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To the Graduate Council:

I am submitting herewith a dissertation written by Kimberly A. Edmondson entitled "Forgiveness and Rumination: Their Relationship and Effects on Psychological and Physical Health." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

Kathleen A. Lawler, Major Professor

We have read this dissertation and recommend its acceptance:

Debora Baldwin, Maureen Groër, James Lawler

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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and recommend its acceptance:

Debora Baldwin

Maureen Groër

James Lawler

Acceptance for the Council:

Anne Mayhew
Vice Chancellor and Dean of Graduate Studies

(Original signatures are on file with official student records.)

FORGIVENESS AND RUMINATION: THEIR RELATIONSHIP AND EFFECTS ON PSYCHOLOGICAL AND PHYSICAL HEALTH

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Kimberly A. Edmondson
December 2004

DEDICATION

This dissertation is dedicated to my children, Carson and Timothy Edmondson. In making the decision to go to graduate school, I took into account that there would be sacrifices. I was ready and willing to make those sacrifices. My children, however, were not given a choice and did not realize the hardships that would be part of the graduate school experience. Yet, I have never heard them complain, or vent their frustration against me. In fact, I doubt very much that I would have been able to finish without them. I was the pessimistic one, anxious about everything, wondering if I could go on. They continually expressed their total belief in me and my abilities. They have been the source of my strength and my inspiration and they deserve as much recognition for the completion of this dissertation as I do.

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I wish to thank Kathleen Lawler for her infinite patience and dedication to producing the best work I could deliver. She has truly been the epitome of the word "mentor." I can honestly say that I could not have accomplished this without her. I would like to thank Debora Baldwin for also taking the time and effort to consult on this dissertation and ultimately make it the best it could be. I would also like to thank Maureen Groër and James Lawler for serving on my committee. Lastly I would like to thank my assistants, Adam Hayes, Charlene Dondero, Stacey Leppert, and Elizabeth Cody for their invaluable help.

ABSTRACT

Forgiveness has recently become a popular focus of research in psychology. In addition to philosophical and theological explorations, psychologists have extended the study of forgiveness into physical and psychological health. The purpose of this study was to determine the relationship between forgiveness and rumination, as well as the associations among these two factors, health and acute physiological responses. Sixty females participated in a betrayal narrative as well as a rumination period. Two measures of state forgiveness, one measure of trait forgiveness, and two measures of trait rumination were used. Blood pressure and cortisol reactivity were assessed. State forgiveness was associated with rumination, but not trait forgiveness. Forgiveness was not related to physical symptoms, but was strongly related to depression and anxiety. State forgiveness was related to increased mean arterial pressure during the betrayal interview, but these increases were not maintained in the rumination period. High forgivers displayed a greater reduction in cortisol level, from post-baseline to post-rumination period, than low forgivers. The role of suppressing emotions and catharsis in cardiovascular and endocrine effects are discussed.

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CHAPTER 1

Introduction

While forgiveness and rumination have recently been popular topics of research, the relationship between them has not been investigated. On one hand, recent research suggests that forgiveness has an overall positive effect on physical and psychological health, while rumination is linked to depression. To the extent that ruminating about a certain betrayal or hurt would increase negative feelings about the event, it would be expected to interfere with or prevent forgiveness. Thus, it is likely that rumination about a transgression would moderate the relationship between forgiveness and health. The purpose of this paper is to investigate the relationship between forgiveness and rumination and the relationships of these two constructs with health. The paper will begin with forgiveness: its definition, and relationships to mental and physical health, and the factors that influence forgiving. The research on rumination will then be presented in the same sequence, followed by an integration of these two constructs.

Forgiveness

While forgiveness has long been explored by philosophers and theologians, only recently has it received scrutiny in the discipline of psychology. Increasingly, attention has been directed toward the theoretical and empirical study of forgiveness and its applications to mental and physical health (McCullough, Pargament, & Thoresen, 2000). It is a worthwhile topic within the field given that relationships form the basis of our society and provide a means of support for individuals and groups. Inevitably problems arise within these relationships, and rather than discarding them or harboring feelings of

hostility and anger and possibly revenge (McCullough & Witvliet, 2002), forgiveness provides a means of repairing the damage that has been done. Forgiveness may not only repair a broken relationship, it may reduce negative feelings that accompany certain transgressions, as well as restoring a means of social support. It is well known that certain forms of negative affect have negative implications for both mental and physical health, while social support has a fairly robust positive effect on health. Thus, forgiveness may provide a means of repairing broken social connections, which has implications for the maintaining of social order and social networks (McCullough & Witvliet, 2002). In addition, forgiveness may directly influence health. There has been a considerable amount of research exploring the relationship between forgiveness and mental health; however, there has been little research concerning the relationship between forgiveness and physical health. Thus, physical and mental health must be explored and identified as enhanced or diminished by the letting go of negative feelings associated with a transgression.

Defining Forgiveness

While there are a number of different definitions of forgiveness, they share two common themes. For the most part, forgiveness is defined primarily as a reduction in negative affect and behavior, and secondarily as an increase in positive feelings, following an interpersonal offense (Rye & Pargament, 2002; Worthington & Wade, 1999). While most researchers subscribe to the above-mentioned definition of forgiveness and its focus on emotions, McCullough, Rachal, Sandage, Worthington, Brown and Hight (1998) conceptualize forgiveness as a motivational phenomenon. They describe forgiveness as "the reduction in avoidance and revenge motivation following an

interpersonal offense (p. 1603)," thus placing greater emphasis on behavior, albeit triggered by emotions. According to McCullough, Fincham, and Tsang (2003), all of the definitions focus on the prosocial aspects of forgiveness which lead to more positive feelings, and fewer negative feelings toward the offender. In addition to defining forgiveness, Enright and Coyle (1998) enumerate what forgiveness is not: forgiveness is not pardoning, condoning, excusing, forgetting, or denial and it also does not imply that reconciliation will necessarily occur. These distinctions protect the safety of those who have endured abusive relationships, as well as maintain their right to pursue justice (McCullough, 2000), separate issues from forgiveness.

Forgiveness and Mental Health

Forgiveness has been extensively studied in relation to mental health (Maltby, Macaskill, & Day, 2001). To the extent that relationships are repaired and negative affect is reduced, forgiveness should have a positive effect on mental health. In fact, forgiveness has been associated with a decrease in schizophrenic traits, social desirability, self-alienation, and persecutory ideas (Al-Mabuk, Enright, & Cardis, 1995). Failure to forgive oneself has been associated with depression (Brown, 2003), anxiety, distrust, self-esteem, and social introversion (Mauger, Freeman, McBride, Perry, Grove, & McKinney, 1992).

In a sample of older people, Krause and Ellison (2003) found that adults who forgive others more easily exhibit a greater sense of well-being than those for whom forgiving is difficult. They also report greater death anxiety and depressed affect among older people less willing to forgive. Another study using a sample of older adults revealed that forgiveness was related to increased self-esteem, lower depression, and

lower state and trait anxiety (Hebl & Enright, 1993). Interestingly, Toussaint, Williams, Musick, and Everson (2001) found that forgiveness may increase its effect on health with age. They report that forgiveness of others is more strongly associated with mental health outcomes for middle and old age adults than for younger adults.

While Toussaint et al. (2001) found stronger effects for older adults, there is considerable evidence relating forgiveness to mental health in younger adults as well. Maltby, Macaskill, and Day (2001) reported that younger to middle-aged adults who fail to forgive themselves or others experience more neuroticism, depression, and anxiety. For personality factors, different effects were reported for forgiveness of others. For men, failure to forgive others was associated with low extraversion, whereas for women it was associated with psychoticism and social dysfunction. In forgiving oneself and forgiving others, depression seems to be a major factor.

Since romantic relationships are frequently beset by situations that involve significant hurt, Berry and Worthington (2001) assessed forgiveness in couples. Thirty-nine participants reported whether or not their relationships were happy. Those reporting an unhappy relationship displayed increased cortisol production and reported more mental health problems. They differentiated between forgiving and unforgiving coping responses to interpersonal transgressions. Forgiving and unforgiving personality traits predicted both physical and mental health. They maintained that unforgivingness endures due to vengeful rumination about the transgressor and the transgression. To the extent that someone is in a state of unforgivingness, those negative emotions could be expected to influence mental and physical health.

Building upon correlational findings of forgiveness and positive mental health, interventions aimed at fostering forgiveness, and thus improving health, have been undertaken. Group therapy sessions have been used to increase feelings of forgiveness and reduce negative feelings. Freedman and Enright (1996) provided a forgiveness intervention, which comprised a 17-unit process by which the participant's responses to the betrayal were reexamined, a commitment to forgiveness was established, and an active therapeutic process involving reframing and rethinking was implemented. A yoked experimental design was used in which pairs of participants were matched on a number of factors, and then randomly assigned to the wait-listed control groups. The participants in the control group completed the intervention protocol after the experimental group. In their sample of 12 incest survivors, the forgiveness intervention was associated with an increase in hopefulness, reduced anxiety and reduced depression, as well as evidence for forgiveness (Freedman & Enright, 1996). The same procedure was utilized by Coyle and Enright (1997) with ten postabortion men. They report that all of the men experienced significant gains in forgiving, while reporting significant reductions in grief, anger, and anxiety. Rye and Pargament (2002) compared a spiritual intervention with a secular intervention and a control group. They reported that both the religiously-oriented and secular interventions were associated with a greater reported existential well-being as well as greater reported happiness, confidence, peace and self-esteem than the control group. Thus, the evidence indicates that forgiveness has protective effects in relation to mental health. It remains to be seen whether those same protective effects can be ascribed to physical health as well.

Forgiveness and Physical Health

Few articles have examined the relationship between forgiveness and physical health. Those that have often approach the topic by focusing on hostility, a well-known risk factor for heart disease morbidity and mortality, as one type of unforgiving response (Witvliet, 2001; McCullough et al., 1998; McCullough, Worthington, & Rachal, 1997). However, research has begun to examine the relationship between forgiveness and physical health directly.

In a sample of 72 undergraduate students, Witvliet, Ludwig, and VanderLann (2001) used imagery to elicit emotions associated with a betrayal. Participants were asked to think about a betrayal either in an unforgiving context (rehearsing an offense, harboring a grudge) or in terms of forgiving (empathizing with offender, granting forgiveness). When participants were asked to think in unforgiving ways, more negative emotions and greater physiological stress were reported, as well as slower recovery than those asked to think in forgiving ways. In addition, individuals in the unforgiving condition displayed greater facial tension (corrugator EMG) than those in the forgiving condition. These results were reflected in skin conductance, blood pressure and heart rate as well. Thus, just imagining harboring a grudge for an offense is likely to produce arousal of the sympathetic nervous system.

In a twist on the typical research study involving forgiveness, Witvliet, Ludwig, and Bauer (2002) assessed transgressors' emotions and physiological responses in a similar imagery study. Forty participants ruminated about a real transgression they had perpetrated, and imagined seeking forgiveness from the victim. They were asked to imagine a list of potential responses from the victim including responding with a grudge,

forgiveness, and reconciliation. When the transgressor imagined a forgiving response from the victim, improvements in emotions were reported; there were also less corrugator and more zygomatic EMG responses. While imagining being forgiven by their victims, participants felt less sad and angry, and less guilty about the transgression than during rumination about the offense. It was reported that transgressors reported higher levels of arousal, sadness, fear, anger, guilt, and shame when they imagined a real-life victim bearing a grudge against them, while the opposite was true when they imagined receiving forgiveness. The authors point out that this response closely resembles the myriad of responses that victims report during betrayal imagery. Thus, it appears that transgressors may also experience the same sorts of emotions and behaviors that victims experience and may benefit equally, or more, from the process of forgiveness.

Huang and Enright (2000) were interested in the effect that differences in motivation for forgiving might have on health. They studied only those individuals who had forgiven a transgressor for an interpersonal offense by having them relate an instance of interpersonal hurt. They compared those who forgave based on obligation, with those who forgave out of love. The latter showed less systolic and diastolic blood pressure elevation as compared to those who forgave based on religious beliefs. This study may indicate that the victim's motivation for forgiving is just as important as actually forgiving.

Similarly, Lawler, Piferi, Younger, Billington, Jobe, Edmondson and Jones (2003) monitored participants while they were relating an instance of interpersonal hurt. More forgiving participants had lower physiological reactivity during the interview than less forgiving participants. In addition, state forgiveness was negatively associated with

illness symptoms indicating overall better health. Lawler, Younger, Piferi, Jobe, Edmondson, and Jones (2004) utilized the same betrayal interview procedure with an older, community sample. Using measures of both state and trait forgiveness, negative relationships were found between forgiveness and both reported physical symptoms and medication use. In addition, trait forgiveness was related to lower blood pressure levels in the betrayal interview.

Seybold, Hill, Neumann, and Chi (2001) reported that state and trait anxiety and depression were negatively related to all three forgiveness scales used. In addition, the more forgiving a person was, the less the reported usage of nicotine and alcohol. Forgiveness was negatively related to anger and hostility. Pertaining to physical health, there were no associations between forgiveness and cardiovascular and immune functioning. However, measures of blood viscosity, a possible cardiovascular risk factor, were negatively related to forgiveness. Surprisingly, lower reported levels of self-forgiveness were associated with higher CD4+/CD8+ ratios. This would indicate that people who were identified as less forgiving had a better immune response, a counter-intuitive finding.

In addition to studies using cardiovascular and immune variables, Berry and Worthington (2001) measured cortisol reactivity in 39 participants described as part of a happy or unhappy relationship. The participants were asked to imagine a scene typical of their relationship. They discovered that high forgivingness, as well as low trait anger, predicted cortisol reactivity to the imagery. These two factors also predicted the quality of the relationship which was defined as high love, liking, and relationship happiness. Forgivingness predicted mental health in this study, but not physical health. However, if

the higher cortisol reactivity is chronic and enduring, it could eventually lead to health problems. Studies measuring both cardiovascular and cortisol responses simultaneously with forgiveness would give a more complete picture of sympathetic nervous system arousal.

This research suggests that forgiveness can influence health through its diminution of hostility and anger, both of which have been associated with health effects, especially in the long-term. These health effects could be induced by the release of certain stress hormones and the frequent increases in blood pressure that are elicited by hostility and anger. The long-term increases in these indices can contribute to allostatic load (McEwen, 1998). Thus, extended physiological stress responses resulting from hostility and anger can lead to health problems (Witvliet, 2001), and interpersonal transgressions and people's reactions to them could contribute to allostatic load and health risk.

Potential Mechanisms Linking Forgiveness and Health

Thoresen, Harris and Luskin (2000) have speculated about the possible physiological mechanisms that may link forgiveness and physical health. They proposed that a greater ability to forgive, or an increased frequency of forgiving in any context (forgiving others or oneself, as well as asking for and receiving forgiveness), reduces distress. Distress, in this case, can take the form of anger, hostility, revenge or blame, all of which have been associated with poorer health indices, through the arousal of the hypothalamic-pituitary-adrenal system. This arousal of the body results in increased activity of the stress hormones such as epinephrine, norepinephrine, and cortisol; these hormones have been associated with a host of negative health outcomes. Stressful

interpersonal relationships have been associated with fluctuations in the endocrine system (e.g. the release of pituitary and adrenal hormones) (Kiecolt-Glaser, Glaser, Cacioppo, & Malarkey, 1998); this system functions as an intermediary between relationships and health by influencing cardiovascular function as well as other bodily systems (Ader, Felten, & Cohen, 1991). In fact, chronic endocrine fluctuation has been associated with cardiovascular disease (Ader, Felton, & Cohen, 1991). Thoresen et al. (2000) suggest that when people are unforgiving, overproduction occurs, while forgiving responses may result in less production of the stress hormones. Thus, forgiveness, by reducing these negative factors, could potentially lower bodily arousal and thereby reduce the risk of disease. In addition, McCullough (2000) suggests that the restoration of supportive, caring relationships accounts, at least in part, for the positive associations between forgiveness and health. As mentioned previously, social relationships provide a fairly robust means of avoiding or delaying various causes of mortality, and it is suggested that they provide this salutary effect through changes in the cardiovascular, endocrine, and immunological systems (Uchino, Uno, & Holt-Lunstad, 1999). Lawler et al. (2004) also examined some of the proposed mechanisms by which forgiveness could affect health. They found that conflict management, higher levels of spirituality and lower levels of negative affect, which represented the strongest relationship, were all mediators of the forgiveness and health relationship.

Factors That Influence Forgiving

What factors facilitate forgiveness, and make a forgiving response more or less likely? McCullough et al. (1998) note that offense severity, empathy, and attributions of responsibility are all likely to influence the decision to forgive or not to forgive. Offense

severity influences a person's willingness to forgive: it is more difficult to forgive someone for a more severe and intentional hurt than a relatively mild one. Another potential influence is empathy. According to McCullough et al. (1998) people are more likely to forgive if they can empathize with the offender, and if they can avoid ruminating and assigning blame (Darby & Schlenker, 1982; Boon & Sulsky, 1997; Wade & Worthington, 2003; McCullough, 2000). McCullough, Fincham, and Tsang (2003) argue that empathy dispels the victim's motivation to seek revenge against the offender and replaces it with positive, benevolent feelings. This concept is further used to explain why people are more likely to forgive transgressors who apologize (McCullough et al., 1998). In addition, if the transgressor accepts responsibility, or expresses remorse, the victim is more likely to forgive.

While all of the above factors are said to influence the decision to forgive, other variables are potentially important. According to McCullough, Fincham, and Tsang (2003), forgiveness involves a prosocial change, and change takes time. Even though they have discovered that people tend to report less negative affectivity in only a few weeks following an offense, the entire process can be protracted. In addition, McCullough et al. (1998) report that people are more inclined to forgive in more committed versus less committed relationships. It is likely that committed relationships have more of an emotional or financial investment, thus providing a reason to work through hurts or betrayals. Finally, rumination may influence forgiveness (McCullough et al., 1998; McCullough, 2000) by maintaining a person's distress regarding a specific offense. McCullough, Bellah, Kilpatrick, and Johnson (2001) propose that revenge

ideation results from excessive rumination about the offense, suggesting that rumination is a potentially important social-cognitive factor in forgiveness.

Rumination

Rumination involves sustained thoughts or feelings about a particular event or person, after the event has passed or the person has left. It can take the form of excessive worrying or intrusive thoughts about a past experience. To the extent that rumination is characterized by negative thoughts and feelings, it may have aversive effects on health. As rumination maintains or perpetuates a cycle of negative thoughts and feelings, it may contribute to depression, anxiety, and hostility, as well as physical illness. Rumination is conceptually similar to self-focus, self-consciousness, and negative automatic thoughts; however, Nolen-Hoeksema (1991) argues that rumination is a separate and distinct construct based on its focus on affect alone. For the most part, rumination has been studied in the context of depression and other indices of mental health. It has been studied only rarely in conjunction with other applicable constructs such as anger and anxiety (e.g., Rusting & Nolen-Hoeksema, 1998) or in relation to physical health.

Defining Rumination

Rumination is defined as "a class of conscious thoughts that revolve around a common instrumental theme and that recur in the absence of immediate environmental demands requiring the thought" (Martin & Tesser, 1996, p.7). This is a broad application of the definition of rumination, clearly made to apply to many different areas. However, Nolen-Hoeksema (1991) has defined rumination as "engaging in behaviors and thoughts that *passively focus* attention on one's symptoms of distress and on all the possible causes and consequences of these symptoms" (p. 569). It is defined in this context as

specifically reflecting the response to depressed mood; however, rumination may be a response to many different types of emotions and circumstances. If those circumstances or emotions are negative or upsetting to the individual, it may indeed be a maladaptive coping mechanism, or even personality trait, that can have effects on mental and physical health. However, this particular construct has not been directly related to measures of physical health. It is likely that rumination, in conjunction with a negative emotion such as depression or anger, can only exacerbate any ill effects of the negative emotion, at least in the short-term.

Rumination and Depression

Rumination has been related to seasonal affective disorder, self-esteem, posttraumatic stress, and lower perceived social support (Rohan, Sigmon, & Dorhofer, 2003; DiPaula & Campbell, 2002; Ehlers, Mayou, & Bryant, 1998; Nolen-Hoeksema & Davis, 1999). However, by far the most research has been dedicated to elucidating the relationship between rumination and depression. In many of these studies, an experimental paradigm is employed which includes a period of rumination about depressive symptoms, in comparison to a condition in which participants are distracted (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Lyubomirsky, & Nolen-Hoeksema, 1993; Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell, & Berg, 1999). It is the view of these authors that ruminative responses, in addition to depressed mood, encourage the person to think about his/her own depressive symptoms (e.g. fatigue, apathy, sadness) or about events that trigger them. Thus, rumination perpetuates the cycle of depression by focusing the person's attention on the negative symptoms. They employ distraction as a contrasting and more adaptive response, directing the

person's attention away from the depressive symptoms. Lyubomirsky & Nolen-Hoeksema (1993) examined the reasons why a depressed person would resort to ruminative thinking, given that it leads to negative effects, rather than distracting activities that tend to lift the depressed person's mood. A ruminative task was introduced in which participants were given a list of 45 items to think about, and were told to focus their attention on emotion-focused, symptom focused, and self-focused thoughts such as, "how active/passive you feel," "the physical sensations in your body," and "what your feelings might mean." In the distraction condition, participants were asked to focus their attention on external matters, such as "the layout of the local post office." First, the authors reported that dysphoric participants, as measured by answers to a Likert-type scale measuring levels of sadness and depression, expected pleasant, distracting activities to be as enjoyable as nondysphoric participants. However, the dysphoric subjects in the rumination condition rated themselves as less likely to participate in pleasant activities than the dysphoric participants in the distraction condition or the nondysphoric participants, because they just did not believe they had the strength. The authors also found that dysphoric participants induced to ruminate felt that they were gaining insight into their problems by spending time focusing on their problems and emotions, while distraction took away from this effort to understand their problems as opposed to the comparison groups. Thus the dysphoric participants felt that they were working through their problems and gaining insight from ruminating; however, the process may have been simultaneously contributing to their depression. In a similar study, Simpson and Papageorgiou (2003) found that eight out of 10 anger-control patients found advantages to angry rumination, as well as disadvantages. These patients listed such concerns as the

beliefs that rumination heightens angry mood, and that it interferes with day-to-day functioning and interpersonal relationships. However, they also reported that rumination was helpful in coping with angry mood, and gaining insight and understanding from the angering event.

In Lyubomirsky & Nolen-Hoeksema (1995), dysphoric participants induced to ruminate via the same method reported above, reported more negative interpretations of hypothetical situations taken from the Cognitive Biases Questionnaire, than did dysphoric participants induced to distract themselves or nondysphoric participants. They also reported that dysphoric participants who ruminated were more pessimistic about their future, and were less efficient problem-solvers, as measured by the Means—Ends Problem-Solving Procedure. However, dysphoric participants who did not ruminate, but were distracted instead, were as optimistic and equally efficient at problem-solving as nondysphoric participants. This finding is reflected in a similar study in which participants were subjected to the rumination induction and then asked to recall autobiographical memories. They were instructed that any memories were fine as long as they were legitimate memories of specific events. The participants were then asked to review their lists of memories and rate them according to their feelings about the event (i.e. positive or negative, happy or sad). Lyubomirsky, Caldwell, & Nolen-Hoeksema (1998) reported that the autobiographical memories recalled by dysphoric participants induced to ruminate were significantly more negative than those recalled by dysphoric participants induced to distract and nondysphoric participants. In addition, dysphoric participants who ruminated were more likely to report more negative life events as

opposed to positive ones. Thus, it is clear that it is the opportunity to ruminate that influences negative thoughts and memories, and not just the depressive disorder itself.

Finally, Lyubomirsky, Tucker, Caldwell, and Berg (1999) induced rumination and distraction through the use of the same procedures described above. They asked participants to report the most troubling problems in their lives, and then rate them according to severity and probability of solving them. The depressed ruminators reported their problems as more severe and less solvable than any of the other groups, including the depressed distractors. In the second study reported in this article, the authors instructed participants to speak their thoughts into an audiotape in response to the distraction or rumination items. The audiotapes were then transcribed and rated on their overall negativity as well as self-criticism, self-blame, self-confidence, optimism, and perceived control. The majority of the depressed participants' thoughts following the rumination induction were characterized by self-criticism and self-blame, as well as lower levels of self-confidence, optimism, and perceived control as compared to depressed distractors and nondepressed groups.

All of these characteristics have implications for mental and physical health outcomes. While these studies focused on inducing a ruminative state in depressed versus nondepressed participants, it is important to determine how trait ruminators differ on these same dimensions. As Nolen-Hoeksema and Davis (1999) suggest, there is evidence for rumination as a stable personality characteristic. Davis and Nolen-Hoeksema (2000) chose participants based on their answers to a 10-item form of the Ruminative Responses Scale of the Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991). Low and high ruminators were given cognitive tasks to

ascertain cognitive flexibility, since rumination has been compared to the tendency to perseverate. Using the Wisconsin Card Sorting Task (WCST) as a measure of cognitive flexibility, the authors found that ruminators perseverate; that is, they continue to use maladaptive problem-solving tendencies despite negative feedback. Thus, not only do ruminators suffer from distressing negative thoughts, but they also may have a problem generating alternative coping methods to deal with their depression.

The preceding studies involved undergraduate student samples. However, Nolen-Hoeksema (2000) conducted a study on community-living adults using three age cohorts. All participants were interviewed, in person, at their homes (time one) and then again one year later (time two). Ruminators and nonruminators were differentiated based on the RSQ. The author found that time one rumination predicted the severity of depressive and anxiety symptoms at time two. In addition, Nolen-Hoeksema and Jackson (2001) examined gender differences in rumination. They found that women indicated a greater tendency to ruminate in response to distress than men. This is consistent with the literature indicating that women are more prone, in general, to depression than men.

Rumination and Anger

While much of the literature on rumination specifically targets depressive rumination, there are a few articles that address the relationship between rumination and anger. Rumination is considered an integral component of angry mood and has been associated with anger-control problems (Simpson & Papageorgiou, 2003). Rusting and Nolen-Hoeksema (1998) conducted a study with a focus on angry mood. Again, this study made use of the rumination and distraction induction tasks. Participants first underwent an anger mood induction, followed by rumination or distraction. Anger was

induced by means of a story about a professor who treated a student unfairly. The college students were then asked to imagine themselves in that situation. Some students ruminated by writing about emotion-focused and self-focused topics (Why do you think the way you do?), whereas others were distracted by writing about nonemotional, irrelevant topics (the layout of the local post office). Participants who ruminated for 20 minutes reported being more angry than participants who were distracted. In addition, in a second study included in this article, participants were induced to feel either angry or neutral, and were then given a choice of an emotion-focused (rumination) or a neutral (distraction) task. This paradigm was used in order to ascertain the difference in choice of responses with gender. The authors found that engaging in rumination while in an angry mood increased feelings of anger and hostility, whereas distraction decreased those feelings. The increase in angry mood in the rumination condition was associated with more negative beliefs, memories, and events present in the stories participants wrote in response to an ambiguous sentence. As far as choice of response was concerned, women were more likely to choose the neutral distracting task when in an angry mood, and when in a neutral mood, women were more likely to choose the emotion-focused task. The authors conclude that women attempt to avoid feelings of anger and aggression. Men chose to distract no matter what the condition. Thus, it appears that rumination has a similar effect on anger as it does with depression of enhancing and sustaining these thoughts.

While this study reported a significant relationship between rumination and angry mood, there was one study with myocardial infarction patients in which "hostile rumination" was not related to anger. Caprara, Barbaranelli, Colombo, Politi and Valerio

(1995) gave participants a set of questionnaires related to aggressive inclination (hostile rumination, irritability, emotional susceptibility). Those participants who had suffered an infarction reported themselves to be more emotionally susceptible than non-infarcted participants; however, there were no differences related to hostile rumination as measured by the Dissipation-Rumination Scale (Caprara, 1986). This may be the result of differences in rumination measurement and future studies should compare the rumination indices to determine reliability. While rumination has been studied in relation to depression, other indices of psychological health have been neglected. It would be enlightening to explore further the relationships between rumination and anger, as well as anxiety, self-esteem, optimism, and other psychological constructs.

Rumination and Physical Health

While extensive work has been completed elucidating the relationship between depression and rumination, or what Nolen-Hoeksema (1991) refers to as depressive rumination, the same cannot be said for the relationship between physical health and rumination. To the extent that depression has an effect on physical health, it can be speculated that rumination would only add to that effect. For example, depression has been associated with a number of physical ailments, such as pain and diminished general health, as well as cardiac morbidity and mortality, although the mechanisms remain unclear (Wells, Stewart, Hays, Burnam, Rogers, Daniels, Berry, Greenfield, & Ware, 1989; Carney, Freedman, Miller, & Jaffe, 2002; Kubzansky & Kawachi, 2000). It could be said that many of these ailments precede and lead to depression, or that many of the same risk factors co-occur with these illnesses as well as depression. However, as reported by Irwin (2002), studies have found evidence for depression acting as an

independent risk factor when controlling for known risk factors. Carney et al. (2002) list a number of possible mechanisms that could explain the relationship between depression and cardiovascular health, including antidepressant cardiotoxicity, the association between depression and cardiac risk factors (cigarette smoking, diabetes, etc.), and the association of depression with greater coronary heart disease severity, nonadherence to treatment regimens, lower heart rate variability, increased platelet aggregation and increased inflammation. In their review of depression and cardiovascular disease, Kubzansky & Kawachi (2000) note contradictory findings, making a conclusive statement about depression and cardiovascular health difficult. In addition to studies linking depression and cardiovascular health, Rosenkranz, Jackson, Dalton, Dolski, Ryff, Singer, Muller, Kalin, and Davidson (2003) reported an association between affective style and basal cortisol levels indicating that this association may be one pathway through which depression influences health. Depression has been associated with shorter survival periods after a cancer diagnosis (DeBoer, Ryckman, Pruyn, & Van den Borne, 1999). It remains to be seen whether this relationship is causal or mediated by some other factor. To the extent that negative mood exacerbates the mechanisms involved in the etiology of heart problems and the development of cancer, rumination may be a substantial, additive factor. In addition Kubzansky & Kawachi (2000) also reviewed the literature relating anger to coronary heart disease. It is thought that negative emotions, such as anger, affect the cardiovascular system through the activation of the hypothalamic-pituitary-adrenalcortical axis and the sympathetic-adrenomedullary system, which lead to the subsequent release of cortisol and catecholamines. It is known that these stress hormones lead to the development of disease.

One of the mechanisms through which anger and hostility are thought to influence health is cardiovascular reactivity (Suinn, 2001). There is voluminous research devoted to the manipulation of psychological stressors in the laboratory and the measurement of bodily response, particularly the cardiovascular response. The brief psychological stressors used in the laboratory are meant to simulate the stress encountered in everyday life. These stressors have fairly consistent autonomic, psychological and, more recently, immunological effects, including increased heart rate and blood pressure (Bosch, DeGeus, Kelder, Veerman, Hoogstraten, & Amerongen, 2001). Although these tasks are reliable as far as eliciting a fight or flight response, there are substantial individual differences in how people react to the same stressor, even accounting for various factors such as coping, personality, or perceived level of stress. The idea that these differences in physiological reactivity to a specific stressor are the reason some people are more susceptible to disease while others are more resistant, is the basis for the reactivity hypothesis (Cacioppo, Berntson, Malarkey, Kiecolt-Glaser, Sheridan, Poehlmann, Burleson, Ernst, Hawkley, & Glaser, 1998; Rosenkranz et al., 2003). As suggested by Cacioppo et al. (1998), people with exaggerated stress responses to relatively mild daily hassles are more vulnerable to disease than people with more subdued reactions to stress. Though the research is not completely persuasive, there is considerable evidence that acute cardiovascular reactivity translates into eventual disease outcomes, through the everyday wear and tear on the cardiovascular system (Krantz & Manuck, 1984; Bosch et al., 2003).

Studies that specifically measure the relationship between rumination and cardiovascular reactivity are few. Bermudez & Perez-Garcia (1996) gave mental

arithmetic and reaction time tasks to 61 undergraduates. The experiment included a baseline period, followed by a mental arithmetic and reaction time task, which were counterbalanced. Rumination was measured via the Dissipation-Rumination Scale (Caprara, 1986). The authors reported that the hostility, competitiveness, and rumination dimensions were significantly associated with physiological reactivity (mainly systolic blood pressure), particularly during the mental arithmetic task. Overall, they found the hostility component to be the most predictive of reactivity.

Glynn, Christenfeld, and Gerin (2002) reported a study in which participants experienced one of four tasks and then were asked to recall the tasks as vividly as possible. They varied whether the task had an emotional component or not and whether the task produced moderate or high initial reactivity. Blood pressure and heart rate were monitored during the stressor, during rumination, and also during recovery. Participants who had completed an emotional task, and then ruminated, exhibited elevated blood pressure, while participants in the nonemotional condition did not. The blood pressure of those who recalled the mental arithmetic or shock-avoidance task exhibited an average of 16 mmHg of reactivity for systolic and 6 mmHg for diastolic, while the blood pressure of those who recalled the nonemotional tasks (e.g. cold pressor, exercise) stayed at baseline during rumination. The second experiment consisted of a mental arithmetic task and a distractor task (lengthy questionnaire). Following a 10 minute baseline, participants performed a three minute mental arithmetic task. In the non-distraction condition, the subject sat quietly for 10 minutes after the stressor. In the distraction condition, the participant was told to relax and sit quietly and work on a questionnaire for 10 minutes. Those given the distractor task immediately following the stressor had significantly lower

blood pressure levels than those not given the distractor; they had lower blood pressure in spite of the fact that they were actively engaged in a task. The authors argued that the distractor prevented the participants from ruminating and this allowed almost complete blood pressure recovery. This is an important finding indicating the continued mobilization of the cardiovascular system after the stressor had ended. This has implications for cardiovascular health as well as overall health and well-being.

Hogan and Linden (2003) proposed a two-dimensional model of anger expression, which includes five different anger coping styles on one dimension and adds a second dimension that describes the degree to which people ruminate about the anger responses that they show. The first dimension includes the following response styles: direct anger out, assertion, support seeking, diffusion, and avoidance, while the second dimension is solely rumination. The authors propose that the addition of rumination may change the relationship between the anger response styles and blood pressure. If so, then rumination may in fact moderate the influence of anger response styles on health outcomes. One hundred nine people participated in their first study (45 men, 64 women). They found that the interaction of rumination and assertion was a significant predictor of resting diastolic blood pressure in the healthy males (not females), while controlling for age, hostility and anger response styles. High levels of assertion with low levels of rumination, predicted lower diastolic blood pressure levels, whereas high levels of assertion paired with rumination predicted higher diastolic blood pressure. No other response styles were significantly linked to blood pressure. In the second study, 162 physician-diagnosed hypertensives were recruited from the community (90 men, 69 women). This study involved the use of ambulatory blood pressure measurement over 24

hours. The anger response styles significantly predicted ambulatory systolic blood pressure in the female hypertensive sample, accounting for 20% of the variance. In the male hypertensive group, when low rumination was paired with high social support seeking, systolic blood pressure levels were low but when high rumination was paired with high social support seeking, systolic blood pressure levels were the highest. For the hypertensive females low on social support seeking and high on rumination, systolic and diastolic blood pressure levels were the highest, whereas for those low on social support and low on rumination, the systolic and diastolic levels were the lowest. For both ambulatory systolic and diastolic blood pressure, when high avoidance was paired with high rumination, higher levels of blood pressure were observed. Thus, it appears that anger response styles and rumination interact in important ways to have an impact on blood pressure: rumination may play a moderating role on the relationship between anger and blood pressure.

Hogan, Linden, Davidson, Kiess, and Ignaszewski (2003) also investigated the relationship of anger response styles and BP reactivity and recovery to an interpersonal anger provocation in a sample of coronary heart disease patients. Participants completed the Expanded Structured interview (ESI), a 12-minute, interpersonally stressful, Type A interview designed to assess and provoke anger and hostility. The ESI was associated with systolic and diastolic blood pressure arousal, but there were only weak associations between anger response styles and either blood pressure reactivity or recovery. The moderating effect of rumination on the relationship between the other anger response styles and blood pressure was also examined. Rumination had a deleterious effect on the relationship between avoidance and assertion and blood pressure reactivity and recovery.

Once again, rumination was associated with continued blood pressure response after the stressor had been stopped. Thus, it appears that the addition of rumination to certain anger response styles has the potential to influence cardiovascular variables. Further research should explore the interaction of rumination and anger in relation to cardiovascular variables, as well as endocrine variables.

Rumination and Forgiveness

While the study of forgiveness has increased over the last few years, only one study has included the analysis of both forgiveness and rumination. However, it seems that there would be an obvious link between these two constructs. If someone dwells on the experience of a betrayal in his/her past, it is likely that he/she would have trouble forgiving the transgressor. Research has tentatively shown that rumination and anger are related, and that ruminating about an anger-arousing situation is likely to cause more anger or hostility (Rusting & Nolen-Hoeksema, 1998). McCullough et al. (2001) conducted two studies in which factors such as vengefulness, forgiveness, rumination, well-being, and the Big Five were studied. They hypothesized that vengefulness was positively related to rumination about the offense, efforts to suppress those ruminations, and negative affectivity/neuroticism and inversely related to forgiveness, subjective well-being, and agreeableness. They also predicted that vengeful people would show less reduction in rumination and suppression, less reduction in avoidance and revenge motivations, and less increase in subjective well-being over time. They also predicted that changes over time in rumination, suppression, forgiving, and satisfaction with life would be intercorrelated. In their first study, they examined the relationship between vengefulness and participants' responses to a transgression over a period of 8 weeks. In

study two, they investigated the association of vengefulness with the constructs in the Big Five model of personality. Rumination was measured with the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979). This scale identifies the extent to which the participant experiences intrusive thoughts or affect about a transgression or other life event, and also the participant's attempts to avoid those thoughts or affect, called rumination and suppression respectively. Since the IES specifically refers to instances within the last seven days, the participants were instructed to think back on the seven days since they had returned from vacation and to indicate how frequently they had experienced ruminative or suppressive symptoms. At baseline, vengefulness was positively correlated with rumination, TRIM-revenge, TRIM-avoidance, and negative affect and was negatively correlated with satisfaction with life. People with higher vengefulness scores ruminated more, were less forgiving, and had less satisfaction with life and higher negative affect than people with lower vengefulness scores. They also examined whether vengefulness was associated with the extent to which rumination, suppression, forgiving, and satisfaction with life changed over the 8-week study period. People who experienced relative reductions in rumination over time also experienced relative reductions in TRIM-avoidance scores. Suppression also had reductions in TRIM-avoidance and TRIM-revenge. Thus people who ruminated less and suppressed more over time also became more forgiving over time. Satisfaction with life was not associated with changes in rumination or suppression. In study two, vengefulness was correlated negatively with conscientiousness, negatively with agreeableness, and positively with neuroticism. Thus it appears that there is an association between forgiveness and rumination that should be further elucidated.

Rationale

Based on the preceding research, the primary focus of this study was to investigate the respective roles of forgiveness and rumination to each other and to self-reported physical and mental health. In addition, we sought to determine whether there was an association between an individual's level of forgiveness and rumination and cardiovascular and endocrine responses to a betrayal interview and rumination period. Finally, event-related factors that influence forgiveness were assessed, as well as anger styles and empathy, in order to determine the unique significance of rumination in the process of forgiving.

Hypotheses

(a) It was expected that there would be an inverse relationship between forgiveness and rumination.

(b) It was expected that those who scored high on forgiveness would score lower on depression and anxiety than those who scored lower on forgiveness.

(c) It was expected that those who scored high on forgiveness would report fewer physical symptoms than those who scored lower on forgiveness

(d) It was expected that those who scored low on forgiveness would show a greater cardiovascular response to the betrayal interview than those who scored higher on forgiveness.

(e) It was expected that those who scored low on forgiveness would display a greater cortisol response than those who scored higher on forgiveness.

(f) It was expected that relationship commitment, and time since event would be positively related to forgiveness, while attributions of blame and offense severity would be negatively related.

(g) It was expected that rumination would be positively related to depression and anxiety.

(h) It was expected that rumination would be positively related to number of physical symptoms.

(i) It was expected that those who scored high on rumination would show a greater cardiovascular response to the betrayal interview than those who scored lower on rumination.

(j) It was expected that those who scored high on rumination would display a greater cortisol response than those who scored low on rumination.

(k) It was expected that even with relationship commitment, time since event, attributions of blame and offense severity included in a regression equation, rumination would add significant variance to the prediction of forgiveness.

CHAPTER 2

Method

Design

Each participant was given a short baseline/rest period and then a social stressor operationalized as a betrayal interview, followed by a rumination period, and ending with a recovery period. Cardiovascular responses were measured across the time intervals, including systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), and heart rate (HR). In addition, saliva samples were taken post-baseline and immediately following the rumination period in order to measure cortisol response.

Participants

Sixty female college students participated in the study. Participants ranged in age from 18 to 49 years old with a mean age of 21.07, sd = 4.73. Fifty-two (86%) participants were Caucasian, four (6.7%) were African-American, three (5.0%) were Asian-American, and 1 (1.7%) was of Hispanic origin. Twenty-six participants (43.3%) were never married and not in a romantic relationship, 32 participants (53.3%) were never married and in a romantic relationship, and two (3.3%) were married. Ten participants (16.7%) were smokers. The mean Body Mass Index (BMI) was 23.28, sd = 4.088. The participants were recruited through a sign-up sheet on a bulletin board and given extra credit for participation.

Setting

This experiment was performed in the health psychology laboratory at a large southern university. Initially, the participants were received in a large meeting room with a table, two desks, and a number of chairs. They completed questionnaires in this room.

The room in which the experiment took place is connected to the meeting room and is equipped with cardiovascular monitoring devices, 2 chairs, a television, and a VCR. Cardiovascular equipment was monitored from an adjoining room.

Physiological Measures

Blood pressure was measured noninvasively with a Critikon Dinamap Vital Signs Monitor, Model 1846SX (Johnson & Johnson, Tampa, FL). A blood pressure cuff was placed on the participant's nondominant arm, and measurements were activated by a research assistant in the adjacent equipment room. Following cuff deflation, systolic, diastolic, mean arterial pressure, and heart rate were printed. Blood pressure was measured at minutes 5, 9, 13, and 17 during the 20-minute baseline period; 15 seconds into the betrayal interview and at 2 minute intervals until 3 measures were taken; 15 seconds into the rumination period and at 2 minute intervals until 3 measures were taken, and 15 seconds into the recovery and at 3 minute intervals.

Cortisol was measured noninvasively by collecting saliva in a test tube following baseline and the rumination period for a total of 2 samples. These were used in order to ascertain the level of sympathetic nervous system arousal throughout the protocol. Salivary cortisol testing has been shown to be a significant noninvasive measure of stress, coping, and health (Schmidt, 1997). Salivary cortisol concentrations were determined by an enzyme immunosorbent assay (Salimetrics LLC) using a microplate reader (Thermo Labsystem, model #340). Cortisol levels were determined in duplicate. All participants completed the protocol between the hours of 9:00 am and 12:00 pm in order to control for the diurnal fluctuations in cortisol levels. In addition, participants were asked to refrain

from eating, drinking caffeinated beverages, smoking, or brushing their teeth for two hours prior to their appointment.

Questionnaires

Rumination. Rumination was measured with the Ruminative Responses Scale (RRS) from the Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991). It is a 21-item measure assessing responses to depressed mood that are self-focused, symptom focused, or focused on possible causes of depressed mood. It has adequate internal consistency at .89, and good 5-month retest reliability at .80. Participants are asked to rate how often they do certain behaviors such as, "focus on specific aspects of a situation/problem/goal/task," and "think about your feelings of fatigue and achiness." Responses to this scale have been correlated (.62) with reported ruminative responses to depressed mood in a 30-day diary study (Nolen-Hoeksema & Morrow, 1991). In addition, the Behavioral Anger Response Questionnaire (BARQ; Hogan & Linden, 2002), a 37-item measure of a number of anger response styles (direct anger out, assertion, support seeking, diffusion, and avoidance) and rumination was used. This measure has demonstrated adequate test-retest reliability ranging from .61 to .85 for the subscales. Internal consistencies range from .70 to .85.

Forgiveness. Trait forgiveness was assessed with the Forgiving Personality Inventory (Jones, Iyer, & Lawler, 2002). It contains 33 items, such as "I tend to be a forgiving person" and "I tend to hold grudges," to which the participant responds on a 5 point Likert scale from strongly agree to strongly disagree. The scale has demonstrated more than adequate reliability, with a coefficient alpha of .93, mean interitem correlation of .30

and a test-retest correlation of .79, over a two month interval. Validity of the scale has been shown through correlations with other dispositional measures of forgiveness (Schratter, 2000). State forgiveness was assessed with the Acts of Forgiveness Scale (AF; Drinnon & Jones, 1999) and the Transgression-related Interpersonal Motivations Inventory (TRIM; McCullough, Rachal, Sandage, Worthington, Brown, & Hight, 1998). The AF consists of 45 items relating to a specific time when one has been betrayed by someone else. It includes items such as, "just thinking about what happened makes me fume," and "my relationship with the person has changed for the worse." It has adequate internal reliability (.96); as well as satisfactory test-retest reliability (.90). It employs a 5-point Likert-type scale, ranging from strongly disagree to strongly agree. Validity of the AF has been demonstrated by comparing it to other measures of forgiveness (Schratter, 2000). The TRIM consists of 12 items on which participants are asked to rate the offender, using a 5-point Likert scale. The TRIM also includes two subscales, Revenge and Avoidance. The subscales have adequate internal reliability ranging from .86 to .93. The items include, "I'll make him/her pay," and "I keep as much distance between us as possible."

Health. Physical health was measured with the Cohen–Hoberman Inventory of Physical Symptoms (CHIPS; Cohen & Hoberman, 1983). This scale includes a list of 33 symptoms that the participant may have experienced in the last month. It was scored as a 4-point Likert scale, ranging from "not at all" to "very much" a part of my life. The coefficient alpha was reported at .88 and was significantly correlated with use of Student Health Facilities over a 5-week interval. Mental health was measured with Beck

Depression Inventory (BDI; Beck, Steer, & Brown, 1996). The BDI is a widely used depression inventory that consists of 21 items scored on a four-point scale. It is designed to measure depressive symptoms including depressed mood, feelings of guilt, worthlessness, helplessness and hopelessness, loss of energy, and sleep and appetite disturbances. The 21 symptoms are rated for frequency (over the past week) from "rarely or none of the time" to "most or all of the time." Reliability and validity have been acceptable across a variety of demographic characteristics including age, education, geographic area, and racial, ethnic and language groups. Finally, state and trait anxiety were measured with the State/Trait Anxiety Scale (STAI: Spielberger, 1985). The STAI consists of 40 items, 20 of which represent anxiety at a certain point in time (state anxiety) and 20 representing how the individual generally feels (trait anxiety).

Empathy. Empathy was measured with the Interpersonal Reactivity Index (IRI; Davis, 1983). The IRI is a 28-item self-report questionnaire consisting of four 7-item subscales. For the purposes of this study, only two of these subscales were used, the Perspective-Taking (PT) scale and the Empathic Concern (EC) scale. The PT scale measures the ability to take someone else's point of view and includes such items as, "I sometimes try to understand my friends better by imagining how things look from their perspective." The EC scale measures the affective component of empathy and indicates the level of compassion, concern and care for other people. It includes items such as, "I often have tender, concerned feelings for people less fortunate than me." Davis reports adequate test-retest reliabilities for the subscales from .62 to .71, and satisfactory internal reliabilities ranging from .71 to .77 (Davis, 1980).

Offense-related Measures. Participants were given a list of one-item measures on a Visual Analog scale from not at all to very much. These items assessed level of commitment, severity of the offense, and level of intentionality. In addition, participants were asked to report how long ago the offense occurred.

Demographics. Participants were given a demographics sheet on which they were asked to indicate age, height, weight, marital status, ethnicity, number of medical conditions for which they had been treated in the past 12 months, number of medications they were currently taking, whether or not they smoked, and if they suffered from periodontal disease. The last question is important because the presence of periodontal disease can influence cortisol levels in the saliva.

Procedure

Participants were contacted by telephone and reminded of the time for which they had signed up, and the location. In addition, they were instructed to come without brushing their teeth or flossing for 2 hours, and no eating, smoking or drinking caffeine for one hour prior to their appointment. In addition, they were asked to record any canker sores, gingivitis, or other oral problem that could influence the cortisol readings. Upon arrival, the participants were given an informed consent form and instructed to read it carefully. The informed consent form explained the study, and reminded them that they may discontinue the experiment at any time.

When the informed consent was completed, the participant was asked to complete a packet of questionnaires including the Forgiving Personality Scale, the Beck Depression Inventory, the State/Trait Anxiety Scale, the Cohen-Hoberman Inventory of

Physical Symptoms, the Behavioral Anger Response Questionnaire, the Ruminative Responses Scale, the Interpersonal Reactivity Index, and a demographic questionnaire.

Following the completion of the questionnaires, the participant was taken into the experimental room and fitted with a blood pressure cuff. After testing for signal clarity and comfort of the participant, she was asked to sit comfortably in the chair and watch a relaxing video of tropical fish accompanied by soft music (Piferi, Kline, Younger, & Lawler, 2000). Following the 20-minute rest period, the experimenter reentered the room and a saliva sample was taken. Saliva samples took approximately 5 minutes to collect. The betrayal interview began with the statement, "I would like you to recall a time when a parent or primary caregiver betrayed or deeply hurt you. Take a moment to remember the event and then describe it in as much detail as you can (all interview questions can be found in Appendix B)." When the narrative was finished, participants were asked to rate offense severity, level of intentionality, and commitment to the relationship on a visual analog scale.

Immediately following the interview was the rumination period. During this time, participants completed the Acts of Forgiveness Scale and the Transgression-related Interpersonal Motivations Inventory. These two scales are designed to refer to a specific betrayal and required that the participant continue to think about the betrayal they had just related. Immediately following the rumination period a second and final saliva sample was obtained. Finally, there was a 10-minute recovery period in which the participant rested quietly while blood pressure is monitored.

Data Quantification

All of the questionnaires were hand-scored and entered into an SPSS file. The first step in the analysis of data was to compute a correlational matrix. This step allowed us to ascertain the association between forgiveness and physical symptoms, depression, and rumination, as well as rumination and depression, physical symptoms, anger response styles and event-related factors (e.g., severity of offense, blame, relationship commitment). The correlational matrix then determined what factors were added into the regression equation to predict forgiveness. Analyses of variance were computed to determine whether differences existed in baseline measures of cardiovascular and cortisol measures for participants high or low in forgiveness as well as high or low in rumination. A repeated measures analysis of variance was computed to determine whether there was a change in physiological measures from baseline to recovery. When group comparisons are used, the participants were divided into high and low groups according to the median. For the AF groups, participants were divided based on the median of 165. The low AF group ranged from 71-165 with a mean of 128.93 (sd=24.9). The high AF group ranged from 166-215 with a mean of 192.3 (sd=14.03). For the TRIM groups, participants were divided based on the median of 13. The low TRIM group ranged from 12-13 with a mean of 12.10 (sd=.31). The high TRIM group ranged from 14-54 with a mean of 29.8 (sd=10.68).

CHAPTER 3

Results

Forgiveness and Rumination

A number of scales were used to measure forgiveness including a measure of trait forgiveness (FP), and two measures of state forgiveness (AF, TRIM). These measures, shown in the first two columns of Table 1 (All tables can be found in Appendix A), were all correlated, with the two state measures representing the strongest relationship ($r = -.88$, $p<.01$). This is a negative relationship because high scores on the TRIM indicate an event for which the individual has not forgiven, while high scores on the AF reflect the opposite. Rumination was measured with two trait rumination scales, the Ruminative Responses Scale (RRS) of the Response Styles Questionnaire, and the BARQ Rumination (BRUM). These two measures were highly correlated (see columns three and four). The intercorrelations among the forgiveness and rumination measures can be found in Table 1. Both measures of state forgiveness (AF and TRIM) were related to the RRS (r's = -.25 and .31; $p<.05$); however, trait forgiveness was not associated with rumination. Only the TRIM was associated with the BRUM measure of rumination ($r = .35$, $p<.01$). Thus, state forgiveness is associated with lower levels of rumination.

Forgiveness and Mental Health

Mental health was assessed with a measure of depression, as well as state/trait anxiety, also shown in Table 1. We had hypothesized that high forgivers would score lower than low forgivers on measures of negative affect such as depression and anxiety; this association was obtained. The participants who scored higher on trait forgiveness reported lower depression ($r = -.28$, $p<.05$) and trait anxiety ($r = -.43$, $p<.01$). The same

pattern was observed with state forgiveness (AF) and depression ($r = -.28$, $p<.05$), trait anxiety ($r = -.29$, $p<.05$), and state anxiety ($r = -.30$, $p<.05$). The TRIM was also associated with depression ($r = .41$, $p<.01$) and trait anxiety ($r = .32$, $p<.05$). In all cases, higher forgiveness was associated with lower depression and lower anxiety. The strongest associations were those obtained between trait forgiveness and trait anxiety and state forgiveness, as measured by the TRIM, and depression.

Forgiveness and Physical Health

Physical health was assessed with the Cohen-Hoberman Inventory of Physical Symptoms, as well as by number of medical conditions, medications, BMI, and smoking. These correlations can be found in Table 2. Both trait forgiveness and one of the state measures of forgiveness (AF) were related to the smoking variable ($r = -.39$, $p< .01$ and $r = -.25$, $p<.05$). In both cases, high forgivers were less likely to smoke than low forgivers. However, the hypothesis that high forgivers would report fewer physical symptoms than low forgivers was not supported. None of the three measures of forgiveness was related to self-reported health or the number of medical conditions or medications taken in the past 12 months. In addition, none of the forgiveness measures was related to BMI.

Forgiveness and Cardiovascular Responses

It was expected that those who scored low on forgiveness would show a greater cardiovascular response to the betrayal interview (interview-baseline) than those who scored high on forgiveness. This relationship was assessed via correlation between reactivity from baseline and interview and state forgiveness and was obtained with one measure of state forgiveness (AF) and ΔMAP ($r = -.28$, $p<.05$). This relationship indicates that high forgivers displayed lower mean arterial reactivity to the betrayal

interview than low forgivers (see Table 3). No further relationships were found for the AF, the second measure of state forgiveness (TRIM), or trait forgiveness (FP) with cardiovascular responses.

A repeated measures analysis of variance was also performed in order to compare forgiveness groups across the entire session; the participants were divided into two groups based on a median split of AF scores. The main effect of AF groups was nonsignficant ($F(1, 788)= 1.038$, $p > .10$). For illustration purposes, Figure 1 (All figures can be found in Appendix A) displays the AF groups across the session. As shown in the Figure, and verified by the correlational data, forgiveness only related to MAP during the interview. Trait forgiveness and the TRIM were not related to cardiovascular reactivity. In addition, we had expected that any blood pressure increases observed in the interview would be maintained in the rumination period. This was not the case. When the rumination period began, blood pressure and heart rate immediately began to decrease.

Forgiveness and Cortisol

In Table 4, we present the cortisol means for the total sample as well as the state forgiveness groups. We had hypothesized that low forgivers would display a greater cortisol response to the betrayal interview than high forgivers. Reactivity was computed by subtracting post-baseline rumination levels from the post-rumination period levels. In fact, state forgiveness (AF and TRIM) was associated with cortisol reactivity ($r = -.26$, $p<.05$ and $r = .31$, $p<.05$). A further investigation of this effect was performed on median groups with t-tests. There was little change in cortisol level from baseline to post-rumination period for low state forgivers, but there was a significant change in cortisol level from baseline to rumination period for high forgivers. For the high forgivers,

cortisol decreased after the rumination period, compared to baseline. The same pattern was observed for low forgivers, but the change was not significant (see Figure 2). High and low forgiveness groups did not differ at baseline or post-rumination.

Forgiveness and Anger Response Styles

While the relationship between forgiveness and anger response styles has not been explored in previous studies, we had hypothesized that anger would be associated with the success of forgiving in the long term, and the initial decision to forgive. As shown in Table 5, there was no evidence to support the relationship between anger response styles and state forgiveness. However, trait forgiveness was associated with three anger response styles including, assertion ($r = .54$, $p<.01$), direct anger out ($r = -.35$, $p<.01$), and social support seeking ($r = .32$, $p<.05$). Thus, trait forgiveness is associated with anger styles that include confronting the offender and working out the event, seeking out friends and relatives to discuss the event, and low verbal and physical responses to anger. Rumination was also associated with anger responses: the RRS was associated with diffusion ($r = .30$, $p<.05$) and the BRUM was associated with social support seeking ($r = .28$, $p<.05$). Thus, the more an individual ruminates, as indicated by the RRS, the more they respond to anger by performing other distracting activities. In contrast, the more an individual ruminates, as indicated by the BRUM, the more likely they are to seek social support.

Rumination and Health

Correlations between rumination and mental health can be found in Table 1. Both rumination measures (RRS and BRUM) were associated with depression ($r = .59$, $p<.001$ and $r = .27$, $p<.05$ respectively), and trait anxiety ($r = .68$, $p<.001$ and $r = .33$, $p<.05$

respectively). In addition, the RRS was related to state anxiety ($r = .26$, $p<.05$). In all cases, the higher rumination scores were associated with higher depression and anxiety scores, with the associations between the RRS and depression and trait anxiety representing the strongest associations.

The hypothesis that rumination would be related to number of physical symptoms was obtained for one measure (RRS) (see Table 2). Rumination was related to physical symptoms ($r = .36$ $p<.01$); however, the BRUM was not. Neither rumination measure was related to BMI, Smoking, Medical Conditions or Medications. Thus, only the RRS was related to physical health.

Rumination and Cardiovascular Responses

We had hypothesized that higher rumination would be associated with a greater cardiovascular response to the betrayal interview than lower rumination. There was no evidence that rumination was associated with cardiovascular responses. However, as shown in Table 3, there was a trend indicating that the BRUM was associated with ΔSBP ($r = .22$, $p<.10$). Thus, higher rumination scores on the BRUM were weakly associated with greater systolic blood pressure reactivity to the betrayal interview.

Rumination and Cortisol

The relationship between rumination and cortisol has not been documented in the literature, but we hypothesized that higher rumination would be associated with higher cortisol levels. This association was not observed (Table 3).

Forgiveness, Event-related Variables, Empathy, and Rumination

We had expected that the event-related variables (apology, time, intentionality, commitment, severity) and empathy would be significantly related to forgiveness. As

shown in Table 6, the measures of state forgiveness (AF and TRIM) were related to the presence of an apology ($r = .50$, $p<.01$, and $r = -.38$, $p<.01$ respectively), intentionality ($r = -.49$, $p<.01$, and $r = .40$, $p<.01$ respectively), and severity of the offense ($r = -.59$, $p<.01$, and $r = .50$, $p<.01$ respectively). Time since the event and commitment were unrelated to any forgiveness measures. The empathy measures (PT and EC) were related to trait forgiveness ($r = .35$, $p<.01$; $r = .37$, $p<.01$), but not to state forgiveness.

We had also hypothesized that rumination would predict forgiveness over and above the other event-related factors and empathy. As shown in Table 7, a hierarchical regression was performed for state forgiveness (AF), entering apology, severity and intentionality first, followed by rumination. All of the variables remained significant and accounted for 63% of the variance, with the RRS accounting for 3% of the variance. A second regression was performed substituting the BRUM in place of the RRS. This model accounted for 61% of the variance, but the BRUM did not remain significant (beta = -.104). In Table 8, apology, severity, intentionality, and the RRS were entered into a regression to predict state forgiveness (TRIM). All of the variables remained significant, with the model accounting for 45% of the variance. The RRS accounted for 6%. Again, the RRS was replaced with the BRUM to predict the TRIM. While apology and intentionality did not remain significant, the model accounted for 46% of the variance, with the BRUM accounting for 7% of the variance.

CHAPTER 4

Discussion

In the current study we investigated the relationships among forgiveness, rumination, and self-reported mental and physical health. We also sought to determine whether forgiveness and rumination would be related to cardiovascular and endocrine responses to an interpersonal stressor. We assessed blood pressure and heart rate in response to an interview in which participants were instructed to relate a time of parental conflict or hurt. We also determined cortisol reactivity from saliva samples collected post-baseline and post-rumination.

While there are several studies linking forgiveness with physical and mental health, there is only one study in the literature describing the relationship between forgiveness and rumination. McCullough et al. (2001) used the Impact of Events Scale (Horowitz, Wilner, & Alvarez, 1979) to measure rumination. The participants were asked to think about something that happened since Christmas vacation. Since time is presumed to be a factor in the process of forgiving, we did not limit our participants to a fairly recent event and we used the Ruminative Responses Scale and the BARQ Rumination Scale instead. In order to measure forgiveness, McCullough et al. (2001) used the TRIM, which we also used. They found that the participants who ruminated less over time, also became more forgiving, indicating a relationship between rumination and forgiveness. In our study, we sought to replicate their finding using one measure of trait forgiveness, two measures of state forgiveness (including the TRIM), and two measures of trait rumination. In addition, we investigated the relationship of these factors with health and acute physiological responses. Past research indicated a consistent association

between forgiveness and mental health (Lawler et al., 2003; Seybold et al., 2000), and a tentative association between forgiveness and physical health (Lawler et al., 2003; Witvliet et al., 2000). In addition, associations were obtained between forgiveness and blood pressure (Lawler et al., 2003; Witvliet et al., 2000) and forgiveness and cortisol (Berry & Worthington, 2001). Thus, our hypotheses were based on previous research suggesting an association between forgiveness and rumination, and the importance of forgiveness on certain measures of mental and physical health, including acute physiological responses.

Forgiveness and Rumination

We had expected that there would be an association between forgiveness and rumination. However, this association was found only between state forgiveness and trait rumination and not between trait forgiveness and trait rumination. This would suggest that there is no association between a forgiving personality and a tendency to ruminate. This finding would seem counterintuitive, but perhaps scoring lower on the RRS makes state forgiveness more likely. This would make sense in that people who do not tend to ruminate would be more likely to forgive in a given situation. In addition, state forgiveness could be more representative of the person than trait forgiveness. Participants might perceive that they are forgiving people, or they may like to project themselves as forgiving people, when in actuality they are not. Thus, those participants who had not forgiven the specific event reported in the interview, tend to ruminate in general. However, we cannot conclude that individuals who tend to ruminate also tend to be unforgiving, in general, based on the findings discussed above.

While analyzing the data, it became clear that there is a difference between the two measures of state forgiveness (AF and TRIM) which suggests that, although correlated, they are measuring something slightly different. The TRIM is more strongly related to depression and trait anxiety than the AF, while the AF is related to cardiovascular reactivity. Both measures are determining state forgiveness, but the TRIM is a motivational and behavioral measure that seeks to determine levels of revenge and avoidance. The AF is primarily measuring feelings and emotions. This would imply that feelings and emotions have more influence on blood pressure reactivity than motivation and behavior. Thoughts of revenge or avoidance, however, may have more of an influence on mood. Research supports the idea that feelings and emotions have an influence on cardiovascular health, and it seems reasonable that vengeful thoughts and avoidance behavior could affect mood. Since these two measures are highly correlated, but measuring slightly different aspects, it would seem beneficial to use both questionnaires to assess state forgiveness. Future research would benefit from a comparison of these two measures of state forgiveness to other related constructs.

Differences were also observed between the two measures of rumination (RRS and BRUM). Both measures of state forgiveness were similarly related to the RRS with higher levels of forgiveness associated with lower levels of rumination. However, the BRUM was only related to the TRIM. This may have something to do with the motivational and behavioral aspects of the TRIM as compared with the AF, or some difference in the RRS and the BRUM. The RRS, as developed by Nolen-Hoeksema (1991), was designed to determine the extent to which a person is a depressive ruminator. Thus, the scale is self-focused, symptom-focused, and dwells on the possible causes of

the depressed mood. This would indicate that any associations between the RRS and other factors may be influenced by the strong association between the RRS and depression. The BRUM is less focused on the self, and more directed toward the event and the offender. This may explain the association between the TRIM and the BRUM, as they both predominantly direct attention toward the offender. Thus for future research, some consideration should go into which measure is used, depending on the focus of the research.

Forgiveness and Mental Health

Mental health was assessed with measures of depression and state/trait anxiety. We had hypothesized that high forgivers would score lower than low forgivers on measures of negative affect such as depression and anxiety. In all cases, higher forgiveness was associated with lower depression and lower anxiety. This finding dovetails with past research indicating the relationship between forgiveness and mental health (Lawler et al., 2003; Maltby, Macaskill, & Day, 2001; Al-Mabuk et al., 1995; Brown, 2003; Mauger et al., 1992, Seybold, et al., 2001). This is a reasonable finding given that an unforgiven event may still have the power to evoke strong emotions, such as depression and anxiety, or the individual's inability to forgive may keep the event more salient. While no relationship was found between physical health and forgiveness, the association between depression and physical health is well known. Thus, the association between forgiveness and depression could represent one pathway through which unforgiveness could affect health in the future. A recent study (Lawler et al., 2004) explored the pathways between forgiveness and physical health and found that reduction

in negative affect (anger, anxiety, and depression) completely accounted for the relationship.

Forgiveness and Physical Health

We had expected that forgiveness would be inversely related to number of physical symptoms, thus we examined these factors in a correlational matrix. Interestingly, the only measure of physical health related to trait and state forgiveness was smoking. In both cases, higher forgiveness scores were associated with a lower tendency to smoke. This finding is in line with Seybold et al. (2001), who also found that low forgiveness was associated with higher cigarette use. One possible explanation for this finding may be that non-forgivers use smoking as a form of self-medication. Smoking may be related to the general negative affect and stress associated with the lack of forgiveness. The failure to detect a relationship between physical symptoms and forgiveness contradicts past studies reporting a consistent and strong association (Lawler et al., 2003; 2004). Possible explanations include sample characteristics: Sixty-three percent of the sample (all female, mean age = 21) reported no medical condition for which they received treatment in the past year and 35% reported taking no medications. Thus, the health variables were skewed in a positive direction. In addition, our sample size (n=60) may have been too small to detect differences between high and low forgivers.

Forgiveness and Cardiovascular Responses

We had also expected that those who scored lower on forgiveness would show a greater cardiovascular response to the betrayal interview than those who scored higher on forgiveness. This hypothesis was partially supported. While past research has

demonstrated this effect, we found only one association between state forgiveness (AF) and ΔMAP. This finding replicates past research indicating the relationship between state forgiveness and mean arterial pressure (Lawler et al., 2003). In addition, systolic and diastolic blood pressure reactivity were marginally associated ($p<.10$) with state forgiveness. These associations seem to indicate an overall cardiovascular response to a specific betrayal event that has relevance in an individual's life. This is problematic for the individual given the relationship between cardiovascular reactivity and later hypertension and coronary heart disease (Krantz & Manuck, 1984; Light et al., 1999). We did not replicate the associations obtained by Lawler et al. (2003) between trait forgiveness and blood pressure reactivity, even with similar samples. In addition, we had expected that any blood pressure increases observed in the interview would be maintained in the rumination period. Instead, the data indicated that blood pressure and heart rate immediately began to fall following the interview. This indicates that thinking about the betrayal event after relating the event to the experimenter did not have the effect we had hypothesized that it would. On the contrary, it seems as if disclosing the event had a cathartic effect for all subjects regardless of forgiveness. The effects of emotional suppression are reported by Richards and Gross (1999) who reported a significant cardiovascular activation in response to suppressing emotion. In addition, Pennebaker and Susman (1988) proposed that suppressing information is physiologically taxing while the opportunity to disclose a trauma is cathartic. If someone does not have the opportunity to disclose potentially harmful information, it becomes a cumulative stressor that can eventually lead to stress related disease. Further, Pennebaker and Susman (1988) predict that if someone has the opportunity to disclose this information, it

will reduce harmful ruminations about the event and thereby reduce the risk for disease. Their follow-up work seems to indicate that that is the case. Students asked to write their feelings about a traumatic event reported greater psychological health four months later, as well as a reduced tendency to visit the health center six months after participating in the experiment, as compared to those students asked to write about trivial topics. Also according to Pennebaker and Susman (1988), a traumatic event that is not disclosed is associated with obsession about that event, while revealing thoughts and feelings concerning the trauma produces an eventual understanding of the trauma. Perhaps our participants were initially anxious about imparting personal and upsetting information, which explains the initial increase in blood pressure, and then relieved to have revealed the information even though they were asked to continue thinking about the event in the rumination condition. Furthermore, Pennebaker, Hughes, and O'Heeron (1987) conclude that asking a participant to think about the event is very different than ruminating about the event, especially right after they were asked to recount the event to the experimenter. They assert that rumination is less organized and complete than thoughts associated with being asked to think about the traumatic event. It is also possible that the participants in our study realized the difficult portion of the study was over with the end of the betrayal interview, and their blood pressure reflected that realization.

Forgiveness and Cortisol

We had also expected that low forgivers would display a greater cortisol response to the betrayal interview than high forgivers, which was not obtained. While both measures of state forgiveness were associated with cortisol reactivity, further investigation revealed that high forgivers significantly *decreased* cortisol levels from

baseline to post-rumination period. While not what we expected, this may be due to the cathartic effect of relating the event to an objective experimenter as seen in the blood pressure data. However, the low forgivers did not benefit from the relating of the event to the extent that the high forgivers did. While the high forgivers started out with slightly higher cortisol levels, their cortisol levels dipped below the low forgivers' post-rumination levels. This suggests that while the high forgivers were initially equally or even more anxious about disclosing, they benefited more from the revealing of a betrayal event than did the low forgivers. This may be due, in part, to the social desirability of having forgiven someone and reporting that information to the experimenter. In addition, the observed post-rumination levels may represent a return to baseline for both groups with the initial high cortisol levels representing an anticipatory response.

Forgiveness and Anger Response Styles

While the relationship between forgiveness and anger response styles has not been explored in previous studies, we had hypothesized that anger would be associated with the decision to forgive or the success of forgiving in the long term. The association with state forgiveness was not found, indicating that anger style has no influence on the decision to forgive in this specific instance. However, trait forgiveness was associated with three anger response styles: assertion, direct anger-out, and social support seeking. Thus, trait forgiveness is associated with anger styles that include confronting the offender and working out the event, seeking friends and relatives to discuss the event, and low verbal and physical responses to anger. Pennebaker and Susman (1988) also point out the health benefits that result from directly confronting situations and turning to social support networks. Thus, an individual who forgives easily may do so because they tend

to confront the offender without resorting to violence, while also turning to friends and family to help them understand the event. Similarly, rumination was also associated with anger responses: the RRS was associated with diffusion, or engaging in distracting activities when angered, while the BRUM was associated with social support seeking. These are interesting associations especially given the type of anger response style related to the RRS. Interventions designed to combat rumination sometimes include the use of distracting activities. Thus, it may be adaptive for an individual who ruminates to also deal with anger by engaging in distracting activities. In addition, the BRUM is associated with the use of a social network to work out the angering event. This represents another adaptive method of dealing with anger. So, perhaps we did not find some of the associations we expected to find due to the associations that the ruminators had with adaptive methods of dealing with angering events.

Rumination and Health

We found that the Ruminative Response Scale of the Response Styles Questionnaire (Nolen-Hoeksema et al., 1991) was related to physical symptoms: higher rumination was associated with poorer self-reported physical health. Since this scale is related strongly to depression, the RRS-CHIPS association may reflect the association between depression and physical symptoms. In fact, a partial correlation controlling for depression revealed that the RRS-CHIPS association was no longer significant. Moreover, the BARQ rumination scale (BRUM), developed by Hogan and Linden (2003) also measures rumination, but was not as strongly related to depression and was not related to physical health. In addition, the RRS was more strongly related to anxiety, both trait and state, than the BRUM. This also may be the result of the strong

associations between the RRS and depression since anxiety and depression tend to be highly correlated.

Rumination, Cardiovascular Responses, and Cortisol

For exploratory purposes, we had hypothesized that higher rumination would be associated with a greater cardiovascular response to the betrayal interview than lower rumination. While this association was not found, there was a trend associating the BRUM with ΔSBP. This is consistent with the idea that just thinking about an upsetting event can lead to sympathetic nervous system arousal. However, the relative weakness of the effect raises some questions. Perhaps the association would have been stronger given a larger sample size. However, Hogan and Linden (2003) indicated that the relationship between rumination (BRUM) and blood pressure reactivity occurred only in combination with anger response styles. Perhaps there is some relationship between rumination and anger responses that deserves further investigation; however, we found only one significant relationship between rumination and one of the anger response styles reported by Hogan and Linden (2003), which was social support-seeking. Since there was no relationship between social support-seeking and blood pressure, this relationship was not pursued.

We had also expected rumination to be related to cortisol levels due to its association with depression. This association was not found, however this may be due to the fact that only two saliva samples were taken during the protocol and our limited sample size.

Forgiveness, Event-related Variables, Empathy, and Rumination

We had expected that the event-related variables (apology, time, intentionality, commitment, severity) and empathy would be significantly related to forgiveness. Apology, intentionality, and severity of the offense were all related to both measures of state forgiveness. However, time since the event and commitment were unrelated to any forgiveness measures. This is in contrast to past studies where time and commitment were a significant component of the forgiveness process (McCullough et al., 2000). Commitment may have been rendered nonsignificant by asking participants to talk about parental betrayals, assuming that most children are committed to relationships with their parents. It is unclear why time was not a factor in deciding to forgive in this case. Perhaps participants chose their most recent experience to discuss rather than their most upsetting experience. Empathy was related to trait forgiveness, but not state forgiveness. This may be the result of using a trait measure of empathy rather than a state measure. However, if someone is empathic in general, then there should still be an association with state forgiveness based on past research (McCullough, 2001). However, an individual with a forgiving personality tends to be more empathic. Since our sample consisted of women only, who may tend to be more empathic than men (Fox, Gibbs, & Auerbach, 1985), differences may have been obscured.

In our last hypothesis, we had expected that rumination would predict forgiveness over and above the other event-related factors as well as empathy. Regression analyses verified that both rumination measures predicted state forgiveness. Apology, intentionality, severity of the event, and the RRS predicted a large proportion of the variance in the AF (63%) with rumination contributing a significant percentage (3%),

clearly indicating the substantial role of rumination in state forgiveness. The BRUM did not predict the AF. Using the TRIM, the RRS predicted 6% of the variance while the BRUM predicted 7%. In addition, when the BRUM was used to predict the TRIM, apology and intentionality did not remain significant. Thus, although 46% of the variance was still explained it was explained solely by severity of the offense and the BRUM. This indicates that the motivational and behavioral aspect of state forgiveness may be more strongly related to the severity of the offense and rumination. No matter which measure of rumination or state forgiveness is used, the elements most likely to predict forgiveness are the presence of an apology, whether the offense was intentional, the severity of the offense, and rumination. However, as we expected, rumination does add predictive power over and above event-related variables. These findings underscore past research indicating the most salient elements involved in forgiving.

Limitations and Future Directions

While past studies found strong and consistent associations between trait and state forgiveness and physical symptoms, we did not. Perhaps a larger sample size would have allowed us to detect differences among high and low forgivers in self-reported physical health and blood pressure levels. Since health information was overwhelming positive, the small sample size is problematic. In addition, we used only female participants, which limits the generalizability of our findings due to the absence of males. It would be interesting to determine the differences between males and females on different questions raised in the current study. For example, do males differ from females in which factors are likely to predict forgiveness? Since females are more likely to ruminate (Nolen-Hoeksema, 1991), does rumination affect forgiveness for males to the same extent it does

with females? Do males differ in their anger response styles from females, and if so, does that affect forgiveness? These questions could also inform interventions aimed at fostering forgiveness in mixed gender groups.

A more experimental design, such as the inclusion of a control group in which participants would have talked about an inconsequential experience, would have allowed us to compare groups and make stronger conclusions. In addition, a distraction condition in comparison to the rumination condition, as seen in Nolen-Hoeksema and Morrow (1991), would have allowed us to draw more conclusions about the rumination condition.

It should be noted that the TRIM was not normally distributed, which could not be corrected by a log transformation. For this reason, any conclusions drawn about the TRIM are problematic. Perhaps the AF is a better measure of state forgiveness and should be used instead of the TRIM.

Finally, a cortisol sample after the recovery period may have provided a more detailed picture of the changes over time during the protocol. Since baseline cortisol levels were fairly high, this finding may be indicative of an anticipatory anxiety response that is found prior to participation in a study that involves interpersonal stress (Rejeski, Thompson, Brubaker, & Miller, 1992; Gonzalez-Bono, Moya-Albiol, Salvadore, Carillo, Ricarte, & Gomez-Amor, 2002), as well as anxiety concerning disclosing personal data. This may indicate that 20 minutes was not a suitable length of time to obtain baseline cortisol levels. Perhaps baseline saliva samples could have been taken after the protocol or at a later date in order to control for this anticipatory response. Future studies should consider these limitations and the useful information that may be gained by addressing these issues.

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Appendices

Appendix A

Tables and Figures

Table 1.

Correlations Among Forgiveness, Rumination, and Measures of Mental Health

	AF	TRIM	RRS	BRUM	BDI	Tanx	Sanx
FP	**.33****	**-.36****	-.10	-.17	**-.28***	**-.43****	-.21
AF		**-.88****	**-.25***	**-.23**	**-.28***	**-.29***	**-.30***
TRIM			**.31***	**.35****	**.41****	**.32***	**.24**
RRS				**.46****	**.58*****	**.68*****	**.26***
BRUM					**.27***	**.33***	.21
BDI						**.75****	**.37****
Tanx							**.62****

p < .10
***p < .05**
****p < .01**
*****p<.001**

Note: Forgiving Personality Inventory (FP); Acts of Forgiveness (AF); Transgression-related Interpersonal Motivations Inventory (TRIM); Ruminative Responses Scale (RRS); BARQ Rumination Scale (BRUM); Beck Depression Inventory (BDI); Trait Anxiety (Tanx); State Anxiety (Sanx)

Table 2.

Correlations Among Forgiveness, Rumination and Measures of Physical Health

	CHIPS	BMI	Smoke	Cond	Meds
FP	-.01	-.14	**-.39****	-.08	-.13
AF	-.18	.02	**-.25***	-.16	-.09
TRIM	.16	-.06	.21	.13	.08
RRS	**.36***	.01	.14	.01	-.04
BRUM	.10	.03	-.03	.10	.18

***p < .05**
****p < .01**
Note: Forgiving Personality Inventory (FP); Acts of Forgiveness (AF); Transgression-related Interpersonal Motivations Inventory (TRIM); Ruminative Responses Scale (RRS); BARQ Rumination (BRUM); Cohen-Hoberman Inventory of Physical Symptoms (CHIPS); Body Mass Index (BMI); Smoker (Smoke); Medical Conditions (Cond); Medications (Meds)

Table 3.

Correlations Among Forgiveness, Rumination, Cardiovascular Reactivity, and Cortisol Reactivity

	AF	FP	TRIM	RRS	BRUM
Systolic Reactivity	**-.25**	.01	.18	.06	**.22**
Diastolic Reactivity	**-.24**	-.02	.10	.01	.14
MAP Reactivity	**-.28***	.05	.12	.01	.15
HR Reactivity	-.11	-.03	-.00	.06	.20
Cortisol Reactivity	**-.26***	-.08	**.31***	.21	.14

p<.10

***p<.05**

Note: Acts of Forgiveness (AF), Forgiving Personality Inventory (FP), Transgression- related Interpersonal Motivations Inventory (TRIM); Ruminative Responses Scale (RRS); BARQ Rumination (BRUM)

Table 4.

Descriptive Statistics for Cortisol for the Total Sample and for State Forgiveness Groups

Cortisol	Range	Total Sample		Lo AF		Hi AF		Lo TRIM		Hi TRIM	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Post-Baseline	.06-1.78	.53	.38	.51	.31	.56	.44	.58	.42	.49	.33
Post-Rumination	.06-1.58	.42	.32	.45	.36	.38	.28	.40	.27	.43	.37

Note: Cortisol levels in μg/dl

Table 5.

Correlations Among Forgiveness, Rumination and Anger Response Styles

	BASS	BDAO	BSS	BAVOID	BDIFF
FP	**.54*** **	**-.35** **	**.32***	-.05	.10
AF	-.04	.07	.18	-.09	-.10
TRIM	-.09	-.05	-.14	.06	.16
RRS	-.03	-.04	**.25**	.16	**.30***
BRUM	-.03	.15	**.28***	.10	.17

p<.10
***p<.05**
****p<.01**
*****p<.001**

Note: Forgiving Personality Inventory (FP); Acts of Forgiveness (AF); Transgression-related Interpersonal Motivations Inventory (TRIM); Ruminative Responses Scale (RRS); BARQ Rumination (BRUM); BARQ Assertion (BASS), BARQ Direct Anger Out (BDAO), BARQ Social-Support Seeking (BSS), BARQ Avoidance (BAVOID), BARQ Diffusion (BDIFF)

Table 6.

Correlations Among Forgiveness, Event-related Variables, and Empathy

	Time	Commit	Apology	Severity	Intentionality	PT	EC
FP	-.03	.15	.07	-.18	-.22	**.35****	**.37****
AF	.14	.24	**.50****	**-.59****	**-.49****	.15	.02
TRIM	-.06	-.17	**-.38****	**.50****	**.40****	-.11	.03

****p<.01**

Note: Time since event (Time), Commitment to the relationship (Commit), The presence of an apology (Apology), Severity of the offense (Severity), The extent to which the event was intentional (Intentionality), Perspective-Taking (PT), Empathic Concern (EC)

Table 7.

Regressions Predicting State Forgiveness (AF)

Predicting AF with RRS – R = .791, R^2 = .626		
	Beta	p
Apology	.290	.001
Severity	-.476	.0001
Intent	-.297	.001
RRS	-.176	.039

Predicting AF with BRUM – R = .779, R^2 = .606		
	Beta	p
Apology	.273	.003
Severity	-.498	.0001
Intent	-.284	.003
BRUM	-.104	.237

Table 8.

Regressions Predicting State Forgiveness (TRIM)

Predicting TRIM WITH RRS – R = .674, R^2 = .454		
	Beta	p
Apology	-.214	.042
Severity	.395	.0001
Intent	.234	.032
RRS	.245	.018

Predicting TRIM WITH BRUM – R = .680, R^2 = .462		
	Beta	p
Apology	-.169	.108
Severity	.429	.0001
Intent	.200	.064
BRUM	.266	.011

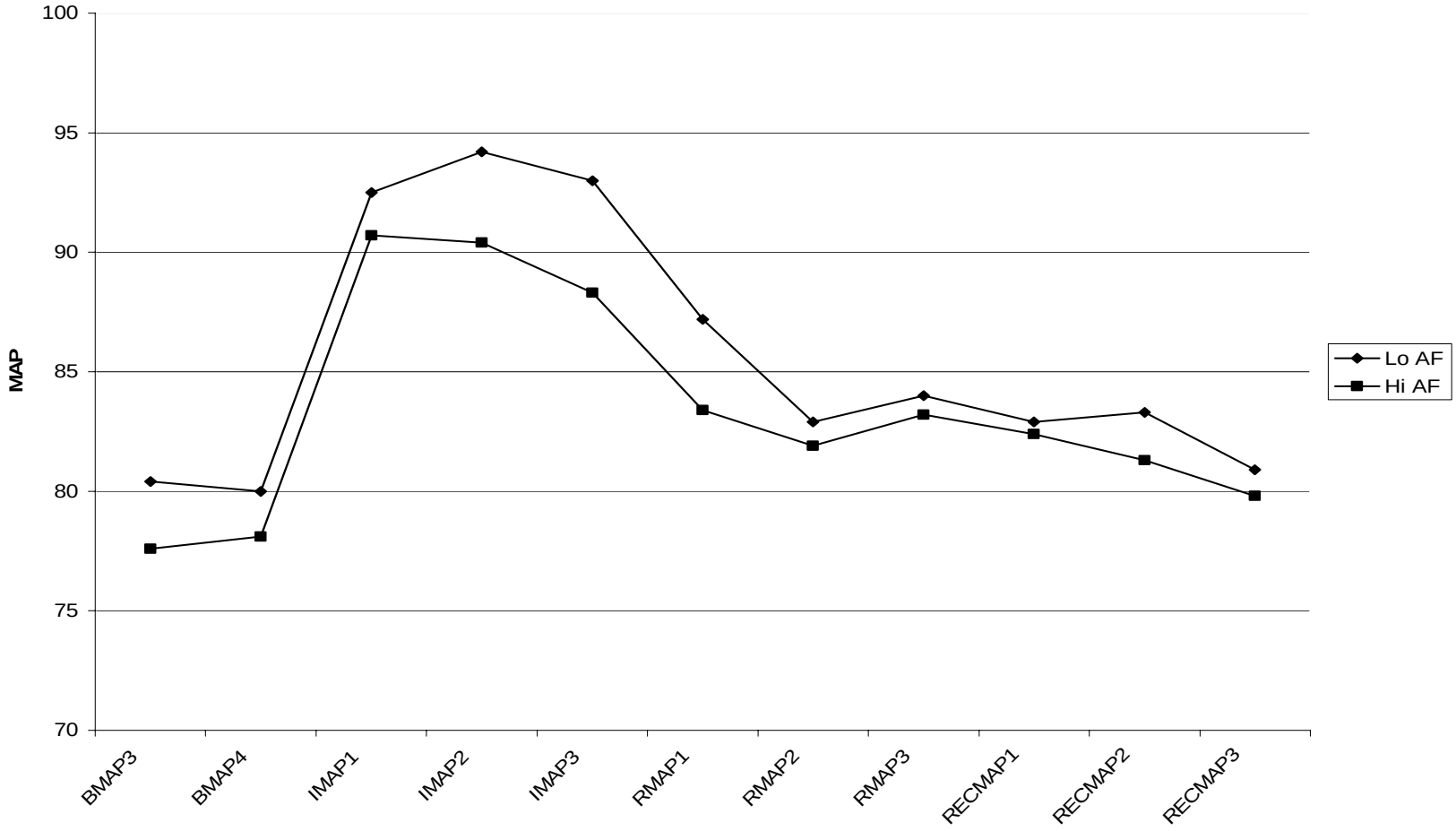

Figure 1.

State Forgiveness (AF) and Mean Arterial Pressure (MAP) from Baseline to Recovery

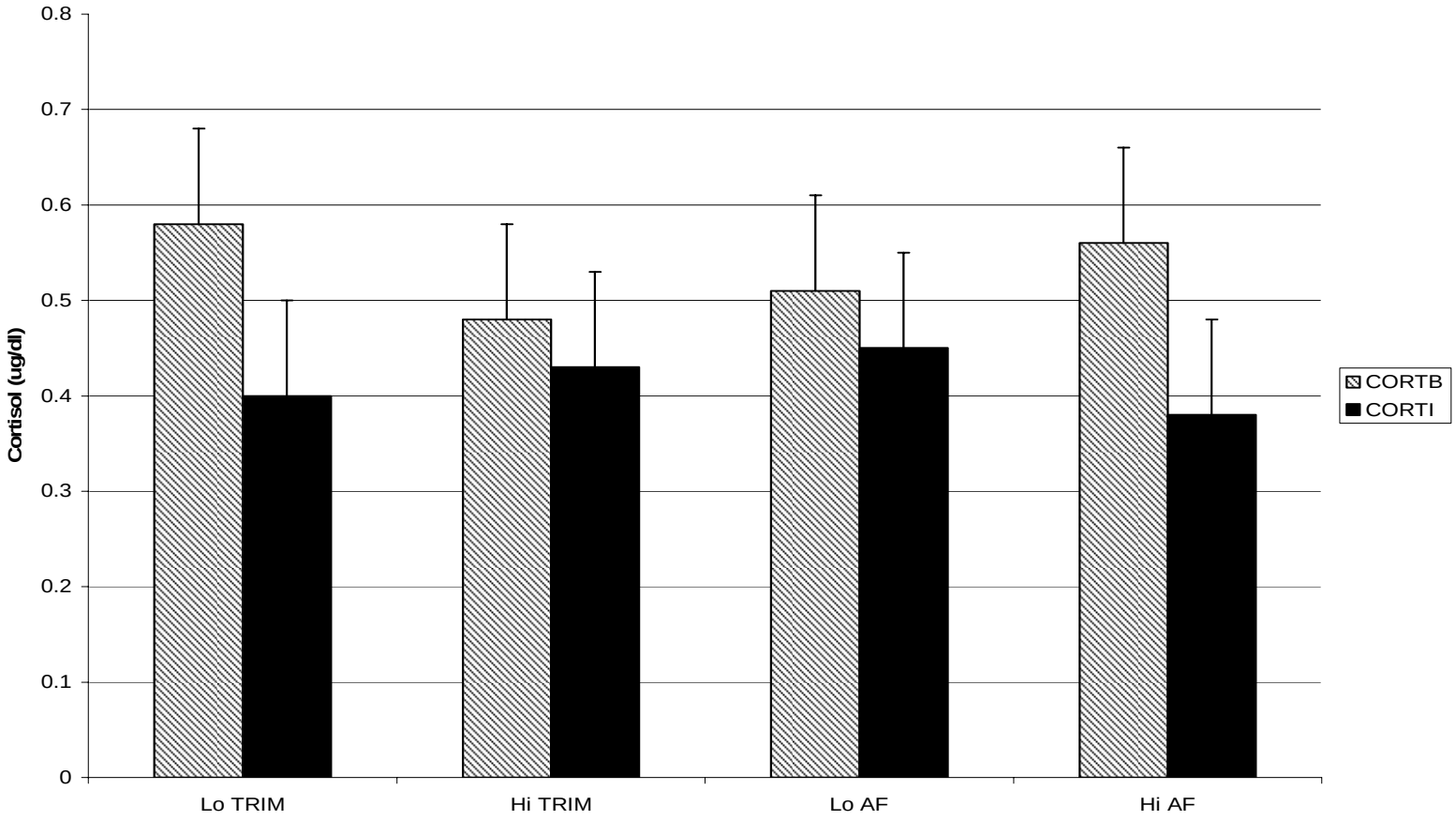

Figure 2.

High and Low State Forgiveness (TRIM and AF) Cortisol Levels Post-Baseline and Post-Rumination

Appendix B

Interview Questions

1) Now, I would like for you to describe a time when you were betrayed or otherwise hurt by one of your parents. Please describe this event in as much detail as you can.

2) What feelings do you remember having during this event?

3) How did you respond to the offender – did you express your feelings to the offender?

4) Why do you suppose they did this to you?

5) What about this event hurt you the most?

6) What would it take for this situation to be completely reconciled or resolved?

7) How long ago did this happen? (in years, months, or days)

8) Who was involved? (e.g., "M" = mother, "F" = father, "G" = guardian)

9) Did the offender ever apologize for what he/she did?

10) How severe was the event for you?

|_____|

not at all serious — devastating

11) How intentional do you think his/her behavior was?

|_____|

not at all — 100% intentional

12) How committed were you to the relationship before the event?

|_____|

not at all — extremely

13) How much have you forgiven the offender?

|_____|

none — totally

VITA

Kimberly Reed Edmondson was born on July 5, 1970 in Mechanicsburg, Pennsylvania. She was raised in Dillsburg, Pennsylvania and was graduated from Northern York County School in June, 1988. She entered the Air Force in June, 1988 and served as an Arabic Linguist. In August 1995, she entered The Pennsylvania State University in York where she received her Associate of Arts degree. She then continued to receive her Bachelor of Science degree with Highest Honors, majoring in Psychology from The Pennsylvania State University in Harrisburg. The following fall, she entered The University of Tennessee, Knoxville and completed the requirements for the Master of Arts Degree in July, 2002.

Currently, she is pursuing a doctoral degree in Experimental Psychology at The University of Tennessee, Knoxville. Her research focuses on the relationship between forgiveness, spirituality, and health.

Kimberly is the daughter of Lewis Reed and Jean Baker of Dillsburg, Pennsylvania. She has two sons, Carson and Timothy.