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Rumination and Cognitive Ability in Undergraduate Females

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ABSTRACT- *The present study investigated the hypothesis that rumination, induced through a negative-based self reflection questionnaire would hinder cognitive ability in undergraduate females, as measured by an anagram test. Sixty-eight females from Brigham Young University took an anagram test and filled out the Beck Depression Inventory, the Burns Anxiety Inventory, and Rumination Responses Scale. Thirty-seven of these participants also filled out a Rumination Induction Questionnaire (RIQ) before taking the anagram test. Manipulation checks indicated that the Rumination Induction Questionnaire was an ineffective method for inducing rumination. Results did not support the original hypothesis. Instead, results showed that those who took the RIQ performed no different on the anagram task than those who did not. Additionally, ruminators and non-ruminators performed no differently from one another, indicating that there was no causal role between rumination and anagram performance. The study also supported previous research findings that rumination, anxiety, and depression are strongly related. Possible limitations and suggestions for future research are discussed.*

Rumination is a repetitive focus on one's own circumstances and the causes and consequences of the resulting mood. Ruminators continually focus on their own thoughts, feelings, and behaviors. Although individuals may engage in positive or neutral rumination, this coping style is more often associated with negative thought processes (Ward, Lyubomirsky, Sousa, & Nolen-Hoeksema, 2003). Rumination is strongly linked to depression and dysphoria. Indeed, those who engage in rumination are at greater risk for developing depression and often suffer from more severe depression than those who do not ruminate (Lyubomirsky & Nolen-Hoeksema, 1995). Dysphoric individuals who engaged in distraction activities showed less depressive symptoms and solved problems more effectively, compared to those dysphoric individuals who engaged in rumination (Lyubomirsky, Caldwell, & Nolen-

Hoeksema, 1998). Additionally, there seems to be a difference between depression and depression in combination with rumination. Rumination, when paired with a depressive state, is more likely to impair concentration, as well as performance in school work and general day to day activities (Lyubomirsky, Kasri, & Zehm, 2003). This impairment is likely the cause of one's negative feelings.

Rumination is the depressed individual's attempt to overcome negative feelings. People often believe that an inward-focused coping style, such as rumination, will lead to greater insight concerning their problems. Ruminators often ponder the answers to questions such as "Why am I feeling depressed?", "What does it mean when I feel this way?", and "Why can't I stop feeling this way?" Depressive ruminators dwell on personal mistakes and inadequacies, and they focus on their feelings of hopelessness and isolation (Davis & Nolen-Hoeksema, 2000). Compared to depressed individuals who were not induced to ruminate, depressed ruminators believed they were reaching a greater understanding concerning the circumstances that were causing them to feel depressed (Ward et al., 2003). In reality, this ruminative coping style led to negative and ineffective solutions to the individual's problems. Attempts to clarify reasons behind troubles only generated inefficient results for the ruminator (Ward et al., 2003).

Compared to individuals who engaged in a distraction task, self-focused ruminators were found to entertain more negative thoughts and distorted interpretations of events. Additionally, these individuals had more negative expectations for the future and generated poorer solutions to interpersonal problems (Lyubomirsky et al., 1995). Ruminators not only experienced more severe depression and dysphoria,

but they also had more negative interpretations of their situations and more difficulty finding solutions to their problems. Studies have shown that depressed individuals have a lower ability to interact effectively with other people when put into a social environment. Rumination may contribute to this: when individuals are constantly replaying thoughts and memories in their mind, they lose focus and hinder their social problem solving skills (Godard, Dritschel, & Burton, 1996; Kao, Dritschel, & Astell, 2006). This may only serve to add to the depressive state of mind, as ruminators then will wonder why they have difficulties socializing with other people.

Rumination disrupts the initiation of behaviors that may help solve the everyday challenges associated with socializing. This may be the result of reduced confidence and satisfaction with solutions, as well as a decreased willingness to commit to solutions (Ward et al., 2003). People engaged in ruminative responses do not take action to change their situation; instead, they spend much of their time focusing on how bad they feel and wondering "Why me?" (Davis & Nolen-Hoeksema, 2000). Due to the fact that ruminators primarily focus on their negative, depressed, and anxious thoughts or feelings, they lack self-effectiveness (Bandura, 1986, as cited in Ward et al., 2003). As a result, ruminators tend to feel less motivated to try to resolve their predicaments. Not only do ruminators have difficulty initiating the very behaviors that will help them escape the vicious cycle of depression and rumination, but they also withdraw from, or avoid altogether, activities which they would normally enjoy (Ward et al., 2003). Given rumination's negative impact on social problem-solving, this coping style may also have a negative impact on cognitive problem solving.

In a memory study, depressed college students were evaluated on rumination and their ability to recall a passage. Results showed that the more a participant recorded mind lapses, the worse the individual performed on the memory recall test. These mind lapses measure rumination by providing evidence that the participant's negative thoughts were distracting them from the memory recall test (Hertel, 1998). Dysphoric ruminators experience impaired concentration on academic tasks, including reading and answering questions, listening to a lecture and digesting the information, and proofreading a paper (Lyubomirsky et al., 2003). It seems this is the result of rumination taxing the individual's cognitive capacity. Those individu-

als who were depressed and focusing on what is wrong with them – why they feel the way they do and why they can't snap out of the mood they are in – found their ability to concentrate significantly diminished. More specifically, these individuals spent more time on the tasks, reported more frequent interfering thoughts, and displayed somewhat poorer performance on the tasks (Lyubomirsky et al., 2003).

Further research has suggested that women are affected more by rumination and perform poorer on the tasks (Lyubomirsky et al., 2003). There seem to be clear gender differences between men and women for depression and rumination. This dichotomy first becomes apparent in the adolescent years. Adolescent girls engage in co-rumination more often than their male counterparts (Rose, 2002). As girls and boys mature, girls are also more likely to develop depression as well as engage in ruminative thought processes. These traits characteristic of adolescent girls are carried into adulthood, as there is increasing evidence that women suffer from depression much more often than men (Papadakis, Prince, Jones, & Strauman, 2006). Studies testing gender differences in rumination have also been consistent in finding that females report a more ruminative response style than males (Goldman, 2005; Mezulis, Abramson, & Hyde, 2002).

Furthermore, research suggests that men are much less likely to recount or be observed in ruminative and depressive states than are women (Butler & Nolen-Hoeksema, 1994; Nolen-Hoeksema, Morrow, & Fredrickson, 1993; Nolen-Hoeksema, Parker, & Larson, 1994). In general, males are much more apt to distract themselves from their depression, while females tend to exacerbate their depression (Morrow & Nolen-Hoeksema, 1990). Nolen-Hoeksema, Larson, & Grayson (1999) suggest that women are more vulnerable to depression because they experience more chronic strain, have a greater tendency to ruminate when stressed, and perceive less mastery over their lives. Due to this previous research indicating that females are affected more by rumination, our study focused on women's overall cognitive ability of problem-solving as measured by anagram performance.

We were particularly interested in studying how college-aged women were affected by rumination in their ability to complete the anagram problem-solving task. Zarantonello, Slaymaker, Johnson, & Petzel (1984) found that anxiety led to reduced efficiency in anagram comple-

tion, a test of cognitive problem-solving abilities. Like anxiety, rumination is often associated with depression. Just as anxiety negatively affects performance on anagram completion, rumination may have similar consequences. We hypothesized that rumination, induced through a negative-based self reflection questionnaire would hinder cognitive ability in undergraduate females, as measured by an anagram test. As suggested by Lyubomirsky et al. (2003), participants were given a time limit in which to complete the anagram task. Also assessed in our study were some of the factors that may intervene between a participant's level of rumination and her performance on the anagram task. In particular, we administered the Beck Depression Inventory and the Burns Anxiety Inventory, as depression and anxiety were potential covariates in our study.

Method

Participants

The participants for our study were recruited from courses at Brigham Young University. We studied sixty-eight female undergraduates. The majority of participants were Caucasian and between the ages of 18 and 28. Participants were recruited through fliers and in-class announcements. Signed consent was obtained upon their arrival for participation. Institutional Review Board approval was obtained.

Materials

Our study included questionnaires comprised of a Rumination Induction Questionnaire (RIQ), the Beck Depression Inventory (BDI), the Burns Anxiety Inventory (BAI), and the Ruminative Responses Scale (RRS). The Rumination Induction Questionnaire, created by the researchers, consists of nine items and is designed to induce negative-based self reflection in individuals. Questions included:

6. What is the worst day you had last week? Why was it so bad?
7. What was the most depressing day you have ever had? Why?
9. Think about significant life crises you have personally experienced such as a car accident, death of a family member or friend, natural disaster, etc. Write about your experience and the feelings and emotions you associate with these negative events.

This questionnaire was not scored, as its only purpose was

to induce rumination.

The BDI contains 21 items and the BAI contains 33 items. These inventories assess an individual's depressive and anxious tendencies, respectively. Typical questions from the BDI include:

3. 0 I do not feel like a failure.
 - 1 I feel I have failed more than the average person.
 - 2 As I look back on my life, all I can see is a lot of failures.
 - 3 I feel I am a complete failure as a person.
7. 0 I don't feel disappointed in myself.
 - 1 I am disappointed in myself.
 - 2 I am disgusted with myself.
 - 3 I hate myself.
12. 0 I have not lost interest in other people.
 - 1 I am less interested in other people than I used to be.
 - 2 I have lost most of my interest in other people.
 - 3 I have lost all of my interest in other people.

Questions on the BAI were answered on a four-point scale where 0 means not at all, 1 means somewhat, 2 means moderately, and 3 means a lot. Typical questions include:

1. Anxiety, nervousness, worry, or fear 0 1 2 3
7. Difficulty concentrating 0 1 2 3
21. Butterflies or discomfort in the stomach 0 1 2 3
31. Headaches or pains in the neck or back 0 1 2 3

The RRS consists of 22 items, which serve to indicate the participant's present level of rumination. These questions were also answered on a four-point scale indicating how often participants engaged in particular thoughts or behaviors where 1 means almost never, 2 means sometimes, 3 means very often, and 4 means almost always. Example questions include:

- 6 Think about how passive and unmotivated you feel
- 13 Think about a recent situation, wishing it had gone better
- 14 Think "I won't be able to concentrate if I keep feeling this way."
- 21 Go someplace alone to think about your feelings

Questions on the BDI, BAI, and RRS were scored based on the number circled by participants. Total scores for each separate questionnaire were calculated by adding up all of the circled numbers. All three tests have been used frequently in psychological research. They have been accepted as valid and reliable measures for depression, anxiety, and rumination in the scientific community.

Additionally, a 60-item anagram test was administered for a seven minute time limit. The anagrams chosen were random and unassociated with any particular theme or goal. A clock was used to keep track of the seven minute

test period. The tests were administered with paper and pencils.

Procedure

Research participants were randomly assigned to either the experimental or the control group based upon the session or day they came. Upon the participants' arrival, the study was introduced as research on response style and cognitive ability, and participants signed the consent form. Participants in the experimental condition began by filling out the RIQ. There was a ten minute time period for this questionnaire. Following this, participants took the seven minute anagram test. Lastly, these participants filled out the questionnaire containing the BDI, BAI, and RRS. If participants were in the control condition, they followed the same procedure, except they did not fill out the RIQ; they began immediately with the anagram test. Participants who filled out the RIQ were debriefed before they left. These research methods, along with all materials and consent forms, were submitted to and approved by the institutional review board of Brigham Young University.

Data Analysis

Data was entered and analyzed using Statistical Package for the Social Sciences (SPSS). We used a Between-Subjects Design with covariates. We used the General Linear Model Procedure to analyze the effects of rumination, the independent variable, on cognitive ability, the dependent variable, while controlling for the covariates measured, namely depression and anxiety. Additional procedures included T-tests, Chi-Square analyses, and Pearson Correlations. Before entering data into SPSS, scores from each questionnaire were tallied by adding the individual responses as dictated by each questionnaire's instructions. Participants had four scores each: depression, anxiety, rumination, and anagram.

Results

Because the researchers attempted to induce rumination in the experimental condition, we used the Rumination Responses Scale as a manipulation check to see if rumination was actually induced. Results showed that

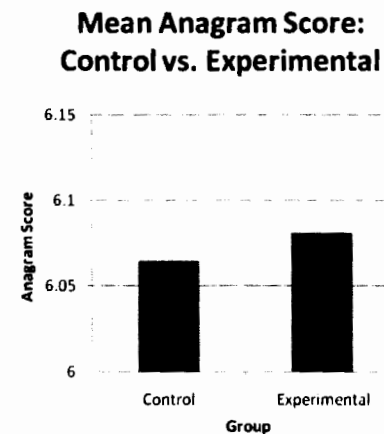
Table 1 Differences Between Participants

Variable	Experimental Group	Control Group	<i>p</i> value
Demographics			
Age	20.757 (1.964)	19.258 (1.673)	.001
Ethnicity (% Caucasian)	91.9%	71.0%	.024
(% Other)	8.1%	29.0%	
Education (% Freshmen)	10.8%	38.7%	.010
(% Sophomore)	27.0%	35.5%	
(% Junior)	29.7%	16.1%	
(% Senior)	32.4%	9.7%	
Manipulation Check			
Rumination	37.135 (13.639)	35.355 (12.716)	.582
Potential Confounds			
Depression	10.081 (7.391)	8.065 (6.603)	.244
Anxiety	26.162 (15.550)	23.387 (17.035)	.485
Dependent Variable			
Anagram	6.081 (3.947)	6.065 (3.768)	.986

there was no significant difference between groups' scores on the RRS, indicating that the manipulation was ineffective ($t = .553$, $p = .582$). Furthermore, the control and experimental groups differed significantly in age, class, and ethnicity (see Table 1). This implies that our randomization did not work.

Our hypothesis was that rumination would hinder cognitive ability in female undergraduates. As previously mentioned, researchers attempted to induce rumination in the experimental group through a negative-based self reflection questionnaire. Cognitive ability was measured in all participants by a seven-minute anagram test. Results did not support the hypothesis. The difference between

Figure 1



Graph of mean anagram score for control and experimental groups.

Table 2

Relationship	Pearson Correlation	Significance Level
Rumination and Depression	.749	$p < .001$
Rumination and Anxiety	.636	$p < .001$
Depression and Anxiety	.620	$p < .001$
Anagram and Anxiety	.201	$p = .050$

the groups was insignificant ($p = .986$). More importantly, there was no correlation between rumination and anagram scores (Pearson correlation = .028, $p = .409$). Thus, the difference between the control and experimental groups, as well as the difference between ruminators and non-ruminators, was statistically insignificant.

Research suggests that depression, anxiety, and rumination are connected. We included depression and anxiety as covariates. As shown in Table 1, the control and experimental groups were not different in these factors. Table 2 confirms that, consistent with previous studies, there were strong correlations between all three variables. There is also a significant correlation between anagram score and anxiety. Although our main finding concerning rumination and cognitive ability was insignificant, this may be attributed to our ineffective manipulation. It is important to note that no strong relationship was found between rumination and anagram score.

Discussion

We hypothesized that rumination, induced through a negative-based self reflection questionnaire would hinder cognitive ability in undergraduate females, as measured by an anagram test. There was no significant difference in the anagram score of participants in the control group versus the experimental group because the Rumination Induction Questionnaire failed to generate ruminative thoughts and feelings in the experimental group, eliminating our dependent variable. Overall, those that were induced to ruminate were not actively ruminating while taking the anagram test. Therefore, no statistically significant difference was produced between the control and experimental groups in this regard.

More importantly, there was no statistically significant correlation between rumination and anagram score despite evidence for a valid measure of rumination. Like previous research, the Rumination Responses Scale ap-

peared to be a valid measure of rumination as it strongly correlated with both the Beck Depression Inventory and the Burns Anxiety Inventory. However, there was still no positive relationship between rumination and anagram score. Though rumination may affect performance in other cognitive tasks, this result is particularly compelling as it indicates that there is no evidence to suggest that rumination plays a causal role in the cognitive disruption of anagram performance.

Limitations

There were many shortcomings associated with our study which may contribute to the lack of statistically significant results. First, differences in the administration of the exam by different experimenters may have affected results. There was a set protocol for administering the tests. However, as the tests were handed out in new and varying settings the experimenters were put into environments that were unplanned. Questions and comments by participants were brought up in each study presenting the need for instructors to interact with participants in unscripted dialogue. These unscripted dialogues may have affected the results of the participants.

Second, while conducting the experiment we were unable to recruit the desired number of participants through our designated study sessions, which affected the randomization of the study. The environment of the study was meant to be strict and structured, giving the participants a silent room without distraction or interaction among participants. Most of the participants who took the test in these ideal conditions were students of introductory level psychology courses; they constituted a large portion of the control group. Because of recruiting difficulties, there was a lack of participants from Psychology 101, Psychology 111, and History of Psychology courses for the experimental group. Different recruiting patterns took place as a result. Friends and roommates of the researchers became participants, which accounts for the variation in ages and ethnicities. It was through friends and roommates that the majority of the experimental group was established. Therefore, there were significant differences in age and ethnicity between the control and experimental groups, and randomization was not successful. These participants, while given the same tests and questionnaires, were in different environments than the original sessions administered. This difference in environment may have affected overall results, as participants likely felt less re-

served and more relaxed. Under this more casual setting, it is possible that participants may have taken the test less seriously. Overall, randomization did not occur, and it is very likely that these variations in environment were major contributors to the lack of significant findings.

Lastly, the largest limitation and main confound of the study was the Rumination Induction Questionnaire. This questionnaire was created by the researchers; therefore, its effectiveness in inducing rumination was uncertain. We included the Rumination Response Scale as a manipulation check. This scale showed the rumination levels of the participants, enabling us to see the levels of rumination in the control group versus the experimental group. It was important to recognize the levels of rumination to identify whether there was a significant difference in rumination between groups. The results of this scale showed that the groups were not different and that the experimental group did not have increased rumination. Both groups had similar scores on the anagram test. The scale uncovered the weakness of our Rumination Induction Questionnaire, exposing the loss of our independent variable: rumination.

Confounds

Researchers of other studies have found that individuals who engage in rumination find it more difficult to focus, leading to poorer performance on cognitive tests and abilities. However, we failed to demonstrate that rumination directly affects the underlying cognitive mechanisms of anagram performance. The correlations we found between depression, anxiety, and rumination were consistent with previous research in this area. Individuals who suffer from one of these conditions likely suffers from one or both of the others. Depression, anxiety, and rumination go hand in hand, as the presence of one increases the presence of another. As in previous studies, participants in our research who indicated one of these conditions tended to have one of the other conditions as well.

Future Research

For future research we suggest that the experimenters choose participants that are known to ruminate, instead of attempting to induce rumination. Should experimenters choose to induce rumination we suggest using different methods. Possible ideas might include using more thought provoking questions, using multiple techniques

(questions and music), and increasing the amount of time given for the rumination induction. It is also very important that the environment is kept constant through sessions and across conditions. Also, for testing overall cognitive ability, we suggest using other types of tests, such as a memory recall or a reasoning test. Other possible directions for research might include varying the difficulty of the tasks and varying the time given for the tasks. Understanding the effects of rumination on cognitive ability is important for improving educational systems and workplace settings. Being able to recognize rumination and possible coping strategies may help people overcome their ruminative tendencies and perform better in school and work. This recognition also has the potential to reduce the prevalence of depression and feelings of loneliness that accompany rumination.

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