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Rethinking Rumination

Susan Nolen-Hoeksema,[1] **Blair E. Wisco,**[1] **and Sonja Lyubomirsky**[2]

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ABSTRACT—*The response styles theory (Nolen-Hoeksema, 1991) was proposed to explain the insidious relationship between rumination and depression. We review the aspects of the response styles theory that have been well-supported, including evidence that rumination exacerbates depression, enhances negative thinking, impairs problem solving, interferes with instrumental behavior, and erodes social support. Next, we address contradictory and new findings. Specifically, rumination appears to more consistently predict the onset of depression rather than the duration, but rumination interacts with negative cognitive styles to predict the duration of depressive symptoms. Contrary to original predictions, the use of positive distractions has not consistently been correlated with lower levels of depressive symptoms in correlational studies, although dozens of experimental studies show positive distractions relieve depressed mood. Further, evidence now suggests that rumination is associated with psychopathologies in addition to depression, including anxiety, binge eating, binge drinking, and self-harm. We discuss the relationships between rumination and worry and between rumination and other coping or emotion-regulation strategies. Finally, we highlight recent research on the distinction between rumination and more adaptive forms of self-reflection, on basic cognitive deficits or biases in rumination, on its neural and genetic correlates, and on possible interventions to combat rumination.*

It is said that human beings are the only species who can reflect upon themselves. Self-reflection, the process of focusing on one's experiences, thoughts, and feelings, has been the topic of a great deal of research in recent years (see reviews by Ingram, 1990; Mor & Winquist, 2002; Papageorgiou & Wells, 2004). Much of this research has been concerned with maladaptive forms of self-reflection in people prone to depression, anxiety, or other forms of psychopathology. In their meta-analysis of the literature on self-focused attention, Mor and Winquist (2002)

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concluded that rumination was the form most strongly and consistently related to depressive symptoms.

The conceptualization and operationalizations of rumination in the response styles theory (Nolen-Hoeksema, 1991) have been used in much of the research on depressive rumination. According to the response styles theory, rumination is a mode of responding to distress that involves repetitively and passively focusing on symptoms of distress and on the possible causes and consequences of these symptoms. Rumination does not lead to active problem solving to change circumstances surrounding these symptoms. Instead, people who are ruminating remain fixated on the problems and on their feelings about them without taking action.

The content of ruminative thought in depressed people is typically negative in valence, similar to the automatic thoughts, schema, and negative cognitive styles that have been studied extensively by cognitive theorists (e.g., Beck, 1967). We define rumination, however, as the process of thinking perseveratively about one's feelings and problems rather than in terms of the specific content of thoughts. Still, rumination is correlated with a variety of maladaptive cognitive styles, including negative inferential or attributional styles, dysfunctional attitudes, hopelessness, pessimism, self-criticism, low mastery, dependency, sociotropy, neediness, and neuroticism (Ciesla & Roberts, 2002; Flett, Madorsky, Hewitt, & Heisel, 2002; Lam, Smith, Checkley, Rijsdijk, & Sham, 2003; Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell, & Berg, 1999; Nolen-Hoeksema & Davis, 1999; Nolen-Hoeksema & Jackson, 2001; Nolen-Hoeksema, Larson, & Grayson, 1999; Robinson & Alloy, 2003; Spasojevic & Alloy, 2001), even after controlling for levels of depression (Lam et al., 2003; Nolen-Hoeksema et al., 1994; Nolen-Hoeksema, Parker, & Larson, 1999; Roberts, Gilboa, & Gotlib, 1998). Rumination appears to have a unique relationship to depression over and above its relationship to negative cognitive styles and continues to be related to depression after statistically controlling for neuroticism, pessimism, perfectionism, and several other negative cognitive styles (Flett et al., 2002; Nolen-Hoeksema et al., 1994; Spasojevic & Alloy, 2001). Indeed, rumination has been found to partially or fully mediate the relationship between depression and neuroticism, negative inferential styles, dysfunctional attitudes, self-criticism, dependency, and neediness (Ito & Agari, 2003; Nolan, Roberts, & Gotlib, 1998; Nolen-Hoeksema et al., 1994; Spasojevic & Alloy, 2001).

According to the response styles theory (Nolen-Hoeksema, 1991), rumination exacerbates and prolongs distress, particularly depression, through several mechanisms. First, rumination enhances the effects of depressed mood on thinking, making it more likely that people will use the negative thoughts and memories activated by their depressed mood to understand their current circumstances. Second, rumination interferes with effective problem solving, in part by making thinking more pessimistic and fatalistic. Third, rumination interferes with instrumental behavior, leading to increases in stressful circumstances. In addition, Nolen-Hoeksema and Davis (1999) argued that people who chronically ruminate will lose social support, which in turn will fuel their depression. These consequences of rumination then make it more likely that the initial symptoms of depression will become more severe and evolve into episodes of major depression. In addition, they could prolong current depressive episodes.

An adaptive and instrumental alternative is to use pleasant or neutral distractions to lift one's mood and relieve one's depressive symptoms. Then, if necessary, one can commence problem solving (Nolen-Hoeksema, 1991). Distracting responses are thoughts and behaviors that help divert one's attention away from one's depressed mood and its consequences and turn it to pleasant or benign thoughts and activities that are absorbing, engaging, and capable of providing positive reinforcement (Csikszentmihalyi, 1990; Nolen-Hoeksema, 1991): for example, going for a run or a bike ride, seeing a movie with friends, or concentrating on a project at work. Effective distractions do not include inherently dangerous or self-destructive activities, such as reckless driving, heavy drinking, drug abuse, or aggressive behavior, that may take attention away from current problems in the short-term but are harmful in the long run.

In this article, we concisely review the evidence for this conceptualization of rumination and its effects. We conclude that many of the arguments of the original response styles theory have been well-supported. Still, findings contradicting the original theory require the rethinking of rumination and its consequences and functions. We also address a number of questions that have arisen in the last 15 years about rumination—the range of psychopathologies it might affect, its relationship to worry and other coping or emotion-regulation strategies, possible subtypes of self-reflection, the basic cognitive deficits or biases that may underlie rumination, its neural and genetic correlates, and how it can be overcome.

THE EFFECTS OF RUMINATION

According to the original response styles theory, rumination maintains and exacerbates depression by enhancing negative thinking, impairing problem solving, interfering with instrumental behavior, and eroding social support. We will briefly review the large body of evidence supporting these claims (for more extensive reviews, see Lyubomirsky & Tkach, 2004; Mor & Winquist, 2002; Nolen-Hoeksema, 2004b).

Rumination and Depression

To assess individual differences in the tendency to ruminate, Nolen-Hoeksema and Morrow (1991) developed the Ruminative Responses Scale of the Response Styles Questionnaire. Respondents are asked to indicate how often they engage in each of 22 ruminative thoughts or behaviors when they feel sad, blue, or depressed.[1] These 22 items describe responses to depressed mood that are self-focused (e.g., "I think 'Why do I react this way?'"), symptom-focused (e.g., "I think about how hard it is to concentrate"), and focused on the possible consequences and causes of one's mood (e.g., "I think 'I won't be able to do my job if I don't snap out of this'"). This scale has high internal consistency and acceptable convergent validity (Butler & Nolen-Hoeksema, 1994; Nolen-Hoeksema & Morrow, 1991).

The tendency to ruminate is relatively stable even in individuals who experience significant change in their levels of depression (Bagby, Rector, Bacchiochi, & McBride, 2004; Just & Alloy, 1997; Kuehner & Weber, 1999; Nolen-Hoeksema, Morrow, & Fredrickson, 1993; Nolen-Hoeksema et al., 1994). For example, in a longitudinal study of recently bereaved people spanning 18 months (Nolen-Hoeksema & Davis, 1999), the intraclass correlation for the Ruminative Responses Scale across 5 interviews was .75 ($p < .0001$), despite the fact that levels of depression dropped precipitously in the 18 months following the bereavement.[2]

Prospective longitudinal studies using this scale have shown that people who engage in rumination when distressed have more prolonged periods of depression and are more likely to develop depressive disorders (Just & Alloy, 1997; Kuehner & Weber, 1999; Nolan et al., 1998; Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 1999; Nolen-Hoeksema et al., 1993, 1994; Roberts et al., 1998; Sarin, Abela, & Auerbach, 2005; Segerstrom, Tsao, Alden, & Craske, 2000; Spasojevic & Alloy, 2001; Wood, Saltzberg, Neale, Stone, & Rachmiel, 1990); similar results were found in samples of adolescents or children (Abela, Brozina, & Haigh, 2002; Nolen-Hoeksema, Stice, Wade,

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[1]Slightly different versions of the rumination scale have been used in various studies over the years. Because our unpublished data suggest that these other versions correlate very highly with the 22-item version currently recommended for use (Treynor, Gonzalez, & Nolen-Hoeksema, 2002), we will not separately review studies that have used different versions of the scale.

[2]Bagby et al. (2004) distinguished between absolute stability (i.e., when the participants' scores did not change significantly over time) and relative stability (i.e., when the participants' rank ordering of scores remained stable but their actual scores varied over time). Rumination scores tend to decline as levels of depression decline, suggesting that they do not show absolute stability (Bagby et al., 2004; Kasch, Klein, & Lara, 2001). Bagby et al. (2004), however, found evidence for relative stability of rumination scores even among patients being treated with antidepressants for a major depressive episode. In addition, they found that pretreatment rumination scores predicted posttreatment rumination scores even after accounting for changes in depression levels over the course of treatment, suggesting that changes in rumination scores were not simply a function of changes in levels of depression due to treatment.

& Bohon, 2007; J.A.J. Schwartz & Koenig, 1996) and in samples outside the United States (Ito & Agari, 2002; Kuehner & Weber, 1999; Raes, Hermans, & Eelen, 2003; Sakamoto, Kambara, & Tanno, 2001).[3] Other measures of rumination—in particular, those assessing a perseverative focus on the self and one's problems—have demonstrated similar links to depression (Luminet, 2004; Mor & Winquist, 2002; Siegle, Moore, & Thase, 2004). In addition, scores on the Ruminative Responses Scale correlated significantly with scores on alternative measures of negative rumination (Siegle et al., 2004). Thus, although much of the work on rumination has relied on the Ruminative Responses Scale, the relationship between rumination and depression has been found with different measures of rumination.[4]

Experimental studies testing the effects of rumination have generally used the rumination induction developed by Nolen-Hoeksema and Morrow (1993). Participants are asked to focus on the meanings, causes, and consequences of their current feelings for 8 min (e.g., "Think about the level of motivation you feel right now," "Think about the long-term goals you have set"). Because these are emotionally neutral prompts, they are expected to have no effect on the moods of nondysphoric people. But because dysphoric or depressed people have more negative feelings and cognitions, this ruminative self-focus is expected to lead them to become significantly more dysphoric. The contrasting distraction induction is meant to take participants' minds off themselves and their problems temporarily. In this condition, participants' attention is focused on non-self-relevant images (e.g., "Think about a fan slowly rotating back and forth," "Think about the layout of your local shopping center"). These distracting prompts are expected to have no effect on the moods of nondysphoric people but are expected to lead dysphoric people to become significantly less depressed for a short time.

We have conducted dozens of studies using these rumination and distraction manipulations and have found that the rumination induction significantly increases dysphoric mood in dysphoric participants but not in nondysphoric participants. The distraction induction decreases dysphoric mood in dysphoric participants but has no effect on mood in nondysphoric participants (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Lyubomirsky et al., 1999; Morrow & Nolen-Hoeksema, 1990; Nolen-Hoeksema & Morrow, 1993). Other investigators using our rumination and distraction inductions have found similar effects in clinically depressed participants (Donaldson & Lam,

2004; Lavender & Watkins, 2004; Watkins & Baracaia, 2002; Watkins & Moulds, 2005; Watkins & Teasdale, 2001).

Negative Thinking
Rumination appears to lead dysphoric or clinically depressed people to think more negatively about the past, the present, and the future. Dysphoric participants induced to ruminate spontaneously retrieve more negative memories from their recent past and recall negative events as having occurred more frequently in their lives than do dysphoric participants induced to distract from negative thoughts (Lyubomirsky et al., 1998; McFarland & Buehler, 1998; Pyszczynski, Hamilton, Herring, & Greenberg, 1989).

With regard to current events in their lives, dysphoric participants induced to ruminate spontaneously talk about troubling problems, such as conflict with families or financial woes, whereas dysphoric participants induced to distract from negative thoughts and the nondysphoric participants tend to talk about more cheerful situations they are facing (Lyubomirsky et al., 1999). Dysphoric ruminators are also more negative, more self-critical, and more likely to blame themselves for their current problems, and they express reduced self-confidence and optimism in overcoming those problems. When presented with hypothetical negative life events, dysphoric ruminators choose more negatively biased and distorted interpretations of those events (e.g., minimizing their successes and overgeneralizing from their failures; Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky et al., 1999; see also Greenberg, Pyszczynski, Burling, & Tibbs, 1992).

Finally, in their predictions about the future, dysphoric ruminators are more gloomy, with low expectations for positive events (Lyubomirsky & Nolen-Hoeksema, 1995; see also Pyszczynski, Holt, & Greenberg, 1987), solutions to their problems (Lyubomirsky et al., 1999), or for fun activities (Lyubomirsky & Nolen-Hoeksema, 1993). In all of these studies, dysphoric participants instructed to distract for 8 min were no more pessimistic or negative in their thinking than were nondysphorics (see also Pyszczynski et al., 1987, 1989). Similarly, studies using people meeting criteria for major depressive disorder have found that those induced to ruminate subsequently show more negative thinking about themselves and the future than do those in other induction conditions (Lavender & Watkins, 2004; Rimes & Watkins, 2005).

Poor Problem Solving
People prone to rumination often say they are trying to understand and solve their problems (Papageorgiou & Wells, 2001, 2003). Unfortunately, however, rumination in the context of dysphoria seems to interfere with good problem solving. Experimental studies show that inducing dysphoric participants to ruminate prompts them to appraise their problems as overwhelming and unsolvable (Lyubomirsky et al., 1999) and to fail

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[3]The Ruminative Responses Scale has been translated into German (Kuehner & Weber, 1999), Japanese (Ito & Agari, 2002; Sakamoto et al., 2001), and Dutch (Raes et al., 2003) for studies in those languages, and it has also been adapted for investigations with children by simplifying the language (Abela et al., 2002).

[4]The Adaptive Forms of Self-Reflection section of this article offers further discussion of alternative conceptualizations and operationalizations of rumination. Readers interested in the assessment of rumination are referred to Luminet (2004), which details the psychometric properties of some of the most commonly used measures.

to come up with effective problem solutions (Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky et al., 1999). Similar results have been found in samples of clinically depressed patients. (e.g., Donaldson & Lam, 2004; Watkins & Baracaia, 2002; Watkins & Moulds, 2005).

Even when a depressed ruminator generates a worthwhile solution to a problem, rumination may impede him or her from implementing it. In one laboratory study, dysphoric students who ruminated came up with perfectly good solutions to pressing problems (e.g., "study harder" or "spend less money") but showed a reduced likelihood of actually implementing those plans (Lyubomirsky et al., 1999). In a quasi-experimental study, participants prone to rumination expressed less confidence in a solution they had generated to a complex problem (e.g., how to improve their school's curriculum), asked for more time to work on the solution before they committed to it, and were less confident in their oral presentation of their solutions (Ward, Lyubomirsky, Sousa, & Nolen-Hoeksema, 2003).

Inhibition of Instrumental Behavior

One of the ways that ruminative responses to depressed mood can interfere with successful problem solving is by sapping people's motivation and initiative. Rumination maintains one's focus on one's depressive symptoms, which may convince dysphoric people that they lack the efficacy and wherewithal to engage in constructive behavior, such as participation in mood-alleviating activities. Indeed, the results of several studies suggest that people who focus on themselves and their feelings in the context of a negative mood show reduced motivation to initiate instrumental behavior. For example, one study revealed that although dysphoric ruminators recognized that pleasant, distracting activities would lift their mood, they were unwilling to try them (Lyubomirsky & Nolen-Hoeksema, 1993; see also Wenzlaff, Wegner, & Roper, 1988).

The consequences of ruminative thinking for the inhibition of instrumental action can be troublesome or inconvenient at best and serious or dangerous at worst. In the domain of health, laboratory and field studies show that women with chronic ruminative styles suffer heightened distress upon discovering potential health symptoms (e.g., a breast lump) and, consequently, delay seeking a diagnosis (Lyubomirsky, Kasri, Chang, & Chung, 2006). For example, women ruminators with breast cancer reported having delayed the presentation of their initial cancer symptoms to a physician more than 2 months longer than did nonruminators (Lyubomirsky, Kasri, et al., 2006). Furthermore, the effect of ruminative style on delay was moderated in part by the experience of positive mood at the time of symptom discovery—women ruminators who were relatively upbeat when they detected their symptom were less likely to delay. Similarly, in correlational studies, a tendency towards rumination was related to low compliance with a medical regimen among a diverse set of cancer patients in Germany

(Aymanns, Filipp, & Klauer, 1995), and emotion-focused rumination among first-time patients predicted rehospitalization 4 months after a coronary event such as a heart attack (Fritz, 1999).

Reduction of Social Support

Chronic ruminators appear to behave in ways that are counterproductive to their relationships with family, friends, and even strangers. In a study of bereaved adults, ruminators were more likely to reach out for social support after their loss, but they reported more social friction and less emotional support from others (Nolen-Hoeksema & Davis, 1999). Anecdotal reports from ruminative participants suggest that friends and family members become frustrated with their continued need to talk about their loss and its meanings for their lives many months after the loss (Nolen-Hoeksema & Larson, 1999). Other studies suggest that ruminators are perceived less favorably by others (J.L. Schwartz & McCombs, 1995).

Rumination is associated with several undesirable personality characteristics, including both a dependent, clingy interpersonal style and aggressive tendencies that may lead to this loss of social support. Ruminators suffer from *unmitigated communion* (i.e., the tendency to assume undue responsibility for the well-being of others; Nolen-Hoeksema & Jackson, 2001), dependency, neediness (Spasojevic & Alloy, 2001), and sociotropy (Gorski & Young, 2002). Rumination is also associated with the desire for revenge after an interpersonal transgression or slight (e.g., "I want to see her hurt and miserable"; McCullough, Bellah, Kilpatrick, & Johnson, 2001; McCullough et al., 1998) and with increased aggression following a provocation (Collins & Bell, 1997).

Thus, a large number of studies from our laboratories and those of other investigators have shown that rumination is associated with the experience of depressive symptoms and that rumination in the context of depressed mood or major depression is associated with more negative thinking, poorer problem solving, diminished instrumental behavior, and reduced social support. Many of these studies have used experimental designs, and many of the effects have been found both with dysphoric and with clinically depressed individuals.

CHALLENGES TO THE RESPONSE STYLES THEORY

Not all of the predictions of the original response styles theory have been supported. In this section, we address two central predictions that have frequently failed to gain support.

Duration Versus Onset of Depression

Nolen-Hoeksema (1991) originally suggested that rumination should predict the duration of depressed mood or depressive episodes more than it should predict their onset. This argument

has been directly tested in several studies.[5] In a sample of approximately 1,300 adults randomly drawn from the community, Nolen-Hoeksema (2000) found that rumination scores at a first assessment predicted new onsets of major depressive episodes (assessed with a structured clinical interview) over the next year among people who were not initially in a major depressive episode. Among people who were already in a major depressive episode at the first assessment, however, rumination scores did not predict whether they would still be in a depressive episode 1 year later. Just and Alloy (1997) found that college students' rumination scores at the beginning of a study predicted which students would show new onsets of significant depressive symptoms over 18 months, but the scores did not predict the duration of depressive symptoms in already-depressed students. Similarly, Lara, Klein, and Kasch (2000) assessed rumination in 84 college students who met criteria for major depression at the beginning of the study and found that it did not predict duration of their depression or time to remission over a 6-month follow-up.

Other studies have found that rumination does not predict duration of episodes of major depression in patients being treated for major depression (Arnow, Spangler, Klein, & Burns, 2004; Bagby & Parker, 2001; Park, Goodyer, & Teasdale, 2004; Schmaling, Dimidjian, Katon, & Sullivan, 2002). We do not believe this is an appropriate test of the response styles theory, however, as it does not make predictions about the effects of rumination on change in depression in patients who are undergoing pharmacotherapy or psychotherapy specifically designed to relieve their depression. In addition, it seems unreasonable to expect that pretreatment levels of rumination should predict responses to treatments that may have direct effects on patients' levels of rumination.

Some studies have found that rumination predicts the duration of depressive episodes. Kuehner and Weber (1999) assessed rumination in patients at the end of their treatment for depression and found that it predicted which patients would be in an episode of major depression 3 months later, as well as their levels of depression at 3 months postdischarge. Two studies found that the interaction of rumination and negative cognitive styles predicted the duration of diagnosed depressive episodes: one study used an untreated sample (Robinson & Alloy, 2003) and one study used a sample that had been given psychoeducational treatment (Ciesla & Roberts, 2002). These findings suggest that the combination of negatively biased, irrational thoughts with a passive and repetitive focus on such thoughts can maintain depressive episodes.

There may be simple statistical reasons why rumination scores do not consistently predict the duration of depression in people already meeting criteria for major depression. People susceptible to developing major depression appear to be highly likely to ruminate (Just & Alloy, 1997; Nolen-Hoeksema, 2000), so samples of already-depressed people may be relatively homogeneous for rumination, reducing variance in scores and thus reducing the statistical power for rumination to predict duration of depression. In addition, most studies have statistically controlled for initial levels of depressive symptoms in already-depressed participants in analyses to predict the duration of their symptoms; because rumination is likely to be correlated with initial levels of depression in already-depressed participants, this statistical control procedure further reduces the power of rumination to predict the duration of depressive symptoms.

A more interesting possibility is that rumination contributes to an individual "crossing the line" from dysphoria into a major depressive episode, but once an individual is in an episode, other autonomous self-perpetuating processes emerge that determine the duration of episodes. There are several neurobiological processes that appear to be state-dependent in major depression, including elevated peripheral levels of norepinephrine metabolites, increased phasic REM sleep, poor sleep maintenance, hypercortisolism, decreased cerebral blood flow and glucose metabolism within anterior cortical structures, and increased blood flow and glucose metabolism in paralimbic regions (Thase, Jindal, & Howland, 2002). These processes may help to maintain the symptoms of depression once they begin, even if they did not trigger the symptoms initially. For example, a person who ruminates over the loss of a close loved one may develop a severe enough grief reaction to meet criteria for a diagnosis of major depression, but the duration of the symptoms may depend on the functioning of these neurobiological systems in the individual.

The evidence that rumination predicts onsets of depression but does not always predict its duration parallels findings emerging from large nationally representative epidemiological studies that women's greater rates of depression are due to gender differences in first onsets, but not in duration of the episodes (Eaton et al., 1997; Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993). This is particularly interesting because the response styles theory was originally proposed, in part, to explain women's greater vulnerability to depression (Nolen-Hoeksema, 1987). Several studies have found that women are more likely to engage in rumination than men are (Butler & Nolen-Hoeksema, 1994; Grant et al., 2004; Nolen-Hoeksema & Larson, 1999; Nolen-Hoeksema et al., 1993, 1999; Roberts et al., 1998; Ziegart & Kistner, 2002), and the gender difference in rumination has been found to mediate the gender difference in depression in some studies (Grant et al., 2004; Nolen-Hoeksema et al., 1999; Roberts et al., 1998). Thus, since the original formulation of the response styles theory, the pattern of findings that has emerged is consistent with the argument that gender

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[5]Most longitudinal studies have only tested whether rumination scores taken at one point in time predict change in depression scores from that time to a second assessment in the future. These analyses (which are usually regression analyses) cannot distinguish whether rumination is predicting the onset of new depressive symptoms, the maintenance of existing depressive symptoms, or the degree of reduction of depressive symptoms.

differences in rumination help to account for the gender differences in depression.

Distraction as an Adaptive Alternative to Rumination

The original response styles theory argued that using positive distractions was an adaptive alternative to rumination and suggested that these two response styles were orthogonal, if not in direct opposition (Nolen-Hoeksema, 1991). Studies using the distraction subscale of the Response Styles Questionnaire, however, have found inconsistent relationships to depressive symptoms and rumination (e.g., Knowles, Tai, Christensen, & Bentall, 2005). Sometimes distraction is negatively correlated with depression and rumination (Bagby & Parker, 2001; Chang, 2004; Lam et al., 2003; Nolen-Hoeksema et al., 1994), sometimes it is positively correlated (Schmaling et al., 2002), and sometimes it is uncorrelated (Abela et al., 2002; Arnow et al., 2004; Just & Alloy, 1997; Kuehner & Weber, 1999; Nolen-Hoeksema et al., 1993).

The inconsistent findings across studies may be due to differences in populations (e.g., younger vs. older, clinical vs. community). We also suspect a problem with the way positive distraction is operationalized on the distraction subscale of the Response Styles Scale (and on related distraction scales). The distraction subscale asks people how often they use each of 11 activities, such as "go to a favorite place to get your mind off your feelings" and "do something you enjoy," in response to a sad or depressed mood. Respondents' scores are then summed across all 11 items, so high scores on this scale can indicate that a respondent engages in several distracting activities fairly often. Although it makes intuitive sense, at least initially, that engaging in more distracting activities is adaptive, this may not be true. Some people who engage in lots of distracting activities may be flitting from one to another, desperately trying to get their minds off their negative mood and ruminations. They may not, however, pour their attention fully into any one of these activities and thus find that none of them provide relief. This could explain why some studies have found distraction to be positively correlated cross-sectionally with both rumination and depression.

In contrast, people who use distraction effectively may have one or two activities they engage in when they are feeling upset or overwhelmed with concerns, and they may absorb themselves fully in these activities. For example, when they are feeling sad or blue, they may automatically pick up a hobby (knitting, playing the piano) or engage in a physical activity (a vigorous tennis game, playing basketball with friends) that is engrossing, distracting, and uplifting.

Thus, laboratory studies have reliably shown that inducing depressed people to focus on positive or benign distractions reduces their negative affect. Self-report measures of distraction, however, have not produced clear or consistent correlations. We encourage development of better methods to assess the everyday use of positive distractions as a mood-management technique. These new methods should assess not only the number of distractions and frequency of use, but also people's ability to maintain their attention on these distracters.

OTHER PSYCHOPATHOLOGIES PREDICTED BY RUMINATION

The original response styles theory focused only on the relationship between rumination and depression. However, rumination might be expected to predict additional forms of psychopathology. Heatherton, Baumeister, and colleagues (Abramson, Bardone-Cone, Vohs, Joiner, & Heatherton, 2006; Heatherton & Baumeister, 1991) argue that some people prone to high levels of aversive self-awareness, as are people who ruminate, turn to escapist behaviors such as binge eating or binge drinking to temporarily quell their self-directed thoughts. On the basis of this work, we hypothesized that individual differences in rumination would predict binge drinking and related symptoms of alcohol abuse, as well as binge eating and related symptoms of bulimia nervosa. Two prospective studies of adults have found that rumination predicts increases in binge drinking and/or symptoms of alcohol abuse over time (Nolen-Hoeksema & Harrell, 2002; Nolen-Hoeksema & Larson, 1999). Similarly, Nolen-Hoeksema et al. (2007) found that adolescent girls with high rumination scores were more likely to develop not only depression, but also symptoms of alcohol abuse, and they were also more likely to meet diagnostic criteria for alcohol abuse over a 4-year period. Adolescent girls prone to rumination were also more likely to develop symptoms of bulimia nervosa, especially binge eating, over the 4 years of the study. It is important to note that rumination did not predict changes in externalizing symptoms (e.g., aggression, delinquency) in these girls, providing evidence for the specificity of rumination in predicting internalizing symptoms and escapist behaviors.

Future investigations that test the self-reflective consequences of bulimic behaviors and substance abuse should be conducted to determine whether these behaviors actually do provide an escape from ruminative self-awareness. In addition, future research should also seek to determine what distinguishes those ruminators who turn to escapist behaviors from those who do not. Body dissatisfaction and acceptance of social norms for thinness have been found to predict excessive dieting and other behaviors designed to avoid gaining weight (e.g., self-induced vomiting; see Stice, 2002). Perhaps rumination interacts with these attitudinal variables to predict which individuals develop bulimia nervosa. Similarly, positive expectancies for the effects of alcohol (e.g., that alcohol will improve one's mood) predict drinking behavior (Cooper, Russell, & George, 1988; Cooper, Russell, Skinner, Frone, & Mudar, 1992). Perhaps rumination interacts with these positive expectancies to predict who will engage in excessive alcohol consumption. These and other hypotheses could be tested to determine what combination of

conditions are necessary for rumination to trigger significant symptoms of eating disorders or substance abuse.

Other studies should investigate additional forms of escapist behavior that may be related to rumination, such as self-injurious behaviors. Some theorists have argued that these behaviors are reinforced by the reductions in aversive emotions and thoughts that occur when an individual engages in them (e.g., Hayes, Wilson, Gifford, Follette, & Strosahl, 1996; Nock & Prinstein, 2004). This would suggest that some people who engage in self-harming behavior may do so to quiet ruminations. Rumination was significantly related to nonsuicidal self-injury behaviors in a cross-sectional study of adolescent girls (Hilt, Cha, & Nolen-Hoeksema, 2008), and it predicted increases in suicidal ideation over time in two samples of adults (Miranda & Nolen-Hoeksema, 2007; Smith, Alloy, & Abramson, 2006). Findings of further links between rumination and self-harming behaviors would suggest that interventions to prevent self-harm might benefit from targeting the tendency to ruminate. Dialectical behavior therapy (Linehan, Cochran, & Kehrer, 2001), which has been shown to be helpful in reducing suicidal and impulsive behavior, emphasizes the development of more adaptive emotion-regulation skills. It would also be interesting to determine whether this therapy reduces ruminative responses to distress and whether this is one of its mechanisms of action.

Given the high comorbidity between depression and anxiety, rumination might be expected to increase risk for anxiety disorders as well as depression. Indeed, longitudinal prospective studies have found that people prone to rumination also have higher levels of general anxiety and posttraumatic stress symptoms (Fritz, 1999; Nolen-Hoeksema, 2000; Nolen-Hoeksema & Morrow, 1991; J.A.J. Schwartz & Koenig, 1996; Segerstrom et al., 2000; for significant cross-sectional relationships between rumination and anxiety, see Abbott & Rapee, 2004; Fresco, Frankel, Mennin, Turk, & Heimberg, 2002; Harrington & Blankenship, 2002; Kocovski, Endler, Rector, & Flett, 2005; Muris, Roelofs, Rassin, Franken, & Mayer, 2005). Anxiety disorders, however, are typically characterized by a different form of perseverative thought: worry. The distinctions between rumination and worry and the proposed functions of each style of thought are discussed below.

RUMINATION AND WORRY

Worry has been defined as follows:

> [A] chain of thoughts and images, negatively affect-laden and relatively uncontrollable; it represents an attempt to engage in mental problem-solving on an issue whose outcome is uncertain but contains the possibility of one or more negative outcomes; consequently worry relates closely to the fear process (Borkovec, Robinson, Pruzinsky, & DePree, 1983, p. 10).

Worry is regarded as the central defining feature of Generalized Anxiety Disorder (American Psychiatric Association, 2000) and is present in most of the anxiety disorders (Barlow, 2002).

Rumination and worry are significantly correlated with each other (Fresco et al., 2002; Muris, Roelofs, Meesters, & Boomsma, 2004; Segerstrom et al., 2000; Watkins, 2004; Watkins, Moulds, & Mackintosh, 2005), and they share many characteristics (McLaughlin, Sibrava, Behar, & Borkovec, 2006). Both are repetitive, perseverative forms of thought that are self-focused (Barlow, 2002; Borkovec, Alcaine, & Behar, 2004; Segerstrom et al., 2000). Rumination and worry share an abstract, overgeneral thinking style (Stöber, 1996; Watkins & Teasdale, 2001; Watkins, Teasdale, & Williams, 2000). Both are associated with cognitive inflexibility and difficulty in switching attention from negative stimuli (Davis & Nolen-Hoeksema, 1999; Hazlett-Stevens, 2001). Performance deficits, difficulties in concentration and attention, poor problem solving, and inadequate solution implementation are consequences of both rumination and worry (Davey, 1994; Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky et al., 1999; Ward et al., 2003; Watkins & Baracaia, 2002; Watkins & Moulds, 2005). Finally, both rumination and worry are associated with and exacerbate depression and anxiety (Abbott & Rapee, 2004; Barlow, 2002; Fresco et al., 2002; Harrington & Blankenship, 2002; Kocovski et al., 2005; Muris et al., 2005; Nolen-Hoeksema, 2000; Nolen-Hoeksema & Morrow, 1991; J.A.J. Schwartz & Koenig, 1996).

Still, studies directly comparing measures of rumination and worry find that they are statistically distinguishable (e.g., they load on different factors; Fresco et al., 2002; Hong, 2007; Muris et al., 2004; Segerstrom et al., 2000; Watkins et al., 2005). Key features differentiate worry and rumination (see Table 1).

First, several theorists have noted differences in the time orientation of worry versus that of rumination (e.g., Alloy, Kelly, Mineka, & Clements, 1990; Barlow, 2002; Beck, 1967; McLaughlin, Borkovec, & Sibrava, 2007; Mineka, Watson, & Clark, 1998; Watkins, Moulds, & Mackintosh, 2005). Worry tends to be future-oriented and focuses on threats that might occur but have not yet occurred. Even when people worry about something that has happened in the past, such as a faux pas they made in a social situation, they are often worrying about the implications of this event for the future (e.g., "Will everyone now see me as an idiot?"; Barlow, 2002). In contrast, although rumination can involve concerns about possible threats in the future, it predominantly involves going over past events, wondering why they happened, and thinking about the meanings of those events (e.g., "How could my lover have cheated on me?"; Lyubomirsky et al., 1999; McLaughlin et al., 2007; Watkins, 2004; Watkins et al., 2005). We suggest that the distinct theme of rumination is loss, whether through fate, one's own failure, or the failure of others to live up to expectations.

People report that worry helps them to anticipate and prepare for threat (Borkovec, Hazlett-Stevens, & Diaz, 1999). Those prone to worry tend to feel uncertain they can control events and cannot tolerate this uncertainty (Dugas, Gagnon, Ladouceur, &

TABLE 1
Distinguishing Features of Worry and Rumination

Worry	Rumination
More future-oriented	More past-/present-oriented
Focused on anticipated threats	Focused on issues of self-worth, meaning, themes of loss
Conscious motive is to anticipate and prepare for threat	Conscious motive is to understand the deep meanings of events, gain insight, and solve problems
Nonconscious motive is to avoid core negative affect and painful images	Nonconscious motive is to avoid aversive situations and the responsibility to take action

Freeston, 1998; Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994). Worry helps them feel that they have anticipated possible threats and taken action against them. Because these threats are unlikely to occur, worry is reinforced by the nonoccurrence of the threats (Borkovec et al., 2004).

In contrast to the conscious functions of worry, Borkovec and colleagues (Borkovec, 1979; Borkovec et al., 2004) argue that the nonconscious function of worry is to avoid confronting core negative affect and aversive images. The linguistic, verbal nature of worry limits conscious access to vivid or painful images, and the avoidance of these images then reinforces the worrying. Worrying may also be reinforced by reductions in physiological arousal associated with distressing images. Inducing individuals to worry before the presentation of an anxiety-producing image reduces autonomic responses to these images (Borkovec & Hu, 1990; Borkovec, Lyonfields, Wiser, & Deihl, 1993; Hoehn-Saric & McLeod, 1990).

In contrast, when ruminating, people report feeling that they are gaining insight into the meanings of their feelings and problems, trying to draw the connections between their problems, attempting to discern the reasons that things happen to them, and trying to make sense of unhappy memories (Lyubomirsky & Nolen-Hoeksema, 1993; Papageorgiou & Wells, 2001; Watkins & Baracaia, 2002). Thus, rumination appears to be associated with sustained processing of negative emotional material (McLaughlin et al., 2007). Further evidence for this link comes from functional magnetic resonance imaging studies that show that rumination is associated with increased amygdala activity during the processing of emotional stimuli (Ray et al., 2005; Siegle, Ingram, & Matt, 2002).

We suggest that the content of rumination often focuses on the very kind of core negative affect and concerns that worry seems intended to avoid. Thus, it would appear that the nonconscious avoidant functions of rumination are different from the nonconscious avoidant functions of worry. What might rumination serve to avoid? Behavioral theorists have argued that rumination helps depressed individuals avoid engaging in the aversive environment that surrounds them by preoccupying their attention and time (Ferster, 1973; Martell, Addis, & Jacobson, 2001).

We go beyond this behavioral argument to suggest a more complex avoidant function for rumination: Rumination serves to build a case that the individual is facing a hopelessly uncontrollable situation and so he or she is not able to take action to overcome the situation. That is, rumination is not just a cognitive activity that removes people from aversive situations. Rather, rumination provides depressed individuals with the evidentiary base to justify withdrawal and inactivity. When people ruminate, they build a mountain of evidence that all is hopeless and that they might as well give up. This certainty that all their efforts are fruitless may actually be less aversive than the uncertainty about whether they can control situations. In turn, this sense of certainty may help to reinforce rumination and the conclusions drawn from rumination (Lyubomirsky & Nolen-Hoeksema, 1993). In addition, the case that is built through rumination provides a rationale for avoiding taking action or responsibility for situations and for withdrawing instead. In turn, the withdrawal and inactivity that is justified by ruminations is reinforced because it reduces exposure to an aversive environment (Ferster, 1973; Martell, Addis, & Jacobson, 2001).

We take our clues for this line of argument from several sources. Reductions in activity, anhedonia, and social withdrawal are hallmarks of depression and are, indeed, symptoms that set depression apart from anxiety (Clark & Watson, 1991). Behavioral theories suggest that these symptoms are responses to environments that are deficient in positive reinforcers and full of punishments. Thus, inactivity and withdrawal are reinforced because they remove the individual from an aversive environment (Ferster, 1973; Lewinsohn & Graf, 1973). Evolutionary theories, however, suggest that anhedonia, inactivity, and social withdrawal function to conserve resources and reduce action in situations where further action is futile or dangerous (Barlow, 2002; Nesse, 2000). The symptoms of depression also signal the social environment to provide support rather than make demands on the individual (Watson & Andrews, 2002). In turn, the provision of social support by others reinforces the depressive behavior (Ferster, 1973; Jacobson, Martell, & Dimidjian, 2001).

However, many social and environmental pressures operate against the individual completely withdrawing and becoming inactive (Watson & Andrews, 2002). People in the depressed individual's social network may not accept the conclusion that all is lost and instead urge the depressed person to take action, to fulfill his or her responsibilities (e.g., to take care of children), to solve problems, or simply to lift his or her mood. Thus, depressed people may need to convince important others that they should

not be expected to meet responsibilities or that problems are unsolvable. Rumination may be motivated by this need.

Often depressed mood arises in the absence of an obviously aversive or hopeless environment. Even when the depressed person acknowledges there is "no good reason" for his or her depression, evolutionary theories would suggest that depressed mood would still signal to the individual that he or she has experienced a loss or is facing a hopeless situation (see also Teasdale, 1985). This felt sense of loss and futility may in turn activate nonconscious agendas to determine what has been lost. This kind of agenda would lead to the kind of biased reflective processing observed in depression, as the individual selectively retrieves and rehearses negative recent events that match the sense of loss and hopelessness and notes similarities across them (e.g., "Every time I try to talk to my husband, it turns into a fight"). The felt sense that all is hopeless may also bias the individual to selectively reflect on obstacles to possible solutions to problems (e.g., "I could ask my husband what is wrong with our marriage, but he probably won't tell me").

We are not suggesting that people consciously engage in rumination to build a case that they should not be held responsible for changing their situation. Nonetheless, rumination is reinforced by the reductions in distress that come from withdrawing from aversive situations, from being relieved of responsibility, and from a sense of certainty about one's conclusions. Further, rumination supports the social signaling function of depression by providing reasons for others to come to the depressed person's aid (see also Jacobson et al., 2001).

Several of the studies already reviewed in this article support our proposed functions of rumination. First, although ruminators say they are trying to solve their problems, rumination leads people to see obstacles to the implementation of solutions (Lyubomirsky et al., 1999), to be less willing to commit to implementing the solutions they generate (Ward et al., 2003), and to be more likely to disengage from real-life problems than to continue trying to solve them (Hong, 2007). Notably, these patterns of results are observed even when the effects of depressed mood are statistically controlled, suggesting that they are linked to rumination per se. Similarly, rumination leads people to be less willing to engage in pleasant activities to lift their moods when given the chance (Lyubomirsky & Nolen-Hoeksema, 1993). Thus, rumination appears to be effective at convincing depressed individuals that they cannot take action and overcome their problems.

Research on self-verification theory (Swann, 1990) shows that having one's self-view verified is reinforcing, even when that self-view is negative. Swann and colleagues have found that people selectively solicit, attend to, recall, and believe feedback from others that confirms their self-concept (Giesler, Josephs, & Swann, 1996; Swann, Griffin, Predmore, & Gaines, 1987; Swann & Read, 1981a, 1981b). In applications of this theory to depression, researchers have found that depressed people selectively seek criticism and other feedback from others that

confirms their negative views of themselves (Joiner, 2002; Swann, Wenzlaff, Krull, & Pelham, 1992; Swann, Wenzlaff, & Tafarodi, 1992). The selective processing of negative information seen in rumination would serve to verify depressed people's views of themselves as being unable to control important outcomes, and this verification could be highly reinforcing.

Regarding the social signaling function of depressive rumination, we have found that bereaved people prone to rumination will reach out to others for social support more often than those not prone to rumination (even after controlling for differences between ruminators and nonruminators in depression levels; Nolen-Hoeksema & Davis, 1999). In turn, positive social support is even more beneficial to bereaved ruminators than to bereaved nonruminators: Bereaved ruminators who receive positive emotional support just after their loss show significant declines in depressive symptoms, whereas bereaved people who are not ruminators show no relation between the degree of emotional support received and changes in depressive symptoms. This suggests that rumination that is effective in signaling to the social environment that the ruminator needs support may eventually prove beneficial to the ruminator and thus may be reinforced. On the other hand, bereaved ruminators in our study received more criticism from others for their inability to cope than did nonruminators, suggesting the social signaling function of rumination may backfire, making the environment even more aversive and perhaps thereby motivating even more social withdrawal.

If worry and rumination serve different functions, how can we understand their comorbidity? Both worry and rumination are associated with concerns about control and uncertainty (Freeston et al., 1994; Ward et al., 2003). We suggest that when people are worrying, they are uncertain about their ability to control important outcomes, but they have some belief that they could control those outcomes if they just try (or worry) hard enough (Alloy et al., 1990; Barlow, 1988). In contrast, when people are ruminating, they are more certain that important outcomes are definitely uncontrollable (Lyubomirsky et al., 1999). Thus, worry and rumination differ in the degree of uncertainty and uncontrollability people perceive in the environment: Worry occurs when people are less certain but see events as potentially controllable, whereas rumination occurs when people are more certain and see events as not controllable.

In turn, these perceptions of uncertainty and uncontrollability can wax and wane depending on actual events. For example, a man who has been worrying that he might lose his job may move into rumination about the meanings of job loss when he receives a poor performance review from his boss (e.g., "I'm a total failure at life"). The poor review increases his certainty that he can do nothing to avoid losing his job, so he is more certain that the situation is uncontrollable. In contrast, if some event were to challenge his certainty that he will lose his job (for example, the boss himself gets fired), the man might move from rumination into worry, as his level of certainty about job loss decreases and

his belief in the potential controllability of losing his job increases.

People may also shift from rumination to worry when their inaction and withdrawal are not being reinforced by others, as when there are demands on individuals to continue to do their job, tend to their children, interact socially, and so on. Similarly, some berate themselves for ruminating and for becoming depressed and immobilized (see Campbell-Sills, Barlow, Brown, & Hoffman, 2006; Papageorgiou & Wells, 2001). To be able to engage in some action, people may attempt to avoid their thoughts of hopelessness and futility by worrying. For example, individuals with Generalized Anxiety Disorder say that worrying helps them avoid thinking about more aversive emotional topics (Borkovec & Roemer, 1995). Thus, worry may help people avoid rumination about the certain lack of control in their lives. Those who have ruminated a lot in the past, however, may easily slip back into rumination because they have rehearsed thoughts of hopelessness a great deal, making them highly accessible. With minor triggers, including a mild depressed mood that signals futility, rumination is reignited (e.g., Persons & Miranda, 1995).

Our arguments about the distinctions between rumination and worry, and about the avoidant functions of rumination, necessitate more research. As we argue below, however, we believe they hold important implications both for understanding self-reflection and for clinical interventions with ruminators.

RUMINATION IN RELATION TO OTHER COPING AND EMOTION-REGULATION STRATEGIES

When Nolen-Hoeksema (1987, 1991) proposed the response styles theory of rumination in the late 1980s and early 1990s, models of coping were popular in personality, social, and clinical psychology (e.g., Carver, Scheier, & Weintraub, 1989; Endler & Parker, 1994; Folkman & Lazarus, 1980, 1986; Moos & Billings, 1982). Whether one considers rumination a coping strategy depends on how one defines coping—as any response, adaptive or maladaptive, that might affect the outcome of a situation, or only as a response aimed at producing positive outcomes to stressful situations. Nolen-Hoeksema (1991) elected to define rumination as a maladaptive response to distressing situations, regardless of the intentions people have for engaging in rumination.

Coping theorists, however, have catalogued the various ways people could cope with stressful situations. For example, a common distinction has been made between *problem-focused coping strategies* that can change an aversive situation and *emotion-focused coping strategies* that manage the individual's emotional reactions to the situation. Problem-focused coping tends to be correlated with positive psychological outcomes, although the results have been somewhat mixed (see Lam et al., 2003; Skinner, Edge, Altman, & Sherwood, 2003, for a review). The relationships between emotion-focused coping strategies and psychological outcomes have also been quite inconsistent

across studies, in part because measures of emotion-focused coping contain a disparate collection of responses to negative moods, including reappraisal, wishful thinking, a desire for social support, denial, and avoidance (see Stanton, Danoff-Burg, Cameron, & Ellis, 1994, for a critique of these scales). Reappraisal coping tends to be associated with positive psychological outcomes (e.g., less depression and anxiety), whereas wishful thinking (which has similarities to rumination) and avoidance of emotions tend to be associated with negative psychological outcomes (see Carver et al., 1989; Skinner et al., 2003). Even within the construct of avoidance coping, the omnibus coping measures comprise a number of subscales tapping different types of avoidance, including cognitive denial (e.g., "I refuse to believe that it has happened"), dangerous escapist behaviors (e.g., "I use alcohol or drugs to make myself feel better"), and behavioral disengagement (e.g., "I admit to myself that I can't deal with it and quit trying"; Carver et al., 1989). Although dangerous escapist behaviors have been consistently associated with poor psychological outcomes, cognitive denial and behavioral disengagement have been less consistently related to poor outcomes. These strategies may be adaptive in the short term to manage initial distress. But these behaviors may be maladaptive in the long run if they prevent the individual from dealing with the situations that cause distress.

In the 1990s and 2000s, theories of emotion-regulation proliferated (see reviews in Gross, 2007; Mennin & Farach, 2007). One of the most influential emotion-regulation models is Gross's (1998) model of antecedent-focused and response-focused emotion regulation. Antecedent-focused strategies, such as reappraisal, attempt to modify the likelihood or experience of a stressor to prevent or reduce the amount of distress it creates. Response-focused strategies, such as suppression, attempt to modify one's emotional response to a stressor once it has occurred. In experimental studies, Gross and colleagues (see Gross & Thompson, 2007) have found that instructing participants to reappraise a distressing image lowers subjective distress, whereas instructing participants to suppress their emotional expressions in response to a distressing image increases sympathetic arousal. Using self-report measures, Gross and John (2003) found that people who often use reappraisal experience more positive well-being and interpersonal functioning, whereas people who often use emotional suppression experience less positive well-being and interpersonal functioning.

How does rumination relate to the several coping and emotion-regulation constructs that have been studied most intensively over the last 30 years? Figure 1 presents our best conjectures, based on existing studies. As reviewed earlier, experimental studies reveal that rumination is associated with a relatively weak problem-solving orientation, poorer problem solving, and with more negative appraisals of situations. Correlational studies show that rumination is positively related to suppression or avoidance of distressing feelings and thoughts
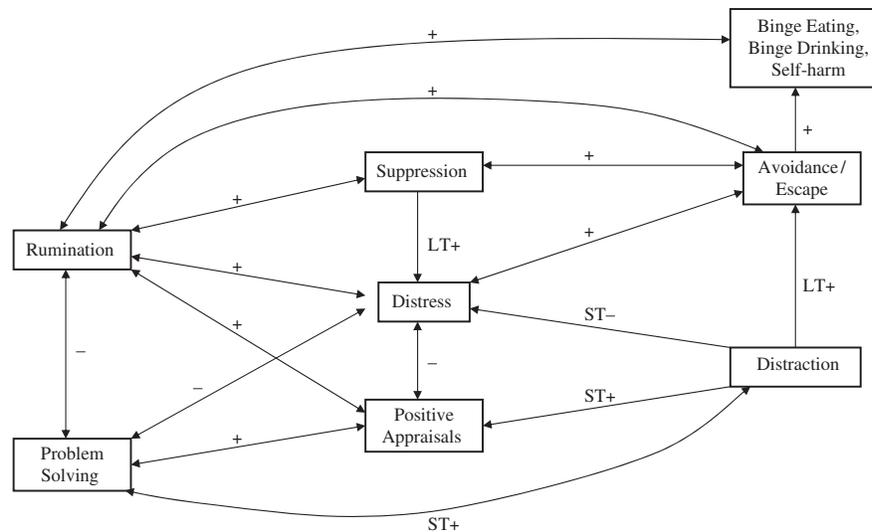
Fig. 1. A conceptual model of the relationships between rumination and other coping or emotion-regulation constructs. + = positive relationship; − = negative relationship; ST=short-term; LT=long-term.

(Moulds, Kandris, Starr, & Wong, 2007; Nolen-Hoeksema & Morrow, 1991; Wenzlaff & Luxton, 2003). People who ruminate may seek to escape from aversive self-focus by suppressing negative feelings and thoughts cognitively or by engaging in behaviors to avoid self-awareness. In turn, we speculate in Figure 1 that attempts to suppress or avoid ruminative thoughts mediate the link between rumination and binge eating, binge drinking, and self-harm (Hilt, Cha, & Nolen-Hoeksema, 2008; Miranda & Nolen-Hoeksema, 2007; Nolen-Hoeksema et al., 2007).

Wenzlaff and Luxton (2003) suggest that suppression and avoidance can also fuel rumination. Suppression often backfires, increasing the availability of unwanted thoughts (Wegner, 1994). Depressed people try valiantly to suppress their negative thoughts but experience rebounding of these thoughts, which could contribute to rumination (Wenzlaff et al., 1988). Indeed, Wenzlaff and Luxton (2003) followed people who were initially high or low on suppression, but uniformly low on rumination, for 10 weeks and found that the high-suppression people who experienced stressful events showed increases in rumination over time, whereas the low-suppression people did not. Engaging in behavioral avoidance (e.g., binge eating) can also contribute to rumination when these behaviors create more problems in individuals' lives, as suggested by our findings that adolescent girls who engage in binge eating display increases in rumination over time (Nolen-Hoeksema et al., 2007).

In contrast, our experimental studies show that inducing dysphoric people to distract from negative thoughts leads to relatively more positive appraisals of situations, better problem solving, and less distress. These are short-term effects of distraction. Chronic use of distraction without subsequently engaging in reappraisal or problem solving, however, may morph

into avoidance of negative emotions through maladaptive avoidance behaviors.

One emotion-focused coping response not shown in Figure 1 is emotional expression. In a long line of impressive research, Pennebaker and colleagues (see reviews by Frattaroli, 2006; Niederhoffer & Pennebaker, 2002) have shown that people prompted to express distressing emotions about difficult or traumatic events through writing about them or talking to others experience more positive physical and psychological health outcomes. Stanton and colleagues (Stanton, Kirk, Cameron, & Danoff-Burg, 2000) have extended Pennebaker's work to investigate emotional processing as a mechanism by which emotional expression impacts physical health. They define emotional processing as active attempts to acknowledge, explore meanings, and come to an understanding of one's emotions (Stanton et al., 2000). Longitudinal studies have found that emotional processing predicts improved emotional well-being over time, but there are important moderators of these relationships (see Austenfeld & Stanton, 2004, for a review).

We have omitted emotional expression or processing from Figure 1 because the evidence about its relationships to rumination is mixed. Pennebaker (1989) suggested that emotional disclosure can reduce rumination, and Pennebaker and O'Heeron (1984) found that the widows of men who committed suicide showed less rumination about their tragedy over time if they shared their experience with friends. On the other hand, Stanton and colleagues (2000) found that emotional processing was related to more rumination, but only in men. In a cross-sectional correlational study of 186 undergraduates, we found that Stanton and colleague's emotional processing scale was significantly positively correlated with rumination, with no gender differences in the size of this correlation (Nolen-Hoeksema & Jacobs, 2007).

Pennebaker (1989) argued that emotional disclosure reduces rumination, and ultimately distress, only when it leads to a change in individuals' understanding of the sources of their distress. Sometimes, people may attempt to understand their emotions through disclosure and processing, but instead fall into rumination. Austenfeld and Stanton (2004) and Pennebaker (1989) suggest that the interpersonal context may be important in determining whether emotional expression and processing are helpful or unhelpful. When others are supportive of emotional expression and help individuals understand their distressing situations in new ways, rumination may decline. When others are unsupportive or critical of individuals' emotional expressions, rumination may be fueled by this negative response. The results of our bereavement study support these contentions (Nolen-Hoeksema & Davis, 1999). Bereaved ruminators whose social networks were supportive of their expressions of grief evidenced declines in depression over time. In contrast, bereaved ruminators whose social networks were unsupportive and critical of their continued need to talk about their loss experienced less decline in depression over time.

Several researchers are currently trying to clarify when self-reflection, including the acknowledgement and processing of emotions, is adaptive and when it turns into rumination. We discuss these important efforts later in this article.

COGNITIVE AND NEURAL CORRELATES OF RUMINATION

Researchers have recently been exploring the possible cognitive and neural correlates of rumination. Certain cognitive deficits, biases or changes in neural activity may be both causes and consequences of rumination.

Cognitive Deficits and Biases in Depressive Rumination

Deficits in concentration and memory are common in depression, particularly on tasks in which attention is not constrained by the task (Hertel & Hardin, 1990, Hertel & Rude, 1991) and when attention is easily redirected to personal concerns or irrelevant information (Ellis, Thomas, & Rodriguez, 1984). Rumination may further impair concentration and memory for neutral stimuli by distracting the attention of depressed individuals during cognitive tasks, thus impairing overall performance. In a series of three experimental laboratory studies, dysphoric students who ruminated about their feelings and personal characteristics reported diminished concentration on academic tasks, needed additional time during reading and test taking, and displayed impaired work strategies and performance (Lyubomirsky, Boehm, Kasri, & Zehm, 2007; see also Kuhl, 1981; Strack, Blaney, Ganellen, & Coyne, 1985). Rumination alone, in the absence of a depressed mood, did not produce impaired concentration in these studies.

Rumination may also be associated with deficits in retrieval of nonvalenced information from memory. Hertel (1998) tested recall for lists of words in dysphoric and nondysphoric individuals. After learning the words, participants were induced to ruminate, to distract themselves, or they were given no instructions at all. The dysphoric participants performed worse than the nondysphoric ones in the rumination and control conditions, but no difference emerged between the groups in the distraction condition.

Ruminators may have a general deficit in the ability to switch from unhelpful to helpful strategies for performing a task. We found that people who score high on our self-report scale of rumination show more perseverative errors on the Wisconsin Card Sort Task than do people who score low on rumination, even after controlling for group differences in levels of depression (Davis & Nolen-Hoeksema, 2000). Similarly, Watkins and Brown (2002) found that depressed patients induced to ruminate showed a significant increase in the tendency toward stereotyped counting responses in a random-number generation task (thought to reflect a tendency to perseverate on a nonoptimal strategy) in comparison with depressed patients induced to distract or nondepressed controls. Whitmer and Banich (2007) noted that such difficulties could be caused by the participant either having trouble switching to the new strategy or having difficulty inhibiting the previously useful strategy. Using a set-switching task to distinguish these two possibilities, the researchers found that ruminators, who scored high on our measure of depressive rumination, were particularly impaired in their ability to inhibit previously useful strategies. This effect held even when statistically controlling for depressive symptoms. Thus, people prone to rumination may have general deficits in the ability to inhibit nonoptimal strategies currently in use in order to adopt new, potentially more useful strategies for solving tasks.

Rumination may also be associated with biases in information processing, specifically a tendency to attend to and remember negative information rather than positive information. We have already summarized the evidence that inducing depressed people to ruminate leads to negative biases in tests of relatively explicit cognitive processes, such as the retrieval of autobiographical memories or the generation of predictions about the future (Lyubomirsky et al., 1998). Recent work also suggests that depressed ruminators show biases towards negative information in tests of basic attention and implicit memory and show difficulties in inhibiting negative information when it is irrelevant (Joormann, 2004, 2005; Siegle, Steinhauer, Thase, Stenger, & Carter, 2002). For example, self-reported rumination predicted bias for negative words on a commonly used attention measure, the dot probe task, even when statistically controlling for depressive symptoms (Donaldson, Lam, & Mathews, 2007). And Joormann (2006) investigated the inhibition of emotional stimuli, both positive and negative, in ruminators. She found that individuals who scored high on our measure of rumination showed greater deficits in inhibiting emotional information than did individuals who scored low in rumination. This finding

remained significant when individual differences in dysphoria (which were correlated with rumination) were statistically controlled. Of particular interest is the finding that ruminators have difficulty inhibiting negative information. People who find it difficult to inhibit negative information when necessary, and for whom irrelevant negative information intrudes upon and interferes with processing, may find it easy to jump from one negative thought to another and become drawn into rumination. On the other hand, rumination on negative information may make it difficult to inhibit irrelevant negative stimuli, which in turn feeds rumination.

Deficits in the inhibition of negative information may make it difficult for ruminators to use positive distracters to successfully manage negative moods (Joormann, 2005). Wenzlaff and colleagues (1988) found that dysphoric people tend to use negative distracters (e.g., thoughts of a car accident) when trying to turn their attention away from distressing information, whereas nondysphoric people tend to use positive distracters (e.g., thoughts of winning a sweepstakes). In addition, even when experimenters provided participants with positive and negative distracters, dysphoric participants were less likely to use the positive distracters and more likely to use the negative distracters than were nondysphoric participants. These results were obtained despite the fact that dysphoric participants acknowledged that positive distracters are more useful than negative distracters in redirecting attention away from distressing material. Thus, the dysphoric participants understood the utility of positive distracters but they had more difficulty using them when it was beneficial to do so.

Again, this difficulty in inhibiting negative information and maintaining attention to positive distracters may be even more pronounced among depressed people who are ruminating (Hertel & Gerstle, 2003). Joormann and Seimer (2004) found that dysphoric individuals induced to ruminate were slower to recall positive autobiographical memories to repair their moods when instructed to do so than were dysphoric people induced to distract or nondysphoric controls, suggesting they had more difficulty retrieving these memories. Similarly, McFarland and Buehler (1998) found that dysphoric participants prompted to focus on their negative moods were less likely to use positive memories to overcome their negative moods than were dysphoric people distracted from self-focus. We found that dysphoric people induced to ruminate rated themselves as being significantly less likely to engage in positive distracting activities in comparison with the dysphoric/distraction group and the two nondysphoric groups (Lyubomirsky & Nolen-Hoeksema, 1993). Notably, the dysphoric ruminators rated these activities as being just as useful for lifting one's mood as did the other groups. In other words, they acknowledged that it would lift their mood to engage in these activities, but they were less inclined to actually engage in them. The inability to successfully use positive distracters to relieve rumination and negative mood may motivate ruminators to turn to escapist behaviors, such as binge eating or binge drinking, to escape from aversive self-awareness. That is, fundamental deficits in inhibiting negative information may both make it more difficult for ruminators to suppress negative thoughts and make it more likely they turn to maladaptive behaviors to escape from these thoughts, contributing to the links between rumination and maladaptive behaviors such as binge eating and binge drinking (e.g., Nolen-Hoeksema et al., 2007).

Deficits in inhibiting negative information could also contribute to the interpersonal problem-solving deficits observed in dysphoric and clinically depressed people induced to ruminate (Lyubomirsky & Nolen-Hoeksema, 1995; Watkins & Moulds, 2005). Even when dysphoric ruminators generate good solutions to problems, they appear more reluctant to move forward into implementing those solutions, expressing less confidence in the solutions and wanting more time to think about them (Ward et al., 2003). This may be because they have difficulty inhibiting thoughts about the ways the solutions could go awry.

Neural and Genetic Correlates of Rumination

Rumination involves both attention to negative affect and self-referential processing (Lyubomirsky et al., 1999). Furthermore, as we just reviewed, emerging evidence suggests that rumination may be associated with deficits in inhibitory processes, perhaps especially for negative information (Joormann, 2005). Thus, rumination would be expected to be associated with altered activation in neural areas involved in attention to negative affect, self-referential processing, and inhibition of negative information.

Neuroimaging studies have consistently shown that tasks that arouse negative affect or require participants to focus on negative affect are associated with activity in the amygdala (Cunningham, Raye, & Johnson, 2004, 2005; Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003). By contrast, self-referential processing is associated with increased activity in a number of areas, including the anterior medial cortex (medial frontal gyrus and/or anterior cingulate cortex) and posterior medial cortex (posterior cingulate cortex and/or precuneus; see Johnson et al., 2006; Macrae, Moran, Heatherton, Banfield, & Kelley, 2004; Ochsner et al., 2005, for reviews of findings focusing on medial frontal areas and see Cavanna & Trimble, 2006; Vogt & Laureys, 2005, for reviews focusing on medial posterior areas). Finally, deficits in the inhibition of negative emotional stimuli have been associated with activity in the rostral subdivision of the anterior cingulate cortex (Davidson, Pizzagalli, Nitschke, & Putnam, 2002).

In turn, the few neuroimaging studies of rumination show differences between ruminators and nonruminators in these areas of the brain when performing tasks that are emotional, involve self-referential thought, or require inhibition of emotion. Two studies have revealed that participants who score higher on trait rumination show greater amygdala activity in response to negative stimuli (Siegle, Steinhauer, Thase, Stenger, & Carter, 2002) or when asked to appraise negative photos in ways that

would increase their negative affect (Ray et al., 2005). In addition, Ray and colleagues (2005) found that ruminators showed more activity in the medial prefrontal cortex (PFC) when instructed to use appraisal to enhance their negative affect, suggesting that they were increasing their negative affect by interpreting negative photos as self-relevant. When participants high on rumination were simply told to look at negative photos, they showed greater activity in the medial PFC than they did when they were told to change negative affect in response to these photos, suggesting that they may chronically recruit medial prefrontal regions associated with negative self-referential processing even when instructed simply to look at photos. Ray et al. (2005) also found increased activity in the left ventrolateral PFC when ruminators were looking at negative photos without instructions to regulate their response. This area of the brain has been associated with representing changes in the affective relevance of stimuli, and the increased activity in this area among ruminators suggests they chronically recruit brain regions associated with updating the affective salience of stimuli, even when not instructed to regulate their affect.

Joormann and Gotlib (2005) found that greater activity in the rostral anterior cingulate cortex was associated with greater ability to inhibit negative distracters in depressed and nondepressed participants. Moreover, participants who scored higher on rumination, regardless of their depression status, showed lower rostral anterior cingulate activity when attempting to inhibit negative distracters. This suggests that the deficits in inhibition of negative stimuli seen in dysphoric rumination could be associated with decreased anterior cingulate activity.

Johnson, Nolen-Hoeksema, Mitchell, and Levin (2008) induced dysphoric and nondysphoric participants to ruminate or distract while they were undergoing neuroimaging. In addition, individual difference measures of rumination were obtained for all participants. They found that both dysphoric individuals and individuals high on rumination showed lower activity in the anterior medial PFC during the rumination task than did nondysphoric and low ruminating individuals. As the anterior PFC is associated with thinking about approach-related goals (Johnson et al., 2006), this suggests that dysphoric ruminators were less likely to recruit areas associated with positive self-referential processing when ruminating. Dysphoric individuals and ruminators showed greater activity than did nondysphoric and nonruminative individuals in both the anterior and posterior medial PFC during the distraction trials, suggesting sustained self-referential processing even when they were supposed to be engaging in distracting thoughts. This is consistent with the previously reviewed behavioral evidence asserting that rumination is associated with difficulty in disengaging from self-focused thoughts when it would be appropriate to do so.

Finally, a recent study examined genetic variants associated with rumination (Hilt, Sander, Nolen-Hoeksema, & Simen, 2007). This study focused on a single nucleotide polymorphism in the brain-derived neurotropic factor (BDNF) gene resulting in a valine-to-methionine substitution at codon 66 (Val66Met), which has been associated with childhood-onset mood disorders (e.g., Strauss et al., 2004). Preclinical and human work has suggested that BDNF plays a role in hippocampal functioning, in synaptic plasticity in times of stress, and in PFC functioning (for a review, see Egan et al., 2003). In turn, depression is associated with alterations in the structure and functioning of the hippocampus and PFC (Davidson et al., 2002), and as noted above, rumination is associated with biased memory processes and with altered activity in prefrontal areas. We reasoned that rumination may be a mediator between the BDNF gene and depressive symptoms. Researchers interviewed 200 young adolescent girls and their mothers to assess depressive symptoms and rumination and drew blood samples to extract DNA. The Val/Val genotype for BDNF was associated with greater rumination in the girls and with more childhood-onset depression, and in turn, rumination was a significant mediator of the relationship between the Val/Val genotype and childhood-onset depressive symptoms.

Understanding more about the neural and genetic correlates of rumination can shed light on possible contributors to the tendency to ruminate. Such studies also can provide information on the mechanisms by which rumination contributes to depression.

ADAPTIVE FORMS OF SELF-REFLECTION?

Are there adaptive forms of rumination, or more generally, of self-reflection? Several alternative conceptualizations of rumination and self-reflection and many new measures of various types of self-reflective thought have recently appeared in the literature (see Luminet, 2004; Mor & Winquist, 2002; Segerstrom, Stanton, Alden, & Shortridge, 2003; Siegle et al., 2004; Watkins, 2008). Some researchers have attempted to understand the differences between adaptive and maladaptive forms of self-reflection by conducting meta-analyses of the literature (Mor & Winquist, 2002; Watkins, 2008) or by administering several different measures of self-reflection to large samples of participants and using statistical procedures to reveal underlying dimensions (Segerstrom et al., 2003; Siegle et al., 2004). These studies have consistently shown that the type of self-reflection we define as rumination—an abstract, evaluative self-reflection, particularly one focused on negative content—is associated with depression and other types of negative affect (Watkins, 2008). Less clarity exists about what types of self-reflection are adaptive or, at least, benign. We review the results of this growing and somewhat confusing literature, organizing this section according to prominent alternative theories about what makes rumination maladaptive and what types of self-reflection may be adaptive.

Rumination Versus Intellectual Self-Reflection
One approach to understanding the differences between adaptive and maladaptive self-reflection has been to distinguish

between ruminative thought as a perseverative focus on negative moods and problems versus an intellectual curiosity about the self. Trapnell and Campbell (1999) developed separate measures of rumination and intellectual self-reflection. Their rumination measure includes items like "I always seem to be rehashing in my mind why I do things," whereas their reflection measure includes items like "I love analyzing why I do things." Rumination was found to be associated with neuroticism and reflection with openness to experience (Teasdale & Green, 2004; Trapnell & Campbell, 1999). However, reflection was also significantly correlated with neuroticism, and rumination and reflection were significantly correlated with each other, suggesting they share common variance (Teasdale & Green, 2004). Trapnell and Campbell's rumination subscale has also been found to be positively associated with current depressive symptoms, but the reflection subscale was found to be uncorrelated with depressive symptoms (e.g., Siegle et al., 2004). Thus, this rumination subscale seems to consistently tap into a maladaptive form of self-reflection, but the reflection subscale assesses a form of self-reflection that is unclear in its adaptive value.

Several investigators have used factor analysis to reveal underlying dimensions in the Ruminative Responses Scale of the Response Styles Questionnaire, including symptom focus, self-blame, isolation/introspection, and problem-solving analysis (Bagby & Parker, 2001; Bagby et al., 2004; Conway, Csank, Holm, & Blake, 2000; Lam et al., 2003; Roberts et al., 1998). Symptom focus, self-blame, and isolation/introspection have generally been positively correlated with depressive symptoms, whereas problem-solving analysis, the measure of intellectual self-reflection, has not (e.g., Lam et al., 2003). The Ruminative Responses Scale has been aptly criticized, however, for having items that overlap in content with depression items (e.g., "I think about how alone I feel" and "I think about how hard it is to concentrate"). These items often fall on the symptom-focus subscale in factor analyses, so it is not surprising that this subscale tends to correlate most highly with depressive symptoms.

Treynor et al. (2003) attempted to correct this problem by purging the Ruminative Responses Scale of items that could be argued to overlap with depression items and submitting the remaining items to a factor analysis. The two factors obtained paralleled Trapnell and Campbell's (1999) conceptualization of rumination and reflection and were labeled brooding and pondering. Brooding tapped negative aspects of self-reflection, including a focus on abstract "why me?" issues (e.g., "I think, 'What am I doing to deserve this?'") and a focus on obstacles to overcoming problems (e.g., "I think, 'Why can't I handle problems better?'"). The brooding factor was positively correlated with depression scores in a large sample both concurrently and longitudinally over one year (Treynor et al., 2003; see also Siegle et al., 2004).

The pondering scale included items that suggested a more general self-reflective tendency (e.g., "I go someplace alone to think about my feelings.") and other items that suggested a

problem-solving orientation to problems (e.g., "I analyze recent events to try to understand why I am depressed"). It was positively correlated with depression concurrently but negatively correlated with depression longitudinally (Treynor et al., 2003).

Joormann, Dkane, and Gotlib (2006) examined the results of the brooding and pondering subscales from the Ruminative Responses Scale from participants with current major depression, remitted major depression, social phobia, and no psychopathology. They found that participants with current major depression had the highest brooding scores of all the groups and that the remitted major depression and social phobia groups had brooding scores that were significantly higher than controls, but not different from one another. As for the pondering scale, participants with current major depression had significantly higher scores than control participants, with no other group differences found. Next, Joormann and colleagues administered the dot probe task to assess attentional bias toward negative faces and used the self-referent encoding task to assess negative memory biases. Those scoring higher on brooding showed more negative attentional and memory biases; furthermore, the correlation between brooding and attentional biases (but not memory biases) remained significant after controlling for depressive symptom scores. Greater pondering was associated with more memory bias, but not more attentional bias, and the association with memory bias was no longer significant after controlling for depression scores. The pattern of results from this study suggests that brooding is associated with higher current levels of depression, with a history of depression, and with attentional biases (and to a lesser extent memory biases) toward negative stimuli. Brooding was also linked to a diagnosis of social phobia, which is in line with previous studies showing rumination predicts anxiety as well as depression.

Joormann et al.'s (2006) findings that pondering is associated with greater depression and with more negative memory biases raise questions about its adaptiveness. Several other studies examining the concurrent relationship between depressive symptoms and the pondering subscale (or a slightly different version of the scale) have also revealed positive correlations (Fresco et al., 2002; Lam et al., 2003; Roberts et al., 1998; Siegle et al., 2004). Treynor et al. (2003) found that, although pondering was associated with more depression concurrently, it was associated with less depression over time. Thus, it may be that pondering is a form of self-reflection that may be emotionally distressing in the short run, but adaptive in the long run because it leads to successful problem solving.

Self-Regulation Theories

Self-regulation theories (Carver & Scheier, 1998; Duval & Wicklund, 1972; Martin & Tesser, 1996; Pyszczynski & Greenberg, 1987) argue that self-focused rumination is initiated by perceived discrepancies between one's current state or sit-

uation and a goal or desired state. For example, if a woman has the goal of a positive relationship with her husband but has been having frequent arguments with him, she is likely to focus on the discrepancy between her goal (a positive relationship) and her current state (hostility between the couple; Martin & Tesser, 1996). The woman's self-focused thinking will end either when she takes action to overcome the discrepancies (e.g., talks with her husband in an effort to repair the relationship) or when she relinquishes the desired goal (e.g., decides her husband is impossible to live with and files for divorce). In this case, the woman's thoughts are instrumental and lead to a resolution of her goal discrepancies. In contrast, if she simply continues to perseverate on the discrepancies between the current state and the desired state, the discrepancy will remain and she will experience negative affect. In this case, her ruminations will have a deleterious outcome. Thus, self-regulation theories suggest that rumination can be adaptive when it leads to problem solving or the abandonment of unattainable goals, but it is maladaptive when the individual only perseverates on discrepancies.

A number of studies have supported the self-regulation theories' arguments that perseverating on self-discrepancies engenders negative affect (for reviews, see Carver & Scheier, 1998; Martin, Shrira, & Startup, 2004; Martin & Tesser, 1996; Watkins, 2008). In particular, Pyszczynski and Greenberg (1987) applied self-regulation models to depression, arguing that depressed people tend to self-focus after failures, but not after positive events. They found support for this argument in a number of experimental studies (for a review, see Pyszczynski & Greenberg, 1987). Similarly, chronically unhappy individuals have been found to be more inclined than their happier peers to dwell excessively about themselves after failures and, subsequently, to experience impaired concentration and performance on important academic tasks (Lyubomirsky et al., 2007).

The results of a meta-analysis of studies on self-focus and negative affect show that perseverating on negative self-content is maladaptive (Mor & Winquist, 2002). The researchers examined 226 effect sizes across experimental and correlational studies that used a variety of manipulations and measures and concluded that self-focus after failure was associated with increased negative affect but that self-focus after positive events was associated with reduced negative affect. In a different effort to make sense of the proliferation of self-report scales of self-reflection and rumination in recent years, Segerstrom and colleagues (2003) administered six measures of repetitive thought to 978 undergraduates and used multidimensional scaling to reveal two underlying dimensions across the measures: positive versus negative content and searching versus resolving. Repetitive thought with negative content was associated with more negative affect than was repetitive thought with positive content.

Thus, the results of several studies support the idea that perseverating on negative self-content is associated with negative affect, whereas focusing on positive self-content is associated with positive affect. These results generally map onto the arguments of the self-regulation theories that self-reflection leads to negative affect when it involves perseverating on self-discrepancies.

However, the adaptiveness of other forms of self-reflection, including a problem-solving orientation, is less clear. Segerstrom and colleagues (2003) did not find a consistent relationship between the searching/resolving dimension of repetitive thought and negative affect. Similarly, Siegle and colleagues (2004) administered 16 different measures of rumination to undergraduates, depressed adults, and healthy adults across different studies and concluded that two general constructs of negative rumination and problem-solving rumination could be distinguished but that these two constructs are highly intercorrelated and both generally related to dysphoria. We note that studies of the relationship of self-report measures of problem-solving coping to depression have found mixed results (e.g., Lam et al., 2003), suggesting that a problem-solving orientation does not always lead to positive outcomes.

The mixed evidence about the adaptiveness of attempts to understand and solve one's problems raises the question of when and how people take an effective problem-solving approach to self-discrepancies and when attempts to problem-solve devolve into perseverative rumination. Clues to this question come from our experimental studies of interpersonal problem solving. Inducing dysphoric or depressed participants to distract from their moods and ruminations for just 8 min leads them to generate solutions to problems that are just as effective as nondepressed participants' solutions and significantly more effective than those generated by dysphoric participants induced to ruminate. The short distraction induction also leads dysphoric and depressed participants to express more control and self-efficacy, to appraise the causes of problems more optimistically, and to have more confidence in their ability to overcome their problems than do dysphoric people induced to ruminate. By contrast, the nondysphoric participants in our studies generate effective problem solutions and are positive and efficacious in their cognitions about their problems, regardless of whether they have just undergone a rumination or distraction induction.

These results suggest that attempts to resolve self-discrepancies will be more successful and less likely to devolve into perseverations about problems if individuals are either in a neutral or positive mood or if they first use neutral or positive distractions to lift their moods and interrupt ongoing ruminations. Is it simply that relieving an individual's negative mood by any means before they engage in self-reflection will allow that self-reflection to be positive and efficacious? The recent work by Watkins, Teasdale, and colleagues, reviewed in the next section, suggests that the answer to this question is "no": To affect the quality of depressed people's problem solving, it is critical to interrupt the ruminative way they think about themselves and their problems.

Abstract/Analytical Rumination Versus Experiential Mindfulness

Watkins (2008) and colleagues (Teasdale, Segal, & Williams, 1995; Watkins, 2004; Watkins & Teasdale, 2001) have distinguished between two types of rumination: one that involves abstract, evaluative thoughts about the self or emotion and current circumstances, and another that involves a nonevaluative awareness of present experiences, which Watkins and colleagues have referred to as concrete rumination or mindful experiencing/being. Similar distinctions have been made between monitoring and evaluating one's mood and the ability to be aware of and label one's moods without evaluating them (Reeves, Watson, Ramsey, & Morris, 1995; Swinkels & Giuliano, 1995). In an impressive review of the literature on various forms of repetitive thought, Watkins (2008) provides evidence that more abstract, evaluative rumination is unconstructive, particularly when it is negatively valenced, in comparison with a more concrete focus on present situations and experiences.

For example, Watkins and colleagues (Watkins, 2004; Watkins & Teasdale, 2001) induced an analytical focus or an experiential focus in depressed patients, using the rumination stimuli developed by Nolen-Hoeksema, Lyubomirsky, and colleagues in previous studies. In the analytical focus condition, patients were instructed to think about the causes, meanings, and consequences of their feelings. In the experiential focus condition, the same stimuli were presented to participants, but they were instructed to "think about the concrete experience of x." The researchers found that although the experiential induction did not lift depressed participants' negative moods, it led to less overgeneral (i.e., categoric) autobiographical memory than did the analytical rumination induction. Other studies using these inductions have shown that the experiential induction prompts depressed participants to engage in less global negative self-judgments (Rimes & Watkins, 2005) and better social problem solving (Watkins & Moulds, 2005) than did the analytical rumination induction.

The neuroimaging study of rumination described earlier (Johnson et al., 2008) also supports a distinction between analytical and experiential ruminations. In this study, there were two rumination conditions, an analytical condition (e.g., think about why things turn out the way they do, what your feelings mean), and an experiential condition (e.g., think about your current physical sensations, how motivated you feel). In both dysphoric and nondysphoric individuals, the analytical rumination condition tended to result in more medial PFC activity than did the experiential rumination condition, suggesting it induced greater self-referential thinking. However, dysphoric participants and those high in rumination showed greater reduction in activity in the anterior medial PFC, which is associated with approach-related goals, in the analytical rumination condition than they did in the experiential rumination condition, suggesting the dysphorics and ruminators were thinking less about approach-related goals when engaging in analytical rumination than when engaging in experiential rumination.

The behavioral work of Watkins and colleagues and our recent neuroimaging findings suggest that the maladaptive component of rumination may be its abstract analytical aspects, whereas a more experiential form of self-reflection is not maladaptive. Furthermore, our distraction induction's positive effects on thinking may not be solely due to improvements in participants' moods, because Watkins' experiential induction does not lift participants' depressed moods, but it does improve the quality of their thinking. This work clearly has important implications for therapeutic interventions for people prone to depressive rumination.

INTERVENTIONS TO OVERCOME RUMINATION

The consistent evidence from experimental studies that short periods of positive distractions improve not only depressed people's moods, but also the quality of their thinking and problem solving, suggests the importance of teaching people prone to depressive rumination to engage in neutral or pleasant distractions as a short-term strategy when they find themselves caught in ruminative thinking. Once individuals' moods are lifted through positive distractions, they may engage in problem solving or reappraisal to address the situations contributing to their moods.

The kinds of activities that might serve as distractions (e.g., going jogging, getting together with friends) are similar to activities recommended in behavioral activation interventions for depression (Jacobson et al., 1996; Lewinsohn, Antonuccio, Brekenridge, & Turi, 1984), and studies have affirmed the efficacy of these interventions for depression (Jacobson et al., 1996, 2001). Behavioral activation may work by countering the action tendency that is central to depression—namely, withdrawal and inactivity.[6] Our research suggests that these strategies also relieve depression by teaching depressed people how to break their habitual ruminative cycle.

Some people may chronically attempt to distract themselves from or suppress their moods and problems. Depressed individuals do engage in more suppression than do nondepressed ones (Beevers, Wenzlaff, Hayes, & Scott, 1999), but it is difficult to maintain. Negative thoughts tend to rebound with greater force after attempts to suppress (Wegner & Wenzlaff, 1996). As noted earlier, depressed people, particularly depressed ruminators, find it difficult to inhibit negative thoughts and tend to choose the wrong cognitive activities to distract themselves (i.e., they focus on negative thoughts and memories rather than positive ones; Joormann & Siemer, 2004; Wenzlaff et al., 1988). Although depressed ruminators may engage in distracting behaviors to suppress their thoughts, our work suggests that they

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[6]We thank David Barlow for calling attention to this mechanism.

may sometimes turn to maladaptive behaviors, such as binge eating and binge drinking (e.g., Nolen-Hoeksema et al., 2007).

Recent conceptualizations of behavioral activation interventions (Jacobson et al., 1996) suggest that effective behavioral strategies not only distract individuals from their moods and increase positive reinforcers in the short-term, but that they also increase positive reinforcers for the long-term by helping to overcome problems in their lives. Indeed, if people simply avoid their problems through constant distraction, these problems are likely to recur. Thus, it is critical that behavioral interventions encourage depressed people to engage in problem solving after engaging in short-term distractions and/or to focus on activities that increase the probability that their environments will be improved.

In light of the effectiveness of distraction and behavioral activation interventions for rumination and depression, it seems paradoxical that interventions designed to focus attention on distressing emotions and thoughts, such as experiential or mindfulness therapies, also have positive effects on depression in some studies. Mindfulness therapy (Segal, Williams, & Teasdale, 2002; Teasdale et al., 2000) and acceptance-based approaches (Hayes et al., 2003) teach depressed people to notice their feelings and thoughts without judging them or becoming embroiled in them. Mindfulness interventions have been shown to reduce relapse following remission in people with recurrent depression (Teasdale et al., 2000) and to reduce depressive symptoms in patients with residual depression despite having undergone pharmacotherapy (Watkins et al., 2007). Mindfulness training may help depressed people gain attentional control and reduce the activation of associative networks of negative thoughts, allowing depressive thoughts to enter and leave consciousness without spiraling the individual into depressive rumination (Segal et al., 2002; Teasdale et al., 1995). Over time, mindfulness practices may thus reduce the links between depressive thoughts in the associative network.

Our functional analysis of rumination also suggests another mechanism by which mindfulness may help to reduce or prevent relapse in depression. If rumination serves to build a case for hopelessness, mindfulness techniques may reduce ruminations by challenging the validity of this case. Mindfulness strategies teach individuals that their thoughts are not necessarily true and do not control their actions and that they should instead to view their thoughts as outside of or distant from themselves (Segal et al., 2002). Thus, these techniques may challenge the validity of the case the ruminations have built for hopelessness and may train individuals not to mechanically accept the felt sense of hopelessness that comes with depression. Mindfulness or experiential interventions are thought to reduce worry and anxiety by reducing avoidance of painful images and negative emotions and by aiding in the processing of these images and emotions (Kabat-Zinn et al., 1992; Miller, Fletcher, & Kabat-Zinn, 1995; Roemer, Salters-Pedneault, & Orsillo, 2006). These interventions may have similar effects on rumination, to the extent that it

serves similar emotional avoidance functions (Watkins et al., 2007).

The cognitive restructuring techniques of cognitive therapy (Beck, Rush, Shaw, & Emery, 1979) might seem to engage depressed people in a form of rumination, in that they focus attention on the stream of negative thoughts passing through the depressed person's mind. Cognitive therapy, however, teaches depressed people, including depressed ruminators, methods for challenging these thoughts rather than passively replaying or accepting them. Barber and DeRubeis (1989) and Teasdale et al. (1995) suggest that cognitive therapy works not by changing the content of depressed people's cognitions, but by teaching them methods for standing apart from those cognitions and questioning them when they occur. In other words, the key to therapy is for people to stop automatically accepting the truth value of their negative thoughts and to choose to substitute these thoughts with more rational or adaptive ones. This argument suggests that cognitive therapies may also be effective in part because they counter the avoidant functions of ruminations in developing a case that individuals cannot do anything to change their environments.

Finally, interpersonal therapy (Klerman & Weissman, 1986; Weissman & Markowitz, 2002) and social problem-solving therapies (e.g., Arean, Perri, Nezu, & Schein, 1993; D'Zurilla, Nezu, & Maydeu-Olivares, 2004; Nezu, 1986) have also been shown to be helpful in depression and may have positive effects on rumination. People prone to rumination report more interpersonal conflict, even when they are not currently depressed (Nolen-Hoeksema & Davis, 1999), and interpersonal conflict may both contribute to and result from rumination. Understanding the role of close relationships in their depression, making changes in unsatisfying relationships, and improving their social skills may help depressed ruminators to overcome their interpersonal problems.

The various interventions we have discussed are based on quite different theories of the causes of depression and target different problems in depression. Yet studies directly comparing the efficacy of various types of therapy generally do not find consistent differences among them (see review by Hollon, Thase, & Markowitz, 2002). Similarly, the few studies that have examined whether diverse treatments have differential effects on rumination among depressed people have found that they do not (Arnow et al., 2004; Schmaling et al., 2002).

An intriguing possibility is that one reason all these interventions are effective is because all of them provide depressed ruminators with an explanation for why they are depressed and a set of steps to overcome their depression. As long as ruminators believe the explanation the therapist is delivering, they have answers to ruminative questions about what is wrong with their lives and a set of strategies for facing the future. Even if the explanation provided by the therapist is wrong, giving depressed ruminators a plausible rationale for their depression and the hope they can overcome it by following the therapist's prescriptions

may go a long way in interrupting the depression–rumination–inaction cycle (Frank, 1973).

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

After rethinking the construct of rumination in light of existing evidence, we conclude that many aspects of the original response styles theory have been supported but some of them need revision. Rumination does predict depressive symptoms and disorders and does impair thinking, problem solving, instrumental behavior, and social relationships. Inducing rumination prolongs the experience of negative mood in dysphoric individuals, but self-reported rumination does not reliably predict duration of episodes of major depression. Similarly, experimental manipulations of distraction have the predicted effects on mood, but self-report measures of distraction do not. In addition, new evidence reveals that rumination predicts not only depression, but anxiety, substance abuse, eating disorders, and possibly self-harm.

We have outlined the similarities and differences between rumination and worry and have suggested that rumination provides depressed individuals with evidence that their situations are uncontrollable and that further action is futile; in turn, rumination is reinforced when individuals can avoid aversive situations and responsibility for action and when it successfully signals to others that the ruminating individual needs help. We have also proposed a model of how rumination relates to other coping and emotion-regulation constructs. We see our hypotheses about the avoidant functions of rumination and about how rumination relates to other coping and emotion-regulation constructs as important foci for future research.

We have highlighted some exciting new areas of research that are shedding light on the cognitive deficits and neural processes correlated with rumination and on adaptive versus maladaptive forms of self-reflection. Several questions about rumination, however, remain to be fully answered: What are the developmental antecedents of individual differences in rumination? How can depressed people avoid falling into rumination when they are trying to understand their very real problems? What makes it so difficult to break free of rumination once it has begun? And what are the most effective strategies for combating rumination in depressed people? Answering these questions will be critically important to the development of more effective prevention and intervention programs for depressive rumination.

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