DOES RUMINATION HAVE ADVERSE INTERPERSONAL CONSEQUENCES?
A TEST OF AN EMOTION-DYSREGULATION EXTENSION TO STRESS-
GENERATION THEORY IN DEPRESSION

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Abstract

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Stress-generation theory posits that depressed individuals behave in ways that cause stress in their relationships, reducing the quality of social support available to them and thereby maintaining their symptoms. The present study proposes an extension to the existing stress-generation framework to include emotion dysregulation as a precursor to interpersonal stress. In a sample of 135 pairs of same-sex friends, I conducted an experimental test of two predictions: first, that individuals induced to ruminate will be rated poorer in interpersonal functioning during a discussion with a friend than individuals induced to distract themselves; and second, that friends will ruminate more during discussions with individuals induced to ruminate versus distract themselves. These predictions could not be tested adequately due to failure of the emotion-regulation manipulation to produce differential levels of negative mood. Exploratory analyses revealed that higher state rumination predicted lower subsequent state rumination in friends.
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CHAPTER 1:
INTRODUCTION

Major depressive disorder affects 350 million people worldwide and is greatly distressing not only to those with the condition but also to associates of depressed people (World Health Organization, 2016). In the United States, approximately one in six individuals experiences a major depressive episode in his or her lifetime (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). According to the World Health Organization, depression is the world’s foremost cause of disability and is a leading cause of suicide (American Association of Suicidology, 2014; World Health Organization, 2016). Individuals who have been depressed previously are at high risk for another depressive episode, and the disorder is not only recurrent but also long-lasting (Solomon et al., 2000).

Treatments for depression commonly target cognitive, behavioral, and interpersonal factors. Cognitive-behavioral therapy (CBT; Beck, Rush, Shaw, & Emery, 1979) is among the most efficacious treatments for depression. Cognitions are targeted in CBT, which aims to change depressed individuals’ schemas and underlying core beliefs by challenging their thoughts (Beck, 2011). Behaviors are also targeted in CBT, as individuals learn to engage in activities that provide feelings of pleasure and mastery (Beck, 2011). Interpersonal psychotherapy (Klerman, Weissman, Rounsaville, &
Chevron, 1984) is another of the most effective psychotherapies for depression (Cuijpers et al., 2011), with at least one meta-analysis showing it to be superior to CBT (Feijo De Mello, De Jesus Mari, Bacaltchuk, Verdelli, & Neugebauer, 2005). Interpersonal psychotherapy aims to improve depressed individuals’ social relationships (Klerman et al., 1984). Relationship problems, particularly those related to interpersonal loss or rejection, have been shown to lead to depressive symptoms (Kendler, Hettema, Butera, Gardner, & Prescott, 2003; Slavich, O’Donovan, Epel, & Kemeny, 2010).

In addition to contributing to the development of depression, interpersonal factors also appear to play a role in its maintenance. Even if the precipitating causes of depression are removed, the disorder may persist as long as maintenance factors different from the original causes of depression development remain. Joiner, Coyne, & Blalock (1999) argued that depression is fundamentally an interpersonal disorder, such that it can only truly be understood in an interpersonal context. Joiner and colleagues take the position that the causes of depression are primarily, if not entirely, interpersonal. Not only do interpersonal difficulties lead to depression, but depression also increases the likelihood that individuals will engage in maladaptive interpersonal behaviors, furthering relationship problems. Hammen (1991, 2006) defines the stress experienced subsequent to problematic interpersonal behaviors as “dependent stress,” because the stressors depend on, that is, are generated by, the depressed individual. Stress-generation theory is one of a variety of theories describing interpersonal processes in depression, summarized in the next section.
1.1 Brief overview of interpersonal theories of depression

Hammen’s stress-generation hypothesis was influenced by Coyne’s interactional theory of depression, which proposed that depressed individuals engage in annoying behaviors, such as excessively seeking reassurance from others, leading others to adopt critical and rejecting attitudes toward depressed individuals (Coyne, 1976). Coyne proposed that others reject depressed individuals due to depressed mood “contagion,” whereby depressed moods are transferred to others through social interactions. Tests of Coyne’s theory have shown that depressed individuals indeed tend to elicit negative moods and even depressive symptoms in others, and they tend to face social rejection at higher rates than healthy controls (Joiner, Alfano, & Metalsky, 1992; Joiner & Katz, 1999; Segrin & Dillard, 1992). However, evidence has so far not supported negative-mood contagion as a mechanism by which depression elicits rejection (Joiner et al., 1992; Segrin & Dillard, 1992).

Unlike depression contagion, excessive reassurance seeking has gained support as a mechanism through which depressed individuals elicit rejection from others (Joiner, Alfano, & Metalsky, 1992; Joiner, Metalsky, Katz, & Beach, 1999; Starr & Davila, 2008). In a related manner, depressed individuals also appear to seek negative, rather than reassuring, feedback from others (Giesler, Josephs, & Swann, 1996; Swann, Wenzlaff, Krull, & Pelham, 1992). Integrative models have even been proposed incorporating both excessive reassurance seeking and negative-feedback seeking (Evraire & Dozois, 2011; Joiner, 2000; Joiner, Alfano, & Metalsky, 1993; Swann, Hixon, Stein-Seroussi, & Gilbert, 1990), and a broader model places both types of feedback-seeking behaviors in a stress-generation framework (Liu, 2013).
1.2 The role of cognitive-affective depressive symptoms in interpersonal functioning

Stress generation and other theories agree that depressed people behave in ways that cause their interpersonal relationships to suffer. We may also look beyond these depressive behaviors to the specific symptoms of depression that may increase stress-generating behavior frequency. Depressive symptoms, as defined by the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (American Psychiatric Association, 2013), can be categorized into cognitive-affective symptoms and somatic symptoms (Beck, 1996). In adolescents, the cognitive-affective symptoms, specifically sadness, pessimism, feelings of failure, and guilt, have been shown to be more closely tied to interpersonal dependent stressors than are the somatic symptoms (Harkness & Stewart, 2009). As of yet, these results have not been tested in adult populations.

Beyond establishing behavioral and symptom-based correlates of interpersonal stress, the hypothesis that cognitive-affective symptoms are the primary drivers of stress generation requires investigations of the interpersonal consequences of basic cognitive deficits and affective symptoms. One integrated model (Liu, 2013) designates cognitive risk factors, such as negative attributional style, as causal antecedents of depressogenic interpersonal factors, such as insecure attachment style, feedback-seeking behaviors, and poor interpersonal problem-solving skills. The present study attempts to illuminate a potential link between cognitive style and interpersonal consequences, an area that remains relatively unexplored (Liu, 2013).

To illustrate the impact of basic cognitive and affective deficits on interpersonal relationships, consider that human social interaction is an extremely complicated orchestration requiring coordination among a plethora of verbal and nonverbal processes.
If any one of these processes goes awry during the course of a conversation, we may readily form a negative impression of our conversational partner and rapport may suffer (e.g., Sacco & Dunn, 1990; Szczurek, Monin, & Gross, 2012; Voncken, Alden, Bögels, & Roelofs, 2008). Although a full enumeration and analysis of the dysfunctional processes that could cause social interaction to suffer is beyond the scope of this paper, we can appreciate that there are several ways in which depressed individuals may perform poorly in interpersonal contexts, a phenomenon well documented, for instance, by research on social-skills deficits in depression (Libet & Lewinsohn, 1973; Segrin, 2001). Without becoming mired in the intricacies of interpersonal behavior and social cognition, we can readily establish that, when individuals lack social skills or when interpersonal processes go awry for any of myriad other reasons, loss of social support and other interpersonal issues may ensue (e.g., Carton, Kessler, & Pape, 1999; Flora & Segrin, 1999; Segrin & Flora, 2000).

Through what proximal mechanisms might the specific cognitive and affective deficits seen in depression begin to damage social interaction? Based on previous research, we may formulate several possible answers to this question. Depressed individuals show attentional biases toward negative information (Armstrong & Olatunji, 2012; Donaldson, Lam, & Mathews, 2007; Joormann & Gotlib, 2007; Woody, Owens, Burkhouse, & Gibb, 2016) and negative interpretative biases of stimuli (Mogg, Bradbury, & Bradley, 2006; Rude, Wenzlaff, Gibbs, Vane, & Whitney, 2002; Yoon, Joormann, & Gotlib, 2009). Additionally, depressive rumination is posited to result from difficulty inhibiting negative information in working memory (Joormann, Yoon, & Zetsche, 2007; Koster, De Lissnyder, Derakshan, & De Raedt, 2011; but see Roberts, Watkins, & Wills,
and reduced working-memory capacity (Curci, Lanciano, Soleti, & Rimé, 2013; Hubbard et al., 2015; for a review of cognitive deficits in depression, see Gotlib & Joormann, 2010). These cognitive biases, coupled with persistent negative emotions, may cause depressed individuals to focus on negative topics in conversation with other people. Furthermore, an inability on the part of depressed individuals to disengage from ruminative thinking may result in working-memory capacity loss, impairing their ability to engage in the verbal and nonverbal behaviors required for mutually beneficial social interaction (see Hames, Hagan, & Joiner, 2013, for a review of interpersonal processes in depression).

1.3 Emotion dysregulation in stress generation

If affective symptoms of depression, such as feelings of sadness and guilt, predict stress generation in adults to the same extent they do in adolescents (Harkness & Stewart, 2009), emotion regulation may be a key process in mitigating these affects, thereby limiting any resultant interpersonal stress. Emotion regulation is a process for which there are substantial individual differences in style and ability (John & Gross, 2007), and these individual differences may be importantly tied to depression (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Unlike several more dispositional risk factors for depression, emotion-regulation strategies can be marshalled during short periods of time, including social interactions (Campos, Walle, Dahl, & Main, 2011; Richards, Butler, & Gross, 2003). Together, these facts comprise the rationale for including emotion regulation in stress-generation models, which is that individuals who are able to control their experience and expression of negative emotions during social interactions will be less likely to engage in
the depressive interpersonal behaviors that generate depressogenic stress. Likewise, those who less able to control their experience and expression of negative emotions will generate more stress.

As an extension to the existing stress-generation theoretical literature, I propose that emotion dysregulation contributes to interpersonal-stress generation by increasing the expression of problematic social behaviors, thereby worsening or maintaining depression. On the level of individual differences, individuals with emotion-regulation repertoires that tend to be effective in reducing negative emotional experience while also limiting potential cognitive deficits will tend to form more satisfying, less conflictual interpersonal relationships than those who fail to regulate their emotions or who use less effective strategies, such as rumination, suppression, and avoidance. On the within-person level, the use of effective emotion-regulation strategies will tend to be more adaptive interpersonally than the use of strategies that are ineffective at mitigating negative emotional experience and potential cognitive lapses.

I propose that the mechanism by which emotion dysregulation precipitates stress generation unfolds as follows. First, individuals experience affective symptoms of depression, such as depressed mood, sadness, guilt, and shame. This does not require that these individuals meet diagnostic criteria for major depressive disorder; it merely requires the detectable existence of symptoms. Second, individuals respond to their affective symptoms by regulating them more or less effectively. There are a variety of possible responses to affect, most of which fall under the umbrella of emotion regulation. Most individuals attempt to down-regulate, or reduce, affective symptoms due to their unpleasant nature, but individuals may also occasionally attempt to up-regulate, or
intensify, affective symptoms. These emotion-regulation strategies can be arranged on a dimension of down-regulation effectiveness, which can be operationalized as the extent to which affective symptoms are reduced. Strategies that are ineffective at reducing affective symptoms are referred to here as emotion dysregulation. Effective emotion-regulation results in lower levels of depressive affect and cognitions than does emotion dysregulation. These affects and cognitions produce differential levels of stress-generating behaviors during social interactions, behaviors that remain to be enumerated fully but which may include excessive reassurance seeking, negative-feedback seeking, and co-rumination. Each of these behaviors generates interpersonal stress through its own unique mechanism, resulting in depression worsening or maintenance.

In the sections that follow, I outline support for emotion regulation as a component of stress-generation processes in depression, make predictions based on this theoretical extension, and introduce a test of two predictions derived from the extension. But first, a crucial distinction must be made between adaptiveness and effectiveness as these terms relate to emotion-regulation strategies. Emotion regulation is referred to as adaptive when its habitual use is broadly beneficial to the individual in a particular context (e.g., mental health). That reappraisal and problem-solving are generally adaptive in the mental-health context will be discussed in the next section. However, the adaptiveness or maladaptiveness of emotion-regulation strategies can vary greatly across contexts (McGreevy, Bonanno, & D’Andrea, 2015). For example, distraction was first believed to be a broadly adaptive emotion-regulation strategy, but is now understood to lead to widely different outcomes depending on person, context, and outcome (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Emotion regulation is effective if it is
successful in achieving its intended purpose. A strategy such as suppression can be seen as ineffective as a means of reducing negative emotional experience because it fails to do so, but it is nonetheless effective for concealing one’s emotional expression (Gross, 1998). Suppression can also be seen as ineffective as it relates to memory, because suppression reduces memory for conversational utterances (Richards et al., 2003). Suppression is also maladaptive due to its association with mental disorders (Aldao et al., 2010). The theory presented here proposes that emotion regulation strategies that are effective in reducing the affective symptoms of depression will be more adaptive in an interpersonal context. That is, use of these strategies will lead to higher-quality interpersonal relationships, thereby lessening stress generation and promoting recovery from depression.

1.4 Emotion dysregulation in depression

There is abundant evidence that emotion dysregulation predisposes individuals to become depressed. According to a meta-analysis by Aldao and colleagues (2010), the dispositional emotion-regulation strategies most strongly tied to depressive symptoms are rumination \((r = .55)\), avoidance \((r = .48)\), and suppression \((r = .36)\), all of which have been regarded as maladaptive emotion-regulation strategies (Gross, 1998; Kashdan, Barrios, Forsyth, & Steger, 2006; Nolen-Hoeksema et al., 2008). In contrast, depressive symptoms are negatively associated with the habitual use of such emotion-regulation strategies as problem solving \((r = -.33)\) and reappraisal \((r = -.17)\), which are putatively adaptive and tend to be effective for reducing negative emotional experience (Aldao et al., 2010; Gross, 1998). The link between depression and rumination is particularly
pernicious, with evidence supporting rumination as a strong vulnerability factor for depression (Abela & Hankin, 2011; Nolen-Hoeksema, Larson, & Grayson, 1999; see Farb, Irving, Anderson, & Segal, 2015 for a review showing evidence for a two-factor model of depressive-relapse vulnerability).

1.5 Interpersonal consequences of emotion dysregulation

Emotion-regulation research to date has largely focused on the intrapersonal consequences of different emotion-regulation strategies. Less is known about the interpersonal consequences, but we do know that strategies that are ineffective for reducing negative emotional experience in intrapersonal contexts also tend to be maladaptive interpersonally. Suppression has been shown to lead to undesirable interpersonal outcomes, including reduced rapport, reduced memory for conversation topics, increased negative affect, and heightened cardiovascular arousal in both partners when used during brief dyadic conversations (Ben-Naim, Hirschberger, Ein-Dor, & Mikulincer, 2013; Butler et al., 2003; Richards et al., 2003). Observers judged individuals instructed to suppress their emotional expression as less agreeable and more interpersonally anxious and avoidant than those who were instructed to express their emotions (Tackman & Srivastava, 2016). Avoidance, which is central to coping research and, recently, emotion-regulation research, has also been linked with interpersonal-stress generation. In an important longitudinal study, avoidance coping predicted life stress 4 years later, which predicted depressive symptoms after another 6 years (Holahan, Moos, Holahan, Brennan, & Schutte, 2005), a result that has been replicated (Elliot, Thrash, & Murayama, 2011).
1.5.1 Rumination

Rumination, as the emotion-regulation strategy most closely linked to depression, is a compelling candidate for testing emotion-regulation processes in a stress-generation framework. Studies focusing on rumination as a maintenance factor in depression have typically concentrated on the intrapersonal consequences of rumination, but interpersonal factors could readily contribute to depressive chronicity as well. Because individuals who have a more ruminative response style tend to be depressed for longer (Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema, Morrow, & Fredrickson, 1993), rumination has been cited as a potential self-propagatory interpersonal process in depression, possibly as a precursor to behaviors such as excessive reassurance seeking and negative-feedback seeking (Joiner, 2000; Nolen-Hoeksema, 2000). Rumination has been identified as a mechanism in stress generation in adolescents, with findings suggesting that high levels of rumination lead to subsequent peer victimization (McLaughlin & Nolen-Hoeksema, 2012). Additional tests of the interpersonal consequences of rumination in a stress-generation framework have found that a tendency to ruminate predicts subsequent interpersonal stress and, further, that this effect may be mediated by discontent with one’s social-support network among young adults (Flynn, Kecmanovic, & Alloy, 2010) and by excessive reassurance seeking among early adolescents (Stroud, Sosoo, & Wilson, 2018). Individuals who ruminate more often also seek social support at higher rates than their non-ruminating counterparts (Nolen-Hoeksema & Davis, 1999). Although they tend to benefit from social support, ruminators report receiving less social support than non-ruminators and may also generate other types of social friction (Nolen-Hoeksema & Davis, 1999). Finally, correlational findings indicate that a tendency to ruminate may
mediate the relation between depression and excessive reassurance seeking (Weinstock & Whisman, 2007), which is known to be associated with interpersonal rejection (Joiner et al., 1992; Joiner & Metalsky, 1995; Starr & Davila, 2008), and therefore likely contributes to interpersonal-stress generation.

1.5.2 Contagion

Another interpersonal consequence of rumination may be that it spreads to one’s interaction partner. The tendency to ruminate has been shown to be “contagious” in randomly assigned roommate pairs over a span of months (Haeffel & Hames, 2014).

There is evidence that worry, a repetitive thought pattern similar to rumination, may spread between interaction partners in a matter of minutes (Christensen, 2015). The exact timespan over which rumination spreads between roommates is unclear, and other causes of the contagion phenomenon cannot yet be ruled out. Experimental research could aim to test short-term rumination-contagion effects while attempting to eliminate other possible causes of this phenomenon.

If ruminative speech patterns spread between partners during the span of a normal conversation, then frequent conversations between partners might reinforce longer-term changes in speech and thought patterns. Rumination contagion may then be potentiated by co-rumination, a dyadic behavioral pattern in which conversation partners discuss and dwell on each other’s problems (Rose, 2002). Among adolescents, higher frequency of co-rumination was shown to predict increases in rumination over a 6-month period, which in turn predicted depressive symptoms 6 months later (Stone & Gibb, 2015). These results suggest that repeatedly discussing negative events in one’s life increases the amount of time and mental effort individuals devote to ruminating on negative aspects of
their lives on their own. Though there may be other mechanisms as well, co-rumination may represent an especially plausible mechanism through which rumination contagion occurs.

A final conceptualization can be derived from the analytical rumination hypothesis (Andrews & Thomson, 2009), which posits that rumination is triggered in response to complex social problems in one’s environment and serves an adaptive problem-solving function. If this is the case, then others in the same environment would benefit from detecting the social problem themselves, which could prompt them to look for verbal and nonverbal cues indicating rumination in their interaction partners. If rumination is detected in one’s interaction partner, it could trigger ruminative efforts in oneself to analyze the social problem and possibly generate solutions. This necessitates that the relationship between rumination and interpersonal functioning be bidirectional. Studies have shown that rumination can result from interpersonal stressors (Zoccola, Dickerson, & Lam, 2012; Zoccola, Dickerson, & Zaldivar, 2008).

1.6 Predictions of the proposed extension

To the extent that emotion dysregulation leads to interpersonal-stress generation, then rumination, which is an emotion-regulation strategy common in depression that has been established as both maladaptive (Aldao et al., 2010) and ineffective for reducing cognitive and affective symptoms of depression (Nolen-Hoeksema, 1991), should lead to more interpersonal problems than would alternative strategies, such as distraction, which consistently reduce depressed mood to a greater extent than rumination (Nolen-Hoeksema, 1991; Webb, Miles, & Sheeran, 2012). Indeed, evidence from correlational
studies establishes associations between rumination and various kinds of interpersonal
difficulties. For example, studies show depressive rumination contributing to relationship
dissatisfaction (Pearson, Watkins, Kuyken, & Mullan, 2010) and dysfunctional feedback-
seeking behaviors (Cambron & Acitelli, 2010; Weinstock & Whisman, 2007). In
experimental studies, rumination has also been shown to worsen interpersonal problem-
solving (Donaldson & Lam, 2004; Lyubomirsky & Nolen-Hoeksema, 1995; Watkins &
Moulds, 2005; Yoon & Joormann, 2012) and create less favorable impressions from
strangers (Schwartz & Thomas, 1995) compared to distraction. However, this
experimental line of research was conducted using hypothetical scenarios in which lone
participants interact with imaginary others; whether the phenomenon replicates in real
dyadic and other multi-person contexts is presently unknown.

Although “interpersonal difficulties” represents a broad domain of functioning,
the term “interpersonal” necessitates a system containing at least two individuals, so such
difficulties may arise from either individual in a dyadic interaction. Therefore, a corollary
of the prediction that rumination leads to interpersonal difficulties is that rumination in
one’s interaction partner adds to interpersonal difficulties in the context of that particular
dyadic relationship. If indeed rumination spreads to one’s interaction partner during the
span of a normal conversation, we would also expect partner rumination to contribute to
interpersonal difficulties within the same dyadic relationship. Therefore, I predict that the
interpersonal consequences of one individual’s rumination are amplified due to additional
interpersonal difficulties attributable to rumination contagion and subsequent partner
rumination. When rumination contagion is dampened due to individual or situational
differences, interpersonal consequences should be lessened as well.
1.7 The present study

The present study aims to test the predictions that rumination (1) leads to interpersonal difficulties and (2) is contagious over the course of a normal conversation. In a dyadic within-subjects experiment, target participants were instructed to ruminate or distract themselves following a negative-mood induction. After a 10-minute discussion with a friend, friends’ perceptions of rapport during the discussion, willingness to affiliate further with the target participant, and perception of the target’s worth were assessed. These three constructs have been assessed previously in studies of interpersonal consequences of emotion dysregulation and depressive behaviors (e.g., Butler et al., 2003; Joiner et al., 1992). Each construct captures a unique facet of the short-term interpersonal difficulties that may contribute to stress generation over time. The rapport variable evaluates changes in friends’ perceptions of relationship fit at the present moment. The willingness to affiliate variable captures friends’ instant judgments of whether to spend more or less time with targets in the future. Such judgments may be made by friends and relatives of depressed individuals in response to depressive behaviors, leading to decrements in social support. Stress generation does not always entail a loss in social support, but sometimes consists of increases in interpersonal conflict. Although conflict measures would assess another key aspect of interpersonal distress, conflict was not measured because it was judged that little conflict would be apparent during 10-minute laboratory interactions between friends. Finally, the friend-worth variable encompasses friends’ feelings about targets directly rather than perceptions of relationship fit. Assessing these three constructs in combination will allow for a multifaceted evaluation of interpersonal functioning.
I first hypothesized that experimentally induced rumination would be followed by lower partner-rated scores on measures of rapport, willingness to affiliate, and friend worth than distraction. Second, in a test of the rumination-contagion prediction, I hypothesized that partners’ levels of state rumination would be higher during discussions in which target participants ruminated than during discussions in which target participants distracted themselves. Following from this hypothesis, I further predicted that partner state rumination during discussions would mediate an association between target rumination or distraction and the average of both friends’ rapport, willingness to affiliate, and friend-worth ratings. That is, induced target rumination will spawn rumination in the partner, which will then contribute to lower ratings across the three areas of interpersonal functioning.
CHAPTER 2:

METHOD

2.1 Participants

One hundred thirty-five participants were recruited from two sources. First, 67 participants were recruited from psychology courses at the University of Notre Dame. They received course credit in exchange for their participation. Second, 68 additional participants were recruited from the general community surrounding Notre Dame, Indiana through flyers posted throughout the university campus and general community, postings in email newsletters, and internet advertising. These participants received $10-20 for participating. Each participant was instructed to bring a same-sex friend to the experiment, who was paid $10-20 for participating or compensated with course credit if desired. Therefore, 270 individuals participated in total. Two participants were excluded for being under 18 years of age, and one additional participant was excluded for rushing through questionnaires, resulting in a final sample of 267 individuals. If a participant was excluded, his or her friend’s data were retained for analyses. Of the participants who completed the depression measure (the Center for Epidemiologic Studies Depression Scale; see below), 19.8% met the cutoff for possible depression of 16 or greater, consistent with a previous estimate of 21% in the general population (Radloff, 1977). The majority of the sample was female (77%). Participants ranged in age from 18 to 61 years
old ($M = 20.39, SD = 5.45$). The majority were white (87%) with 13% Asian, 5% African American, 2% Native Hawaiian or Pacific Islander, and 1% American Indian. A minority of the sample identified as Hispanic or Latino (12%).

2.2 Power analysis

Large effect sizes have been found in previous studies manipulating emotion-regulation strategies and measuring interpersonal outcomes (e.g., Butler et al., 2003). Although few studies have related rumination to interpersonal difficulties, one study found a large correlation ($r = -.54$) between brooding and relationship satisfaction. Of the interpersonal functioning variables measured, willingness to affiliate and friend worth were only assessed once, whereas rapport was assessed at two time points. Due to this limitation, and because friend worth has not been measured in studies of emotion regulation, effect size was estimated for willingness to affiliate. In a previous study (Butler et al., 2003), willingness to affiliate differed between suppression and reappraisal groups by a magnitude of $d = .51$. As a between-subjects effect with $\alpha = .05$, 124 dyads would be needed to achieve power of .80 at this effect size. Rumination-contagion effects have only been investigated once, in a long-term, non-experimental context, and the resulting effect size was small in magnitude (Haeffel & Hames, 2014). A meta-analysis of depressive-symptom contagion and depressed-mood contagion also found small contagion effects (near $d = .20$; Joiner & Katz, 1999). Using G*Power 3.0 (Faul, Erdfelder, Lang, & Buchner, 2007), I found that 125 dyads would be needed to achieve a power of .60 in a repeated-measures design with $\alpha = .05$. Therefore, 135 dyads were recruited with the expectation that 10 would warrant exclusion (e.g., failure to follow task
instructions or withdrawing from the study). In reality, no participants withdrew from the study, and all participants followed task instructions to the best of the experimenters’ knowledge except for the participant excluded for rushing through questionnaires.

2.3 Materials and measures

2.3.1 Negative-mood induction

Two video clips were used to induce negative feelings (e.g., sadness, anger, fear). The first was a 5-minute scene from the animated movie *Up* (Rivera & Docter, 2009), and the second was a 9-minute compilation of news coverage of the September 11 attacks on the World Trade Center (Roman, 2007), both selected because they were shown to induce negative emotions in a pilot test. Video clips with a negative focus have been used previously to induce negative-mood states prior to rumination (e.g., Joormann & Siemer, 2004; Yoon & Joormann, 2012). It is necessary for participants to be experiencing at least moderate levels of negative emotion so that a difference in the effectiveness of rumination versus distraction for reducing negative emotion can be observed (Nolen-Hoeksema et al., 2008).

2.3.2 Response-manipulation tasks

The response-manipulation tasks (Lyubomirsky & Nolen-Hoeksema, 1993; Morrow & Nolen-Hoeksema, 1990) are intended to shape participants’ thought processes into either a ruminative style or a distracted style. The rumination and distraction tasks each consist of 45 items on which participants are directed to focus their attention for exactly 8 minutes. In the rumination condition, participants are directed to focus their
attention on a series of items related to their thoughts, feelings, and self-concept (e.g., “Think about whether you feel stressed right now”). In the distraction condition, participants are asked to attend to a series of externally focused items not related to their current mood (e.g., “Think about the shape of the torch on the Statue of Liberty”).

2.3.3 Friendship quality and length

Two items were included in the baseline demographic questionnaire to assess the quality of participants’ friendship and its length. Responses to the friendship quality question ranged from 0 (“Complete stranger”) to 5 (“Best friend”) in answering the question, “How well do you know your friend?” Participants were asked to respond to the question, “How long have you known your friend?” Possible responses were 1 (“Less than 1 month”), 2 (“1-6 months”), 3 (“6 months – 2 years”), and 4 (“More than 2 years”). The response options focused on differentiating responses across the ranges expected of undergraduate friendships.

2.3.4 Perseverative Thinking Questionnaire – State Version

The Perseverative Thinking Questionnaire – State Version (PTQ-S; Zetsche, Ehring, & Ehlers, 2009) is a 15-item self-report scale measuring state rumination. Participants are asked to describe their thinking process during a specified period of time (e.g., in the past 5 minutes) by rating the frequency of occurrences of thoughts such as, “I kept thinking about the same issue all the time,” and “My thoughts were not much help to me,” on a scale from 0 (“never”) to 4 (“almost always”). The PTQ-S has been shown to possess good internal consistency ($\alpha = .89$) and to reflect changes in state rumination in response to a laboratory manipulation (Zetsche et al., 2009). Therefore, the scale is
expected to reflect within-subjects fluctuations in state rumination following manipulation. However, the validity of the PTQ-S for assessing within-subjects changes in state rumination is currently unknown. In the present sample, Cronbach’s alphas were .91 and .93 at the first and second time points, respectively. The correlation between the two administrations of the PTQ-S was .51.

2.3.5 Ruminative Responses Scale

The Ruminative Responses Scale (RRS; Treynor, Gonzalez, & Nolen-Hoeksema, 2003) measures individual differences in the tendency to ruminate when experiencing depressed mood, and comprises the two factors of brooding and reflection. Participants are asked to rate how often they engage in various thinking processes when they feel down, sad, or depressed on a series of 10 items (1 = “almost never,” 4 = “almost always”). The RRS is the most widely used scale measuring trait rumination. The 10-item version possesses acceptable internal consistency (brooding: \( \alpha = .77 \), reflection: \( \alpha = .72 \)) and validity, showing a correlation with depressive symptoms without substantial overlap between item content and depressive symptoms (Treynor et al., 2003). The RRS measures a stable construct, which has been shown not to differ even when participants’ depression levels change greatly (Just & Alloy, 1997). Internal consistency was good in the present sample (\( \alpha = .80 \)).

2.3.6 Mood rating scales

Participants were asked to rate their mood using seven 5-point scales (0 = “not at all,” 4 = “very”) on five occasions during the study: before the first mood induction, before the first discussion, after the first discussion, before the second discussion, and
after the second discussion. Ratings assigned to “sad” and “depressed” were averaged to form a negative-mood variable. The other five scales (e.g., “impatient,” “energized”) were filler items designed to distract from the true purpose of the scales. A similar measure has been used to assess mood states in a previous study on rumination, in which negative mood was shown to decrease as time elapsed following a negative-mood induction and to be higher following a rumination than a distraction condition (Yoon & Joormann, 2012). Cronbach’s alphas for the two-item negative-mood scale ranged from .69 to .74 across the five measurement occasions.

2.3.7 Center for Epidemiologic Studies Depression Scale

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) assesses current symptoms of depression. Participants are asked to indicate how often they have felt or behaved in certain ways over the past week. Responses range on a 0-3 scale from “Rarely or none of the time” to “Most or all of the time,” with higher scores indicating more severe depression. The CES-D possesses good internal consistency in the general population (α = .85) and demonstrated good internal consistency in this sample (α = .87). The scale also possesses good convergent validity, being able to discriminate between psychiatric inpatients and the general population, showing decreases as a result of treatment, and correlating highly with other measures of depression (Radloff, 1977). It should be noted, however, that the CES-D has been shown to correlate strongly with trait anxiety (Orme, Reis, & Herz, 1986).
2.3.8 Rapport scales

To assess the rapport felt by both conversation partners following each discussion, participants will be asked to rate their answers to the following three questions on a 0-10 scale (0 = “not at all,” 10 = “a great deal”): “How warm was the conversation?”, “How smooth was the conversation?”, and “How well did you ‘click’ with your friend?” This 3-item scale has been used to measure dyadic rapport previously with good internal consistency ($\alpha = .85$), and rapport was shown to be lower in dyads where one partner suppressed emotions than in control dyads (Butler et al., 2003). In the present sample, Cronbach’s alphas were .76 and .78 at the first and second time points, respectively.

2.3.9 Willingness to affiliate scales

Five items were written to assess participants’ willingness to maintain a relationship with their friend in the future. Participants rated items on 4-point scales ranging from “strongly disagree” to “strongly agree,” with higher total scores representing higher willingness to affiliate with friends. Three items asked participants to rate the likelihood that they would still be friends with their study partner after 1, 5, and 10 years. The other two items were, “I would like to spend more time together than we currently do,” and “If I had a serious problem, he/she would be one of the first to know.” Internal consistency was acceptable in the present sample ($\alpha = .70$).

2.3.10 Evaluation of friend on revision of Rosenberg Self-Esteem Questionnaire

The Rosenberg Self-Esteem Questionnaire (R-SEQ; Rosenberg, 1965) was developed to measure global self-worth, and it was later adapted to measure participants’ perceptions of their roommates’ worth (Swann et al., 1992). Participants rate 10 items on
a 4-point scale from “strongly agree” to “strongly disagree” (e.g., “I feel that my roommate is a person of worth, at least on an equal basis with others”), with higher scores representing more negative impressions of roommates’ worth. The R-SEQ has previously shown good internal consistency (α = .87). The scale also correlates strongly with measures of rejection, and scores correlate with depression among individuals high in reassurance seeking (Joiner et al., 1992). Items were reworded to refer to friends instead of roommates for the present study (α = .75).

2.4 Procedure

See Figure 2.1 for a diagram detailing the flow of the experiment. Participants recruited through the undergraduate participant pool completed the CES-D as part of a larger screening survey administered at the beginning of each academic semester to all undergraduates in psychology who are interested in participating in studies for course credit. Because average levels of depressive symptoms were expected to be low in an undergraduate population, students with CES-D scores indicating at least mild depression were invited to participate.
Figure 2.1: Experiment flow diagram. Parentheses indicate a counterbalanced randomization. CES-D = Center for Epidemiological Studies Depression Scale. RRS = Ruminative Responses Scale. PTQ-S = Perseverative Thinking Questionnaire – State Version. R-SEQ = Evaluation of friend on revision of Rosenberg Self-Esteem Questionnaire.
When participants arrived at the lab with their friends, both provided informed consent. As a cover story, participants were told the study focused on “reactions to adverse events in friend pairs.” When experimenters asked participants what they believed to be the true purpose of the study during debriefing, no participants gave answers that approximated the main study hypotheses. Participants then completed a battery of questionnaires covering demographic information, personal and family history of common internalizing disorders, and the items assessing friendship quality and length. They also completed the CES-D, the RRS, and baseline measurements on the mood rating scales.

Of the recruited participant and friend, one was assigned randomly to the target group, which received the rumination versus distraction manipulation, and the other to the partner group (hereafter referred to as the target and partner, respectively). The order of rumination and distraction conditions, as well as the order of the two negative mood-induction videos, was also randomized. Both participants watched the first negative mood-induction video together, as they were later asked to discuss their reactions to it. Next, they were separated into different rooms. The target participant received either the rumination or distraction task, while the partner was asked to wait until the experimenter returned. Because the target participant was in no way being compared to the partner, it was not necessary to make their tasks equivalent. After the 8 minutes allocated to complete the response-manipulation task had passed, participants rated their moods on the mood rating scales. Both participants next were brought back to the same room, sat in chairs facing each other, and were asked to discuss their thoughts and feelings in response to the negative-mood induction video for 10 minutes. Following the discussion,
Participants were led into separate rooms again to complete the PTQ-S, mood rating scales, rapport scales, affiliation scales, and R-SEQ.

Participants then reconvened to watch the second video together and then were separated once more. Target participants completed either the rumination or distraction task, whichever they were not assigned following the first video, and partners were asked to wait again. Following this task, both participants rated their moods. Next, both participants again were brought into the same room and asked to discuss their thoughts and feelings in response to the second negative mood induction video for 10 minutes. After the second discussion, participants were separated to complete the PTQ-S, mood rating scales, and rapport scales. Finally, participants were shown a happy video (a clip from the movie *The Lion King*, during the song “Hakuna Matata”; Hahn, Allers, & Minkoff, 1994) to relieve any lingering negative emotions, were debriefed, and were paid or awarded credit.

2.5 Data analysis

All data analyses were conducted in SPSS version 24 except where noted. First, descriptive statistics were examined for all variables. Independent-samples *t*-tests were then used to evaluate whether target participants who completed the rumination condition first and target participants who completed the distraction condition first differed on baseline measures.

2.5.1 Manipulation check

Previous research has found that distraction is more effective than rumination at reducing negative emotional experience following a negative mood induction.
(Lyubomirsky & Nolen-Hoeksema, 1993). Therefore, I expected targets’ negative mood to be lower immediately following the distraction task than immediately following the rumination task. A 2 (task order: rumination-distraction vs. distraction-rumination) × 2 (condition: rumination vs. distraction) repeated-measures ANOVA was conducted to test for the expected main effect of condition on post-response-manipulation task negative mood. Second, I expected target participants to report higher state rumination during discussions following rumination than during discussions following distraction. Another 2 × 2 repeated-measures ANOVA was conducted with PTQ-S state-rumination scores as the dependent variable and identical predictors to test for the expected main effect of condition.

2.5.2 Hypothesis tests

To examine levels of interpersonal functioning between conditions, I conducted three separate analyses of covariance (ANCOVAs), one testing rapport as the outcome, one testing R-SEQ friend-worth as the outcome, and the third testing willingness to affiliate as the outcome. In all three analyses, condition was the only fixed factor, and CES-D depression, RRS trait rumination, and baseline negative mood were covariates. Moderation by each of these three covariates were tested by examining the interaction terms between each covariate and condition. For the analysis testing rapport as the outcome, the effects of condition were within-subjects, because rapport scales were completed following both discussions. Therefore, repeated-measures ANCOVA was used for this analysis. For the analyses testing R-SEQ friend-worth scores and willingness to affiliate as the outcome, the effects of condition were between-subjects, with condition being whichever experimental condition (rumination or distraction) was completed first.
To analyze state-rumination contagion effects, I conducted one additional repeated-measures ANCOVA with partner PTQ-S state-rumination scores as the outcome. Again, condition was the only fixed factor, and CES-D depression, RRS trait rumination, and baseline negative mood were covariates. The covariates were again allowed to interact with condition. Condition was a within-subjects variable in this analysis because PTQ-S state rumination was assessed after both discussions.

To test the indirect effects of rumination on interpersonal functioning through partner rumination, two mediational models were planned. Both used experimental condition (rumination vs. distraction) as the predictor and partner PTQ-S state-rumination scores as the mediator. One model used the average of targets’ and partners’ R-SEQ friend-worth scores as the outcome and the other used the average of targets’ and partners’ willingness to affiliate scores as the outcome. A mediational model is justified here because the PTQ-S asks participants to rate their state rumination during discussions, whereas the R-SEQ and willingness to affiliate scales assessed friend-worth and willingness to affiliate, respectively, at the time of scale completion, which was after the discussions. Rapport ratings were not evaluated as an outcome in mediational models because these scales assess rapport during the discussions, making any causal direction arbitrary. A significant indirect effect of experimental condition on either friend-worth or willingness to affiliate through partner state rumination would provide evidence for a mechanism in which individuals generate interpersonal stress in their relationships by way of rumination contagion.
CHAPTER 3: RESULTS

The data were first checked for missingness. The most missing data points for any single item were 5 participants (2%). There were seven participants who left one or more items blank on the CES-D, preventing us from computing a total score to be used to determine whether or not participants scored above the cutoff point for depression. It should also be noted that scores derived from several of the continuous measures used here did not follow a normal distribution. Scores on CES-D, rapport, willingness to affiliate, R-SEQ, and negative mood at all time points showed marked skewness. Scores on PTQ-S and RRS appeared normally distributed. When outliers existed, they tended to appear on the end of the distribution in which the skew pointed (e.g., high outliers for positively skewed variables). Cook’s distance and leverage values were examined for each analysis to look for potentially influential data points. One especially influential point was identified in the rapport scales and was removed from corresponding analyses.

To evaluate whether the randomization procedure created approximately equal groups, I compared partner participants who completed the rumination task first with the partner participants who completed the distraction task first on all measures assessed in the baseline questionnaire. No differences were detected between groups (see Table 3.1).
TABLE 3.1

COMPARISON OF MEANS OF PARTNER SCORES ON BASELINE MEASURES
BY RANDOMLY ASSIGNED ORDER OF TARGET CONDITIONS

<table>
<thead>
<tr>
<th>Baseline measure</th>
<th>Rumination-distraction (N = 66)</th>
<th>Distraction-rumination (N = 68)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>20.61 (.63)</td>
<td>20.18 (4.97)</td>
<td>.44</td>
</tr>
<tr>
<td>Friendship quality a</td>
<td>3.92 (.91)</td>
<td>4.10 (1.04)</td>
<td>-1.06</td>
</tr>
<tr>
<td>Friendship length</td>
<td>2.74 (.97)</td>
<td>2.96 (.97)</td>
<td>-1.28</td>
</tr>
<tr>
<td>CES-D depression</td>
<td>11.10 (7.49)</td>
<td>10.39 (7.86)</td>
<td>.53</td>
</tr>
<tr>
<td>RRS trait rumination</td>
<td>2.14 (.57)</td>
<td>2.18 (.54)</td>
<td>-.41</td>
</tr>
<tr>
<td>Negative mood</td>
<td>1.39 (.63)</td>
<td>1.45 (.64)</td>
<td>-.50</td>
</tr>
</tbody>
</table>

NOTE: Standard deviations are shown in parentheses. Degrees of freedom for the t-tests were 132. CES-D = Center for Epidemiological Studies Depression Scale, total scale score corrected for missing items. RRS = Ruminative Responses Scale, average item score.

a N = 65 in the rumination first, distraction second group. Degrees of freedom for the t-test on this variable were 131.

b No group differences were significant (p’s > .05).

3.1 Manipulation check

The results of both analyses testing the success of the rumination versus distraction manipulation failed to detect any significant effects. Contrary to expectations, no significant main effect of condition on negative mood following rumination or distraction was detected, $F(1, 129) = 1.58, p = .21, \eta_p^2 = .01$. To investigate whether the negative-mood induction had increased targets’ negative mood from baseline to the period following the response-manipulation tasks, I conducted a 2 (video: September 11th vs. Up) × 2 (time: baseline vs. following response-manipulation task) repeated-measures ANOVA. A significant interaction was detected between video and time, $F(1, 130) = 9.19, p = .003, \eta_p^2 = .07$, suggesting changes in negative mood depended on which video participants watched. Simple-effects analyses revealed that negative mood increased from baseline to the period following response-manipulation tasks for both
videos; this increase was larger following the September 11th video, $F(1, 130) = 380.28$, $p < .001$, $d = .80$, than following the Up video, $F(1, 130) = 380.28$, $p < .001$, $d = .39$.

Similarly, no significant main effect of condition on PTQ-S state rumination during discussions was detected, $F(1, 130) = .37$, $p = .55$, $\eta^2_p = .00$. Although this result may suggest that the manipulation failed to affect actual rumination during discussions at all, another possibility is that the PTQ-S lacks validity to detect induced differences in state rumination. However, target participants’ PTQ-S scores correlated positively with RRS trait rumination scores, CES-D depression scores, and negative mood before and after corresponding discussions, all of which provide evidence for the scale’s convergent validity (see Table 3.2).

3.2 Test of hypothesis 1

The first hypothesis was that experimentally induced rumination would be followed by lower partner-rated scores on measures of rapport, willingness to affiliate, and friend worth than would experimentally induced distraction. The repeated-measures ANCOVA testing the effect of experimental condition on rapport revealed no significant effect of condition on rapport, $F(1, 128) = .269$, $p = .61$, $\eta^2_p = .00$, and no significant influence of the three covariates of depression symptoms, trait rumination, and baseline negative mood ($p$’s > .47). There were no interactions between covariates and condition ($p$’s > .17). The effect of condition remained non-significant after removing covariates from the model, $t(131) = -.49$, $p = .62$, with rapport rated as approximately the same whether targets ruminated ($M = 6.88, SD = 1.80$) or distracted themselves ($M = 6.96, SD = 1.75; d = .04$, 95% CI [-.20, .28]).
TABLE 3.2

BIVARIATE CORRELATIONS BETWEEN TARGET PTQ-S STATE RUMINATION SCORES AND RELATED MEASURES

<table>
<thead>
<tr>
<th>Measure</th>
<th>PTQ-S state rumination, rumination condition</th>
<th>PTQ-S state rumination, distraction condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>RRS trait rumination</td>
<td>.29**</td>
<td>.26**</td>
</tr>
<tr>
<td>$N$</td>
<td>132</td>
<td>133</td>
</tr>
<tr>
<td>CES-D depression</td>
<td>.17*</td>
<td>.18*</td>
</tr>
<tr>
<td>$N$</td>
<td>132</td>
<td>133</td>
</tr>
<tr>
<td>Negative mood before rumination discussion</td>
<td>.40***</td>
<td>.09</td>
</tr>
<tr>
<td>$N$</td>
<td>132</td>
<td>133</td>
</tr>
<tr>
<td>Negative mood after rumination discussion</td>
<td>.44***</td>
<td>.13</td>
</tr>
<tr>
<td>$N$</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>Negative mood before distraction discussion</td>
<td>.19*</td>
<td>.38***</td>
</tr>
<tr>
<td>$N$</td>
<td>130</td>
<td>131</td>
</tr>
<tr>
<td>Negative mood after distraction discussion</td>
<td>.10</td>
<td>.44***</td>
</tr>
<tr>
<td>$N$</td>
<td>131</td>
<td>132</td>
</tr>
</tbody>
</table>

NOTE: The PTQ-S was administered following both discussions and refer to participants’ state rumination during each discussion. “Rumination discussion” and “distraction discussion” refer to the response-manipulation task condition preceding the discussions. CES-D = Center for Epidemiological Studies Depression Scale. PTQ-S = Perseverative Thinking Questionnaire – State Version. RRS = Ruminative Responses Scale.

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

The ANCOVA testing the effect of experimental condition on willingness to affiliate similarly revealed no main effect of condition, $F(1, 126) = 1.74$, $p = .19$, $\eta_p^2 = .01$, and no significant interactions between the three covariates and condition ($p$’s > .38). After removing interaction terms from the model, a significant effect of CES-
D depression scores on willingness to affiliate was detected, $F(1, 129) = 7.38, p = .01$, $\eta_p^2 = .05$, indicating participants higher in depression symptoms reported being less willing to affiliate further with their friends in the future than those lower in depression symptoms. The effect of condition again remained non-significant after removing covariates from the model, $t(132) = 1.30, p = .20$, with willingness to affiliate rated as not significantly different whether targets ruminated ($M = 3.24, SD = .45$) or distracted themselves ($M = 3.34, SD = .46; d = .18, 95\% CI [-.16, .52]$).

Finally, the ANCOVA testing R-SEQ friend worth as the dependent variable revealed no main effect of condition, $F(1, 126) = .61, p = .44, \eta_p^2 = .01$, and no significant interactions between the three covariates and condition ($p$’s > .15). Moreover, there were no main effects of any of the three covariates after removing the interaction terms from the model ($p$’s > .13). The effect of condition remained non-significant after removing covariates from the model, $t(122.52) = -1.63, p = .11$, with friend worth rated as not significantly different whether targets ruminated ($M = 3.77, SD = .23$) or distracted themselves ($M = 3.69, SD = .31; d = .27, 95\% CI [-.61, .07]$).

### 3.3 Test of hypothesis 2

The second hypothesis was that partner state rumination would be higher following target rumination than following target distraction, which tests the rumination-contagion prediction. The repeated-measures ANCOVA used to test this hypothesis revealed no significant main effect of condition on PTQ-S state rumination scores, $F(1, 129) = 2.20, p = .14, \eta_p^2 = .02$. All main effects and interactions involving the three covariates were non-significant ($p$’s > .13). After removing the covariates from the
model, there remained no significant differences in state rumination across conditions, \( t(132) = -0.41, p = 0.69 \), with partner state rumination approximately the same whether targets ruminated \( (M = 2.51, SD = 0.79) \) or distracted themselves \( (M = 2.54, SD = 0.72; d = -0.04, 95\% CI [-0.21, 0.28]) \).

In light of the very small size of this effect, the tests of planned mediation models were not conducted. Because this effect was close to zero, indirect effects passing through the path from condition to PTQ-S state rumination would be even smaller, meaning state rumination could not emerge as a mediator in either of the proposed models.

3.4 Exploratory analyses

Because the manipulation appeared not to have been successful, additional post hoc tests were conducted to diagnose experimental issues and explore possible relationships in the data. The exploratory findings reported here should be interpreted with caution, as they were not planned analysis based on hypotheses but rather post hoc analyses conducted after seeing the results of the main analyses. Exploratory analyses are subject to inflated type-I error rates and should be replicated before being accepted as empirically established.

3.4.1 Effects of the negative-mood induction videos

As noted above, participants’ negative mood differed depending on which video was used to induce negative mood. Because the video of the World Trade Center attack on September 11th induced more negative mood than the \( Up \) video, the September 11th video will be referred to as the “high negative mood” video, whereas the \( Up \) video will be
referred to as the “low negative mood” video. Resulting mood intensity was not the only emotional difference between the videos; the September 11th video contained more scenes that could induce fear and may have induced a state of higher arousal, for example. The September 11th video, therefore, was not only more intensely negative, it also possibly induced a wider variety of negative emotions.

I conducted two independent-samples $t$-tests evaluating whether willingness to affiliate and R-SEQ friend worth differed between the high and low negative mood videos, and I conducted two paired-samples $t$-tests to evaluate differences in rapport and PTQ-S state rumination between the high and low negative mood videos. Video did not affect willingness to affiliate, $t(132) = -.42, p = .67, d = -.07$, or R-SEQ friend worth, $t(132) = -.16, p = .88, d = -.03$. However, there were significant differences between high and low negative mood videos for rapport, $t(131) = -5.17, p < .001, d = -.44$, and PTQ-S state rumination, $t(132) = 6.01, p < .001, d = .48$. Partners rated rapport as lower following the high than the low negative mood video. Partners also reported higher state rumination following the high than the low negative mood video.

3.4.2 Response-manipulation task diagnostics

These findings raise the possibility that the low negative mood video was not strong enough to induce reliable negative mood and therefore was insufficient to allow the response-manipulation task to induce differences in negative mood. Therefore, I included video as a factor in the models testing the main study hypotheses. If only the high negative mood video was strong enough to induce the negative mood necessary for rumination to have effects on interpersonal functioning beyond those of distraction, I would expect to see an interaction between condition (rumination vs. distraction) and
video (high vs. low negative mood). This interaction was only significant for the analysis testing willingness to affiliate as the dependent variable, \( F(1, 130) = 4.54, p = .04, \eta_p^2 = .03 \). Follow-up tests of simple effects revealed no significant difference in willingness to affiliate between the rumination and distraction conditions regardless of video (\( p \)'s > .05). Thus, it is improbable that only the high negative mood video was sufficient for inducing negative mood.

Previous studies have found that the response-manipulation task used in this study only induces differential moods in dysphoric or depressed participants (Lyubomirsky & Nolen-Hoeksema, 1993; Nolen-Hoeksema & Morrow, 1993). Although the mood induction in the current study appears to have resulted in some dysphoria, it is possible that not enough participants were actively depressed for the response-manipulation task to create a difference in negative mood between the rumination and distraction conditions. To examine this possibility, CES-D depression scores were tested as a moderator in a one-way ANCOVA testing the effects of condition (rumination vs. distraction) on negative mood following the response-manipulation task. There was no interaction between CES-D scores and condition, \( F(1, 129) = .89, p = .35, \eta_p^2 = .00 \), suggesting depression symptoms were irrelevant to the success of the manipulation. In another analysis, only those participants who were above the recommended CES-D cutoff score of 16 or greater for possible depression (Radloff, 1977) were included, resulting in a sample of 28 participants. Even after allowing for a liberal type-I error rate (\( \alpha = .10 \)) in this small sample, there was no significant difference in negative mood following the rumination versus the distraction task, \( t(27) = 1.26, p = .22, d = .18 \), among possibly depressed participants.
3.4.3 Additional tests of rumination contagion

The test of experimentally induced rumination contagion was non-significant. However, this may have been due to failure of the experimental manipulation to induce differential levels of rumination in participants. To examine the possibility that rumination spreads between individuals over time, I tested the effects of one participant’s state rumination during the first discussion on the friend’s state rumination during the second discussion (i.e., partner effects), controlling for the friend’s state rumination during the first discussion (i.e., actor effects) and the first participant’s state rumination during the second discussion. Significant partner effects for both participants would provide evidence for rumination contagion effects.

I constructed two hierarchical regression models, one testing target state rumination during discussion 2 as the outcome and the other testing partner state rumination during discussion 2 as the outcome. In the model testing effects from partners to targets, partner’s state rumination in discussion 2 and target’s state rumination in discussion 1 were entered as predictors in the first step. Partner’s state rumination in discussion 1 was entered in the second step. The other model was identical to the first model swapping partners for targets.

Results of both hierarchical regression analyses are displayed in Table 3.3. There were significant partner effects of state rumination from discussion 1 to discussion 2, although these effects were in the opposite direction as would be expected by rumination contagion. These effects, with negative signs, suggest one participant’s higher state rumination during discussion 1 predicted lower state rumination in their friend during discussion 2.
### TABLE 3.3

HIERARCHICAL REGRESSION ANALYSES PREDICTING STATE RUMINATION DURING THE SECOND DISCUSSION

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Predictor</th>
<th>B</th>
<th>SE (B)</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>ΔR²</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTQ-S&lt;sub&gt;T,2&lt;/sub&gt;</td>
<td><em>Step 1</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.38</td>
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<tr>
<td></td>
<td>PTQ-S&lt;sub&gt;P,2&lt;/sub&gt;</td>
<td>.32</td>
<td>.07</td>
<td>.32</td>
<td>4.66</td>
<td>&lt; .001</td>
<td></td>
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<td>.52</td>
<td>.08</td>
<td>.48</td>
<td>6.87</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Step 2</em></td>
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<td>.08</td>
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<td></td>
<td>PTQ-S&lt;sub&gt;P,1&lt;/sub&gt;</td>
<td>-.38</td>
<td>.09</td>
<td>-.35</td>
<td>-4.42</td>
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<td></td>
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<td>PTQ-S&lt;sub&gt;P,2&lt;/sub&gt;</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.35</td>
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<td></td>
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<td></td>
<td>PTQ-S&lt;sub&gt;P,1&lt;/sub&gt;</td>
<td>.47</td>
<td>.08</td>
<td>.43</td>
<td>6.09</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Step 2</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.07</td>
</tr>
<tr>
<td></td>
<td>PTQ-S&lt;sub&gt;T,1&lt;/sub&gt;</td>
<td>-.38</td>
<td>.10</td>
<td>-.35</td>
<td>-3.98</td>
<td>&lt; .001</td>
<td></td>
</tr>
</tbody>
</table>


#### 3.4.4 Testing a general factor of interpersonal functioning

Although the main analyses using three separate dependent variables to assess interpersonal functioning failed to detect significant differences between rumination and distraction conditions, one possibility is that none of the dependent variables alone varied significantly between conditions but that a general factor of interpersonal functioning may have. Extracting common variance from all the items used to measure interpersonal functioning may increase power to detect differences between conditions. Therefore, I conducted an exploratory factor analysis of partner scores using R version 3.4.0 (R Core Team, 2017). All 10 R-SEQ items, five willingness to affiliate items, and three rapport
items from the first discussion only were initially included in an exploratory factor analysis model. The one-factor solution fit poorly, \( \chi^2(135) = 446.26, p < .001 \), RMSEA = .14, 90% CI [.12, .15]. All items with loadings of less than .40 on the general factor, which were R-SEQ item 2, willingness to affiliate item 4, and the “warm” and “smooth” items of the rapport scale, were dropped. The same exploratory factor analysis was then run again, and the one-factor model still fit poorly, \( \chi^2(77) = 237.44, p < .001 \), RMSEA = .13, 90% CI [.11, .15]. Because no general factor could be extracted, further efforts to model interpersonal functioning as a single construct were abandoned.
CHAPTER 4:
DISCUSSION

The present study aimed to test two predictions derived from an extension to stress-generation theory that hypothesized emotion dysregulation is a precursor to interpersonal distress. In a within-subjects experiment, target participants completed a task designed to make them either ruminate or distract themselves, after which they engaged in a discussion with their partners (i.e., a friend), after which partners rated targets’ interpersonal functioning and their own state rumination. First, I hypothesized that experimentally induced rumination, compared to distraction, would lead to lower scores on measures of rapport, willingness to affiliate, and friend worth. Second, I hypothesized that partners’ state rumination would be higher following target rumination than following target distraction. A manipulation check showed no evidence that the emotion-regulation manipulation caused target participants to ruminate or distract themselves despite evidence of successful negative-mood induction. Thus, the main study hypotheses could not be tested adequately, with planned hypothesis tests returning null results. However, participants’ state rumination and rapport ratings depended on which negative-mood induction video they watched, videos that differed in intensity and possibly complexity of negative mood induced. Exploratory analyses suggested that state rumination in one participant does not increase, but rather decreases, subsequent state
rumination in their interaction partner. Lastly, a general factor of interpersonal functioning could not be extracted from the three interpersonal-functioning measures used.

The main results do not match the predictions generated by the emotion-dysregulation extension to stress-generation theory in depression. The most likely explanation for this mismatch is that the emotion-regulation manipulation used herein failed to induce rumination and distraction in participants. Another explanation for the null findings reported here is that emotion dysregulation is in fact not a precursor to interpersonal stress, although this possibility seems unlikely in light of previous studies describing a variety of negative interpersonal consequences associated with variability in emotion regulation (Ben-Naim et al., 2013; Butler et al., 2003; Flynn et al., 2010; McLaughlin & Nolen-Hoeksema, 2012; Richards et al., 2003). More likely are the possibilities that either rumination performs better or distraction performs worse in interpersonal contexts than predicted, possibilities that cannot be differentiated given the present results. All of these possibilities fail to explain why there were no negative-mood differences between the rumination and distraction conditions. The finding that PTQ-S state rumination did not differ between rumination and distraction tasks provides additional support for the notion that the emotion-regulation manipulation failed, given evidence for the reliability of the PTQ-S and its convergent validity for measuring state rumination.

Due to lack of an effective experimental manipulation, support or lack of support for the proposed theoretical extension is limited to correlational findings, and tests of the emotion-dysregulation extension await further research. The theoretical extension posits
that interpersonal deficits in response to an emotion-regulation strategy hinge on the strategy’s effectiveness for reducing negative emotion, an idea which cannot be tested experimentally without showing differences in negative emotions following an emotion-regulation manipulation.

The response-manipulation task has been used to induce rumination and distraction and alter participants’ self-reported negative mood consistently in previous studies (Joormann & Siemer, 2004; Lyubomirsky & Nolen-Hoeksema, 1993; Morrow & Nolen-Hoeksema, 1990; Yoon & Joormann, 2012). The procedures used in this study matched previous procedures closely, using the same wording in paper packets provided to participants and allotting exactly 8 minutes for participants to complete the task. The most obvious procedural difference between the present study and past studies is that pairs of friends participated simultaneously in the present study. Although friends were separated into different rooms before the target participant completed the response-manipulation task, watching the negative-mood induction videos with a friend may have altered participants’ emotional responses. In an attempt to promote negative emotions in response to the videos and limit potential interpersonal emotion regulation, participants were instructed not to communicate during or share any reactions immediately following the videos. However, even watching a video with a friend in silence may be enough to change the way participants process emotions in response to the video. At least one study has shown that participants avoid strong emotions when they know they will interact with another participant (Erber, Wegner, & Therriault, 1996). Furthermore, for participants to remain blind to each other’s tasks, target participants were instructed not to share any details of the response-manipulation task with their friend during subsequent discussions.
It is possible that this instruction, which immediately followed task instructions, redirected targets’ attention away from the focus of the task materials and toward trying to discern the purpose of the task or wondering what their friend was doing.

4.1 Interpretation of exploratory findings

The first exploratory finding was that partner-rated rapport and state rumination depended on which of two negative-mood induction videos participants watched together. Partners reported lower rapport and higher state rumination during discussions following a video which induced higher levels of negative mood than following a video which induced lower levels of negative mood. These results are consistent with previous work showing negative mood precipitates rejection by others (Carver, Kus, & Scheier, 1994; Segrin & Dillard, 1992), although it is unclear why willingness to affiliate and R-SEQ friend-worth scores were unaffected by the video watched. It is also possible that participants’ ratings of rapport were entirely dependent on their own, not their friend’s, negative mood. Individuals in negative moods have been shown to judge others more negatively than individuals in positive moods (Forgas & Bower, 1987). Forgas’s affect infusion model (1995) may explain why only rapport judgments and not willingness to affiliate or R-SEQ friend-worth ratings were affected by the strength of the negative mood induction. Under this model, affective states influence social judgments when making heuristic judgments in novel situations more than when making preexisting, crystallized judgments about others. In the present study, the rapport questionnaire asked participants to make heuristic judgments about the specific discussion they just completed, and these judgments likely relied on participants’ affective states (e.g., “How
warm was the conversation”), whereas the R-SEQ and willingness to affiliate scale asked participants to evaluate their friend more generally in a manner not specific to the most recent interaction. The finding in which state rumination levels were higher following the high negative mood than the low negative mood video was consistent with previous results showing rumination is linked with higher levels of negative affect (for review, see Thomsen, 2006).

Exploratory tests also revealed negative partner effects for state rumination across the two discussions. That is, greater rumination in one participant during the first discussion predicted lower rumination in this participant’s friend during the second discussion. This effect was not merely due to the friend’s state rumination levels during the first discussion, nor was it attributable to the first participant’s state rumination during the second discussion, because both of these variables were statistically controlled for in analyses. Based on previous findings (Haeffel & Hames, 2014), I expected higher state rumination in one participant to increase, not decrease, subsequent state rumination in the other participant. Aspects of communication becoming more dissimilar during an interaction is referred to as “divergence” in communication accommodation theory (Giles & Ogay, 2007). A speculative explanation for this divergence of cognitive styles rests on social status negotiations. Rumination may spring from detection of social problems in one’s environment, which includes low status (Andrews & Thomson, 2009), and trigger social comparison and status-striving efforts, such as demonstrating resource-holding potential or social attention holding power (Gilbert, Price, & Allan, 1995). Such efforts may be a component of intrasexual selection, which applies in this sample of same-sex friend pairs. Participants may have been more prone to ruminating during the first
discussion if they detected they were the less dominant interaction partner. In turn, the more dominant interaction partner would have securely negotiated his or her status during the first discussion and ruminate less during the second discussion as a result. One consideration is that most of the participants in this study had been acquainted for less than 2 years, so status negotiations may have been especially prevalent in this population. The laboratory setting also represents a novel environment with a unique set of demands and rewards, which may have sparked social competition.

4.2 Limitations and future directions

The primary limitation of this study is the apparent failure of the response-manipulation task to produce requisite differential levels of negative mood between the rumination and distraction conditions. Without a successful manipulation of responses, the proposed theoretical extension could not be tested. That is, without differing levels of negative mood between experimental conditions, it cannot be inferred that the two emotion-regulation strategies differed on the dimension of down-regulation effectiveness, variability in which would have been necessary to produce differing amounts of stress-generating behaviors during discussions.

Measuring friends’ perceptions of each other’s interpersonal functioning introduced another challenge. The willingness to affiliate and R-SEQ friend-worth scales showed pronounced negative skewness and ceiling effects, such that many participants were unwilling to rate their friends as anything but the highest in worth and were even overly optimistic about how likely they were to remain friends. For example, 50% of participants strongly agreed with the item, “We are likely to still be friends five years
from now,” despite the fact that most participants were undergraduates at a university which tends to place alumni in diverse areas of the United States and other countries, and that friend pairs had known each other a median of only 6 months to 2 years. Notably, the R-SEQ was originally constructed to rate self-worth, not friend-worth. The scale’s psychometric properties appear to have suffered when used to rate friends because individuals hold their friends in higher esteem than they hold themselves. To capture additional variability in willingness to affiliate and friend worth, more “difficult” items should be written with more extreme positive choices (e.g., “My friend is the greatest person I have ever met,” “I would sacrifice my life for my friend”).

The present sample, which consisted of community adults and not a clinical population, may also have limited generalizability. The proportion of depressed individuals in the current sample was approximately the same as would be expected in the general population (Radloff, 1977) despite attempts to oversample depressed participants. The response-manipulation task has succeeded in general community populations previously but only when participants were dysphoric (Nolen-Hoeksema et al., 2008). The negative-mood inductions used in this study significantly altered participants’ mood to be more negative. However, it is possible that participants were still not sufficiently dysphoric for the response-manipulation task to succeed. I tested whether depression scores moderated the effect of the rumination and distraction conditions on subsequent negative mood. Because depression was not a significant moderator, however, the failure of the response-manipulation task cannot be attributed to the non-depressed participants in the sample. Clinical samples might nonetheless provide useful insight into how individuals with major depressive disorder regulate emotions and
illuminate the interpersonal consequences that may result from different emotion-regulation strategies.

4.3 Conclusion

The present study tested an extension to stress-generation theory in depression which holds that emotion dysregulation leads to interpersonal stress. The experimental manipulation of emotion regulation did not produce the expected negative-mood differences between the rumination and distraction conditions, casting doubt on its effectiveness in this study. The main hypotheses were unable to be tested adequately, and thus the theoretical extension awaits testing in future research. Contrary to previous findings showing that rumination spreads between individuals, exploratory analyses showed that higher levels of one participant’s state rumination were associated with lower levels of the other participant’s state rumination during a subsequent discussion. Despite the present study’s null findings, evidence appears strong that emotion dysregulation is prospectively related to interpersonal dependent stress.
REFERENCES


