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Saying “Thank You”: Partners’ Expressions of Gratitude Protect Relationship Satisfaction and Commitment From the Harmful Effects of Attachment Insecurity

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Five studies examined whether receiving gratitude expressions from a romantic partner can buffer insecurely attached individuals from experiencing low relationship satisfaction and commitment. In Study 1, the negative associations between attachment avoidance and both satisfaction and commitment were weaker among individuals who perceived that their partner expressed gratitude more frequently. The same pattern was found with attachment anxiety and satisfaction. Study 2 showed that among individuals who perceived high (vs. low) levels of gratitude expressions from the partner, both attachment dimensions were less strongly related to the belief that the partner is low in communal strength, which, in turn, was associated with greater satisfaction and commitment. In Studies 3–5, we examined whether perceptions or a partner’s actual gratitude expression can have benefits on insecurely attached individuals’ daily satisfaction. Our results indicated that perceived, rather than a partner’s self-reported, gratitude expressions were critical to buffering insecurely attached individuals’ daily dissatisfaction. Study 5 also provided evidence for long-term benefits of perceiving a partner’s gratitude expressions on avoidantly attached individuals’ relationship. Perceiving high levels of a partner’s gratitude expressions on average enhanced avoidantly attached individuals’ feelings of being cared for by the partner 3 months later, which were associated with greater satisfaction and commitment. Results from our meta-analysis indicated that benefits of perceiving a partner’s gratitude expressions may be specific to buffering the negative effects of attachment avoidance on satisfaction. Overall, our findings highlight the powerful function of gratitude in insecurely attached individuals’ romantic relationships.

Keywords: attachment insecurity, expression, gratitude, positive emotion

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Among many positive emotions, gratitude holds a unique position for its deeply relational and social nature (McAdams & Bauer, 2004). Gratitude arises when people perceive that they have received a benefit from another person’s costly, intentional act (McCullough, Kimeldorf, & Cohen, 2008), and serves an important function of connecting people (Algoe, 2012). Even in romantic relationships in which benefits are frequently given and re-

ceived, gratitude can boost partners’ satisfaction and strengthen their relationship bond (Algoe, Gable, & Maisel, 2010; Gordon, Impett, Kogan, Oveis, & Keltner, 2012). Importantly, the benefits of gratitude are not limited to the person who experiences the emotion (i.e., the beneficiary of a kind act), but extend to the person who caused the emotion (i.e., the benefactor) when it is expressed (Yoshimura & Berzins, 2017).

The aim of the present research was to examine whether receiving an expression of gratitude from a romantic partner can be beneficial for people who are high in attachment insecurity (Mikulincer & Shaver, 2016). Based on the emerging evidence that relationship partners can enact behaviors that mitigate the negative impact of chronic insecurities (Arriaga, Kumashiro, Simpson, & Overall, 2018; Lemay & Dudley, 2011; Simpson & Overall, 2014), we tested the protective role of a partner’s gratitude expression in enabling insecurely attached individuals to sustain high-quality romantic relationships. Specifically, we predicted that by being perceived as a signal for communal motivation (Algoe, 2012), or specifically, caring for the self, a partner’s expression of gratitude might be able to reduce the low relationship satisfaction and/or commitment associated with attachment insecurity.

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Benefits of Expressing Gratitude

Previous studies have demonstrated that expressing gratitude can promote the development and maintenance of relationships, both for the person who expresses gratitude (i.e., the beneficiary of the kind action; Lambert, Clark, Durtschi, Fincham, & Graham, 2010) and the person who receives gratitude (i.e., the benefactor; Algoe & Zhaoyang, 2016). During the beginning stages of relationships, expressing gratitude can facilitate affiliation by causing the expresser to be perceived as interpersonally warmer (Williams & Bartlett, 2015). However, in more established relationships, people who receive gratitude can infer more about the expresser than their warmth. In particular, Algoe's (2012) find-remind-and-bind theory suggests that expressions of gratitude can relay information about how the expresser views the relationship. Specifically, because feelings of gratitude are assumed to arise from perceiving that the benefactor has been responsive to one's needs, rather than seeking reciprocal benefits, expressing these feelings can communicate the expresser's valuation of this responsiveness and his or her view that the relationship is *communal*, that is, that they too care and are willing to be responsive to the benefactor's needs. Indeed, previous research suggests that perceiving a relationship as strongly communal is precisely what people experience when they express gratitude (Lambert et al., 2010). That is, the expressers tended to feel heightened communal strength (Mills, Clark, Ford, & Johnson, 2004), or willingness to incur costs to provide care for the benefactor.

Importantly, perceiving the partner to be caring and willing to be responsive is closely related to relationship well-being as it plays an essential role in the process of developing intimacy and assigning meaning to the relationship (Reis, Clark, & Holmes, 2004). In fact, people consider following communal norms to be ideal in romantic relationships (Clark, Lemay, Graham, Pataki, & Finkel, 2010), suggesting that they desire to be in a relationship in which partners are concerned about each other's well-being and are responsive to each other's needs (Clark & Mills, 1993; Clark, Mills, & Powell, 1986). As such, those who are highly motivated to care for the needs of the partner are not only satisfied themselves, but also tend to have satisfied partners (Le, Impett, Lemay, Muise, & Tskhay, 2018). Likewise, those who perceive their partners as caring and responsive to their needs tend to be highly satisfied (Lemay, Clark, & Feeney, 2007). Given that gratitude expressions draw attention to the expresser's communal responsiveness when they are communicated to the benefactor (Algoe, 2012), they can help to bind partners together and promote the well-being of their relationship. In support of this idea, past studies have shown that the receipt of gratitude expressions is associated with positive perceptions of the expresser (Williams & Bartlett, 2015), higher relationship satisfaction and commitment (Barton, Futris, & Nielsen, 2015), and prorelationship motivation (Kindt, Vansteenkiste, Cano, & Goubert, 2017).

Partner's Gratitude Expression as a Buffer Against the Negative Impact of Attachment Insecurity

In the present research, we propose that a partner's expressions of gratitude can play an important role in buffering against the low satisfaction and commitment that typically characterize insecurely attached individuals' romantic relationships (Li & Chan, 2012).

According to attachment theory (Bowlby, 1969), people develop beliefs about themselves and others based on early interactions with caregivers as well as later experiences with close others (Fraley, Roisman, Booth-LaForce, Owen, & Holland, 2013). Individuals who have received consistent and sufficient support from significant others develop a sense of attachment security and are able to build and maintain satisfying close relationships that contribute to their mental and physical well-being (Raque-Bogdan, Ericson, Jackson, Martin, & Bryan, 2011). In contrast, repeated interactions with unreliable or unresponsive others result in a sense of attachment insecurity, conceptualized in the two broad dimensions of avoidance and anxiety (Brennan, Clark, & Shaver, 1998), which makes people vulnerable to experiencing poor relationship quality.

Attachment Avoidance

Individuals high in attachment avoidance hold strong distrust of others that leads them to pursue self-reliance and independence rather than closeness (Mikulincer & Shaver, 2016). In romantic relationships, avoidantly attached individuals do not trust that they can depend upon their partner, thus they deny or suppress their attachment needs in times of distress (Collins & Feeney, 2000; Mikulincer & Shaver, 2005) and even underestimate or undervalue the support they do receive (Collins & Feeney, 2004; Shallcross, Howland, Bemis, Simpson, & Frazier, 2011). Their deep distrust toward their partner also deters them from perceiving their partner's kind acts as voluntary (Beck & Clark, 2010) or that their partner follows communal norms in the relationship (Clark et al., 2010) and in particular, that their partner is responsive to their needs (Beck, Pietromonaco, DeVito, Powers, & Boyle, 2014; Segal & Fraley, 2016). As building a sense of mutual caring and responsiveness to each other's needs constitutes a key element of a satisfying relationship (Murray & Holmes, 2009; Reis & Gable, 2015), doubts about a partner's care for the self are likely to hinder avoidantly attached individuals from experiencing high relationship satisfaction, and thus from further committing to the relationship (Etcheverry, Le, Wu, & Wei, 2013; Segal & Fraley, 2016).

Nevertheless, research suggests that the negative relationship outcomes associated with attachment avoidance can be attenuated if the partner challenges their negative views of intimacy and feelings of distrust toward the partner (Simpson & Overall, 2014). For example, during a discussion in which a partner tried to influence or change avoidantly attached individuals, avoidantly attached individuals were less likely to get upset or withdraw from the discussion if the partner clearly communicated positive regard and assuaged their worries that his or her intentions were hostile (Overall, Simpson, & Struthers, 2013). Similarly, when asked to make a big sacrifice for the relationship by the partner, which is a situation particularly threatening to avoidantly attached individuals' autonomy needs, avoidantly attached individuals showed heightened trust and commitment to their relationship if the partner expressed care for them and acknowledged the size of the sacrifice (Farrell, Simpson, Overall, & Shallcross, 2016). Presumably, recognizing and appreciating avoidantly attached individuals' sacrifices helped to reduce their distrust of the partner and possible concerns about being taken advantage of.

However, it is unclear whether experiences that are typically relationship-promotive can also benefit avoidantly attached indi-

viduals in everyday life. On the one hand, it has been shown that engaging in an intimacy-promoting activity or perceiving a variety of partner's intimate behaviors in daily life (e.g., "My partner said something that made me feel loved") can reduce avoidantly attached individuals' negativity and promote their relationship quality (Stanton, Campbell, & Pink, 2017). On the other hand, there are also theoretical reasons to expect the intimate experiences to have null or even opposite effects for avoidantly attached individuals (Spielmann, Maxwell, MacDonald, & Baratta, 2013). Specifically, such experiences can elicit defensive reactions from avoidantly attached individuals who prioritize feelings of autonomy and independence over intimacy or trust in relationships (Ren, Arriaga, & Mahan, 2017). For example, avoidantly attached individuals tend to dismiss their partner's intimate signals (e.g., positive emotional expressions; Kafetsios, Andriopoulos, & Papachiou, 2014) and even react in a less relationship-promotive manner if their partner's interdependent behaviors threaten their autonomy (Overall & Sibley, 2009). Taken together, these findings suggest that buffering the negative impact of attachment avoidance in day-to-day life is a complex and nuanced process in which not all types of prorelationship behaviors can have uniformly positive effects.

Receiving an expression of gratitude from a partner can potentially serve as an effective buffer against the negative impact of attachment avoidance because it challenges the negative views of intimacy held by most avoidant individuals without hampering their sense of autonomy. Specifically, gratitude expressions involve praising the benefactor's actions and personal qualities (Algoe, Fredrickson, & Gable, 2013), which may enhance avoidantly attached individuals' feelings of self-worth (Grant & Gino, 2010) and bolster the subjective reward value of the relationship. Such experiences can challenge avoidantly attached individuals' negative conceptions of intimacy, or their lack of trust in a partner's care that presumably causes them to be uncomfortable with intimacy, without eliciting reactions as defensive as conversations focusing on intimate aspects of the relationship (e.g., best date; Tucker & Anders, 1998). In other words, when embedded in gratitude expressions, a partner's communal responsiveness (Algoe et al., 2013) may be recognized and accepted more readily by avoidant individuals who are not typically receptive to such intimate signals. Over time, as increased perceptions of the partner's care and willingness to be responsive create more secure relationship environments (Overall & Simpson, 2015), it is likely that receiving high levels of a partner's gratitude expression can also confer long-term benefits for avoidantly attached individuals' relationships.

Attachment Anxiety

The other dimension of attachment insecurity, attachment anxiety, stems from a negative view of the self rather than a negative view of others (Mikulincer & Shaver, 2016). Although individuals high in attachment anxiety have strong desires for closeness with their partner (Collins & Feeney, 2004), their chronic doubts about self-worth fuel their fear of rejection and result in a sense of ambivalence toward their relationship (MacDonald, Locke, Spielmann, & Joel, 2013) and their partner (Mikulincer, Shaver, Bar-On, & Ein-Dor, 2010). For example, these individuals hold both positive and negative attitudes toward their partner, and are also simultaneously motivated to both approach and maintain distance

from their partner (Mikulincer et al., 2010). In other words, anxiously attached individuals' fundamental concerns around their self-worth tend to hold them back from fully depending on their partner.

Accordingly, a key to buffering the negative effects of attachment anxiety is to reassure anxiously attached individuals that they are valued relationship partners and to communicate unwavering, uniform care and commitment (Simpson & Overall, 2014). For example, expressing affection to an exaggerated degree (i.e., inflated positive sentiments and concealed negative sentiments) can increase these individuals' feelings of being valued and cared for (Lemay & Dudley, 2011). Similarly, perceiving that the partner is committed to the relationship and is willing to accommodate their needs can improve the typical negative reactions of anxiously attached individuals during distressing conversations (Tran & Simpson, 2009). Likewise, then, it is possible that an expression of gratitude which signals the expresser's care for the partner may also help to assuage anxiously attached individuals' concerns about rejection (Campbell, Simpson, Boldry, & Kashy, 2005) and improve their relationship.

However, there is also evidence to suggest that gratitude expressions may not serve as an effective buffer against anxiously attached individuals' low relationship quality. For example, research suggests that positive experiences such as receiving affectionate words can evoke fear from anxiously attached individuals that these experiences might presage a painful end (Mikulincer & Shaver, 2005). Specifically, anxiously attached individuals struggle with negative interpersonal memories that are readily accessible and hard to repress (Mikulincer, Dolev, & Shaver, 2004; Mikulincer & Orbach, 1995), which contrasts with avoidantly attached individuals who are able to disengage from negative interpersonal memories unless their mental resources are taxed by cognitive load (Mikulincer et al., 2004). As such, it is possible that when their partner expresses gratitude, anxiously attached individuals would feel ambivalent toward accepting the gratitude as a positive signal because they are concerned about potential rejection following intimate experiences. Indeed, anxiously attached individuals who report interest in getting close to others ironically experience greater anxiety when others behave in a way that signals interest in communal (vs. exchange) relationships (Bartz & Lydon, 2006), suggesting their ambivalence.

Furthermore, affectionate messages such as gratitude expressions can elicit resistance from anxiously attached individuals because they might not believe that the expressions are authentic (Lemay & Clark, 2008). Especially given the other-praising feature of gratitude expression (Algoe et al., 2013), anxiously attached individuals who do not believe in their lovability and have doubts about their ability to help the partner (Collins & Feeney, 2000; Feeney, Collins, Van Vleet, & Tomlinson, 2013) might denigrate the authenticity of their partner's gratitude expressions (Lemay & Dudley, 2009). Doubts about how sincere the partner is in expressing positive emotions can in turn affect the way the expressions are accepted and responded to (Ackerman, Giskevicius, & Li, 2011). Combined, these findings suggest that receiving a partner's gratitude expressions might be an ambivalent experience for anxiously attached individuals given their fundamental self-doubt and low felt security. Indeed, such concerns are precisely what prevent anxiously attached individuals from committing to their relationships despite their strong dependence on them

(Joel, MacDonald, & Shimotomai, 2011). Accordingly, we did not have specific predictions as to whether gratitude expressions can also contribute to buffering the poor relationship outcomes associated with attachment anxiety, but we tested this possibility in all studies.

Overview of Research

The aim of the present research was to examine whether a romantic partner's expressions of gratitude can attenuate the typical negative associations between attachment insecurity and relationship outcomes. We focused on two primary indicators of relationship well-being, satisfaction and commitment (Hadden, Smith, & Webster, 2014), which have been extensively studied in relation to attachment insecurity. Although most studies examining the benefits of gratitude expression have been focused on affective outcomes such as satisfaction (Algoe et al., 2013; Gordon, Arnette, & Smith, 2011; but see Gordon et al., 2012), we expected positive effects on commitment given our proposed underlying mechanism, increased perceptions of partner's care, which may also be related to insecurely attached individuals' commitment (Segal & Fraley, 2016). Furthermore, relationship commitment is a key indicator of relationship quality, given its strong link with relationship persistence and the enactment of preresolution behaviors (Le, Dove, Agnew, Korn, & Mutso, 2010; Rusbult & Buunk, 1993).

In Studies 1 and 2, we examined whether the detrimental effects of attachment insecurity on relationship satisfaction and commitment are attenuated when insecurely attached individuals perceive that their partner expresses a lot of gratitude.¹ In Study 2, we also tested a potential mechanism underlying this process, focusing specifically on whether the benefits of a partner's gratitude expressions on insecurely attached individuals pertain to heightened perceptions that the partner cares about the self. Specifically, we examined whether perceived partner gratitude expressions attenuate the negative link between attachment insecurity and perceived partner communal strength, which captures the extent to which individuals perceive that a partner cares about their welfare and is willing to incur costs to benefit them (Mills et al., 2004). Perceiving that a partner is high in communal strength can in turn be associated with greater relationship quality (Lemay et al., 2007).

In Studies 3–5, we used dyadic daily experience methods to test our predictions in the context of couples' everyday lives. In Studies 3 and 4, we examined whether a *partner's* reports of their gratitude expressions can buffer the negative effects of attachment insecurity. Because people commonly miss recognizing the partner's positive expressions (Gable, Reis, & Downey, 2003), coupled with the fact that partners overestimate the extent to which they expressed their emotions (Gilovich, Savitsky, & Medvec, 1998), using the partner's reports provides a more conservative test of our hypotheses. However, examining partners' reports of their own gratitude expression is a useful test particularly because it addresses alternative explanations that would be viable if we only examined perceptions of partner gratitude expressions (e.g., that gratitude expressions were merely positive illusions driven by perceivers' high satisfaction or commitment, rather than interpersonal behaviors) and it more closely approximates the dyadic regulation process outlined above.² In Study 5, we used both perceived partner gratitude expressions and partners' self-reports of their expressions to more precisely capture possible differences

between the two measures. In addition to examining the hypothesized buffering effects, we examined whether attachment insecurity is associated with accuracy in perceiving a partner's gratitude expressions, and if a partner's reports of gratitude expressions are associated with participants' perceptions of gratitude expressions, which in turn can buffer the negative impact of attachment insecurity.

Because previous studies have provided some support for long-term benefits of receiving expressions of gratitude (Algoe et al., 2013), we also examined whether partners' gratitude expressions (both perceived and partner-reported) can be a buffer against the long-term negative effects of attachment insecurity in Study 5. Further, we revisited the mechanism underlying our effects using perceptions of partner's care and tested whether heightened perception that the partner cares for the self underlie both the daily and long-term effects of a partner's gratitude expression on insecurely attached individuals' relationship quality.

Lastly, we also conducted additional analyses in the daily diary studies to test how specific the buffering effects are to the partner's gratitude expression or whether other positive interpersonal experiences can be equally beneficial. First, we distinguished the effects of a partner's gratitude expression from the effects of participants' own experiences of felt gratitude. Based on past research suggesting that insecurely attached individuals do not experience gratitude as frequently, or as positively, as more secure individuals (Mikulincer, Shaver, & Slav, 2006), we attempted to directly show that buffering the negative impact of attachment insecurity may be a unique effect of receiving the partner's gratitude expression that is not found with people's own experiences of gratitude. Second, we examined whether other preresolution behaviors (partner's sacrifice and support in Studies 3 and 4, and physical affection in Study 5) can have the same effects as the partner's gratitude expression. As discussed earlier, buffering the negative impact of attachment avoidance is a complex process and not all preresolution behaviors may show the same effects. Indeed, preresolution behaviors that convey high intimacy may be perceived as threatening to avoidantly attached individuals (Spielmann et al., 2013). Thus, we attempted to show that the effects of the partner's gratitude expression are unique from the effects of other prosocial behaviors enacted by the partner.

We also conducted analyses that help us rule out alternative explanations for our findings in Studies 3 and 4. Specifically, in Studies 3 and 4, we examined the possibility that the effects of the partner's gratitude expression might be an artifact of the effects of

¹ We note that Study 1 was not designed for the purpose of testing the present hypothesis and was exploratory. Study 2 specifically aimed to replicate results found in Study 1, to examine the underlying mechanism, and to understand what construct our mediator in Study 5 is capturing. We used diary studies (Studies 3–5) to replicate and extend what we found in the online studies, but they were not collected specifically for this purpose. We have included a list of previous papers that have used any of the data reported (Studies 3 and 5) as online supplementary materials.

² As another way to address this possibility that insecurely attached individuals who are more satisfied or committed to their relationship receive more gratitude expressions from the partner, we also tested alternative models across the studies in which relationship quality, attachment insecurity, and their interactions predict perceiving partner's gratitude expressions. Only one of 24 possible interaction effects was significant, providing support for the proposed model in our paper. Full results are included as online supplementary materials.

insecurely attached individuals' behaviors that elicited the expression. Conceivably, insecurely attached individuals might report higher satisfaction on days when they engaged in more prorelationship behaviors because those behaviors led them to infer that they were satisfied (e.g., self-perception theory; Bem, 1967). In turn, prorelationship behaviors may provide prime opportunities to receive gratitude expressions from partners. In a similar vein, we also sought to rule out the possibility that other stable qualities of insecurely attached individuals that can coincide with the receipt of gratitude expression account for the long-term effects in Study 5. In particular, insecurely attached individuals who are more agreeable or whose partners are more agreeable may have received more gratitude expressions and simultaneously been less likely to show declines in relationship quality. A summary of differences in the studies including measures, outcome variables, and additional analyses is presented in Table 1.

Study 1

Method

Participants and procedure. A sample of 107 participants currently involved in a romantic relationship was recruited online via Amazon's Mechanical Turk (see footnote 1). After excluding three participants who failed attention checks, there were 104 participants (41 men, 63 women) who were 38.8 years old on average ($SD = 10.8$; range = 23 to 61). Most participants ($n = 84$) described themselves as Caucasian, eight as Asian, seven as Black, seven as Latin American, and three as other (multiple responses allowed). Participants had been together for 11 years and 4 months on average ($SD = 9$ years and 6 months; range = 6 months to 40 years), and a majority of the participants (67.3%) were married to their partner. Participants responded to a battery of questionnaires that included measures listed below.

Measures.

Attachment insecurity. The Revised Experiences in Close Relationships scale (ECR-R; Fraley, Waller, & Brennan, 2000) was used to assess attachment insecurity. This scale consists of two 18-item subscales assessing attachment avoidance (e.g., "I find it difficult to allow myself to depend on romantic partners"; $\alpha = .97$) and attachment anxiety (e.g., "I'm afraid that I will lose my partner's love"; $\alpha = .95$). The measure was completed on a 7-point response scale (1 = *strongly disagree* to 7 = *strongly agree*).

Perceived partner gratitude expression. Participants responded to a question "How often does your partner express gratitude to you?" on a 5-point scale (1 = *never* to 5 = *very frequently*).

Relationship satisfaction. Five items from the Investment Model Scale (Rusbult, Martz, & Agnew, 1998) were used to assess relationship satisfaction (e.g., "I feel satisfied with our relationship"; $\alpha = .95$). The items were measured on a 9-point scale (1 = *strongly disagree* to 9 = *strongly agree*).

Relationship commitment. Seven items from the Investment Model Scale were used to assess relationship commitment (e.g., "I want our relationship to last for a very long time"; $\alpha = .81$). These items were also measured on a 9-point scale (1 = *strongly disagree* to 9 = *strongly agree*).

Results and Discussion

Means, standard deviations, and zero-order correlations for the variables are presented in Table 2. As expected, attachment avoidance and attachment anxiety were negatively associated with both satisfaction and commitment. To examine whether these negative associations were attenuated when insecurely attached individuals perceived that their partner expressed gratitude more frequently, we ran two separate regression analyses predicting satisfaction and commitment from perceived partner gratitude expression, attachment avoidance, attachment anxiety, and the interactions between perceived partner gratitude expression and each attachment dimension.³

Table 3 shows that when satisfaction was entered as an outcome variable, there were significant main effects indicating that high attachment avoidance and perceiving that the partner rarely expresses gratitude were both independently associated with lower relationship satisfaction. The interaction between perceived partner gratitude expression and attachment avoidance was marginal. Simple slope tests at one standard deviation (1 SD) above and below the mean levels of perceived partner gratitude expression (see Figure 1) revealed that attachment avoidance was negatively related to satisfaction at lower levels of perceived partner gratitude expression, $b = -0.42$, $SE = 0.09$, $p < .001$, but this association was not significant at higher levels, $b = -0.20$, $SE = 0.14$, $p = .16$. We also examined the regions of significance which provide the range of perceived partner gratitude expression within which the link between attachment avoidance and relationship outcome is significantly different from zero (Preacher, Curran, & Bauer, 2006). Results showed that attachment avoidance was not significantly related to low satisfaction if perceived partner gratitude expression was higher than 4.52 (0.61 SD above the mean).

As shown in Table 3, the interaction between perceived partner gratitude expression and attachment anxiety also emerged as significant. As plotted in Figure 1, the negative association between attachment anxiety and relationship satisfaction was significant at low levels (-1 SD) of perceived partner gratitude expression, $b = -0.21$, $SE = 0.10$, $p = .04$, but not at high levels ($+1$ SD), $b = 0.12$, $SE = 0.12$, $p = .33$. Region of significance tests showed that the negative association between attachment anxiety and satisfaction was not significant at levels of perceived partner gratitude expression higher than 3.06 (0.83 SD below the mean).

In a separate model with commitment as an outcome variable, we found significant main effects of attachment avoidance and perceived partner gratitude expression, which were qualified by a significant interaction (see Table 3). As shown in Figure 1, attachment avoidance was associated with lower commitment at low levels (-1 SD) of perceived partner gratitude expression, $b = -0.52$, $SE = 0.09$, $p < .001$, but not at high levels ($+1$ SD), $b = -0.18$, $SE = 0.13$, $p = .17$. Region of significance tests showed that the negative association between attachment avoid-

³ Across studies, there were 36 possible three-variable interactions between gender, (perceived or partner-reported) partner's gratitude expression, and attachment dimensions, eight of which were significant. As these effects were not consistent and thus could not be reliably interpreted, we report the results separately for men and women in online supplementary materials. All the models we report in the manuscript were run without the gender effects.

Table 1
Overview of the Studies

Study	Gratitude expression	Outcome variable	Mediation	Discriminant analysis	Alternative explanation
Study 1	Perceived	Satisfaction and commitment			
Study 2	Perceived	Satisfaction and commitment	Perceived communal strength	Actor's feelings of gratitude	
Studies 3 and 4	Partner-reported	Daily satisfaction		Actor's feelings of gratitude, Partner's sacrifice/support	Actor's sacrifice/support
Study 5	Perceived/partner-reported	Daily satisfaction, follow-up satisfaction and commitment	Perceived care	Actor's feelings of gratitude, Perceived physical affection	Actor's and partner's agreeableness

Note. Perceived = Perceived partner gratitude expression; Partner-reported = Partner's self-reported gratitude expression.

ance and commitment was not significant at levels of perceived partner gratitude expression higher than 4.59 (0.68 *SD* above the mean).

In contrast, the main effect of attachment anxiety was not significant, $b = -0.01$, $SE = 0.07$, $p = .95$, and the interaction between perceived partner gratitude expression and attachment anxiety was also not significant (see Table 3). Taken together, these results provide some preliminary support for our prediction that perceiving a romantic partner's expressions of gratitude can buffer insecurely attached individuals, and especially avoidantly attached individuals, from experiencing lower relationship satisfaction and commitment. In Study 2, we sought to replicate these effects in a larger sample and examine an underlying mechanism.

Study 2

The major aim of Study 2 was to test a predicted mechanism for the effects found in Study 1.⁴ We expected that one key reason why insecurely attached individuals benefit from receiving frequent expressions of gratitude from their partner is that these expressions signal to them that their partner is high in communal strength and is willing to incur costs to provide care for them. Specifically, we predicted that when insecurely attached individuals perceive a lot of appreciation from their partner, they are likely to perceive the partner to be high in communal strength. In turn, higher perceptions of a partner's communal strength, which are key characteristics of a secure relationship (Clark & Jordan, 2002), would be associated with greater satisfaction and commitment.

Method

Participants and procedure. We recruited more than the sample size needed to detect the interaction effect found in Study 1 (179 based on the combined results for attachment avoidance in Study 1; Faul, Erdfelder, Lang, & Buchner, 2007) to test the moderated mediation models with adequate power. A total of 296 participants were recruited online via Prolific. All participants were required to be currently involved in romantic relationships. After excluding six participants who failed attention checks, the final sample included 290 participants (117 men, 171 women, one transgendered, and one unidentified), who were 33.1 years old ($SD = 9.9$; range = 19 to 67). There were 206 participants who

described themselves as Western European, 36 as Eastern European, 10 as Asian, nine as Hispanic/Latino, nine as South American, six as Caribbean, four as Native American, four as Middle Eastern, three as African, and 16 as other (multiple responses allowed). Participants had been in a relationship for 8 years and 6 months ($SD = 8$ years and 2 months; range = 1 month to 54 years) on average. Participants described their relationship status as dating (45.5%), married (40.0%), engaged (11.7%), or other (2.8%).

Measures.

Attachment insecurity. Attachment avoidance ($\alpha = .93$) and attachment anxiety ($\alpha = .94$) were assessed using the same measure as Study 1.

Perceived partner gratitude expression. Participants responded to the question "How much does your partner express gratitude to you?" using a scale anchored with 1 (*not at all*) to 7 (*a lot*).

Perceived communal strength. Participants responded to a 10-item measure of perceived communal strength (adapted from a measure of communal strength, Mills et al., 2004; similarly used in Lemay et al., 2007) which assessed participants' perception of their partner's motivation to care and be responsive to their needs. The items (e.g., "How much would your partner be willing to give up to benefit you?"; $\alpha = .79$) were assessed on 7-point scales (1 = *not at all* to 7 = *extremely*).

Relationship satisfaction. Satisfaction was assessed with the same items from Study 1 ($\alpha = .92$).

Relationship commitment. Commitment was assessed with the same items from Study 1 ($\alpha = .88$).

⁴ We replaced Study 2 with newly collected data during the revision process as there were concerns with the way perceived gratitude expression was assessed. Specifically, we had measured perceived gratitude expression with a question, "How much does your partner express gratitude to you?" on a scale ranging from 1 (*too little*) to 7 (*too much*), and the extremity implied in the anchors complicated the interpretation of the results from this study. Nevertheless, we note that there was strong evidence for the predicted buffering effects for avoidantly attached individuals in this study: the interaction between perceived gratitude expression and attachment avoidance was significant with satisfaction or commitment entered as an outcome variable. On the contrary, the interaction between perceived gratitude expression and attachment anxiety was not significant with either outcome variable. Including the effects from this study in the meta-analysis also did not change the pattern of the results we present here (Table 13). Full results can be found in online supplementary materials.

Table 2
Descriptive Statistics and Correlations Among Variables (Studies 1 and 2)

Variable	Study 1 <i>M (SD)</i>	Study 2 <i>M (SD)</i>	1	2	3	4	6	7
1. Perceived partner gratitude expression	3.90 (1.01)	5.26 (1.32)	—	-.63	-.44	—	.78	.55
2. Attachment avoidance	2.27 (1.28)	2.70 (1.04)	-.37	—	.49	—	-.68	-.65
3. Attachment anxiety	2.41 (1.30)	3.17 (1.17)	-.35	.48	—	—	-.44	-.32
4. Perceived communal strength	—	5.19 (0.48)	.60	-.61	-.45	—	—	—
6. Satisfaction	6.50 (1.61)	5.45 (1.24)	.56	-.68	-.49	.73	—	.64
7. Commitment	7.18 (1.15)	6.10 (1.02)	.25	-.66	-.32	.54	.56	—

Note. Possible scores range from 1 to 7 for attachment insecurity, 1 to 5 for perceived partner gratitude of expression, and 1 to 9 for satisfaction and commitment in Study 1. All items were measured using 7-point scales in Study 2. Correlations are presented above the diagonal line for Study 1 and below the diagonal line for Study 2. All correlations are significant at $p < .01$.

Results

The buffering effects of perceived partner gratitude expressions. Means, standard deviations, and correlations among the variables are presented in Table 2. As in Study 1, we conducted regression analyses to examine the moderating effect of perceived partner gratitude expression on the association between attachment insecurity and satisfaction. With satisfaction as an outcome variable, there were main effects of perceived gratitude expression and attachment avoidance, and replicating Study 1, a marginally significant interaction between the two (see Table 3). As plotted in Figure 2, attachment avoidance was associated with lower satisfaction at low levels ($-1 SD$) of perceived partner gratitude expression, $b = -0.66$, $SE = 0.06$, $p < .001$, but this association was significantly attenuated at high levels ($+1 SD$), $b = -0.49$, $SE = 0.08$, $p < .001$. However, region of significance analyses showed that the negative association between attachment avoidance and satisfaction was significant within the observed range of perceived partner gratitude expression. In the same model, the main effect of attachment anxiety was also significant, $b = -0.16$, $SE = 0.05$, $p = .001$, but the interaction between perceived partner gratitude expression and attachment anxiety was not significant (see Table 3).

With commitment as an outcome variable, the interaction between perceived partner gratitude expression and attachment avoidance or attachment anxiety was not significant (see Table 3). Combined, our results indicate that highly avoidant individuals' tendencies to be dissatisfied in their relationship were weaker if the partner was perceived to express more (vs. less) gratitude, but there was no effect on their low commitment. For anxiously attached individuals, there was no evidence that perceived partner gratitude expression had the buffering effects with either satisfaction or commitment as an outcome.

Moderated mediation. Although there was weaker support for the interactions between perceived partner gratitude expression and attachment insecurity in Study 2, we nevertheless tested the significance of possible indirect effects via perceptions of a partner's communal strength. Specifically, we examined whether perceiving gratitude expression is associated with higher perceptions of partner's communal strength, which in turn are linked to greater satisfaction or commitment. We used Model 8 of the PROCESS macro for SPSS (Hayes, 2017) for the moderated mediation analyses using 10,000-sample bootstrap procedures. Table 4 shows that in a model predicting perceived partner communal strength,

perceived partner gratitude expression attenuated the association between both insecurity dimensions and perceived partner communal strength. Specifically, avoidantly attached individuals' tendency to perceive their partner's communal strength as low was weaker at high levels ($+1 SD$) of perceived partner gratitude expression, $b = -0.25$, $SE = 0.06$, $p < .001$, compared with low levels ($-1 SD$), $b = -0.39$, $SE = 0.04$, $p < .001$ (see Figure 2). There was no range of perceived partner gratitude expression at which the link between attachment avoidance and perceived communal strength transitions into nonsignificance.

A similar pattern of interaction was found between perceived partner gratitude expression and attachment anxiety, such that anxiously attached individuals were more likely to view their partner as low in communal strength at low levels ($-1 SD$) of perceived partner gratitude expression, $b = -0.15$, $SE = 0.04$, $p < .001$, but this tendency was not significant at high levels ($+1 SD$), $b = -0.02$, $SE = 0.05$, $p = .71$ (see Figure 2). Region of significance tests indicated that the negative link between attachment anxiety and perceived partner communal strength was not significant if perceived partner gratitude expression was higher than 5.60 ($1.06 SD$ above the mean).

More importantly, a 95% CI for the index of moderated mediation that does not include zero indicated that the indirect effect of attachment insecurity on the relationship outcome variable through perceived partner communal strength depended on perceived partner gratitude expression. With attachment avoidance as a predictor and satisfaction as an outcome variable, we found support for a significant moderated mediation, $b = 0.03$, $SE = 0.01$, 95% CI [0.01, 0.08]. Specifically, attachment avoidance was related to low satisfaction through low partner perceived communal strength at lower levels ($-1 SD$) of perceived partner gratitude expression, $b = -0.21$, $SE = 0.04$, 95% CI [-0.30, -0.14], but this indirect effect was reduced at higher levels ($+1 SD$) of perceived partner gratitude expression, $b = -0.13$, $SE = 0.03$, 95% CI [-0.23, -0.08]. Similarly, when attachment anxiety was entered as a predictor, we also found support for a significant moderated mediation, $b = 0.02$, $SE = 0.01$, 95% CI [0.01, 0.06]. Specifically, attachment anxiety was related to low satisfaction through low perceived communal strength at lower levels ($-1 SD$) of perceived partner gratitude expression, $b = -0.08$, $SE = 0.03$, 95% CI [-0.15, -0.04], but this indirect effect was not significant at higher levels ($+1 SD$) of perceived partner gratitude expression, $b = -0.01$, $SE = 0.02$, 95% CI [-0.06, 0.03].

Table 3
The Effects of Attachment Insecurity and Perceived Partner Gratitude Expression on Satisfaction and Commitment (Studies 1 and 2)

Measure	Study 1				Study 2					
	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β
Satisfaction										
Perceived partner gratitude expression	.79	6.64	<.001	[.55, 1.03]	.49	.29	7.26	<.001	[.21, .37]	.31
Attachment avoidance	-.31	-3.03	.003	[-.52, -.11]	-.25	-.57	-10.52	<.001	[-.68, -.47]	-.48
Attachment anxiety	-.04	-.55	.58	[-.21, .12]	-.04	-.16	-3.30	.001	[-.25, -.06]	-.15
Perceived Partner Gratitude Expression \times Attachment Avoidance	.11	1.72	.09	[-.02, .23]	.13	.07	1.87	.06	[-.003, .14]	.08
Perceived Partner Gratitude Expression \times Attachment Anxiety	.16	2.23	.03	[.02, .31]	.15	.01	.38	.70	[-.05, .08]	.02
Commitment										
Perceived partner gratitude expression	.24	2.17	.03	[.02, .47]	.21	.01	.35	.73	[-.06, .09]	.02
Attachment avoidance	-.35	-3.60	<.001	[-.54, -.16]	-.39	-.64	-12.15	<.001	[-.75, -.54]	-.66
Attachment anxiety	-.004	-.06	.95	[-.16, .15]	-.005	-.002	-.05	.96	[-.09, .09]	-.002
Perceived Partner Gratitude Expression \times Attachment Avoidance	.16	2.75	.007	[.05, .28]	.27	-.02	-.62	.54	[-.09, .05]	-.03
Perceived Partner Gratitude Expression \times Attachment Anxiety	-.07	-1.03	.31	[-.21, .07]	-.09	-.01	-.35	.73	[-.08, .05]	-.02

Although we did not find evidence for the interaction between perceived partner gratitude expression and attachment insecurity predicting commitment, we nevertheless tested the significance of a possible indirect effect via perceptions of a partner's communal strength. When attachment avoidance was entered as a predictor variable, the index of moderated mediation was significant, $b = 0.02$, $SE = 0.01$, 95% CI [0.004, 0.04]. The indirect effect of attachment avoidance on low commitment through low perceived communal strength was significantly weaker when participants perceived their partner to express more gratitude (+1 *SD*), $b = -0.10$, $SE = 0.03$, 95% CI [-0.17, -0.06], compared with when they perceived their partner to express less gratitude (-1 *SD*), $b = -0.16$, $SE = 0.03$, 95% CI [-0.23, -0.10]. Similarly, with attachment anxiety as a predictor, the index of moderated mediation was significant with commitment as an outcome, $b = 0.02$, $SE = 0.01$, 95% CI [0.003, 0.04]. The indirect effect of attachment anxiety on low commitment through low perceived communal strength was significant when participants perceived their partner to express less gratitude (-1 *SD*), $b = -0.06$, $SE = 0.02$, 95% CI [-0.11, -0.03], but not when they perceived their partner to express more gratitude (+1 *SD*), $b = -0.01$, $SE = 0.02$, 95% CI [-0.04, 0.02]. Taken together, these findings provide support for the idea that perceiving a partner's expressions of gratitude expressions can attenuate insecurely attached individuals' low satisfaction and commitment via signaling communal strength.

Discussion

In Study 2, we found weak evidence that the negative effect of attachment avoidance on relationship satisfaction can be attenuated when individuals perceived that their partner expressed a lot of gratitude. However, there was stronger evidence for an indirect effect such that perceiving a partner's gratitude expression was associated with avoidantly attached individuals' heightened perceptions of their partner's communal strength, which in turn were associated with greater satisfaction. Similarly, although we did not find direct buffering effects with commitment as an outcome, there was evidence that perceiving a partner's gratitude expression indirectly buffered the negative effects of attachment avoidance via heightened perceived partner communal strength. For attachment anxiety, we did not find consistent evidence across Studies 1 and 2 that its link to either low satisfaction or commitment is weaker if a partner is perceived to express a lot of gratitude. However, as we found for attachment avoidance, there was evidence that anxiously attached individuals are more likely to perceive their partner as high in communal strength if the partner is perceived to express more gratitude, which in turn can contribute to higher relationship satisfaction and commitment. These findings are consistent with the theory and our predictions that a partner's gratitude expression can provide relational benefits to insecurely attached individuals through signaling the partner's communal motivation to care for them.

It is important to note that in Study 2, our region of significance analyses indicated that perceiving high levels of gratitude in the partner could reduce the dissatisfaction associated with attachment avoidance, but there was no range of perceived partner gratitude at which the effect was completely buffered as in Study 1. Perhaps

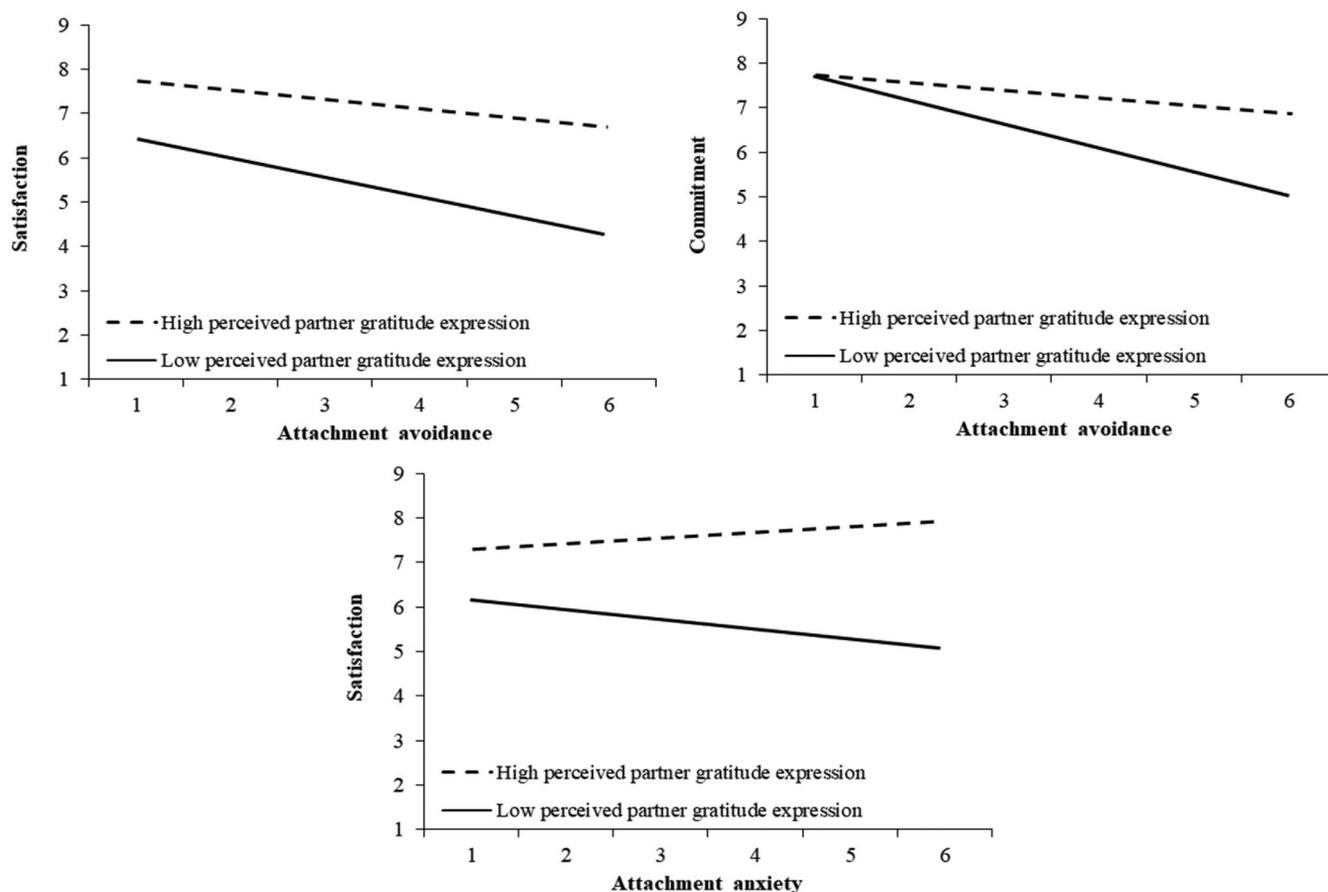


Figure 1. The moderating effect of perceived partner gratitude expression on the link between attachment insecurity and satisfaction/commitment (Study 1). The values on the x axis represent the observed range of participants' attachment insecurity. High and low values represent 1 *SD* above and below the mean.

this was attributable to the response scale used to measure perceived partner gratitude expression. Asking the extent to which partners express gratitude a lot (vs. not at all) may have been more ambiguous than asking the extent to which they express it very frequently (vs. rarely) as in Study 1. For example, the measure of perceived partner gratitude used in this study may reflect the degree to which partners are expressive when they do express gratitude, rather than the frequency at which they express gratitude, which may be more relevant to heightening insecure individuals' feelings of being cared for. In our next three studies, we obtained daily reports of gratitude expressions, which are more ecologically valid and help us to more precisely capture the effects of gratitude expressions.

Study 3

In Studies 3 and 4, we sought to examine whether a partner's daily expressions of gratitude would attenuate the daily dissatisfaction associated with attachment insecurity as assessed in ecologically valid daily experience studies.^{5,6} Specifically, we tested whether insecurely attached individuals' dissatisfaction with their relationship is weaker on days when their partner expresses more gratitude than usual (within-person effects) as

well as if their partner, on average, has expressed a higher level of gratitude than others (between-person effects). In these studies, we used the partner's own reports of how much they expressed gratitude, instead of participants' perceptions of their partner's gratitude expression, which were not assessed in these studies. This allowed us to test our effects of gratitude from the previous studies with reports obtained from a different source, which is important especially given the possibility that our effects may simply be driven by biased perceptions of the

⁵ Daily surveys in the diary studies (Studies 3–5) included a minimum number of questions for brevity and we note that there was no variable equivalent to daily perceived partner gratitude expression or equivalent to our proposed mediator such as perceived care in Studies 3 and 4 that we did not report. In both studies, there was an item "Today, to what extent was your partner motivated to help you?" which we tested as a potential mediator, but we did not find support for its mediating effect. Arguably, perceiving a partner's motivation to help may not precisely capture a message of communal responsiveness that gratitude expression conveys because the perceived partner's motivation may as well be exchange-oriented.

⁶ Across the three diary studies, there were participants who voluntarily completed more than the requested number of diaries. All data were used in the analyses.

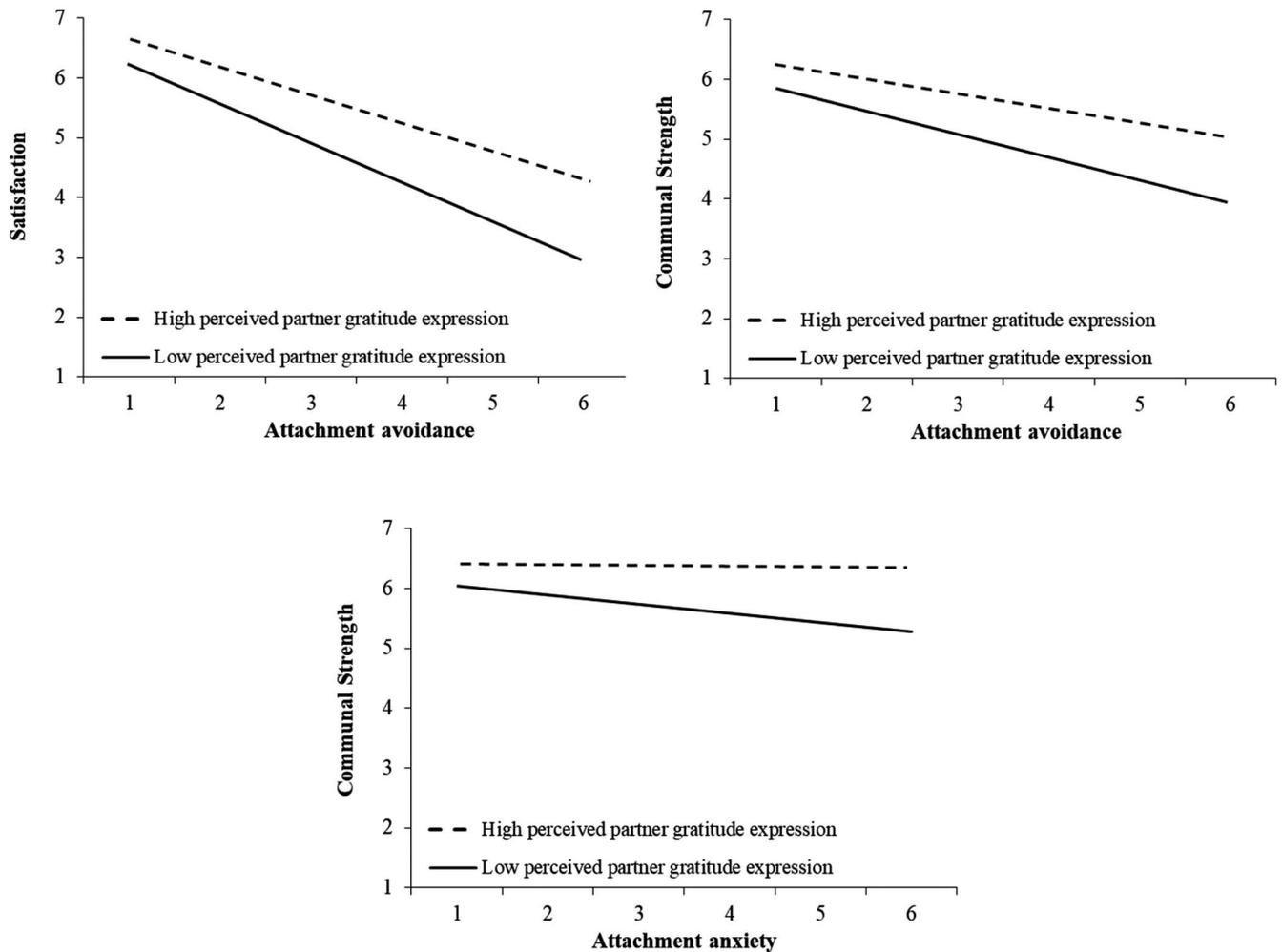


Figure 2. The moderating effect of perceived partner gratitude expression on the link between attachment insecurity and satisfaction/communal strength (Study 2). The values on the x axis represent the observed range of participants' attachment insecurity. High and low values represent 1 SD above and below the mean.

partner's gratitude expressions, independent of how much the partner reports expressing gratitude.

In both studies, when there were significant buffering effects that we predicted, we further examined the uniqueness of these effects in two ways. First, we examined whether they were specific to partners' gratitude expressions or were generalizable to participants' own experience of gratitude. Previous research suggests that insecure individuals are not only less inclined to feel grateful (Zhang, Zhang, Yang, & Li, 2017), but demonstrate fewer benefits when they do feel grateful, such that the link between feeling grateful and pro-social behavior is weaker among individuals high (vs. low) in attachment avoidance or attachment anxiety (Mikulincer & Shaver, 2010). As such, we did not expect the same buffering effects with insecurely attached individuals' own experience of gratitude, and we tested for this possibility. Second, we examined whether the partner's other prorelationship behaviors that might signal responsiveness can have the same effects as the partner's gratitude expressions. Specifically, we used two partner behaviors, making sacrifices and providing emotional support to

the partner, which are closely related to caring about the partner's well-being (Fehr, Harasymchuk, & Sprecher, 2014) to examine whether they have the same buffering effects as does the partner's expression of gratitude.

Lastly, we also attempted to rule out an additional alternative explanation for our predicted effects, which is that a partner's gratitude expression might be a proxy for participants' own engagement in prorelationship behaviors. For example, partners are likely to express more gratitude on days when participants made more sacrifices, and making sacrifices for the partner may be related to high relationship satisfaction regardless of an individual's level of attachment insecurity (Ruppel & Curran, 2012). It is conceivable, then, that insecurely attached individuals' lower levels of dissatisfaction reflect the effect of their own engagement in prorelationship behaviors that day, rather than their partner's appreciation for them. To examine this possibility, we conducted additional analyses in Studies 3 and 4 in which we controlled for participants' own engagement in two relationship behaviors, sacrifice and the provision of support.

Table 4
Summary of Moderated Mediation Analyses (Study 2)

Measure	Perceived partner communal strength					Satisfaction					Commitment				
	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β
Perceived partner gratitude expression	.24	8.49	<.001	[.18, .29]	.37	.16	3.92	<.001	[.08, .24]	.17	-.08	-1.95	.05	[-.16, .001]	-.11
Attachment avoidance	-.32	-8.36	<.001	[-.39, -.24]	-.40	-.40	-7.13	<.001	[-.51, -.29]	-.34	-.52	-9.10	<.001	[-.63, -.41]	-.53
Attachment anxiety	-.09	-2.60	<.001	[-.15, -.02]	-.12	-.11	-2.47	.01	[-.20, -.02]	-.10	.03	.73	.47	[-.06, .12]	.04
Perceived Partner Gratitude Expression \times Attachment Avoidance	.05	2.05	.04	[.002, .10]	.08	.04	1.18	.24	[-.03, .11]	.04	-.04	-1.25	.21	[-.11, .02]	-.06
Perceived Partner Gratitude Expression \times Attachment Anxiety	.05	2.17	.03	[.005, .10]	.10	-.01	-.46	.64	[-.08, .05]	-.02	-.03	-1.01	.32	[-.10, .03]	-.05
Perceived partner communal strength	.57				.54	.65	6.81	<.001	[.38, .69]	.36	.40	5.05	<.001	[.25, .56]	.33
R^2															.48

Method

Participants and procedure. Ninety-eight couples were recruited for the study, and 94 couples that had at least one occasion on which both partners completed daily questionnaires were included for the present analyses. Participants were 23.3 years old on average ($SD = 7.7$; range = 18 to 70), and most of them identified as White ($n = 146$). Thirteen participants were Asian, 12 were Black/African American, three were American Indian/Alaska Native, and 14 identified as other or did not identify. Couples had been together for an average of 3 years and 3 months ($SD = 6$ years and 5 months; range = 1 week to 42 years) and a majority ($n = 137$) of the participants identified their relationship status as dating. Participants first completed a series of questionnaires including their attachment insecurity and relationship evaluations, then completed a daily web-based diary for the following seven days. Participants completed six diaries on average and a total of 1,239 daily reports were used for the analyses.

Background measure: Attachment insecurity. Participants completed the same measure from Studies 1 and 2 assessing attachment avoidance ($\alpha = .91$) and attachment anxiety ($\alpha = .90$).

Daily measures. Participants were instructed to complete an online questionnaire that included assessments of their daily experience and expression of gratitude, daily behaviors, and relationship satisfaction each night for seven days, all measured on 9-point scales (1 = *not at all* to 9 = *extremely*).

Own experience of gratitude. Participants were asked to indicate how much they felt “gratitude” in their relationship each day.

Partner’s expression of gratitude. Partners’ response to the question “Today, to what extent did you express appreciation for the things your partner did for you?” was used as a daily measure of partner’s expression of gratitude.

Own and partner’s proration behaviors. Participants responded to the questions “Today, to what extent did you sacrifice (e.g., your time, goals, or personal wishes) to do something for your partner?” and “Today, to what extent did you provide your partner with emotional support (i.e., to help him/her feel better about a problem or reduce his/her stress)?” Partners’ responses on these items were used to examine whether they had the same effects as partner’s gratitude expression (see discriminant analyses section), and participants’ responses on these items were used to rule out the possibility that insecurely attached individuals’ behaviors are responsible for the effect of partner’s gratitude expression (see alternative explanations section).

Relationship satisfaction. Participants were asked to indicate how “happy” they felt in their relationship each day.

Results

Data analyses. Means, standard deviations, and zero-order correlations for the variables are presented in Table 5. All analyses were conducted using the lme4 package in R (Bates, Maechler, Bolker, & Walker, 2014). We used multilevel modeling to take into account the repeated measures within participants, and the interdependence between dyads (Kenny, Kashy, & Cook, 2006). We tested two-level cross models with random intercepts, in which persons are nested within dyads, and person and days are crossed to account for the fact that both partners completed the daily surveys on the same days (Kenny et al., 2006). Effects were pooled

Table 5
Descriptive Statistics and Correlations Among Variables (Studies 3 and 4)

Variable	Study 3 <i>M (SD)</i>	Study 4 <i>M (SD)</i>	1	2	3	4
1. Partner's gratitude expression	5.92 (1.66)	3.38 (0.85)	—	-.09	-.23**	.41**
2. Attachment avoidance	4.32 (1.10)	2.78 (1.02)	-.15*	—	.27**	-.26**
3. Attachment anxiety	4.13 (1.14)	3.21 (1.00)	-.18**	.27**	—	-.29**
4. Relationship satisfaction	6.56 (1.37)	3.87 (0.70)	.47**	-.38**	-.22**	—

Note. All items were measured using 9-point scales in Study 3. Possible scores range from 1 to 7 for attachment avoidance and attachment anxiety, and 1 to 5 for daily variables in Study 4. Correlations are presented above the diagonal for Study 3 and below the diagonal for Study 4 and do not take the dyadic structure of the data into account. Within-person averages across the diary are used for the daily variables.

* $p < .05$. ** $p < .01$.

across gender and the models we report do not include gender effects (see footnote 3).

We regressed relationship satisfaction on partner's daily report of gratitude expression, attachment avoidance, attachment anxiety, and the interaction between partner's gratitude expression and each attachment dimension. The partner's daily gratitude expression was person-mean centered (Raudenbush, Bryk, Cheong, & Congdon, 2004) so that it was purged of between-person variability. Effects of this variable on satisfaction reflect within-person and across-day effects, an association between day-to-day changes from the partner's own mean on gratitude expression and daily relationship satisfaction. An aggregate of a partner's gratitude expression across the diary period as well as its interactions with each attachment dimension were included to capture the between-person effects separate from within-person effects (Curran & Bauer, 2011). Below, we first discuss the within-person effects, followed by the between-person effects. If there was a significant buffering effect, we examined the extent to which it was unique from other effects (i.e., discriminant analyses) as well as whether an alternative explanation for the effect can be ruled out.

The buffering effects of partner's gratitude expressions: Within-person level. Did the link between attachment insecurity and daily satisfaction within an individual vary across days depending on the level of a partner's daily gratitude expression? As shown in Table 6, the predicted interaction between the partner's daily gratitude expression and attachment avoidance was significant. Decomposing the interaction revealed that on days

when the partner reported low levels ($-1 SD$) of gratitude expression, attachment avoidance was associated with lower relationship satisfaction, $b = -0.30$, $SE = 0.09$, $p = .002$ (see Figure 3). However, on days when the partner reported high levels ($+1 SD$) of gratitude expression, the negative effect of attachment avoidance on relationship satisfaction was not significant, $b = -0.12$, $SE = 0.09$, $p = .19$, suggesting that a partner's expression of gratitude buffered avoidantly attached individuals from experiencing lower satisfaction in their relationship. Region of significance analyses (Preacher et al., 2006) indicated that the negative association between attachment avoidance and daily satisfaction was not significant when the partner reported more than $0.45 SD$ above their average level of gratitude expressions across the diary period. The interaction between partner's gratitude expression and attachment anxiety was not significant (see Table 6).

Discriminant analyses. To examine whether participants' own daily feelings of gratitude had the same effects as the partner's daily gratitude expression, we repeated the same analysis with own gratitude experience as a moderator of the effects of attachment insecurity on daily satisfaction. The results showed that the interaction between gratitude experience and attachment avoidance was not significant, $b = 0.01$, $SE = 0.02$, $p = .53$, suggesting that daily feelings of gratitude did not have the same effect on avoidantly attached individuals' relationship satisfaction as did the partner's daily expression of gratitude.

We also examined whether the partner's other daily prorelationship behaviors such as sacrifice or support also buffered avoidantly

Table 6
The Effects of Attachment Insecurity and Partner's Gratitude Expression on Daily Relationship Satisfaction (Studies 3 and 4)

Measure	Study 3					Study 4				
	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β
Attachment avoidance	-.21	-2.46	.02	[-.38, -.04]	-.12	-.19	-6.59	<.001	[-.25, -.13]	-.21
Attachment anxiety	-.19	-2.16	.03	[-.35, -.02]	-.11	-.04	-1.44	.15	[-.10, .02]	-.05
Within-person effects										
Partner's gratitude expression	.18	6.22	<.001	[.12, .25]	.14	.13	10.99	<.001	[.10, .17]	.12
Partner's Gratitude Expression \times Attachment Avoidance	.06	2.22	.03	[.01, .11]	.05	.02	1.65	.10	[-.004, .04]	.02
Partner's Gratitude Expression \times Attachment Anxiety	-.02	-.66	.51	[-.06, .03]	-.02	.02	1.21	.23	[-.01, .04]	.01
Between-person effects ^a										
Partner's gratitude expression	.27	4.83	<.001	[.16, .38]	.24	.33	9.65	<.001	[.24, .40]	.30
Partner's Gratitude Expression \times Attachment Avoidance	-.08	-1.51	.13	[-.17, .02]	-.08	.07	2.00	.05	[.002, .14]	.06
Partner's Gratitude Expression \times Attachment Anxiety	.03	.56	.58	[-.07, .13]	.03	.03	.88	.38	[-.04, .10]	.03

^a An aggregate across the diary is used for partner's gratitude expression.

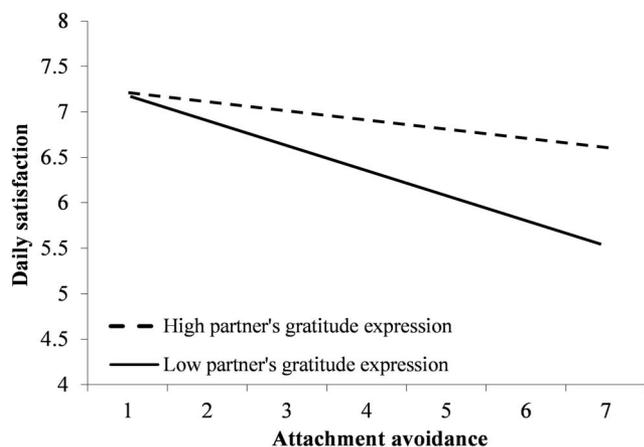


Figure 3. The moderating effect of partner's daily gratitude expression on the link between attachment avoidance and daily satisfaction (Study 3). The values on the x axis represent the observed range of participants' attachment avoidance. High and low values represent 1 SD above and below the mean.

attached individuals from experiencing low satisfaction in their relationship. When we repeated our analysis with the partner's sacrifice in place of partner's gratitude expression, there was no significant interaction between partner sacrifice and attachment avoidance, $b = 0.01$, $SE = 0.02$, $p = .68$. Similar results were found with partner's support as a moderator. There was no significant interaction between partner's support and attachment avoidance, $b = 0.01$, $SE = 0.03$, $p = .86$. Overall, there was no evidence that partner's engagement in other prorelationship behaviors such as sacrifice or support also served as a buffer against avoidantly attached individuals' low satisfaction.

Alternative explanations. Next, we examined the possibility that the effects of the partner's gratitude expression on avoidantly attached individuals' daily satisfaction might reflect the effects of behaviors that elicited gratitude expressions from the partner. To first examine whether participants' own behaviors do have significant effects, we ran our model with participants' daily support in place of the partner's gratitude expression. The results revealed a significant interaction between participants' support and attachment avoidance, such that the negative effect of attachment avoidance on satisfaction was significantly negative on days participants provided low levels (-1 SD) of support, $b = -0.22$, $SE = 0.08$, $p = .01$, but not on days they provided high levels ($+1$ SD) of support, $b = 0.01$, $SE = 0.08$, $p = .87$. A model with participants' daily sacrifice in place of partner's gratitude expression also revealed a significant interaction between participants' sacrifice and attachment avoidance. Specifically, the negative effect of attachment avoidance on satisfaction was significantly negative on days participants made low levels (-1 SD) of sacrifice, but not on days they made high levels ($+1$ SD) of sacrifice, $b = -0.09$, $SE = 0.09$, $p = .33$. Given the effects of participants' own relationship-promotive behaviors, we ran our original model with the key effect (partner's gratitude expression) controlling for the effects of participants' daily sacrifice, support, and their interactions with each attachment dimension. The interaction between participants' support and attachment avoidance remained significant, $b = 0.08$,

$SE = 0.03$, $p = .003$, but not the interaction with participants' sacrifice, $b = 0.002$, $SE = 0.02$, $p = .92$, and importantly, the interaction with partner's gratitude expression, $b = 0.03$, $SE = 0.03$, $p = .22$, suggesting a possible overlap between the effects of partner's gratitude expression and participants' behaviors that could have elicited the expression.

The buffering effects of partner's gratitude expressions: Between-person level. Did the link between attachment insecurity and daily satisfaction vary between participants depending on how much the partner expressed gratitude on average? Table 6 shows that at the between person level, there were no significant interactions between a partner's gratitude expression and either attachment avoidance or anxiety.

Discussion

Extending previous studies that used perceptions of partner's gratitude expressions, our results in Study 3 showed that the negative impact of attachment avoidance, but not anxiety, on daily satisfaction was weaker if the partner reported expressing particularly high levels of gratitude that day. Participants' own experience of gratitude or partner's other behaviors that are considered as relationship-promotive did not have similar buffering effects, suggesting the uniqueness of the effects of receiving a partner's gratitude expression. However, we could not rule out the possibility that the buffering effects of a partner's gratitude expression are attributable to participants' behaviors that elicited gratitude as our key effect was not significant in a model including the effects of participants' sacrifice and support behaviors. Lastly, there were no significant between-person effects in this study. That is, we did not find that the negative effects of attachment insecurity on daily satisfaction were weaker for individuals whose partners expressed a lot of gratitude on average. In Study 4, we used a larger sample, more days of reports, as well as multiple items to measure our key variables, to determine whether the effects found in Study 3 would replicate.

Study 4

Method

Participants and procedure. Two hundred three couples were recruited for the study, and 201 couples that completed background questionnaires and had at least one occasion on which both partners completed daily reports were included in the present analyses. Participants were 20.5 years old ($SD = 2.9$; range = 17 to 54) on average and 208 of them were White, 105 were Asian, and 47 were Black/African American. There was also one American Indian/Alaska Native, and one Native Hawaiian/Other Pacific Islander, and 42 identified as other or did not identify. Participants had been together for an average of 1 year and 5 months ($SD = 1$ year and 8 months; range = 1 week to 13 years). Participants first completed a series of questionnaires including measures of attachment insecurity and relationship evaluations, then completed a daily web-based diary for the following 14 days. Participants completed 13 diaries on average, and a total of 5,154 daily reports were used for the analyses.

Background measure: Attachment insecurity. Participants' attachment avoidance ($\alpha = .83$) and attachment anxiety ($\alpha = .82$)

were assessed using Adult Attachment Questionnaire (Simpson, Rholes, & Phillips, 1996) on a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*).

Daily measures. Participants were instructed to complete an online questionnaire assessing their daily experience and expression of gratitude, daily behaviors, and relationship satisfaction each night for 14 days.

Own experience of gratitude. Participants' daily experience of gratitude was assessed with three items ("grateful for the partner," "thankful for the partner," and "appreciative of the partner") on a 5-point scale (1 = *not at all* to 5 = *extremely*). Within-person reliability of the items (indicated by R_c ; Bolger & Laurenceau, 2013) was .84.

Partner's expression of gratitude. The partner's responses to three statements ("I expressed that I was grateful for my partner," "I expressed that I was thankful for my partner," and "I expressed that I was appreciative of my partner"; $R_c = .85$), measured on a 5-point scale (1 = *not at all expressed* to 5 = *extremely expressed*) were averaged to assess the partner's daily expression of gratitude.

Own and partner's prorelationship behaviors. Participants completed two questions: "Today, to what extent did you sacrifice for your partner?" and "Today, to what extent did you provide your partner with help or support?" assessing their daily sacrifice and support provision, respectively on 5-point scales (1 = *not at all* to 5 = *extremely*). The partner's responses to the same questions were used to indicate the partner's sacrifice and support provision. As in Study 3, partners' responses to these items were used for discriminant analyses, and participants' responses were used to rule out alternative explanations.

Relationship satisfaction. Daily relationship satisfaction was assessed with three items ("happy in my relationship," "content in my relationship," and "satisfied in my relationship"; $R_c = .87$) on a 5-point scale (1 = *not at all* to 5 = *extremely*).

Results

Means, standard deviations, and zero-order correlations for the variables are presented in Table 5. We conducted identical analyses to those in Study 3 to test the daily effects of the partner's gratitude expression on the association between attachment insecurity and relationship satisfaction.

The buffering effects of partner's gratitude expressions: Within-person level. As shown in Table 6, at the within-person level, neither the interaction between the partner's daily gratitude expression and attachment avoidance, nor the interaction between the partner's daily gratitude expression and attachment anxiety was significant.

The buffering effects of partner's gratitude expressions: Between-person level. Table 6 shows that the interaction between the aggregate of a partner's gratitude expression and attachment avoidance was significant, suggesting that at the between-person level, there was support for the predicted buffering effects for avoidantly attached individuals. Specifically, the link between attachment avoidance and daily satisfaction was stronger for those whose partner reported expressing low levels ($-1 SD$) of gratitude, $b = -0.25$, $SE = 0.04$, $p < .001$, than high levels ($+1 SD$) of gratitude on average, $b = -0.13$, $SE = 0.04$, $p = .003$ (see Figure 4). Region of significance analyses indicated that the negative association between attachment avoidance and daily satisfaction

was not significant if the partner's average level of gratitude expressions was higher than $1.47 SD$ above the sample mean.

Discriminant analyses. Did participants' average level of grateful experience have similar effects of buffering avoidantly attached individuals from experiencing dissatisfaction as that of partner's gratitude expression? The results from a model where we replaced the partner's gratitude expression with participants' gratitude experiences showed that the interaction between the aggregate of own gratitude experience and attachment avoidance was not significant, $b = -0.02$, $SE = 0.02$, $p = .40$, suggesting the unique function of a partner's expressions of gratitude.

With the aggregate of partner's sacrifice or support in place of that of the partner's gratitude expression, there was also no support for its interaction with attachment avoidance ($b = 0.01$, $SE = 0.04$, $p = .69$, for sacrifice, and $b = 0.05$, $SE = 0.04$, $p = .16$, for support).

Alternative explanations. Lastly, we ran additional models to rule out the possibilities that our effects with partner's gratitude expression reflect the effects of average levels of participants' own sacrifice or support that could have triggered such expressions. However, when we ran a model with the aggregate of participants' own support in place of partner's gratitude expression, the interaction between support and attachment avoidance was not significant, $b = 0.04$, $SE = 0.03$, $p = .20$. Further, a model with the aggregate of participants' own sacrifice in place of partner's gratitude expression showed that the interaction between sacrifice and attachment avoidance was also not significant, $b = -0.01$, $SE = 0.03$, $p = .80$. Combined, these results suggest that the buffering effects of partner's high levels of gratitude expression are unlikely to reflect the effects of participants themselves engaging in more relationship-promotive behaviors. Nevertheless, we reran our model controlling for the effects of participants' support and sacrifice included in the original model, and indeed found that the only significant interaction was one between the aggregate of partner's gratitude expression and attachment avoidance, $b = 0.07$, $SE = 0.03$, $p = .03$.

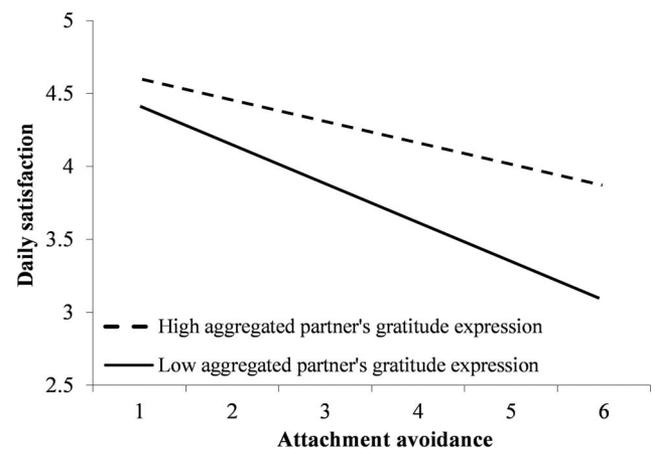


Figure 4. The moderating effect of partner's gratitude expression aggregated over the diary period on the link between attachment avoidance and daily satisfaction (Study 4). The values on the x axis represent the observed range of participants' attachment insecurity. High and low values represent $1 SD$ above and below the mean.

Discussion

The results from Study 4 demonstrated the positive effect of the partner's gratitude expression on avoidantly attached individuals' daily satisfaction at the between-person level, although not at the within-person level. This effect could not be found with feeling high levels of gratitude oneself or having a partner who makes a lot of sacrifices or provides high levels of support on average. Lastly, controlling for participants' average levels of sacrifice and support did not cancel out the positive effects of the partner's gratitude expressions, suggesting that the effects of partner's gratitude expressions could not be attributed to the effects of participants' engaging in the behaviors that elicited the expressions.

On the contrary, we found that the interaction between the partner's gratitude expression and attachment anxiety was not significant at either the within-person or between-person level. Overall, there was mixed evidence as to whether a partner's gratitude expression can have positive effects on insecurely attached individuals when we used the partner's own reports. To provide an overall picture of our findings (i.e., contrasting the effects of perceptions and partner's reports of gratitude expressions and separating out both within-person and between-person effects), we report a set of meta-analyses across all studies at the end.

Study 5

In Study 5, we attempted to extend previous studies in which we had only one source of the partner's gratitude expression by using both the participant's and the partner's reports of daily gratitude expression to replicate our effects. These data allow us to investigate possible discrepancies in the results depending on the source of the report in depth, helping to understand what is driving the effects of gratitude expression (and we address this issue in additional analyses based on the Truth and Bias Model of Judgment; West & Kenny, 2011; also see Lemay, Pruchno, & Feild, 2006). As in Studies 3 and 4, we first examined the daily effects of a partner's gratitude expression (or perceived partner gratitude expression) at both the within- and between-person levels. We also distinguished any significant predicted effect from the effect of participants' own feelings of gratitude, as well as another type of prorelationship behavior, physical affection (Debrot, Schoebi, Perez, & Horn, 2013).

Further, we examined potential long-term benefits of receiving a partner's gratitude expressions (both the participant's and the partner's reports) in Study 5. Specifically, we examined whether receiving a partner's gratitude expressions can protect individuals from experiencing declines in satisfaction or commitment associated with attachment insecurity. In doing so, we also sought to rule out the possibility that any effects we find are attributable to the effects of other stable qualities of participants or partners. For example, individuals with a more agreeable partner may receive more gratitude expressions (Wood, Joseph, & Maltby, 2008) and also experience higher relationship quality (Barelds, 2005). Thus, we conducted additional analyses that control for participants' and partners' agreeableness in examining the buffering effects of a partner's gratitude expressions over the long-term.

Lastly and more importantly, we revisited the mechanism underlying the buffering effects of perceiving gratitude expressions in this study. Study 2 showed that perceptions of a partner's

gratitude expression can serve as an effective buffer against the negative effects of attachment avoidance by enhancing the belief that the expresser is high in communal strength. Similarly, we examined whether perceiving a partner's gratitude expression would be related to insecurely attached individuals' daily or long-term relationship benefits via heightened feelings of being cared for by their partner.

Method

Participants and procedure. Eighty couples were recruited for the study, and 78 couples in which both partners completed attachment measures at baseline were included for the present analyses. Participants were 23.9 years on average ($SD = 6.4$; range = 17 to 60) and 90 participants identified themselves as European or European American, 35 Chinese or Chinese American, 17 other Asian or Asian American, 13 African American, 11 Mexican or Mexican American, seven Native American, six other Latino, four Middle Eastern, and four did not identify (multiple responses were allowed). Participants had been together for an average of 2 years and 5 months ($SD = 3$ years and 8 months; range = 6 months to 30 years). A majority of the couples (78%) identified their relationship status as dating.

Participants completed a series of questionnaires, and were instructed to respond to a short online survey for the following 14 days. Participants completed 12 diaries on average and a total of 1,844 daily reports were used for the analyses. Three months after completing the daily diary study, a link to an online follow-up survey was sent to all the participants and a majority of the participants ($n = 113$) completed it.

Background measures.

Attachment insecurity. Participants' attachment avoidance ($\alpha = .92$) and attachment anxiety ($\alpha = .92$) were assessed using the Experiences in Close Relationships Scale (Brennan et al., 1998) on a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*).

Agreeableness. Agreeableness was measured using nine items from the 44-item Big Five Inventory (John & Srivastava, 1999) on a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*).

Satisfaction. Satisfaction was measured with five items (Rusbult et al., 1998; $\alpha = .88$) on a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*).

Commitment. Commitment was measured with seven items (Rusbult et al., 1998; $\alpha = .87$) on a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*).

Daily measures.

Own experience of gratitude. Each day, participants rated the extent to which they felt "grateful/appreciative/thankful" on a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*). The same anchor was used for the following measures unless indicated otherwise.

Perceived partner gratitude expression. Participants indicated the extent to which they agreed with the statement, "My partner made sure I felt appreciated today" on a 5-point scale.

Partner's gratitude expression. Partners' agreement with the statement, "I made sure my partner felt appreciated today" that was rated on a 5-point scale was used as the partner's report of gratitude expression.

Physical affection. Participants rated the extent to which they experienced “physical affection” in their relationship each day on a 5-point scale (1 = *not at all* to 5 = *a lot*).

Perceived care.⁷ Participants rated the extent to which they felt “cared about/loved/connected” in their relationship on a 5-point scale (1 = *not at all* to 5 = *a lot*).

Relationship satisfaction. Participants rated the extent to which they felt “satisfaction,” “closeness,” and “love” in their relationship each day on 5-point scales (1 = *not at all* to 5 = *a lot*), which were averaged to index daily relationship satisfaction ($R_c = .90$).

Follow-up measures. At the 3-month follow-up, participants completed the same measures of satisfaction ($\alpha = .93$) and commitment ($\alpha = .88$) assessed at baseline, and a similar measure of perceived care as assessed daily (i.e., “I feel cared about/loved/connected in my relationship”).

Results

Means, standard deviations, and zero-order correlations for the variables are presented in Table 7. We tested the daily effects of the partner’s gratitude expression on the association between attachment insecurity and relationship satisfaction with identical models as in Studies 3 and 4. We ran two models, first using perceived partner gratitude expression, and then using partner-reported gratitude expression.

The buffering effects of the partner’s gratitude expressions: Within-person level. When we ran the first model examining the effects of perceiving a partner’s gratitude expression, the cross-level interaction between perceived partner gratitude expression and attachment avoidance was significant (see Table 8). Specifically, the negative effect of attachment avoidance on daily satisfaction was significantly weaker on days when participants perceived high levels (+1 *SD*) of partner gratitude expression, $b = -0.16$, $SE = 0.06$, $p = .01$, than on days they perceived low levels (–1 *SD*), $b = -0.29$, $SE = 0.06$, $p < .001$ (see Figure 5). Region of significance tests showed that the negative association between attachment avoidance and satisfaction was not significant when participants perceived more than 1.43 *SD* above the average level of partner gratitude expressions they reported across the diary period.

Table 8 shows that there was also a significant interaction between perceived partner gratitude expression and attachment anxiety, indicating that the negative effect of attachment anxiety on daily satisfaction was significantly weaker on days when participants perceived high levels (+1 *SD*) of partner gratitude expression, $b = -0.03$, $SE = 0.06$, $p = .62$, compared with days when they perceived low levels (–1 *SD*), $b = -0.15$, $SE = 0.06$, $p = .006$ (see Figure 5). Region of significance tests showed that the negative association between attachment anxiety and satisfaction was not significant when participants perceived gratitude expressions at least 0.17 *SD* below their average.

When we estimated the same model with the partner’s report of their own gratitude expression, however, neither the interaction between the partner’s gratitude expression and attachment avoidance nor attachment anxiety was significant (see Table 8).

Discriminant analyses. As in Studies 3 and 4, we explored the possibility that insecurely attached individuals’ own experience of gratitude can buffer their low daily relationship satisfaction. Re-

sults showed that the interaction between own gratitude experience and attachment avoidance was marginally significant, $b = 0.06$, $SE = 0.03$, $p = .07$, such that the negative effect of attachment avoidance on satisfaction was weaker on days when participants felt high levels (+1 *SD*) of gratitude toward the partner, $b = -0.07$, $SE = 0.07$, $p = .32$, compared with days when they felt low levels (–1 *SD*) of gratitude, $b = -0.34$, $SE = 0.08$, $p < .001$. The interaction between own gratitude experience and attachment anxiety was also significant, $b = 0.07$, $SE = 0.03$, $p = .02$, such that the negative link between attachment anxiety and satisfaction was significant on days when they felt low levels (–1 *SD*) of gratitude, $b = -0.18$, $SE = 0.07$, $p = .009$, but not significant on days when participants felt high levels (+1 *SD*) of gratitude toward the partner, $b = -0.07$, $SE = 0.06$, $p = .32$.

However, given that the effects of feeling grateful and perceiving a partner’s gratitude expression may be closely related (e.g., projection; Lemay et al., 2007), we additionally ran a model in which both the effects of own gratitude experience and perceived partner gratitude expression were included. The results showed that in this model, neither the interaction between own gratitude experience and attachment avoidance, $b = -0.03$, $SE = 0.03$, $p = .36$, nor the interaction between own gratitude experience and attachment anxiety, $b = 0.005$, $SE = 0.03$, $p = .88$, was significant. Instead, the interactions between perceived partner gratitude expression and attachment avoidance, $b = 0.06$, $SE = 0.03$, $p = .01$, and the interaction between perceived partner gratitude expression and attachment anxiety, $b = 0.08$, $SE = 0.03$, $p = .004$, remained significant. In other words, feeling grateful did not have significant benefits above and beyond the effects of perceiving a partner’s gratitude expressions.

We also examined whether another relationship behavior that is considered as relationship-promotive, physical affection, can have effects similar to those of perceived partner gratitude expression. When we ran our original model with perceived physical affection in place of perceived partner gratitude expression, we found no significant interaction with attachment avoidance, $b = 0.004$, $SE = 0.02$, $p = .88$, or attachment anxiety, $b = -0.01$, $SE = 0.02$, $p = .80$, suggesting that high levels of physical affection did not attenuate insecurely attached individuals’ daily dissatisfaction.

Moderated mediation analyses. Next, we examined whether higher perceptions of the partner’s care underlie the interaction between daily perceived partner gratitude expression and attachment insecurity. We ran two models, one in which we entered perceived partner gratitude expression, attachment avoidance and attachment anxiety, as well as interactions between perceived partner gratitude expression and each attachment dimension as predictors of perceived care, and the other with perceived care

⁷ We refer to the item, “I feel cared about/loved/connected in my relationship” as perceived care for simplicity and based on our preliminary evidence that perceiving a partner’s care may indeed be what the item captures. Specifically, in Study 2, participants also responded to this item along with items assessing perceived communal strength, which is closely tied to feelings of being cared for and valued (Lemay & Neal, 2013). Our results indicate that the two constructs were highly correlated ($r = .75$, $p < .001$), and the mediation findings in Study 2 also did not change when we replaced perceived communal strength with perceived care. Overall, there was strong support for the convergent validity of the one-item measure used in this study, and the conceptual similarity between our mediation models in Studies 2 and 5.

Table 7
Descriptive Statistics and Correlations Among Variables (Study 5)

Variable	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6	7	8	9	10
Background measures											
1. Attachment avoidance	2.04 (.56)	—									
2. Attachment anxiety	2.82 (.61)	.13	—								
3. Relationship satisfaction	6.01 (.88)	-.33**	-.12	—							
4. Relationship commitment	6.12 (.91)	-.32**	-.05	.49**	—						
Diary measures											
5. Perceived partner gratitude expression	3.35 (.88)	-.24**	-.18*	.39**	.43**	—					
6. Partner's gratitude expression	3.34 (.85)	-.10	-.08	.24**	.24**	.53**	—				
7. Perceived care	3.48 (.84)	-.31**	-.24**	.40**	.43**	.84**	.53**	—			
8. Relationship satisfaction	3.67 (.75)	-.35**	-.23**	.49**	.50**	.83**	.51**	.86**	—		
Follow-up measures											
9. Perceived care	3.69 (1.08)	-.20*	-.13	.27**	.33**	.42**	.25**	.43**	.43**	—	
10. Relationship satisfaction	5.65 (1.21)	-.24**	-.26**	.55**	.28**	.38**	.28**	.41**	.45**	.59**	—
11. Relationship commitment	5.97 (1.01)	-.36**	-.14	.56**	.71**	.46**	.25**	.51**	.53**	.52**	.62**

Note. All items were measured using 5-point scales except for relationship satisfaction and commitment measured at background and follow-up, which were measured using 7-point scales. Correlations do not take the dyadic structure of the data into account, and within-person averages across the diary are used for the daily variables.

* $p < .05$. ** $p < .01$.

included in addition to the other variables as a predictor of satisfaction. Monte Carlo methods based on 20,000 simulated resamples (Selig & Preacher, 2008) were used to generate confidence intervals for the indirect effect of the interaction between perceived gratitude expression and each attachment dimension on satisfaction via perceived care.

In a model predicting daily perceived care (see Table 9), the interaction between daily perceived partner gratitude expression and attachment avoidance was significant. As plotted in Figure 5, the negative link between attachment avoidance and perceived care was weaker on days of high (+1 *SD*) perceived partner gratitude expression, $b = -0.14$, $SE = 0.07$, $p = .04$, compared with days of low (-1 *SD*) perceived partner gratitude expression, $b = -0.25$, $SE = 0.07$, $p < .001$. Region of significance tests indicated that the negative link between attachment avoidance and perceived care was not significant when participants perceived more than 1.06 *SD* above the average level of partner gratitude expressions they reported across the diary period. Similarly, the interaction between perceived partner gratitude expression and

attachment anxiety was significant (see Table 9), such that the negative link between attachment anxiety and perceived care was weaker on days of high (+1 *SD*) perceived partner gratitude expression, $b = -0.05$, $SE = 0.06$, $p = .41$, compared with days of low (-1 *SD*) perceived partner gratitude expression, $b = -0.22$, $SE = 0.06$, $p < .001$ (see Figure 5). Region of significance tests indicated that the negative link between attachment anxiety and perceived care was not significant when participants perceived more than 0.27 *SD* above the average level of partner gratitude expressions they reported across the diary period.

More importantly, the confidence intervals for the indirect effect of the interaction between perceived partner gratitude expression and attachment avoidance on satisfaction via perceived care did not include zero, 95% CI [0.0002, 0.05]. That is, the link between attachment avoidance and low satisfaction through low perceived care was significant but weaker on days of high (+1 *SD*) perceived partner gratitude expression, 95% CI [-0.10, -0.002], compared with days of low (-1 *SD*) perceived partner gratitude expression, 95% CI [-0.14, -0.04]. A similar pattern of results was found for

Table 8
The Effects of Attachment Insecurity and Perceived Partner Gratitude Expression on Daily Relationship Satisfaction (Study 5)

Measure	Perceived partner gratitude expression					Partner-reported gratitude expression				
	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β
Attachment avoidance	-.22	-3.83	<.001	[-.34, -.11]	-.12	-.39	-4.47	<.001	[-.55, -.22]	-.22
Attachment anxiety	-.09	-1.76	.08	[-.19, .01]	-.05	-.20	-2.48	.01	[-.35, -.04]	-.12
Within-person effects										
Gratitude expression	.56	35.81	<.001	[.53, .59]	.45	.23	10.45	<.001	[.16, .30]	.18
Gratitude Expression \times Attachment Avoidance	.08	3.12	.002	[.01, .12]	.04	-.03	-.75	.46	[-.13, .04]	-.01
Gratitude Expression \times Attachment Anxiety	.08	3.11	.002	[.01, .11]	.04	.04	.96	.34	[-.02, .14]	.02
Between-person effects ^a										
Gratitude expression	.66	16.83	<.001	[.58, .73]	.55	.40	7.01	<.001	[.29, .51]	.34
Gratitude Expression \times Attachment Avoidance	.21	3.16	.002	[.08, .34]	.10	.10	.91	.36	[-.11, .31]	.05
Gratitude Expression \times Attachment Anxiety	-.08	-1.38	.17	[-.20, .03]	-.04	.03	.35	.72	[-.16, .22]	.02

^a Aggregates across the diary are used for the gratitude expression.

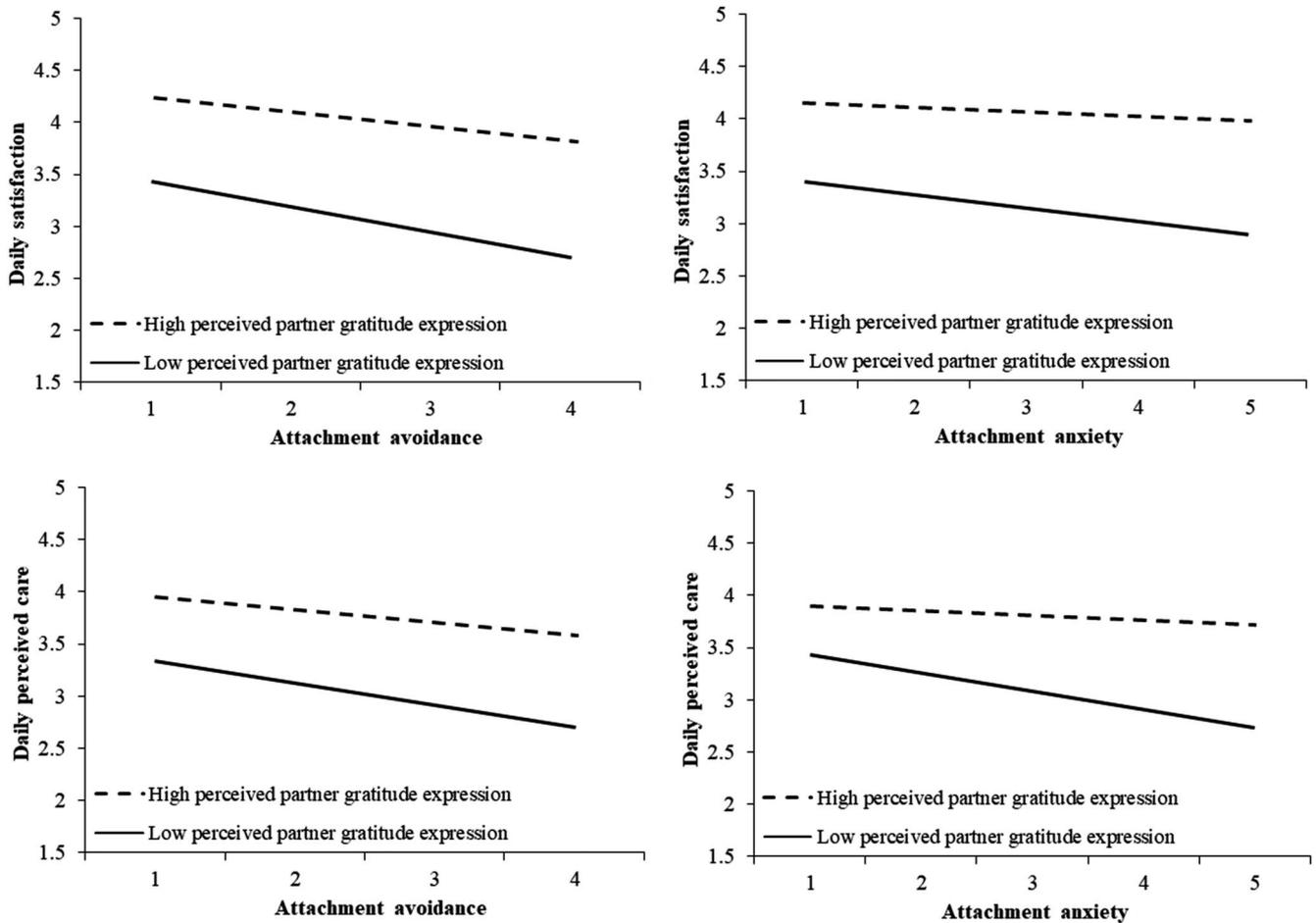


Figure 5. The moderating effect of perceived partner gratitude expression on the link between attachment insecurity and daily satisfaction/perceived care (Study 5). The values on the x axis represent the observed range of participants' attachment insecurity. High and low values represent 1 SD above and below the mean.

attachment anxiety, 95% CI [0.01, 0.05]. The link between attachment anxiety and low satisfaction through low perceived care was not significant on days of high (+1 SD) perceived partner gratitude expression, 95% CI [-0.06, 0.03], but was significant on days of low (-1 SD) perceived partner gratitude expression, 95% CI [-0.13, -0.04]. These findings suggest that insecurely attached individuals (i.e., those high in attachment avoidance and/or anxiety) felt more cared for by their partner on days they perceived more gratitude expressions from the partner, which in turn was associated with higher satisfaction.

The buffering effects of the partner's gratitude expressions: Between-person level. As shown in Table 8, we also found a significant interaction between the aggregate of perceived partner gratitude expressions and attachment avoidance predicting daily satisfaction (i.e., at the between-person level). Specifically, and as depicted in Figure 6, for those who perceived low levels (-1 SD) of gratitude expression from their partner on average, the effect of attachment avoidance on daily satisfaction was significantly negative, $b = -0.41$, $SE = 0.09$, $p < .001$. For those who perceived high levels (+1 SD) of gratitude expression from a partner, however, this effect was not significant, $b = -0.03$, $SE = 0.08$, $p =$

.65. Region of significance tests indicated that the negative link between attachment avoidance and satisfaction was not significant if the average level of perceived gratitude expression was at least 0.54 SD above the sample mean. The interaction between the aggregate of perceived partner gratitude expression and attachment anxiety was not significant. Lastly, and as shown in Table 8, the interaction with neither attachment avoidance nor anxiety was significant at the between-person level when partner-reported gratitude expressions were used.

Discriminant analyses. Next, we examined whether feeling a lot of gratitude on average can have the same buffering effects as that of perceiving gratitude expressions from a partner. In a model with own gratitude experience in place of perceived partner gratitude, the interaction between the aggregate of own gratitude experience and attachment avoidance was significant, $b = 0.21$, $SE = 0.07$, $p = .003$, suggesting some evidence that at the between-person level, feeling grateful had a similar effect as perceiving a partner's gratitude expression. Specifically, the effect of attachment avoidance on satisfaction was significant at low levels (-1 SD) of gratitude experience, $b = -0.50$, $SE = 0.11$, $p < .001$, but not at high levels (+1 SD), $b = -0.09$, $SE = 0.08$, $p = .30$.

Table 9
Summary of Moderated Mediation Analyses at the Daily Level (Study 5)

Measure	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β
Daily perceived care					
Attachment avoidance	-.19	-3.02	.003	[-.32, -.07]	-.09
Attachment anxiety	-.14	-2.40	.02	[-.25, -.03]	-.07
Within-person effects					
Perceived partner gratitude expression	.43	21.94	<.001	[.39, .47]	.32
Perceived Partner Gratitude Expression \times Attachment Avoidance	.06	1.94	.05	[-.001, .13]	.03
Perceived Partner Gratitude Expression \times Attachment Anxiety	.10	3.26	.001	[.04, .16]	.05
Between-person effects ^a					
Perceived partner gratitude expression	.77	18.34	<.001	[.69, .85]	.59
Perceived Partner Gratitude Expression \times Attachment Avoidance	.17	2.31	.02	[.03, .31]	.07
Perceived Partner Gratitude Expression \times Attachment Anxiety	.04	.66	.51	[-.09, .17]	.02
Daily satisfaction					
Attachment avoidance	-.14	-2.71	.01	[-.25, -.04]	-.08
Attachment anxiety	-.03	-.73	.47	[-.12, .06]	-.02
Within-person effects					
Perceived partner gratitude expression	.40	26.14	<.001	[.37, .44]	.33
Perceived Partner Gratitude Expression \times Attachment Avoidance	.06	2.61	.01	[.01, .10]	.03
Perceived Partner Gratitude Expression \times Attachment Anxiety	.04	1.68	.09	[-.01, .08]	.02
Perceived care	.37	21.96	<.001	[.34, .41]	.28
Between-person effects ^a					
Perceived partner gratitude expression	.33	5.39	<.001	[.21, .45]	.28
Perceived Partner Gratitude Expression \times Attachment Avoidance	.14	2.29	.02	[.02, .26]	.07
Perceived Partner Gratitude Expression \times Attachment Anxiety	-.10	-1.94	.05	[-.21, .001]	-.05
Perceived care	.43	6.47	<.001	[.30, .56]	.35

^a An aggregate across the diary is used for perceived partner gratitude expression.

However, as in the within-person effects, when we additionally ran a model with effects of both own gratitude experience and perceived partner gratitude included, the interaction between the aggregate of perceived partner gratitude expression and attachment avoidance (i.e., our key effect) was significant, $b = 0.21$, $SE = 0.10$, $p = .05$, but the interaction between the aggregate of gratitude experience and attachment avoidance was not, $b = -0.01$, $SE = 0.09$, $p = .88$. This suggests an overlap between the observed effects of feeling grateful and of perceiving a partner's gratitude expression, but that it is the latter that indeed has stronger and unique effects on attenuating avoidantly attached individuals' daily dissatisfaction.

Lastly, there was no evidence for the interaction between the aggregate of physical affection and attachment avoidance, $b = 0.07$, $SE = 0.07$, $p = .29$.

Moderated mediation analyses. We next examined whether higher perceptions of the partner's care underlie the buffering effects of aggregated perceived partner gratitude expression. As shown in Table 9, the interaction between the aggregate of perceived partner gratitude expression and attachment avoidance significantly predicted daily perceptions of care. Specifically, the negative effect of attachment avoidance on perceived care was significant for those who perceived lower levels (-1 SD) of gratitude expression on average, $b = -0.34$, $SE = 0.10$, $p < .001$,

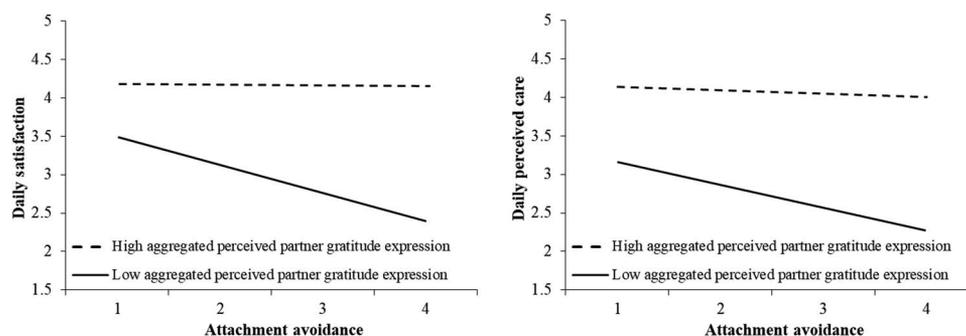


Figure 6. The moderating effect of perceived partner gratitude expression aggregated over the diary period on the link between attachment avoidance and daily satisfaction (Study 5). The values on the x axis represent the observed range of participants' attachment avoidance. High and low values represent 1 SD above and below the mean.

but not for those who perceived higher levels ($+1 SD$), $b = -0.04$, $SE = 0.08$, $p = .61$ (see Figure 6). Region of significance tests indicated that the negative link between attachment avoidance and perceived care was not significant if the average level of perceived gratitude expression was $0.44 SD$ above the sample mean.

Importantly, the confidence intervals for the indirect effect of the interaction between the aggregate of perceived partner gratitude expression and attachment avoidance on satisfaction via perceived care did not include zero, 95% CI [0.01, 0.12], indicating the same pattern as was found at the within-person level. Specifically, the link between attachment avoidance and low satisfaction through low perceived care was significant for people perceiving low levels of ($-1 SD$) partner's gratitude expression on average, 95% CI [-0.20, -0.05], but not for those perceiving high levels ($+1 SD$), 95% CI [-0.07, 0.04]. The interaction between the aggregate of perceived partner gratitude expression and attachment anxiety on perceived care was not significant (see Table 9), and neither was the moderated mediation model, 95% CI [-0.03, 0.06].

Summary of the daily effects. In Study 5, we found the predicted effects of perceived partner gratitude expression on avoidantly attached individuals' daily satisfaction at both the within- and between-person levels. Specifically, avoidantly attached individuals' dissatisfaction was attenuated on days when they perceived that their partner appreciated them to a greater degree or if such perceptions were high on average across the diary period. The daily effects of perceiving a partner's gratitude expression on avoidantly attached individuals' satisfaction were partly explained by its link to perceptions of feeling cared for by the partner. Although there was some evidence that one's own grateful feelings can have similar effects, they did not have effects above and beyond the benefits of perceiving a partner's gratitude expression. Perceiving physical affection also did not serve the same buffering role as did perceptions of partner gratitude expression. On the other hand, findings for attachment anxiety were mixed in that although we found evidence for the buffering effects of perceiving a partner's gratitude expression as well as mediation via perceived care at the within-person level, there was no evidence for the buffering effects at the between-person level.

Importantly, none of the buffering effects was observed when using the partner's report of expressing gratitude at the within-person or between-person level. Together with the results from Studies 3 and 4, our findings indicate a discrepancy between analyses using perceptions of partner's gratitude expression and partner's self-reports of gratitude expressions. One possible explanation for this discrepancy may be that people's perceptions are not precise reflections of reality (assuming that the partner reports reflect reality; see Fletcher & Kerr, 2010)—that is, people may not accurately pick up on their partner's gratitude expressions. In fact, previous research suggests that this (in)accuracy in detecting a partner's behavior may even vary depending on attachment insecurity (Overall, Fletcher, Simpson, & Fillo, 2015). To clarify the connections between perceptions and partner's reports and understand what, more precisely, is buffering the negative effects of insecurity, we conducted additional analyses examining whether people can accurately detect changes in a partner's daily gratitude expressions, and if attachment insecurity is associated with (in)accurate perceptions.

Alternatively, however, it is possible that inaccuracy in tracking a partner's gratitude expressions is not a major contributor to the discrepancy in the results using perceived partner gratitude and the partner's own reports of gratitude. Even if people can accurately track their partner's gratitude expressions, it might be more difficult to find significant buffering effects using the partner's reports than perceptions because partner-reported gratitude expressions are arguably a more distal variable that is drawn from a different person. That is, perceptions are likely to have more direct effects on one's own satisfaction than the partner's reports. One way to test this possibility is to examine whether the partner's expression can indirectly buffer the negative effects of attachment insecurity via participants' perceptions. As such, we also tested whether a partner's reports of daily gratitude expression are associated with perceptions of a partner's gratitude expression, which in turn buffer the negative effects of attachment insecurity.

Additional analyses.

Can people accurately detect a partner's daily gratitude expression? To examine accuracy and bias in people's perceptions of a partner's gratitude expression, we used the Truth and Bias model (Stern & West, 2018; West & Kenny, 2011). This model allows us to examine two forms of accuracy: directional bias (i.e., mean-level differences in an individual's perceived and a partner's self-reported gratitude expression) and tracking accuracy (i.e., correspondence between the two reports; see also Lemay et al., 2006). This model also allows us to take into account the possibility of projection bias (i.e., projection of one's own gratitude expression that day onto the judgment), which is critical given that insecurely attached individuals are likely to differ in their own emotional expression from less insecure individuals (Winterheld, 2016).

We first modeled people's perceptions of partner gratitude expression as a function of (a) the partner's self-reported gratitude expression and (b) the perceiver's own gratitude expression. All variables were centered by subtracting the mean of the partner's self-reported gratitude expression (i.e., mean of the *truth*) for each person. Thus, the intercept is interpreted as the mean-level difference between an individual's perceived partner gratitude expression and their partner's self-reported gratitude expression, or the degree to which an individual over- or underperceives the partner's gratitude expression. The coefficient for the partner's reports is interpreted as tracking accuracy, or the degree to which an individual's perceptions and the partner's reports correlate. The coefficient for the perceiver's own expression is interpreted as projection bias, or the degree to which an individual projects their own gratitude expression onto judgment about their partner's expressions.

Our results showed that there was no significant directional bias, $b = 0.04$, $SE = 0.03$, $p = .23$, suggesting that the average levels of gratitude expressions that individuals perceive and their partner's report on their gratitude were not significantly different. There was significant tracking accuracy, $b = 0.17$, $SE = 0.02$, $p < .001$, suggesting that people can accurately pick up on their partner's gratitude expressions to some extent. Lastly, significant projection bias, $b = 0.74$, $SE = 0.02$, $p < .001$, suggested that individuals' perceptions are also highly influenced by their own gratitude expressions that day.

To examine the effects of perceivers' attachment insecurity on each index of accuracy and bias, attachment avoidance and anxiety

as well as their interactions with each predictor were included in the model. As shown in Table 10, the results showed that there were no significant effects involving attachment avoidance, suggesting that avoidantly attached individuals did not differ from those lower in attachment avoidance in the extent to which they over- or underperceive a partner's gratitude expression, track it, or report it based on their own daily expressions. However, attachment anxiety was associated with directional bias, such that there was a tendency to overperceive a partner's gratitude expression at low levels of attachment anxiety, $b = 0.11$, $SE = 0.04$, $p = .006$, but not at high levels, $b = -0.03$, $SE = 0.04$, $p = .48$. However, attachment anxiety was not significantly associated with tracking accuracy, suggesting that individuals high in attachment anxiety were no different from those low in attachment anxiety in the degree to which they track daily variations in the partner's gratitude expressions.

Combined, these results indicate that people were tracking their partner's gratitude expressions with some degree of accuracy regardless of their levels of attachment insecurity. This argues against the possibility that the effects we found with perceived partner gratitude are entirely reflections of the perceiver's motivated cognition (Lemay & Clark, 2015), such that highly satisfied perceivers were driven to perceive more gratitude expressions that may not be necessarily grounded in reality. Based on these results, we next examined whether it is the case that partner-reported gratitude expressions can indeed buffer the negative impact of attachment insecurity, but being a less proximal variable to the self, its contribution is mediated through perceptions.

Can partner-reported gratitude expressions indirectly buffer the negative effects of attachment insecurity via perceptions?

To examine the possibility that partner-reported gratitude expressions are associated with perceived gratitude expression at a daily level, which in turn interacts with attachment insecurity to predict daily satisfaction (i.e., within-person buffering effects), we ran two models: (a) a model predicting perceived partner gratitude expression with partner-reported gratitude expression, and (b) a model in which daily satisfaction is regressed on perceived gratitude expression and its interactions with attachment insecurity, as well as a partner-reported gratitude expression and its interactions with attachment insecurity.

Our results from the first model showed that a partner's daily reports of gratitude expression significantly predicted perceptions

of the partner's gratitude expression, $b = 0.31$, $SE = 0.03$, $p < .001$. In the second model, we found that both the within-person interaction between perceived partner gratitude expression and attachment avoidance, $b = 0.08$, $SE = 0.04$, $p = .05$, and between perceived partner gratitude expression and attachment anxiety, $b = 0.08$, $SE = 0.03$, $p = .003$, were significant. When we tested whether there is an indirect effect of partner-reported gratitude expression on the buffering effects via perceptions using Monte Carlo simulations, the confidence interval did not include zero both for attachment avoidance, 95% CI [0.01, 0.04], and attachment anxiety, 95% CI [0.01, 0.04], providing evidence for the indirect effects.

These results suggest that partner-reported gratitude expressions indeed made a contribution to the buffering effects we observed. Specifically, daily partner-reported gratitude expressions were related to daily perceptions of a partner's gratitude expressions, which in turn buffered the negative impact of attachment insecurity. Combined with the results from the Truth and Bias analyses, these results suggest that the differences in the daily effects of perceptions and partner's reports do not necessarily indicate drastically diverging perspectives about the same behavior. Rather, they suggest that perceptions are likely to be a more proximal variable than partner reports and thus, their effects are stronger and more easily captured.

Follow-up analyses: The long-term buffering effects of partner's gratitude expressions.

In our last set of analyses, we examined the long-term benefits of perceiving gratitude expressions from a partner or having a partner who reported expressing a lot of gratitude. Specifically, we examined whether perceived partner or partner-reported expressions of gratitude during the diary period (averaged across days) can prevent insecurely attached individuals from experiencing declines in satisfaction or commitment over the next three months. We ran separate models predicting follow-up satisfaction and commitment with the aggregate of (perceived or partner-reported) partner gratitude expression, attachment avoidance and attachment anxiety, and interactions between the aggregate and each attachment dimension. We also included the same relationship variable at baseline (e.g., baseline satisfaction in a model predicting satisfaction at follow-up) to capture the effect of the moderators on changes in relationship quality over time.

Table 10
The Effects of Attachment Insecurity on Accuracy and Bias in Perceptions of Partner Gratitude Expressions (Study 5)

Measure	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β
Directional bias	.04	1.43	.15	[-.02, .10]	.01
Tracking accuracy	.18	9.33	<.001	[.14, .21]	.12
Projection bias	.75	43.69	<.001	[.71, .78]	.72
Effect of perceiver's attachment avoidance					
Directional bias	-.01	-.21	.84	[-.11, .09]	-.01
Tracking accuracy	.01	.22	.83	[-.06, .08]	.003
Projection bias	.02	.56	.58	[-.04, .07]	.01
Effect of perceiver's attachment anxiety					
Directional bias	-.12	-2.44	.02	[-.21, -.02]	-.06
Tracking accuracy	.05	1.40	.16	[-.02, .12]	.02
Projection bias	-.01	-.29	.77	[-.06, .05]	-.005

Perceived partner gratitude expression. As presented in Table 11, the interaction between the aggregate of perceived partner gratitude expression over the course of the diary and attachment avoidance predicting relationship satisfaction at the 3-month follow-up was not significant. However, this interaction was significant in the expected direction in a model predicting follow-up commitment. Specifically, and as plotted in Figure 7, there was a significant negative effect of attachment avoidance on follow-up commitment at low levels (-1 SD) of perceived partner gratitude, $b = -0.49$, $SE = 0.20$, $p = .02$, but this effect was not significant at high levels ($+1$ SD), $b = 0.03$, $SE = 0.17$, $p = .84$. Region of significance tests indicated that the effect of attachment avoidance on commitment was not significant if the level of aggregated perceived partner gratitude expression was higher than at least 0.15 SD below the sample mean. In other words, perceiving a lot of gratitude from their partner buffered avoidantly attached individuals from experiencing decreases in commitment to their relationship over time. The interactions between the aggregate of perceived partner gratitude expression and attachment anxiety predicting both follow-up satisfaction and commitment were not significant (see Table 11).

Partner-reported gratitude expression. We also repeated the same analyses using the aggregate of the partner-reported gratitude expression in place of perceived partner gratitude expression. Table 11 shows that the interaction between partner's gratitude expression over the course of the diary and attachment avoidance was not significant with follow-up satisfaction or commitment as an outcome. However, we additionally explored the possibility that partner-reported expression can indirectly buffer the effects of attachment avoidance via perceptions as was the case at the daily level. Specifically, given that there was a significant interaction between perceived partner gratitude expression and attachment avoidance predicting commitment (see Table 11), we examined whether partner-reported gratitude expressions can indirectly attenuate the effect of attachment avoidance on declines in commitment via perceived gratitude expressions. We tested a model predicting aggregated perceived gratitude expression from aggregated partner-reported gratitude expression, and another model in

which commitment is regressed on aggregated perceived gratitude expression and its interactions with attachment insecurity, as well as aggregated partner-reported gratitude expression and its interactions with attachment insecurity. The first model showed that aggregated partner-reported gratitude expression significantly predicted aggregated perceived gratitude expression, $b = 0.92$, $SE = 0.04$, $p < .001$. In the second model, however, the interaction between aggregated perceived gratitude expression and attachment avoidance was not significant, $b = 0.28$, $SE = 0.17$, $p = .10$. When we tested whether there is an indirect effect of partner-reported gratitude expression on the buffering effects via perceptions using Monte Carlo simulations, the confidence interval included zero, 95% CI $[-0.05, 0.57]$, suggesting that the discrepancies in the long-term effects of the partner's gratitude expression depending on the source of the reports may not be due to the fact that perceptions are more proximal as was the case for daily effects.

On the other hand, Table 11 shows that the interaction between the aggregate of partner's gratitude expression and attachment anxiety was significant in a model predicting follow-up satisfaction. As illustrated in Figure 8, the negative effect of attachment anxiety on follow-up satisfaction was significant at low levels (-1 SD) of partner's gratitude expression, $b = -0.64$, $SE = 0.19$, $p = .001$, but not at high levels ($+1$ SD), $b = 0.14$, $SE = 0.18$, $p = .45$. Region of significance tests showed that attachment anxiety did not predict decreases in satisfaction if the level of aggregated partner-reported gratitude expression was higher than 0.002 SD above the sample mean.

A similar pattern (although not significant, $p = .06$; Table 11) was found in a model predicting follow-up commitment, such that the negative effect of attachment anxiety on follow-up commitment was significant at low levels (-1 SD) of partner's gratitude expression, $b = -0.39$, $SE = 0.16$, $p = .02$, but not at high levels ($+1$ SD), $b = 0.04$, $SE = 0.15$, $p = .77$ (see Figure 8). Region of significance tests showed that attachment anxiety did not predict decreases in commitment if the level of aggregated partner-reported gratitude expression was at least 0.20 SD below the sample mean. Overall, our results indicate

Table 11
The Effects of Attachment Insecurity and Partner's Gratitude Expression on Follow-Up Satisfaction and Commitment (Study 5)

Measure	Perceived partner gratitude expression					Partner's gratitude expression				
	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β	<i>b</i>	<i>t</i>	<i>p</i>	95% CI	β
Satisfaction at follow-up										
Baseline satisfaction	.52	4.21	<.001	[.28, .76]	.52	.50	4.28	<.001	[.27, .72]	.50
Gratitude expression	.17	1.48	.14	[-.06, .40]	.13	.27	2.37	.02	[.05, .49]	.20
Attachment avoidance	-.16	-.96	.34	[-.48, .17]	-.12	-.25	-1.67	.10	[-.55, .04]	-.18
Attachment anxiety	-.22	-1.59	.11	[-.50, .05]	-.10	-.23	-1.81	.07	[-.48, .02]	-.11
Gratitude Expression \times Attachment Avoidance	.23	1.26	.21	[-.13, .59]	.12	.05	.28	.78	[-.33, .44]	.03
Gratitude Expression \times Attachment Anxiety	-.001	-.005	.99	[-.31, .31]	-.001	.46	2.80	.006	[.14, .78]	.46
Commitment at follow-up										
Baseline commitment	.70	6.97	<.001	[.50, .89]	.70	.78	8.48	<.001	[.60, .96]	.78
Gratitude expression	.17	1.94	.05	[-.002, .35]	.14	.06	.71	.48	[-.11, .24]	.05
Attachment avoidance	-.22	-1.66	.10	[-.47, .04]	-.18	-.21	-1.67	.11	[-.46, .05]	-.17
Attachment anxiety	-.11	-1.01	.32	[-.32, .10]	-.06	-.17	-1.62	.13	[-.37, .05]	-.09
Gratitude Expression \times Attachment Avoidance	.30	2.04	.04	[.01, .59]	.17	.23	1.44	.15	[-.08, .54]	.13
Gratitude Expression \times Attachment Anxiety	.09	.70	.49	[-.16, .33]	.09	.25	1.90	.06	[-.01, .51]	.25

Note. Aggregates across the diary period are used for the gratitude expression.

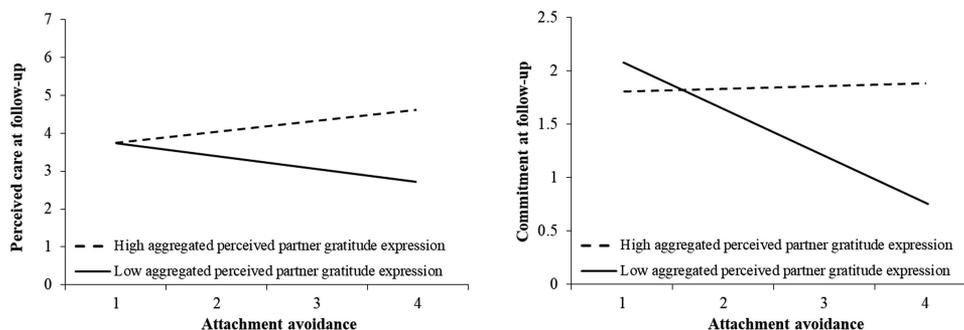


Figure 7. The moderating effect of perceived/partner-reported partner gratitude expression aggregated over the diary period on the link between attachment avoidance and perceived care/commitment at follow-up (Study 5). The values on the x axis represent the observed range of participants' attachment avoidance. High and low values represent 1 *SD* above and below the mean.

that in contrast to the daily effects, it was a partner's reports of having expressed a lot of gratitude, rather than participants' perceptions of receiving it, that can weaken the negative effect of attachment anxiety (on satisfaction and commitment) in the long-term. Together with the finding that the indirect buffering effect of partner-reported gratitude expression via perception for attachment avoidance was not significant in the long-term, these results suggest that the differences in the long-term effects of partner-reported and participants' perceived gratitude expression may require different explanations than for the differences in the daily effects.

Alternative explanations. Next, we attempted to rule out two potential alternative explanations for our effects that involve stable qualities of insecurely attached individuals or their partners. Namely, it is possible that individuals who are more agreeable or those who have partners who are more agreeable experience less steep declines in the relationship quality associated with insecurity and coincidentally also receive more gratitude expressions from the partner during the diary period.

First, when we included the interactions between participants' and partners' agreeableness in the original model using perceived gratitude expression predicting follow-up commitment, the interaction between attachment avoidance and perceived partner gratitude expression remained significant, $b = 0.36$, $SE = 0.16$, $p =$

.03, but the other interactions involving attachment avoidance was not significant ($b = -0.005$, $SE = 0.26$, $p = .99$, for the interaction between participants' agreeableness and attachment avoidance; $b = -0.06$, $SE = 0.19$, $p = .75$, for the interaction between partners' agreeableness and attachment avoidance).

Second, when we included the interactions between participants' and partners' agreeableness in the original model using partner-reported gratitude expression predicting follow-up satisfaction, the interaction between partner-reported gratitude expression and attachment anxiety remained significant, $b = 0.51$, $SE = 0.18$, $p = .006$, but not the other interactions with attachment anxiety ($b = -0.21$, $SE = 0.24$, $p = .38$, for the interaction between participants' agreeableness and attachment anxiety; $b = -0.02$, $SE = 0.32$, $p = .96$, for the interaction between partners' agreeableness and attachment anxiety). In the same model predicting commitment, the interaction between partner-reported gratitude expression and attachment anxiety became weaker, $b = 0.25$, $SE = 0.15$, $p = .09$, with the other interactions included, but there was no evidence that partner-reported gratitude expression interacted with participants' agreeableness, $b = 0.09$, $SE = 0.19$, $p = .62$, or partners' agreeableness, $b = -0.09$, $SE = 0.25$, $p = .72$. These findings suggest that our effects cannot be attributed to participants' or partners' agreeableness.

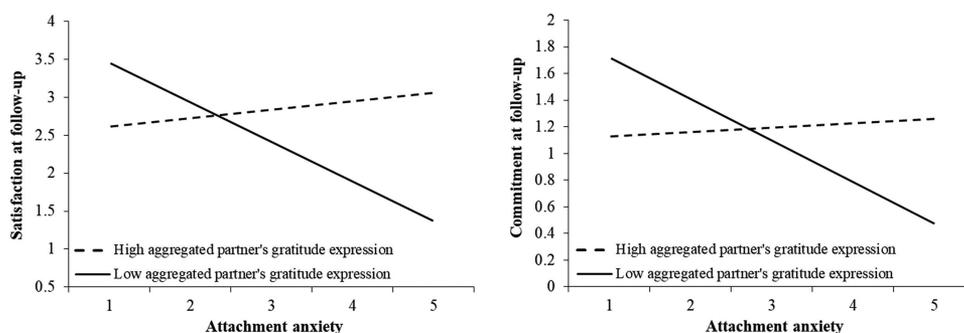


Figure 8. The moderating effect of perceived/partner-reported partner gratitude expression aggregated over the diary period on the link between attachment anxiety and satisfaction/commitment at follow-up (Study 5). The values on the x axis represent the observed range of participants' attachment anxiety. High and low values represent 1 *SD* above and below the mean.

Moderated mediation analyses at follow-up. Finally, we examined whether higher perceptions of partner’s care at the follow-up underlie the long-term benefits of partner’s gratitude expression on insecurely attached individuals’ relationship quality. Two models were estimated, one predicting perceived care measured at follow-up with the aggregate of perceived partner gratitude expression, attachment insecurity, and the interactions between the two, and the other predicting follow-up commitment with follow-up perceived care added as a predictor to the first model. Full results are presented in Table 12.

In a model predicting perceived care at follow-up, the interaction between the aggregate of perceived partner gratitude expression and attachment avoidance was significant, such that the negative effect of attachment avoidance on perceived care after three months was weaker among those who perceived high levels (+1 SD) of partner gratitude expression during the diary period, $b = 0.13$, $SE = 0.20$, $p = .52$, than those who perceived low levels (−1 SD), $b = -0.58$, $SE = 0.21$, $p = .01$ (see Figure 7). Region of significance tests indicated that attachment avoidance was not related to low perceived care at follow-up if the level of aggregated perceived partner gratitude expression was at least 0.17 SD below the sample mean.

We then used Monte Carlo simulations (Selig & Preacher, 2008) to generate a confidence interval for the indirect effect of the interaction between the aggregate of perceived partner gratitude expression and attachment avoidance on follow-up commitment via follow-up perceived care, and found that it did not include zero, indicating a significant moderated mediation effect, 95% CI [0.02, 0.28]. Specifically, attachment avoidance was associated with low perceived care and thus low commitment at the follow-up for those who perceived low levels (−1 SD) of partner gratitude expression over the diary period, 95% CI [−0.39, −0.04], but this was not the case for those who perceived high levels (+1 SD), 95% CI [−0.09, 0.19]. Furthermore, although the interaction between the aggregate of perceived partner gratitude expression and attachment avoidance on follow-up satisfaction was not significant, we tested the possibility that the indirect effect of attachment avoidance on follow-up satisfaction via follow-up perceived care was conditional on the average level of perceived partner gratitude expression. We found a similar pattern of results as commitment, 95% CI [0.04, 0.45]. Specifically, attachment avoidance was associated with low perceived care and thus low satisfaction at the follow-up for those who perceived low levels (−1 SD) of partner gratitude expression over the diary period, 95% CI [−0.60, −0.08], but this was not the case for those who perceived high levels (+1 SD), 95% CI [−0.15, 0.33]. These results indicate that heightened feelings of being cared for by a partner underlie the long-term benefits of perceiving high levels of partner’s gratitude expression on average.

We also ran parallel analyses to examine whether higher perceptions of the partner’s care also underlie the effects of aggregated partner’s gratitude expression on anxiously attached individuals’ follow-up satisfaction or commitment. However, the interaction between partner gratitude expression and attachment anxiety predicting perceived care at follow-up was not significant, $b = 0.27$, $SE = 0.21$, $p = .19$, and the moderated mediation tests were not significant for satisfaction, 95% CI [−0.19, 0.21], or commitment, 95% CI [−0.06, 0.32].

Table 12
Summary of Moderated Mediation Analyses at the Follow-Up (Study 5)

Measure	Perceived care at follow-up			Satisfaction at follow-up			Commitment at follow-up			
	b	t	p	b	t	p	b	t	p	
Perceived partner gratitude expression	.45	4.42	<.001	.45	.07	.54	.06	.25	.02	[.05, .45]
Attachment avoidance	−.21	−1.46	.15	−.17	−.26	.10	−.20	−.50	<.001	[−.77, −.23]
Attachment anxiety	−.03	−.25	.80	−.02	−.20	.15	−.09	−.04	.76	[−.28, .20]
Perceived Partner Gratitude Expression × Attachment Avoidance	.41	2.41	.02	.23	.03	.83	.02	.45	.006	[.14, .77]
Perceived Partner Gratitude Expression × Attachment Anxiety	−.04	−.25	.80	.04	.11	.70	.10	−.07	.61	[−.34, .20]
Perceived care at follow-up				.57	5.34	<.001	.57	.32	<.001	[.14, .50]

Note. An aggregate across the diary period is used for perceived partner gratitude expression.

Discussion

The daily findings from Study 5 indicated that perceiving high levels of gratitude expressions from a partner was associated with greater daily satisfaction for avoidantly attached individuals both at the within-person (i.e., perceiving higher than typical levels of gratitude expressions) and between-person (i.e., perceiving high levels of gratitude expressions on average across the diary period) levels. Similar buffering effects were found for anxiously attached individuals at the within-person level, although not at the between-person level. Further, the moderated mediation analyses showed some (minimal) evidence that the buffering effects of perceiving gratitude expression for both avoidantly and anxiously attached individuals can be partly explained by higher feelings of being cared for by a partner. That is, these individuals felt more cared for, and thus more satisfied on days when they perceived higher than typical levels of gratitude expressions. These findings are consistent with our prediction that perceiving gratitude expressions can benefit insecurely attached individuals' relationship by allowing them to infer greater caring motivation from a partner. Although we did not find any significant effects using the partner's own reports of expressing gratitude at a daily level, our additional analyses suggested that partner-reported gratitude expressions can indirectly contribute to the buffering effects through participants' perceptions of the gratitude expressions.

Further, our follow-up data suggested that perceiving a partner's gratitude expression also conferred long-term benefits for avoidantly attached individuals. Specifically, among those who perceived high levels of gratitude expression from their partner on average, the negative effect of attachment avoidance on feelings of being cared for by a partner at the 3-month follow up was significantly reduced, which in turn contributed to higher satisfaction and commitment. None of these effects was found when the partner's reports of expressing gratitude were used. Overall, our results provide evidence that perceiving a partner's gratitude expression can be beneficial for avoidantly attached individuals' relationship both in the short-term and the long-term.

On the other hand, our long-term findings for attachment anxiety showed a different pattern from the daily findings. Specifically, although we found that perception of a partner's gratitude expression was a more proximal variable that buffered anxiously attached individuals from experiencing daily dissatisfaction, it was a partner's average level of expressing gratitude, rather than the participant's average level of perception, that buffered them from experiencing lower satisfaction and commitment three months later. These results suggest an important difference between the short-term and long-term processes of buffering attachment anxiety. Although we are careful to interpret these findings without replications, one possible explanation is that while perceptions which are more proximal than partner's reports are more likely to capture the effects of a partner's gratitude expressions on anxiously attached individuals' daily satisfaction, the long-term benefits, ironically, may be better captured by measures that are in fact *less* proximal, and *less* precise a reflection of what anxious people have detected. Specifically, despite the immediate positive effects, perceptions of a partner's positive signals may also be imbued with some ambivalence among anxiously attached individuals (Bartz & Lydon, 2006), which prevent them from providing long-term benefits. However, a partner's reports of gratitude expressions are less

of a direct measure of what has been detected by these individuals, and thus, are more likely to capture any long-term effects the gratitude expressions can have. In fact, just as a partner's behavior that goes unnoticed in the moment can manifest as being helpful over the long-term (Girme, Overall, & Simpson, 2013), it might be the case that the partner's reports are indeed more precisely getting at the gratitude expressions that work under the radar of anxiously attached individuals. Overall, our results provide evidence for the positive effects of a partner's gratitude expressions (when assessed as perceptions in the short-term and using partner's reports in the long-term) on anxiously attached individuals although the differences depending on the source of the reports require more in-depth investigations.

Meta-Analysis Across Studies

We conducted a meta-analysis across studies to assess the robustness of the interactions between attachment insecurity and both the partner's gratitude expression and perceived partner gratitude expression. We used the metafor package in R (Viechtbauer, 2010) to run a multilevel meta-analytic model. We first calculated standardized effect sizes for the effects within each study (i.e., combination of source of the gratitude expression reports, attachment dimension, and outcome variable as shown in Table 1), and ran separate models to derive estimates with 95% confidence intervals. Because three of our studies used diary data, we distinguished the level of analysis when drawing the effect sizes from the studies (i.e., within-person or between-person effects). At the between-person level, three effect sizes were available for perceived gratitude expression predicting satisfaction (Studies 1, 2, and 5), two for perceived gratitude expression predicting commitment (Studies 1, 2), and two for the partner's gratitude expression predicting satisfaction (Studies 3 and 4). At the within-person level, we had more than one effect size only for partner-reported gratitude expression predicting satisfaction.⁸

Perceived Partner Gratitude Expression

As shown in Table 13, the overall interaction effect between perceived partner gratitude expression and attachment avoidance was significant when predicting satisfaction. Specifically, the overall effect of attachment avoidance on satisfaction which was significantly negative at low levels (+1 *SD*) of perceived partner gratitude expression, $\beta = -0.37$, $z = -3.65$, $p = <.001$, 95% CI [-0.57, -0.17], was not significant at high levels (+1 *SD*) of perceived partner gratitude expression, $\beta = -0.19$, $z = -1.60$, $p = .11$, 95% CI [-0.43, 0.04]. On the other hand, the overall interaction effect between perceived partner gratitude expression and attachment anxiety predicting satisfaction was not significant. Also, when we ran the same models predicting commitment, the interaction between perceived partner gratitude expression and neither attachment avoidance, $\beta = 0.07$, $z = 0.68$, $p = .50$, 95% CI [-0.14, 0.28], nor anxiety was significant, $\beta = -0.04$, $z = -0.87$, $p = .38$, 95% CI [-0.12, 0.05].

⁸ Although we did not include the long-term effects in the meta-analysis as they may reflect processes distinct from short-term or correlational effects (Simpson & Overall, 2014), including the long-term effects from Study 5 do not change the results of the meta-analysis.

Table 13
A Summary of Meta-Analysis on the Interaction Effects Between Gratitude Expressions and Attachment Insecurity on Satisfaction Across Studies 1–5

Measure	Perceived ^a				Partner-reported ^b			
	β	z	p	95% CI	β	z	p	95% CI
Attachment avoidance	.09	4.01	<.001	[.05, .13]	.02	.38	.70	[–.07, .10]
Attachment anxiety	.03	.52	.60	[–.07, .12]	.03	1.08	.28	[–.02, .07]

Note. Perceived = Perceived partner gratitude expression; Partner-reported = Partner's self-reported gratitude expression.

^a Effects from Studies 1 and 2 and between-person effects from Study 5 were included. ^b Between-person effects from Studies 3 and 4 were included.

Partner's Gratitude Expression

As shown in Table 13, none of the interactions was significant at the between-person level with the partner-reported gratitude expression used as a moderator, again suggesting that perceptions may be the more powerful buffer of attachment insecurity. When we ran separate models at the within-person level, there was also no evidence for a significant effect ($\beta = 0.02$, $z = -1.02$, $p = .31$, 95% CI [–0.02, 0.05], for the interaction between partner's gratitude expression and attachment avoidance, and $\beta = 0.01$, $z = -1.18$, $p = .24$, 95% CI [–0.01, 0.03], for the interaction between partner's gratitude expression and attachment anxiety). Taken together, the meta-analytic effects demonstrate that there was evidence for the benefits of *perceiving* gratitude expressions from the partner for avoidantly attached individuals' relationship satisfaction.

General Discussion

Gratitude is a powerful positive emotion that serves to strengthen relationship bonds (Algoe, 2012). In the present research, we examined whether partners' expressions of gratitude, or perceptions of them, can have positive effects on insecurely attached individuals' romantic relationships. Results from a meta-analysis (using three independent effect sizes) provided evidence that perceiving a partner's expressions of gratitude can help buffer avoidantly attached individuals from experiencing their typically low levels of satisfaction. However, perceived partner gratitude did not have the same effects on anxiously attached individuals' satisfaction, suggesting that perceptions of a partner's gratitude expressions may be specific to buffering the negative effects associated with attachment avoidance. Below, we discuss findings for attachment avoidance and attachment anxiety in detail in separate sections.

Buffering Attachment Avoidance

Across the five studies, attachment avoidance was strongly related to low satisfaction and commitment, as found in previous studies (Li & Chan, 2012). However, perceiving that the partner expresses gratitude at a higher frequency or to a greater degree attenuated the negative associations between attachment avoidance and relationship satisfaction (Studies 1, 2, and 5). Further, among individuals who perceive higher levels of partner's gratitude expression, the negative link between attachment avoidance and commitment was weaker concurrently (Study 1) and longitudinally

(Study 5). Our results indicate that avoidantly attached individuals were more likely to view their partner as high in communal strength if they perceived their partner to express more gratitude, and this in turn contributed to high levels of both satisfaction and commitment (Study 2). Similarly, the daily and long-term benefits of perceiving high levels of gratitude expression were partly explained by avoidantly attached individuals' heightened perceptions of a partner's care (Study 5). Taken together, our findings indicate that perceptions of a partner's gratitude expressions can play a protective role against the detrimental effects of attachment avoidance on relationship quality, partly because these perceptions can assure avoidant individuals that their partner does care for them.

The present findings represent a novel approach to examining how avoidantly attached individuals can benefit from relationship maintenance functions of gratitude (Gordon et al., 2012). Past studies have focused on avoidantly attached individuals' infrequent experiences of gratitude or these experiences being tainted with distrust in others' intentions (Mikulincer et al., 2006; Zhang et al., 2017). These studies imply that these individuals are less likely to garner the relational benefits from experiencing gratitude. However, by focusing on avoidantly attached individuals as the person receiving a partner's gratitude rather than feeling their own gratitude, our research suggests that gratitude can indeed be beneficial in these individuals' romantic relationships. When perceived from a partner, gratitude expressions can be taken as a sign of the partner's communal motivation by avoidantly attached individuals, allowing them to remain relatively satisfied and committed to the relationship. The buffer against experiencing daily dissatisfaction for avoidantly attached individuals was also a unique effect of perceiving a partner's gratitude expression that was not found with avoidants' own experiences of gratitude (Studies 3 and 4) or was stronger than any effect found with their own experiences (Study 5). As such, the current research extends previous findings and makes important and novel contributions to the literatures on gratitude and attachment insecurity.

These findings also contribute to the literature on the regulation of attachment avoidance (Simpson & Overall, 2014) by adding to the few studies that have examined buffering effects outside of stressful contexts (e.g., being requested to change; Overall et al., 2013). In particular, we extend recent research on the effects of a partner's daily positive behaviors (Stanton et al., 2017) in minimizing the negative affect associated with attachment avoidance by adding specificity to it and identifying one particular behavior, expressing gratitude, which can be beneficial. Although it should be noted that many of our findings were specific to *perceiving* a

partner's gratitude expressions (despite some evidence for an indirect daily buffering effect of a partner's actual expression in Study 5; and direct buffering of partner's expression in Studies 3 and 4), narrowing the focus of the investigation to a specific behavior is important especially in light of seemingly contradictory findings showing that signals of intimacy can backfire for avoidantly attached individuals (Spielmann et al., 2013). For example, some studies have found that avoidantly attached individuals show less favorable attitudes toward (Santascioy, Burke, & Dovidio, 2018) and less romantic interest in (Spielmann et al., 2013) people who they expect to provide more opportunities for intimacy. Other studies demonstrating benefits of a partner's pro-relationship behavior, such as support provision for avoidantly attached individuals, have also found them to be conditional on different factors such as the level or type of support provision (Girme, Overall, Simpson, & Fletcher, 2015; Simpson, Winterheld, Rholes, & Oriña, 2007), highlighting the complexity of the buffering process and the need for specificity when studying it.

Nevertheless, several aspects of a partner's gratitude expression should make perceptions of gratitude an effective buffer against attachment avoidance despite being a signal of intimacy that is theoretically unsettling to avoidantly attached individuals (Kafetsios et al., 2014; Spielmann et al., 2013). The most important and unique aspect of gratitude expression is that it does not hamper the sense of autonomy that avoidant individuals highly value (Mikulincer & Shaver, 2016). That is, gratitude expressions can be perceived as communicating the partner's willingness to care about and be responsive to one's needs, an essential ingredient for the buffering of attachment avoidance, while not involving a highly intimate, relationship-focused conversation that avoidantly attached individuals might avoid (Tan, Overall, & Taylor, 2012). In fact, the knowledge that they can effectively satisfy their partner's needs and that their partners are no longer in need cannot only preserve avoidant individuals' immediate sense of independence in their relationship, but also help them to view intimacy and partner dependence as less burdensome. This contrasts with other conventionally positive behaviors a partner can enact that were tested in the current studies (sacrifice and support in Studies 3 and 4, physical affection in Study 5), which did not consistently buffer the negative effects of attachment avoidance.

It is also important that we tested the theoretical mechanism underlying the buffering of attachment avoidance and found support for it in two studies. Study 2 showed that the effects of perceiving partners' gratitude expressions could be partly explained by avoidantly attached individuals' higher perceptions of their partner's communal strength. That is, they were more likely to believe that the partner was willing to incur costs to care and respond to their needs. In a similar vein (see footnote 7), Study 5 showed that greater feelings of being cared for by the partner underlie the buffering effect of partners' gratitude expressions. Perceiving more gratitude expressions provided greater feelings of care to avoidantly attached individuals, which in turn were associated with higher daily satisfaction. Perceiving more gratitude expressions on average also was associated with higher perceptions of care three months later, which in turn were associated with higher satisfaction and commitment. Although the mediation effects were not very large (particularly at the daily level), they were consistent with theory (Simpson & Overall, 2014) and provided support for our predictions.

A common theme across the mediation findings is that avoidantly attached individuals who perceived a lot of gratitude expressions were likely to view their partner as someone upon whom they can rely for care. These tests of the theoretical mechanism are particularly noteworthy as they suggest that a partner's gratitude expression might have even longer-lasting effects and be able to reduce attachment avoidance over time. Arriaga and colleagues (2018) argued that although strategies such as being sensitive to avoidantly attached individuals' autonomy needs (e.g., providing instrumental instead of emotional support; Simpson et al., 2007) can indeed help prevent immediate negative reactions, it is by helping them to adopt a more positive model of others (i.e., addressing their deep-rooted distrust of others) that partners can ultimately reduce their insecurity and improve their relationship quality over the long-term. If perceived gratitude expressions confer benefits for avoidantly attached individuals' relationships by conveying the partner's care, thereby challenging their negative working models, they can potentially shift these individuals toward greater security over the course of the relationship and contribute to the maintenance of high-quality relationships. Our evidence for the long-term benefits of partners' gratitude expressions for avoidantly attached individuals' commitment in Study 5 adds support to this possibility, although changes in attachment security were not examined in our research and warrant future investigation.

Another way to understand our findings is that perceiving a partner's gratitude expressions can assist avoidantly attached individuals through processes of transformation of motivation (Kelley & Thibaut, 1978), whereby they come to move from pursuing self-interest to promoting the well-being of a partner or a relationship. Although avoidantly attached individuals are not predisposed to take such a prorelationship perspective (Burnette, Davis, Green, Worthington, & Bradfield, 2009; Overall et al., 2015), perceiving an expression of gratitude from which they can infer the partner's care may ultimately enhance their own communal strength and allow them to inhibit their automatic impulses to act in their own self-interest (Perunovic & Holmes, 2008). In the long run, their repeated engagement in prorelationship behaviors should theoretically lead to an increase in commitment (Wieselquist, Rusbult, Foster, & Agnew, 1999), which is precisely what we found in Study 5.

This perspective also helps us to understand why perceiving a partner's gratitude expression prevented a decline in avoidantly attached individuals' commitment over time, but not a decline in their satisfaction. Processes underlying changes in commitment (i.e., transformation of motivation) do not necessarily accompany similar changes in affective evaluations of the relationship because they are not always pleasant experiences. Specifically, people feel ambivalent about foregoing self-interest and accommodating their partner's needs (Righetti & Impett, 2017) because failing to meet their own needs or fulfill their own goals can be frustrating (Deci & Ryan, 2000), and those who perceive greater goal conflict with a romantic partner indeed tend to report poorer relationship quality (Gere & Schimmack, 2013). In other words, relationship-enhancing processes that can contribute to an increase in commitment (e.g., adjusting personal goals to align with the partner's goals; Gere & Impett, 2018) may ironically involve forces that decrease satisfaction. Thus, future research with a longer follow-up period may be required to document possible effects of

perceiving a partner's gratitude expression on these individuals' gradual changes in relationship satisfaction.

Buffering Attachment Anxiety

We also found some evidence that perceiving higher levels of partner's gratitude expressions has benefits for anxiously attached individuals, although the findings were more nuanced than they were for avoidantly attached individuals in several ways. Attachment anxiety was not as strongly related to low satisfaction (Study 1), and to low perceived communal strength among individuals who perceived higher levels of gratitude expressions, which contributed to greater satisfaction and commitment (Study 2). Perceiving high levels of partner's gratitude expression also attenuated the negative effects of attachment anxiety on daily satisfaction (Study 5). When combined, however, the overall buffering effect was significant only when we incorporated the effects of perceiving high levels of partner's gratitude expression within an individual rather than across individuals, introducing some need for caution in interpreting the results.

Furthermore, Study 5 showed an interesting pattern that while perceiving a partner's gratitude expression had positive effects on anxiously attached individuals' daily satisfaction, it was the partner's own reports, and not the participants' perceptions, with which we found long-term benefits for anxiously attached individuals' satisfaction and commitment. These findings highlight the differences underlying short-term and long-term buffering processes. Specifically, previous work has demonstrated that anxiously attached individuals react strongly to others' behaviors or evaluations (Srivastava & Beer, 2005). For example, these individuals tend to be responsive to intimate interpersonal signals (e.g., positive facial expressions; Donges et al., 2012), and their daily relationship satisfaction tends to be closely tied to their partner's positive behaviors (Gosnell & Gable, 2013). As such, the rewarding nature of a partner's gratitude expression and the positive message that it delivers can benefit anxiously attached individuals' relationship satisfaction immediately, and these effects are likely to be captured by the extent to which these individuals *perceived* the expressions.

On the contrary, the perceptions may not be needed, and in fact, may interfere with capturing the long-term benefits of a partner's gratitude expressions because they are likely to be also imbued with ambivalence. For example, anxiously attached individuals may harbor suspicions about the authenticity of their partner's gratitude expressions as they do not believe in their own ability to effectively help the partner (Collins & Feeney, 2000), or they may worry about living up to the partner's expectations (Lackebauer & Campbell, 2012) to not lose their feelings of being valued. That is, because people who are uncertain about their value to their partner strive to make themselves indispensable (Murray et al., 2009), anxiously attached individuals are likely to be vigilant to cues of their instrumentality toward their partner. Thus, when their partner expresses gratitude, they may recognize the signal of caring motivation, but simultaneously worry that they may need to continuously make efforts to secure the partner's dependence or to gain their partner's appreciation (e.g., be willing to sacrifice; Impett & Gordon, 2010). Given such ambivalence involved in processing expressions of gratitude, partner's reports that are not precisely reflecting the degree to which anxiously attached indi-

viduals have detected them may be a stronger moderator when it comes to the long-term effects of receiving a partner's gratitude expressions. Nevertheless, the differences in the results depending on the source of the gratitude reports as well as depending on the time frame require replication and in-depth investigations in future research.

Another noteworthy finding was that the processes by which a partner's gratitude expressions buffered against poor long-term relationship outcomes associated with attachment anxiety did not seem to involve higher perceptions of partner's care as was the case for the short-term buffering (which was found with the perceived partner gratitude expression). In fact, high levels of partner's gratitude expressions (both perceptions and partners' reports) did not enhance anxiously attached individuals' perceptions of being cared for by the partner at the follow-up. Considering that we found support for an equivalent mechanism at a daily level, it is unlikely that gratitude expressions fail to make these individuals feel cared for. Rather, the failure to capture the mechanism through perceived care might be a reflection of anxiously attached individuals' unstable perceptions of their partner's care or responsiveness. Indeed, considering that *stability* in perceptions of partner's responsiveness is as important in regulating attachment anxiety as the average level of the perceptions is in regulating attachment avoidance (Gunaydin, Selcuk, Urganci, & Yalcintas, 2018), it might be worthwhile to examine whether receiving a partner's gratitude expression can help anxiously attached individuals to maintain their satisfaction and commitment over the long-term by gradually stabilizing their fluctuating perceptions of their partner's care.

Lastly, it is possible that the processes underlying the long-term regulation of attachment anxiety would ideally also accompany gradual changes in the negative model of self (Arriaga et al., 2018). Although anxiously attached individuals typically evaluate their own caregiving as less helpful than it actually is (i.e., objectively judged; Collins & Feeney, 2000) and feel unappreciated after giving support (Jayamaha, Girme, & Overall, 2017), consistently receiving reassurance and appreciation from their partner should help them to realize that they can and have successfully helped their partner, allowing them to feel adequate and self-confident over time. In other words, it is likely that a partner's gratitude expressions can reduce fundamental self-doubts underlying anxiously attached individuals' rejection concerns and boost their feelings of security. With more self-confidence, perceiving a partner's gratitude expressions might be associated with less ambivalence, and may confer similar long-term benefits as the partner's gratitude expressions. As our research did not explicitly test these ideas and changes in attachment anxiety take time, the role of the partner's gratitude expressions in reducing attachment anxiety merits further investigations over a longer period time.

Limitations and Future Research Directions

One important direction for future research is to examine whether there are particular ways of expressing gratitude that are more or less likely to buffer insecurely attached individuals from experiencing low relationship satisfaction and commitment. Although the present research did not look at *how* partners expressed (or were perceived to express) gratitude, unpacking the gratitude expression and examining what element is essential in meeting

insecurely attached individuals' needs and successfully delivering the affectionate message will be important. For example, the other-praising feature of gratitude expression (i.e., highlighting the praiseworthy features of the actions and the benefactor's personal qualities related to the actions; Algoe et al., 2013) may be a key to convey the positive message without triggering avoidantly attached individuals' defenses as its focuses on the person (i.e., benefactor) and the actions are compatible with these individuals' pursuit of feelings of competence and self-sufficiency (Vogel & Wei, 2005). On the contrary, some expressions such as those focusing too much on the self-benefit aspect (i.e., highlighting the benefits avoidantly attached individuals' acts brought to the self; Algoe et al., 2013) may even backfire by reinforcing avoidantly attached individuals' doubt about their partner's good will and specifically, exploitation intentions. Similarly, there may be different ways of tailoring gratitude expressions to meet anxiously attached individuals' needs that contribute to the buffering effects. For example, gratitude expressions highlighting the benefits received that may be uncomfortable for avoidantly attached individuals may be effective in assuring anxiously attached individuals of their relational value and enhancing their fragile feelings of self-worth. Distinguishing specific types of gratitude expressions that are beneficial also carries practical implications considering that despite some degree of accuracy, there is indeed a discrepancy in the two partners' perceptions of the same behavior (one's gratitude expression). If there are certain aspects of the expressions that allow the two perspectives to align more closely, or put differently, that make them easier for the insecure partner to pick up on, such information could be useful and applicable in therapeutic settings.

Future studies should also take a closer look at the contextual factors associated with gratitude expressions. Specifically, considering the situational contingencies of gratitude expressions, such as the nature of the behavior that elicited the expressions, can further help translate our findings into practical applications. For example, for anxiously attached individuals who are willing to go to great lengths to please their romantic partner (Impett & Peplau, 2002), gratitude expressions in response to small favors that were not costly for them, thus were not anticipated, might induce fear. Not only can receiving appreciation that they do not feel that they deserve be perceived as insincere and ingratiating (McAdams & Bauer, 2004), it can also elicit worries from anxious individuals that someone else might easily replace them and receive a similar message of communal responsiveness from their partner. In contrast, avoidantly attached individuals might particularly enjoy the easily earned gratitude as it signals to them that their partner's needs can be met in ways that are not overly taxing or threatening to avoidant individuals' needs for autonomy.

In addition, although our research focused on perceiving a partner's gratitude expressions, examining how *not* perceiving them plays a role in insecurely attached individuals' relationships can also broaden our understanding of the present findings. Because anxiously attached individuals consistently seek reassurance from others (Wei, Mallinckrodt, Larson, & Zakalik, 2005), they are likely to have higher expectations and cravings for their partner's expressions of gratitude in general (although receiving them can leave them in ambivalence). Accordingly, the failure to receive recognition from the partner (i.e., failure to get the anticipated social reward; MacDonald, 2009) can be particularly hurtful for these individuals and affect their perceptions of the partner's care

as much as receiving recognition does. Perhaps, this can also explain why perceiving high levels of partner's gratitude expression did not necessarily heighten anxiously attached individuals' feelings of being cared for at follow-up; the extent to which they failed to receive the gratitude expressions that they expected during the diary period should also be taken into account. On the other hand, avoidantly attached individuals who may not have high expectations for their partner's gratitude expressions may be not as reactive to the partner's lack of appreciation efforts. In fact, it might be that a partner's gratitude expressions serve as a powerful buffer against attachment avoidance particularly because avoidant individuals do not have expectations for the communal response. In other words, when perceived, the gratitude expressions can be a simple reminder of the communal nature of the relationship that avoidant individuals are not predisposed to expect.

Lastly, it is important to note that our research focused on the context of romantic relationships. That is, the present findings do not suggest that gratitude expressions in other relationship contexts will help bonding with insecurely attached individuals or even convey the same signal of communal responsiveness without resistance. Romantic relationships are communal relational contexts (Clark, Armentano, Boothby, & Hirsch, 2017) in which even insecurely attached individuals are susceptible to perceive the beneficiary's caring motivation from an expression of gratitude. Gratitude expressions in other relationship contexts such as first interactions (Williams & Bartlett, 2015) may not relay the same message as a romantic partner's expression does to insecurely attached individuals. Also, the participants examined in the present studies were those involved in a romantic relationship, which possibly represent a sample that is more receptive to affective messages. However, as there is also an argument to be made that being in a romantic relationship heightens defensive inattention to intimate signals (Kafetsios et al., 2014), the issue of relationship status in generalizing our findings is complex and may be challenging to address.

Conclusion

As well-represented in William James' saying, "the deepest principle in human nature is the craving to be appreciated," perceiving an expression of gratitude from others can be a powerful and fulfilling experience. The results of the present research indicate that perceiving a partner's gratitude expression is associated with reduced negative effects of attachment avoidance on satisfaction in romantic relationships. These findings highlight the interpersonal and attachment implications of gratitude experiences. Partners' expression of their grateful feelings, when perceived, may serve as a simple yet effective reminder of the communal nature of the relationship, and specifically, partner's care for oneself, that can help avoidantly attached individuals' relationships.

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