544	0.654	21.22	0.000	
FULL							0.083
	Intercept	3.04	2.712	3.361	18.39	0.000	
	Other-praising	0.00	-0.071	0.064	-0.10	0.918	
	Happiness	0.31	0.240	0.381	8.63	0.000	
	Perceived Responsiveness	0.44	0.369	0.513	12.06	0.000	
ALTERNATIVE EXPLANATION: WARMTH							
NULL							0.214
	Intercept	3.31	2.986	3.631	20.16	0.000	
	Other-praising	0.11	0.044	0.173	3.31	0.001	
	Warmth	0.77	0.703	0.830	23.82	0.000	
FULL							0.069
	Intercept	2.71	2.383	3.029	16.46	0.000	
	Other-praising	-0.03	-0.095	0.035	-0.90	0.367	
	Warmth	0.48	0.401	0.557	12.07	0.000	
	Perceived Responsiveness	0.39	0.321	0.456	11.31	0.000	

Table S9 continued.

Testing Alternative Explanations for the Hypothesized Mediator of Willingness to Help the Grateful Person

		Coefficient	CI Lower	CI Upper	*t*	*p*	Effect size
ALTERNATIVE EXPLANATION: COMPETENCE							
NULL							0.180
	Intercept	3.35	3.002	3.700	18.85	0.000	
	Other-praising	0.18	0.114	0.246	5.33	0.000	
	Competence	0.77	0.693	0.841	20.26	0.000	
FULL							0.103
	Intercept	2.54	2.195	2.876	14.61	0.000	
	Other-praising	-0.03	-0.095	0.037	-0.86	0.392	
	Competence	0.44	0.355	0.517	10.62	0.000	
	Perceived Responsiveness	0.47	0.411	0.536	14.96	0.000	

Note. The hypothesized main effect model – the first model presented in the table -- was always used as the null for the effect size reported in the "null" model for each alternative explanation. Thus, the effect size reported in the subsequent "null" models are the effects of adding the one particular variable (i.e., happiness, warmth, or competence) to the condition effect. In turn, these three null models (as noted in the first column of the table) are used to test the effect of adding the hypothesized mediator – perceived responsiveness – beyond the alternative explanation.

Means, Standard Deviations, Correlations, and Reliabilities Among Measured Variables in Experiment 8

Table S10.
Means, Standard Deviations, Alphas, and Correlations Among Measured Variables Regarding the Grateful Person in Experiment 8

Measures	1	2	3
1. Willingness to Help	—		
2. Perceived Responsiveness	.61**	—	
3. Participant's Experienced Gratitude	.32**	.39**	—
Mean	6.32	4.06	2.23
SD	1.84	1.45	1.77
Alpha	.87	.949	.973

Note. ** $p < .01$

Table S11.
Means, Standard Deviations, Alphas, and Correlations Among Measured Variables Regarding the Person to Whom Gratitude is Expressed in Experiment 8

Measures	1	2	3
1. Willingness to Help	—		
2. Good Person	.53**	—	
3. Participant's Experienced Gratitude	.34**	.46**	—
Mean	6.44	4.19	2.11
SD	1.86	1.15	1.81
Alpha	.87	.929	.969

Note. ** $p < .01$

Full Report of Alternative Explanations for Hypothesized Mediators from Experiment 8

Table S12.

Testing Alternative Explanations for the Hypothesized Mediator of Willingness to Help the Grateful Person

		Coefficient	CI Lower	CI Upper	*t*	*p*	Effect size
HYPOTHESIZED MAIN EFFECT							
NULL							
	Intercept	5.82	5.482	6.152	34.41	0.000	0.072
	Other-praising	1.00	0.788	1.212	9.30	0.000	
HYPOTHESIZED MEDIATION							
FULL							
	Intercept	3.77	3.353	4.184	17.85	0.000	
	Other-praising	0.02	-0.207	0.248	0.18	0.858	0.300
	Perceived Responsiveness	0.63	0.532	0.720	13.10	0.000	
ALTERNATIVE EXPLANATION: CATCHING GRATITUDE							
NULL							0.063
	Intercept	5.25	4.890	5.611	28.77	0.000	
	Other-praising	0.68	0.466	0.892	6.27	0.000	
	Participant gratitude	0.33	0.239	0.414	7.31	0.000	
FULL							0.258
	Intercept	3.76	3.344	4.168	17.94	0.000	
	Other-praising	-0.01	-0.232	0.217	-0.06	0.951	
	Participant gratitude	0.14	0.055	0.223	3.25	0.001	
	Perceived Responsiveness	0.56	0.455	0.657	10.82	0.000	

Note. The hypothesized main effect model – the first model presented in the table -- was used as the null for the effect size reported in the "null" model for the catching gratitude alternative explanation. Thus, the effect size reported in that null model is the effect of adding participant gratitude to the condition effect. In turn, this null model is used to test the effect of adding the hypothesized mediator – perceived responsiveness – beyond the alternative explanation of participant gratitude.

Table S13.
Testing Alternative Explanations for the Hypothesized Mediator of Willingness to Help the Benefactor

		Coefficient	CI Lower	CI Upper	*t*	*p*	Effect size
HYPOTHESIZED MAIN EFFECT							
NULL							0.091
	Intercept	5.87	5.540	6.208	34.88	0.000	
	Other-praising	1.13	0.901	1.358	9.74	0.000	
HYPOTHESIZED MEDIATION							
FULL							0.207
	Intercept	3.49	2.903	4.084	11.64	0.000	
	Other-praising	0.44	0.183	0.693	3.38	0.001	
	Good Person	0.65	0.511	0.791	9.15	0.000	
ALTERNATIVE EXPLANATION: CATCHING GRATITUDE							
NULL							0.080
	Intercept	5.40	5.035	5.756	29.56	0.000	
	Other-praising	0.86	0.625	1.101	7.14	0.000	
	Participant gratitude	0.29	0.189	0.392	5.63	0.000	
FULL							0.151
	Intercept	3.52	2.937	4.104	11.86	0.000	
	Other-praising	0.38	0.121	0.630	2.91	0.004	
	Participant gratitude	0.16	0.061	0.260	3.16	0.002	
	Good Person	0.57	0.425	0.718	7.67	0.000	

Note. The hypothesized main effect model – the first model presented in the table -- was used as the null for the effect size reported in the "null" model for the catching gratitude alternative explanation. Thus, the effect size reported in that null model is the effect of adding participant gratitude to the condition effect. In turn, this null model is used to test the effect of adding the hypothesized mediator – the benefactor as a good person – beyond the alternative explanation of participant gratitude.

Exploratory Tests for Moderation by Expresser Gender in Experiments 4-8

Experiment 4

We conducted an exploratory test of whether expresser gender interacted with expression condition to predict self-disclosure. We did this using the PROCESS macro (Hayes, 2017) wherein each control condition was dummy coded for comparison with the gratitude condition and expresser gender was coded as 0 = female, 1 = male. This produced two interaction terms, one for each control condition comparison with expressed gratitude, neither of which approached statistical significance (gratitude vs. positive: $B = 0.17$, $SE = .22$, 95% CI [-.267, .598], $p = .453$; gratitude vs. neutral: $B = 0.11$, $SE = .22$, 95% CI [-.320, .540], $p = .616$,). As such, we do not consider expresser gender further and collapsed across this factor in all further analyses.

Experiment 5

We conducted exploratory tests of whether gender of the expresser moderated the effect of emotion expressed in the video on desire to affiliate with either the speaker or with the person being spoken to. We did this using the PROCESS macro (Hayes, 2017) wherein each control condition was dummy coded for comparison with the gratitude condition and expresser gender was coded as 0 = female, 1 = male. This produced two interaction terms for each dependent measure. Neither interaction term approached statistical significance for desire to affiliate with the speaker (gratitude vs. positive: $B = -0.34$, $SE = .36$, 95% CI [-1.040, .362], $p = .342$; gratitude vs. neutral: $B = 0.00$, $SE = .36$, 95% CI [-.703, .702], $p = .999$). However, one of the two did for desire to affiliate with the person being spoken to (gratitude vs. positive: $B = -0.34$, $SE = .35$, $p = .323$, 95% CI [-1.025, .339]; gratitude vs. neutral: $B = -0.68$, $SE = .35$, $p = .052$, 95% CI [-1.359, .007]). Because this was an unexpected trend and the main effect of expression condition remained robust in this analysis ($B = -0.53$, $SE = .24$, 95% CI [-1.009, .056], $p = .029$), we do not consider expresser gender further and collapse across this factor in all future analyses.[13]

Experiment 6

We conducted an exploratory test of the full model including the three manipulated variables and their interactions to explore the possibility of a three-way interaction between other-praising behavior (high vs. low coded as 1 vs. -1), self-benefit behavior (high vs. low coded as 1 vs. -1) and gender of the expresser (male vs. female coded as 1 vs. -1). The three-way interaction term was not significant ($B = 0.05$, $SE = .03$, 95% CI [-.017, .114], $p = .149$), nor was the two-way interaction between our hypothesized mechanism -- other-praising behavior -- and gender ($B = -0.04$, $SE = .03$, 95% CI [-.111, .021], $p = .181$). As such, we do not consider expresser gender further and collapse across this factor in all future analyses.

Experiment 7

[13] All witnesses wanted to affiliate more with the person being spoken to in the gratitude condition than in the two control conditions (see main results). Although simple slopes were not tested due to the p-value, it appears that in the emotionally neutral condition, witnesses were somewhat more interested in affiliating with the partner of the female speaker, relative to the partner of the male speaker, which is likely what marginally attenuated this overall comparison between gratitude and the emotionally neutral control condition.

We conducted an exploratory test of the full model including the three manipulated variables to explore the possibility of a three-way interaction between other-praising behavior (high vs. low), self-benefit behavior (high vs. low) and gender of the expresser (male vs. female). For desire to affiliate, the three-way interaction term was not significant (B = -0.03, SE = .03, 95% CI [-.099, .030], p = .291), nor was the two-way interaction between our hypothesized mechanism -- other-praising behavior -- and expresser gender (B = 0.01, SE = .03, 95% CI [-.056, .072], p = .808). For willingness to help, the three-way interaction term was not significant (B = -0.02, SE = .04, 95% CI [-.093, .046], p = .509), nor was the two-way interaction between our hypothesized mechanism -- other-praising behavior -- and expresser gender (B = 0.07, SE = .04, 95% CI [-.003, .136], p = .062). As such, we do not consider expresser gender further and collapse across this factor in all future analyses.

Experiment 8

We conducted exploratory tests for each full model including the two manipulated variables to explore the possibility of a two-way interaction between other-praising behavior (high vs. low) and gender of the expresser (male vs. female). This interaction term was not significant when the outcome was willingness to help the expresser, B = -0.30, SE = .21, 95% CI [-.712, .118], p = .16, nor when the outcome was willingness to help the benefactor, B = 0.12, SE = .23, 95% CI [-.338, .575], p = .609. As such, we do not consider expresser gender further and collapse across this factor in all future analyses.

Description of Measures from Experiments 1-8 Collected for Exploratory Purposes

The focus of Experiments 1-4 was to assess behavior. After the behavioral task was complete, participants provided several ratings of other features of the situation for exploratory purposes. In Experiments 1-3, participants completed items about their perceptions of both the author and previous MTurk worker (i.e., benefactor), as well as comprehension check questions. The movie review validation study included one exploratory item to assess perceived positivity of the author. In Experiment 4, participants completed items about their perceptions of the person in the video (e.g., emotions expressed) and were asked to report what they were thinking about while watching the video. Participants in Experiments 1-4 were also asked to answer questions about their personality (e.g., Big Five), demographics (e.g., SES), and prior experience using MTurk.

Participants in Experiment 5 were also asked to rate perceived expresser emotions. After the questions about the videos, participants completed demographic questions (e.g., SES), and questions about their prior experience using MTurk, as well as whether or not they were in a romantic relationship and the quality of that relationship, as it may be relevant to interest in affiliating with the people in the video (who are, themselves, in a romantic relationship). Lastly, participants were asked to report what they were thinking while watching the videos.

Participants in Experiments 6-7, as mentioned in the manuscript, were asked to make perceptions of the expresser's general positive affect on nine emotion items. The additional emotion items that were not reported on were the following: proud, thankful, felt good about themselves, appreciative, grateful, nervous. We also asked participants to report on a new item we created and included for curiosity, *"If I were the person receiving this video, I would feel appreciated for my actions."* Additionally, participants were asked to make an evaluation of whether the person in the video "is relaxed/handles stress well". Participants were also asked to report, in a word or phrase, what they thought the person in the video was thanking the other person for after every video. At the end, they also answered questions about their personality (e.g., Big Five), demographics (e.g., SES), and what they were thinking about while watching the videos.

Participants in Experiment 8 were also asked to rate perceived expresser emotions. Additionally, participants rated the grateful person as a good person and the perceived responsiveness of the benefactor, both of which were included for design symmetry and exploratory analyses for future research. After the questions about the videos, participants responded to an open-ended prompt about what the expresser was thanking the partner for and a question about what they were thinking about while watching the videos. At the end, participants answered questions about their demographics (e.g., SES), as well as whether or not they were in a romantic relationship and the quality of that relationship, as it may be relevant to interest in affiliating with the people in the video (who are, themselves, in a romantic relationship).