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Effects of Stress and Co-Rumination on Creativity and Performance

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EFFECTS OF STRESS AND CO-RUMINATION ON CREATIVITY AND
PERFORMANCE

A Thesis

Presented to

The Faculty of Department of Psychology

San Jose State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science

by

Subha Govindarajan

May 2012

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The Designated Thesis Committee Approves the Thesis Titled

EFFECTS OF STRESS AND CO-RUMINATION ON CREATIVITY AND
PERFORMANCE

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ABSTRACT

EFFECTS OF STRESS AND CO-RUMINATION ON CREATIVITY AND PERFORMANCE

By Subha Govindarajan

Stress is shown to have a negative impact on individuals, organizations, and society at large. Though research in industrial/organizational (I/O) psychology has examined the relationship between stress and various organizational outcomes, the effects of stress on creativity and performance have seldom been investigated. Furthermore, despite the well-reported buffering effects of social support on the negative outcomes of stress, the potential effects of one type of social support, co-rumination, on organizational outcomes have not been examined. Therefore, using 100 undergraduate students, the effects of stress and co-rumination on creativity and performance were examined. Results did not show that stress and co-rumination exerted negative effects on creativity and performance. However, co-rumination benefited women more than men by improving their creativity levels and performance ratings, and this was inconsistent with our hypothesis. Results of the present study imply that even if individuals are under stress and co-ruminate with their co-workers to deal with stress in the workplace, stress and co-rumination may not necessarily lower their creativity and performance.

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Introduction

Stress is an inevitable part of life. Whether it comes from work or personal life, stress has become unavoidable in modern day life style. Stress is generally referred to as a physical, emotional, or mental response to an external stimulus (Krantz, Forsman, & Lundberg, 2004). According to Greenberg, Carr, and Summers (2002), psychological stress is caused by “real or perceived challenges to an organism’s ability to meet its real or perceived needs” (p.508). Mild to moderate stress might be beneficial, but when it becomes excessive, it is likely to have a negative impact (Selye, 1955). For example, in an organizational setting, high levels of stress are often associated with negative outcomes such as emotional exhaustion, lower organizational commitment, job dissatisfaction, counterproductive behavior, and increased turnover (Cropanzano, Rapp, & Bryne, 2003). Contemporary employees experience stress at an alarming rate due to a number reasons (Cooper, Liukkonen, & Cartwright, 1996). A report from the American Psychological Association (2008) indicates that the main causes of stress at work are low salaries, heavy work loads, lack of opportunities for growth, and job insecurity.

The cost associated with stress in an organization is a great cause of concern (Cooper et al., 1996). Stress is costly to the individual, organization, and to society at large. At the individual level, it may manifest in the form of hypertension, anger, anxiety, depression, mental fatigue, and sleep disorders (Klink, Blonk, Schene, & Van Dijk, 2001). It has been concluded that high levels of stress play a role in the development of many diseases such as myocardial infarction, depression, cancer, gastrointestinal disorders, chronic pain, and cognitive dysfunction (Claar & Blumenthal,

2003; Kirschbaum, Wolf, May, Wippich, & Hellhammer, 1996; Krantz & McCeney, 2002).

At an organizational level, work stress may result in increased costs because of increased turnover, absenteeism, health care costs, and compensation claims (Wheeler & Riding, 1994). Moreover, a byproduct of work stress may be passed on to consumers in the form of faulty products and negative behaviors such as incivility (Santos & Cox, 2002). According to Goetzel, Ozminkowski, Sederer, and Mark (2002), organizational costs associated with highly stressed employees were 46% higher than those for non-stressed employees.

In addition to loss in productivity, work stress costs a staggering amount in sick pay, health care expenses, and litigation costs, thus affecting the economy at a societal level (Klink et al., 2001; Palmer, Cooper, & Thomas, 2001). For example, in the United Kingdom, the total cost of work stress approximates to 10% of the gross domestic product (Cooper et al., 1996). In the United States, it is estimated that 100 million workdays are lost to stress alone (Bashir & Ramay, 2007). Furthermore, it was reported that stress-related productivity loss was higher in 2008 than in 2007 (APA, 2008). Kalia (2002) observed that, in the United States, stress-related issues such as decreased productivity, absenteeism, poor decision-making, and mental health problems resulted in an annual revenue loss of \$150 billion.

Research on stress in the field of industrial/organizational (I/O) psychology has examined the relationship between stress and various organizational outcomes, including job satisfaction, organizational commitment, turnover, and productivity (Donald et al.,

2005; Richardson & Burke, 1991). For instance, Chandraiah, Agrawal, Marimuthu, and Manoharan (2003) investigated the relationship between stress and job satisfaction among managers working in large scale organizations. They found that managers who were under excessive stress reported their jobs as less satisfying. Other studies have confirmed that job stress is negatively associated with job satisfaction and overall performance (e.g., Ahsan, Abdullah, Fie, & Alam, 2009; Fairbrother, & Warn, 2003).

Similarly, authors report a negative relationship between job stress and organizational commitment (e.g., Khatibi, Asadi, & Hamidi, 2009; Orly, Court, & Patel, 2009). For example, Khatibi et al. (2009) found that a negative relationship between job stress and organizational commitment held true regardless of the sex and marital status of employees. Orly et al. (2009) found that as stress levels in an organization increased, a sense of belonging decreased. Specifically, they report that job stress was negatively related to affective commitment but was not related to continuous and normative commitment.

Furthermore, work stress is related to counterproductive behavior. For example, Omar et al. (2011) saw a positive relationship between work stress and workplace deviant behavior among civil servants working in a public organization in Malaysia. The authors argued that stressful situations in the workplace might influence employee deviant behavior as it may cause employees to become frustrated, impatient, and irritated. Similarly, other investigators found positive relationships between job stress and counterproductive behavior (e.g., Penney & Spector, 2005; Salami, 2010).

From the above findings, we understand that the effect of stress may be broad-reaching and deleterious. However, one important topic that is seldom studied is the potential effect of stress on creativity and performance. In particular, investigation of the effect of stress on creativity is fairly new but too important to be neglected. The lack of research on the potential effects of stress on creativity is unfortunate given that creativity facilitates success across different aspects of life, such as academic and professional life (Amabile, Barsade, Mueller, & Staw, 2005). Creativity is a key element of competitive advantage for organizations (Oldham & Cummings, 1996; McAdam & McClelland, 2002). It is critical for organizations to stay ahead by being creative and innovative in today's highly competitive corporate world. The limited evidence available suggests that the strength and form of the relationship between stress and creativity remain unclear (Byron et al., 2010). Bryon et al. (2010) stated that the relationship between stress and creativity is complex and might not be captured by merely describing the relationship as positive or negative. Similarly authors report that in the work environment, stress induces adrenaline in the body, thereby fueling work performance, intensifying mental focus, and acting as a channel for creativity and innovation (Somaz & Tulgan, 2003). In contrast, a growing body of research suggests that stress impairs information processing and produces memory deficits in healthy adults (Kirschbaum, Wolf, May, Wippich, & Hellhammer, 1996). Hence, stress, in some cases, might inhibit creativity (Shanteau & Dino, 1993). Thus, we do not clearly know whether stress facilitates or impairs creative thoughts. Given the importance of the topic and contradictory findings on this issue, the major purpose of the present study was to get a clearer picture of the relationship between

stress and creativity. We are also interested in determining whether and to what extent stress affects general workplace performance.

Additionally, a form of social support, one that may be common particularly in the workplace setting, may actually augment stress. Co-rumination is the sharing of common or personal problems within a dyadic relationship (Rose, 2002). More specifically, co-rumination is characterized by discussing personal problems, discussing the same problem repeatedly, mutually encouraging the discussion of problems, speculating about problems, and focusing on negative feelings with another person (e.g., friend). Given these characteristics, it is plausible that co-rumination regarding issues at the workplace might have a negative impact on creativity and performance. Therefore, we are also interested in to examining the effect of co-rumination on creativity and performance.

The following sections provide a literature review on (a) stress, creativity, and performance and (b) co-rumination, creativity, and performance. The hypotheses that are tested for our study are also presented.

Stress, Creativity, and Performance

Stress and creativity. Creativity is defined as the production of novel ideas or solutions (Amabile et al., 2005). Cook (1998) considers creativity vital for an organization's competitive advantage since all innovations begin with creative ideas (Amabile, Conti, Coon, Lazenby, & Herron, 1996). When employees think creatively, they often come up with novel suggestions and ideas that provide an organization with important raw material for further development (Woodman, Sawyer, & Griffin, 1993).

Due to such advantages, creativity among employees at all levels in the organization has taken a center stage in the discussion of organizational innovation. Much of the research conducted so far focus on factors that may foster or impede creativity in organizations (e.g., Oldham & Cummings, 1996).

As mentioned earlier, one factor that has not received much research attention is the effect of stress on creativity. Findings from the limited studies so far are contradictory. Some studies show the negative effects of stress on creativity. For example, Shanteau and Dino (1993) studied the effect of environmental stressors on creativity. They placed 32 participants in a small, uncomfortable, and crowded chamber for a 24 hour period. The stressful environment in the chamber was characterized by the following: Complete confinement during the study, normal sleep pattern deliberately disturbed by a series of four hour alternating work and rest schedules, use of a special exercise bicycle which was quite noisy, normal eating habits, and personal hygiene disturbed by the constrains of the chamber environment. Another 32 participants served as a control group in a non-stressful environment (i.e., comfortable surroundings with normal sleep, eating, and hygiene patterns). All the participants were given a series of creative problem solving tasks before and during the study. Expectedly, mean creativity scores for the experimental and control groups on the pre-chamber and chamber administrations of the creativity test revealed that those in the experimental condition showed a sizable decline, whereas the scores for those in the control group remained unchanged. Participants who were placed in the crowded chamber showed consistent decrease in creativity due to increased exposure to environmental stressors.

Several other investigators have also found evidence of negative effect of stress on creativity (e.g., Talbot, Cooper, & Barrow, 1992). Farr and Ford (1990) argue that stress decreases creativity. According to them, stress results in well-rehearsed behavior patterns and it interferes with novel or creative responses. In other words, when employees are affected by stress, they are likely to resort to habitual actions and forsake creative actions. These findings are consistent with the distraction arousal theory which states that people have a limited amount of mental resources, and when under stress, they devote some of the resources to attend to stressors. This creates a situation wherein people who are under stress are left with fewer cognitive resources for other tasks such as creative thinking (Byron et al., 2010). Therefore, when people are stressed, their creative thoughts are likely to suffer.

Alternatively, Anderson, De Dreu, and Nijstad (2004), who conducted a review of literature on creativity and innovation, argued that stress might increase creativity. Based on their findings, stress increases arousal which encourages the use of creative thoughts. Anderson et al. (2004) assert that when people are exposed to stress, they engage in a focused problem solving strategy that leads to enhanced creativity. Consequently, stress enhances creativity by creating a demand for creative solutions and by providing cognitive stimulation. Based on the above findings, stress might either improve or impair creativity. However, it is reasonable to assume that individuals under stress may exhibit lesser creativity. People under stress are likely to exhibit narrow focus and stereotype responses, hindering creativity (Mandler, 1979).

Stress and performance. Literature on the relationship between stress and performance is extensive and diverse. However, findings pertaining to the relationship between stress and performance are not consistent. While some studies show a positive relationship between stress and performance (Keijsers, Schaufeli, Le Blanc, Zwerts, & Miranda, 1995), other studies show a curvilinear relationship (Srivastava & Krishna, 1991; McGrath, 1976). Some studies show a negative relationship between stress and performance (Larsen, 2001). A few studies even show no relationship between stress and performance (Dubin, Hedley, & Taveggia, 1976).

However, much of the research on the relationship between stress and performance in I/O psychology focuses on negative relations between the two (e.g., Bashir & Ramay, 2010; Hsieh, Huang, & Jen Su, 2004; Sullivan & Bhagat, 1992; Jamal, 1985). For example, Rose (2002) argues that stress (e.g., deadlines, long working hours) in work environment reduces the intention of employees to perform better in jobs, leading to a decrease in performance. Vroom (1962) offers a similar explanation, suggesting that physiological responses caused by stressors might impair performance. Vroom further states that high levels of stress narrows down an individual's perception which leads to the individual ignoring important information and cues. This may interfere with performance.

Consistent with these arguments, Bashir and Ramay (2010) indicated that a little stress could have a positive effect on employees in the organizations, but most of the times, the stress associated with work exceeds the bearable limits and has a negative impact. They hypothesized that stress would be negatively associated with job

performance. Bashir and Ramay (2010) conducted a study on stress and job performance on 144 employees of banking sector in Pakistan. They found that stressors (i.e., work conflicts, resource inadequacy, role overload, and work ambiguity) correlated negatively with job performance. Similarly, Hsieh et al. (2004) investigated the relationship between work stress and job performance among hi-tech employees. The study demonstrated a negative correlation between work stress and job performance. Sullivan and Bhagat (1992) argued that the level of stress experienced by individuals has a negative linear relationship with performance because individuals faced with stress spent more time coping or engaging in undesirable activities such as wasting time than focusing on performance.

Co-rumination, Creativity, and Performance

Co-rumination and creativity. Social support is generally thought of as the help from other people in times of difficult situations. It is a mechanism by which an interpersonal relationship presumably acts as a buffer against the stressful environment (Cohen & McKay, 1984). Roy, Steptoe, and Kirschbaum (1998) defined social support as the perceived physical and emotional availability from members of one's own social network. Jacobson (1986) conceptualized social support in three forms: emotional, cognitive, and material support. Emotional support refers to the behavior that fosters feelings of comfort and leads an individual to believe that he or she is admired, respected, and loved. Cognitive support refers to information, knowledge, or advice that helps the individual to understand his or her world and to adjust to changes within it. Material

support refers to goods and services that help to solve practical problems (Jacobson, 1986).

Studies have shown that when people receive social support, it helps in reducing stress hormones in the body, thus generating beneficial effects such as increased calmness, decreased anxiety, reduced heart rate, and increased perception of friendship quality or closeness with members of their support network (Heinrichs, Baumgartner, Kirschbaum, & Ehlert, 2003; Bukowski, Newcomb, & Hartup, 1996; Rosal, King, Ma, & Reed, 2004). Social support or the belief that social support is available has been thought to provide coping assistance, reassurance during severe life events such as death of family members, improved self-esteem, and psychological well being on an individual (Thoits, 1995; Lazarus, DeLongis, & Folkman, 1985; Brown, Brochain, & Harris, 1975; Auslander & Litwin, 1991).

Though the above studies associate social support with positive outcomes (Berndt, Laychak, & Park, 1990; Brissette, Carver, & Scheier, 2002), it need not be the case all the time. It is possible that some social support may come with costs. Indeed, studies show that social support does not always produce positive effects (Rose, Carlson, & Waller, 2007; Heinrichs et al., 2003; Rosal et al., 2004).

Byrd-Craven, Geary, Rose, and Ponzi (2008) referred to a type of social support called co-rumination, which may have negative effects. Co-rumination is characterized by extensive discussion of a problem with friends and involves mutual encouragement of problem talk, rehashing problem details, speculating about the problem, and dwelling on negative effects of the problem (Rose, 2002). According to Rose, co-rumination in

friendships is not only related to feeling of closeness between friends, but also to depression and anxiety.

To illustrate, Bryd-Craven et al. (2008) conducted a study to examine the potential biological underpinning of co-rumination. They utilized an experimental manipulation that elicited co-rumination in young women. Specifically, 48 undergraduate women (24 friendship dyads who indicated that they were “best” or “close” friends) participated in the study. Fourteen dyads were assigned to a problem talk condition (co-rumination) and ten dyads to a control condition. Before a warm-up task, each participant in the problem talk condition selected one problem for discussion. After the warm-up task, participants in the problem talk condition were asked to discuss the problem as they normally would and were told that they could discuss either a friend's problem or both. Participants in the control condition were asked to design a recreation center. The study revealed that participants who were in the problem talk condition co-ruminated more compared to those in the control condition. Results also showed that co-rumination was associated with a significant increase in participants' stress hormone levels, measured immediately after the activity. These findings suggest that co-rumination could amplify, rather than mitigate, hormonal stress responses to personal life stressors. The authors state that in some instances, social support can have a detrimental impact instead of a positive impact among people who seek social support.

Rose et al. (2007) conducted a study to examine whether co-rumination contributed to changes in positive friendship quality. More specifically, co-rumination in friendship was hypothesized to contribute to an increase in positive friendship adjustment

and problematic emotional adjustment over time. Participants of the study were third, fifth, and ninth grade students. From the study we understand that co-rumination increased feelings of closeness and friendship quality. When friends engaged in intimate and intense form of disclosure, they tended to view their relationships positively. However, co-rumination also increased depressive and anxiety symptoms among these students since it involved talking about problems.

Furthermore, in a study conducted by Hoeksema, Larson, and Grayson (1999), it was found that among people who lost their loved ones to terminal illness, those co-ruminating around the time of their loss had higher levels of depressive symptoms over 18 months after their loss than those who co-ruminated less. The authors argued that the reason for the pattern could be that co-rumination utilized maladaptive thought patterns that prevent people from using effective problem solving strategies, ultimately inducing depressive symptoms.

A study conducted by Haggard, Robert, and Rose (2010) examined co-rumination among working adults and looked into how the interaction among co-rumination, gender, and exposure to stress (abusive supervision) influenced both positive and negative individual outcomes. The authors found that women at work engaged in more co-rumination than men and that abusive supervision exacerbated negative effect on women. In contrast, they found that for men, co-rumination was associated with reduced negative effects.

The above mentioned studies clearly indicate that co-rumination seems like a positive support process but actually produces exuberant stress responses. Many studies

in the area of social support have found evidence that co-rumination plays an important role in the development of depression and anxiety which can shift people's mood in a negative direction (e.g., Rose, 2002; Rose et al., 2007). Co-rumination is also known to utilize maladaptive thought patterns that prevent people from using effective problem solving strategies (Hoeksma et al., 2000; Schulberg, 2001). Given that depressive symptoms are negatively related to creativity (Schulberg, 2001), we can assume that co-rumination serves as a strenuous process that affects people's cognitive ability and creativity. Hence we expect co-rumination to be negatively related to creativity and performance.

Purposes of the Study

As mentioned earlier, in order to be globally competitive, modern organizations need to be creative and innovative. Creativity provides a competitive advantage to organizations and is often related to the quality of work for most jobs (Dyne, Jehn, & Cummings, 2002). Given the importance of creativity in the workplace, researchers have been examining factors that foster and impede creativity (Amabile et al., 2005). At the same time, workers are increasingly experiencing stress in the workplace. Given the negative organizational outcomes (e.g., job dissatisfaction, turnover, absenteeism) associated with stress in an organization, we argue that stress might be negatively related to creativity. However, to the author's knowledge, no study has been conducted to directly examine the effect of stress on creativity and performance.

Similarly, limited studies have been conducted on the effects of co-rumination on creativity and performance. Co-rumination is a recently developed construct and very

little attention has been paid to the idea that this friendship process can have both benefit and cost (Rose et al., 2007). Research on co-rumination will provide better understanding of the circumstances under which the consequences of friendship are maladaptive rather than positive. Despite one recent exception (Rose et al., 2007), we could not find any other studies that have done extensive research on co-rumination. Rose et al. (2007) showed that co-rumination positively correlated with certain aspects of anxiety. However, it is unclear whether co-rumination can have any impact on organizational outcomes such as creativity and performance.

Research on stress in the area of I/O psychology has mainly been survey-based and has rarely examined the effect of induced stress. One important drawback of a survey design is the lack of the establishment of a causal relationship. It is not known whether stress actually leads to negative organizational outcomes. The present study fills this gap by examining the effects of induced stress and co-rumination on creativity and performance using the TSST. We try to determine how three experimental conditions: no stress/no co-rumination (control), stress, and stress with co rumination, affect creativity. We also want to determine how two conditions, stress and stress with co-rumination, affect performance. Based on the above literature review on stress, co-rumination, creativity, and performance, the following hypotheses are tested.

Hypothesis 1: Stress and stress with co-rumination impairs creativity. Creativity will be lowest among those in a stress with co-rumination group, followed by a stress group and then those in a control group.

Hypothesis 2: Those in the stress with co-rumination group will fare less in a speech task compared to the stress group.

Methods

Participants

One hundred and eleven undergraduate students from an ethnically diverse university located in Northern California participated in the present study. Participants were at least 18 years old and were given course credit for their participation in the study. Participants who violated experimental restrictions (described below) and those who had missing data were eliminated from the study. Nine participants violated the experimental restrictions and two participants had missing data. The final sample consisted of 100 participants (45 female and 55 male) with an average age of 20.31 ($SD = 4.85$). The ethnic breakdown of the final sample was as follows: 51% Asians ($n = 51$), 21% Caucasians ($n = 21$), 12% Latino ($n = 12$), 8% African American ($n = 8$), and 8% other/mixed ($n = 8$). Out of the final sample, 76% listed their primary language as English and 23% did not list their primary language as English.

Measures

Creativity. Creativity was measured using the Remote Association Test (RAT) (Mednick, 1962). The RAT has been widely used to measure creativity and consists of 66 items. Mednick defined creativity as the forming of associative elements into new combinations, which either meet specified requirements or are in some way useful. Each question on the RAT is composed of three cue words that associate to form a common answer (e.g., cues: surprise, line, and birthday; answer: party). Participants were presented with three words (triad) and were instructed to come up with a fourth word that

was associated with all three words. Creativity was measured by the number of correct answers.

Speech performance. Speech performance was measured based on the performance on a speech task that was assigned during the TSST. A speech performance scale was developed for the study and measurements were taken on seven dimensions. The seven dimensions were organization, persuasiveness, content, clarity, volume, speed, and demeanor. *Organization* was measured in terms of how well ideas were organized in a speech. *Persuasiveness* was measured in terms of how well participants were able to embrace a point of view by providing different ideas. *Content* referred to any relevant information provided to support the talk. *Clarity* was measured in terms of how clear the speech was. The *volume* dimension was measured in terms of how loud the speech was delivered. *Speed* referred to the speed with which the speech was delivered. *Demeanor* was measured in terms of each participant's confidence, professionalism, friendliness, stiffness, posture, and eye contact. All of the dimensions were measured using a 5 point Likert-type scale, with higher ratings denoting more positive evaluations. For example, for the persuasiveness dimension, 1 denotes "*not persuasive at all*" and 5 denotes "*extremely persuasive.*" Performance was measured by one of two judges. Chronbach's alpha for the seven items is .88, which suggests that the items had high internal consistency.

Performance in the speech task was also measured using a total amount of time the participants spoke uninterrupted. One of the judges measured the duration of time between the start of a speech and the first pause. A stopwatch was used for this purpose.

Participants who spoke for longer time without pausing in between were assumed to perform better in the speech task.

Procedure

The experimenter introduced participants to the study by informing them that researchers were trying to study reactions that college students have during various cognitive exercises. Participants had already been asked to refrain from strenuous physical exercise or smoking at least 1 h prior to the study.

When participants came to the laboratory, they were asked to fill out a questionnaire that involved a check for adherence to these experimental restrictions. The questionnaire contained six “yes” or “no” questions. Participants were asked whether they smoked, exercised, ate any food, or drank any liquid other than water 1 h before coming to the lab. In addition, the questionnaire asked the participants to indicate whether they were pregnant or had any other condition that might be adversely affected by stress. Participants who answered “yes” to any of these in the screening questionnaire were removed from the study. The total time for filling out the screening questionnaire was 10 min. Each participant was individually tested for a maximum of 1.5 h. Data were collected between 12:00 p.m. and 6:00 p.m. from Monday through Friday. Table 1 lists a time line of the study with each experimental condition.

The study consisted of three experimental conditions: no stress/no co-rumination (control), stress, and stress with co-rumination. The experimenter assigned participants randomly to one of the three conditions. After filling out the screening questionnaire, participants in both control and stress condition were instructed to sit alone in the lab,

while participants in the stress with co-rumination condition sat in the waiting room with a confederate and began participating in the warm-up phase of the co-rumination process. The co-rumination protocol was divided into two phases: a warm-up phase and a problem talk phase. During the warm-up phase, which lasted 10 min, the confederate initiated a conversation with the participant in order to bond with him or her. The confederate initiated conversation on topics such as school, work, or hobbies. After the 10 min warm-up phase, the experimenter returned to the waiting room and announced that the confederate was randomly selected to participate in an exercise in another room. During this time, the participant was taken in for a task that was not part of the present study. Once he or she finished the task, the experimenter brought the confederate back again to the waiting room. The experimenter then took the confederate and the participant to an interview room where the TSST took place. Participants were asked to imagine that they had just graduated from college. They were required to give a 5 min speech about their ideal job and try to convince the committee that they were the best candidate for the job. They were also told that the committee was especially trained in behavioral observations and that their performance would be video taped. The participant was then told that a second task would follow the speech but that details would be provided after they complete the speech task.

Similarly, those in the stress condition were introduced to the TSST task. However, participants in the control group were instructed to wait in a separate room. After the introduction to the TSST was given to participants in the stress with co-rumination condition, they were taken back into the first room along with the confederate

and asked to wait for 10 min. This was the second phase of co-rumination where a problem talk occurred. The problem talk portion focused on negative topics related to the speech portion of the TSST such as discussing inexperience with job interviews, stressful oral academic presentations, and fear of public speaking. This phase of co-rumination lasted for 10 min. After 10 min, the experimenter went to the waiting room and informed the participants that they would be preparing for the speech task for another 5 min. The confederate was taken out of the room on the pretext of giving him or her separate room to prepare for a speech.

While the stress with co-rumination group was in the problem talk phase, participants in the stress condition waited alone in another room. Participants in both stress condition and stress with co-rumination condition were then taken to the room where two judges waited for them to deliver a speech. All the participants were tested individually. The speech task lasted for 5 min, and the participants were asked to speak for the entire 5 min. If the participant paused in between, one of the judges responded with questions related to the speech (e.g., what experiences do you have in this job?). If the participant finished talking before 5 min, he or she was asked to continue speaking for full 5 min. While the participants were delivering their speech, one of the judges measured the length of the speech using a stopwatch. Immediately after the speech task, an arithmetic task was given to the participants. Each participant was asked to count backwards from 2083, subtracting by 13 each time. The participant was not informed of this task beforehand. This arithmetic test is part of the TSST. Every time a participant made an error, the main judge asked him or her to start over again from 2083.

Throughout the task, participants were told that they would be videotaped to measure their speech performance. One of the judges evaluated the speech performance of the participants.

Similarly, participants in the stress condition also took the TSST task. However, the participants in the control group watched a short travel video clip. After the stress group and the stress with co-rumination group finished the TSST, they underwent the RAT. The participants in the control group also underwent the RAT after they watched the video clip. In this task, the participants were asked to analyze three words and come up with a fourth word that was commonly associated with each of the three words. They were given 10 min to finish the task. At the end of the study, they filled out the demographic questionnaire which had questions such as age, gender, ethnicity, primary language, and year in college. Once they finished the demographic questionnaire, the researcher debriefed the participants regarding the nature of the study and answered any question that they had.

Stress Manipulation

In experimental studies, stress is induced by exposing research participants to a psychological stressor. The most commonly used induced psychosocial stressor is the TSST (Kirshbaum, Pirke, & Hellhammer, 1993). The TSST is a social and cognitive stressor which involves making a speech and performing an oral arithmetic task in front of an audience. It is a standardized psychosocial laboratory stressor consisting of a brief preparation period followed by a test period in which a participant is required to deliver a speech concerning their suitability for employment in a mock job interview and to

perform a mental arithmetic task in front of a panel of two evaluators (Foley & Kirschbaum, 2010).

Table 1

Time line for Control, Stress, and Stress with Co-rumination Conditions

Control Condition	Screening & Consent form	Wait	Wait	Video Tape	RAT	Demographic/Debrief
Stress Condition	Screening & Consent form	Wait	Wait	TSST	RAT	Demographic/Debrief
Stress with Co-rumination Condition	Screening & Consent form	Warm-up	Co-rumination	TSST	RAT	Demographic/Debrief
	10 Min	10 Min	10 Min	10 Min	10 Min	10 Min

Note: TSST = Trier Social Stress Test, RAT = Random Association Test

Results

A total of 36 participants (19 female and 17 male) participated in the control condition, 38 participants (14 female and 24 male) in the stress condition, and 26 participants (12 female and 14 male) in the stress with co-rumination condition.

Tests of Hypotheses

Hypothesis 1 stated that stress and stress with co-rumination would impair creativity. More specifically, it was expected that creativity would be lowest for those in the stress with co-rumination condition, followed by those in the stress condition and then the control group. This hypothesis was tested using one way analysis of variance (ANOVA). Table 2 displays the means and standard deviations of creativity as a function of the experimental conditions. As can be seen in the table, those who co-ruminated seemed to have a higher creativity score ($M = 9.58, SD = 5.04$) compared to those in the stress condition ($M = 8.63, SD = 3.79$) and those in the control group ($M = 8.56, SD = 4.82$). These results are the opposite of what we expected. However, results of the ANOVA did not show an effect of stress on creativity, $F(2, 97) = 0.46, ns$. These results suggest that creativity scores did not differ across the experimental conditions. Hence this hypothesis was not supported.

Hypothesis 2 stated that those in the stress with co-rumination condition would perform poorer in the speech task than those in the stress condition. This hypothesis was tested using an ANOVA. Table 3 displays the means and standard deviations of performance ratings for the stress and stress with co-rumination conditions. As can be seen in the table, the mean performance ratings were similar to those in the stress

condition ($M = 3.15, SD = .75$) and those in the stress with co-rumination condition ($M = 3.02, SD = .72$). Results of the ANOVA did not show support for the hypothesis, $F(1, 62) = 0.51, ns$. These results suggest that performance scores did not differ between the two conditions.

Performance was also measured by examining the total uninterrupted speech length of the participants in the stress condition and the stress with co-rumination condition. Table 4 displays the mean and standard deviation of the speech length of participants for the stress and stress with co-rumination conditions. As can be seen in the table, the mean speech length was higher for those in the stress group ($M = 199.27, SD = 107.49$) than those in the stress with co-rumination group ($M = 192.96, SD = 91.36$). The result of the ANOVA was not significant, $F(1.59) = .56, ns$. The result suggests that speech length did not differ between the two conditions.

Table 2

Mean Creativity Scores for Control, Stress, and Stress with Co-Rumination Conditions

	Control	Stress	Stress with Co-rumination
<i>n</i>	36	38	26
<i>M</i>	8.56	8.63	9.58
<i>SD</i>	4.82	3.79	5.04

Table 3

Mean Performance Ratings for the Stress and Stress with Co-rumination Conditions

	Stress	Stress with Co-rumination
<i>n</i>	38	26
<i>M</i>	3.15	3.02
<i>SD</i>	.75	.72

Table 4

Mean Speech Length for the Stress and Stress with Co-rumination Conditions

	Stress	Stress with Co-rumination
<i>n</i>	38	26
<i>M</i>	199.27	192.96
<i>SD</i>	107.48	91.36

Additional Analysis

Given the lack of significant findings pertaining to the hypotheses, we thought that participants' demographic variables might interact with the experimental conditions to influence creativity scores and performance ratings. Therefore, we examined the potential effect of demographic variables on the measured variables. In particular, we examined the effect of participants' sex and primary language (English vs. non-English) as well as their interaction effects on creativity scores and performance ratings.

Participants' sex.

As mentioned we tried to find out how participants' sex (male vs. female) might interact with stress condition to influence creativity and performance.

Creativity. A 2 (sex) x 3 (experimental condition) ANOVA was conducted on creativity. Table 5 displays the mean and standard deviations of creativity scores as a function of participant sex and the stress conditions. As can be seen in the table, females seemed to have the highest creative score when they were exposed to stress and co-rumination ($M = 10.33$, $SD = 4.85$) compared to those in the stress condition ($M = 7.64$, $SD = 5.27$) and the control group ($M = 7.42$, $SD = 5.27$). In contrast, men seemed to have the lowest creative score when they were exposed to stress and co-rumination ($M = 8.93$, $SD = 5.29$) compared to those in the stress condition ($M = 9.21$, $SD = 3.79$) and those in the control group ($M = 9.82$, $SD = 4.03$). Overall, males seemed to be more creative ($M = 9.33$, $SD = 4.22$) compared to females ($M = 8.27$, $SD = 4.79$). However, the results of the ANOVA showed no main effect for sex, $F(2, 94) = .86$, ns , and stress condition, $F(2,$

94) = .60, *ns*, and no interaction effect between sex and stress condition, $F(2, 94) = 1.43$, *ns*. Overall, it appears that participants' sex did not affect creativity directly or interactively with stress condition. Table 6 displays an ANOVA summary table.

Table 5

Mean Creativity Scores as a Function of Participant Sex and Stress Conditions

Sex	Control	Stress	Stress with Co-rumination	Total
Female				
<i>n</i>	19	14	12	45
<i>M</i>	7.42	7.64	10.33	8.27
<i>SD</i>	5.27	5.27	4.85	4.79
Male				
<i>n</i>	17	24	14	55
<i>M</i>	9.82	9.21	8.93	9.33
<i>SD</i>	4.03	3.79	5.29	4.22
Total				
<i>n</i>	36	38	26	100
<i>M</i>	8.56	8.63	9.58	8.85
<i>SD</i>	4.81	3.79	5.05	4.49

Table 6

ANOVA Summary Table

Source	SS	df	MS	F
Sex	17.32	1	17.32	.86
Stress condition	24	2	11.95	.60
Sex x Stress condition	57.67	2	28.83	1.43
Error	1893.87	94	20.14	

Performance. Table 7 displays the mean and standard deviations of male and female speech performance ratings on the two stress conditions. As can be seen in the table, although male participants seemed to perform better ($M = 3.22$, $SD = .77$) in the speech task than female participants ($M = 2.91$, $SD = .66$), results of 2 (sex) x 2 (stress condition) ANOVA did not show a main effect for sex, $F(1, 60) = 2.23$, *ns*. There was no effect for stress condition, $F(1, 60) = .23$, *ns*, nor an interaction effect between the two, $F(1, 60) = .28$, *ns*. Table 8 displays an ANOVA summary table.

Table 7

Mean Performance Ratings for Males and Females in the Two Stress Conditions

Sex	Stress	Stress with Co-rumination	Total
Female			
<i>n</i>	14	12	26
<i>M</i>	2.90	2.92	2.91
<i>SD</i>	.57	.78	.66
Male			
<i>n</i>	24	14	38
<i>M</i>	3.29	3.10	3.22
<i>SD</i>	.82	.70	.77
Total			
<i>n</i>	38	26	64
<i>M</i>	3.15	3.01	3.09
<i>SD</i>	.74	.72	.73

Table 8

ANOVA Summary Table

Source	SS	df	MS	F
Sex	1.21	1	1.21	2.23
Stress condition	.12	1	.12	.23
Sex x stress condition	.15	1	.15	.28
Error	32.4	60	.54	

Furthermore, Table 9 displays the means and standard deviations of speech length as a function of participant sex and the stress conditions. As can be seen in the table, females had longer uninterrupted speech length ($M = 205.70$, $SD = 96.59$) compared to males ($M = 190.17$, $SD = 104.55$). However, results of a 2 (sex) x 2 (stress condition) showed no main effect for sex, $F(1, 57) = .77$, *ns* and stress condition, $F(1, 57) = .03$, *ns*, nor an interaction effect between the two, $F(1, 57) = 2.0$, *ns*. Table 10 displays an ANOVA summary table.

Overall, these findings indicate that the sex of participants did not have any direct or interactive effect with stress condition to influence creatively scores and speech performance.

Table 9

Mean Speech Length for Males and Females in the Two Stress Conditions

Sex	Stress	Stress with Co-rumination	Total
Female			
<i>n</i>	14	12	26
<i>M</i>	190.28	223.67	205.70
<i>SD</i>	113.20	73.5	96.59
Male			
<i>n</i>	23	12	35
<i>M</i>	204.74	162.25	190.17
<i>SD</i>	106.07	99.95	104.55
Total			
<i>n</i>	37	24	61
<i>M</i>	199.27	192.96	196.79
<i>SD</i>	107.49	91.36	100.70

Table 10

ANOVA Summary Table

Source	SS	df	MS	F
Sex	7832.93	1	7832.93	.77
Stress Condition	294.63	1	294.63	.03
Sex x Stress condition	20443.22	1	20443.22	2.0
Error	583420.20	57	583420.20	

Participants' primary language.

As mentioned earlier, we also examined how participants' primary language (English vs. non-English) might interact with stress condition to influence creativity and performance.

Creativity. A 2 (primary language: English vs. non-English) x 3 (stress condition) ANOVA was conducted on creativity. The means and standard deviations of creativity scores are displayed in Table 11. As can be seen in the table, participants whose primary language was English had a higher creativity score ($M = 9.62, SD = 4.18$) than those whose primary language was non-English ($M = 6.09, SD = 4.48$). The results of the ANOVA showed a main effect for primary language, $F(2, 93) = 7.58, p < 0.05$, but no main effect for stress condition, $F(2, 93) = .49, ns$. There was no interaction effect between primary language and stress condition, $F(2, 93) = .67, ns$. Overall, it

appears that participants' primary language had an effect on the creativity scores. Table 12 displays an ANOVA summary table.

Table 11

Mean Creativity Score as a Function of Participants' Primary Language and Stress Conditions

Primary Language	Control	Stress	Stress with Co-rumination	Total
English				
<i>n</i>	29	29	18	76
<i>M</i>	9.0	9.24	11.22	9.62
<i>SD</i>	4.56	3.60	4.21	4.18
Non English				
<i>n</i>	6	9	8	24
<i>M</i>	5.50	6.67	5.88	6.09
<i>SD</i>	5.24	3.90	5.02	4.48
Total				
<i>n</i>	36	38	26	100
<i>M</i>	7.25	7.96	8.56	9.58
<i>SD</i>	4.81	3.78	5.04	4.48

Table 12

ANOVA Summary Table

Source	SS	df	MS	F
Primary Language	274.56	2	137.28	7.58*
Stress Condition	17.68	2	8.84	.49
Stress Condition x Primary Language	23.92	2	11.96	.67
Error	1684.80	93	18.12	

Note. * $p < 0.05$

Performance. A 2 (primary language) x 2 (stress condition) ANOVA was conducted on performance. Table 13 displays the means and standard deviations of performance scores. As can be seen in the table, participants whose primary language was English had higher performance scores ($M = 3.31$, $SD = .68$) than those whose primary language was non- English ($M = 2.50$, $SD = .56$). ANOVA results showed a main effect for primary language, $F(1, 60) = 18.56$, $p < 0.05$, but no main effect for stress condition, $F(1, 60) = .40$, *ns*. There was no interaction between primary language and stress condition, $F(1, 60) = .24$, $p > 0.05$. Overall, primary language had an effect on performance. Table 14 shows the ANOVA summary table.

Table 13

Mean Performance Scores of English and Non-English Speaking Participants on the Two Stress Conditions

Primary Language	Stress	Stress with Co-rumination	Total
English			
<i>n</i>	29	18	47
<i>M</i>	3.32	3.29	3.31
<i>SD</i>	.72	.60	.68
Non-English			
<i>n</i>	9	8	17
<i>M</i>	2.60	2.40	2.50
<i>SD</i>	.54	.60	.56
Total			
<i>n</i>	38	26	64
<i>M</i>	3.15	3.02	3.10
<i>SD</i>	.74	.73	.7

Table 14

ANOVA Summary Table

Source	SS	df	MS	F
Primary Language	.8.03	1	8.03	18.56*
Stress Condition	.17	1	.17	.40
Stress condition x Primary language	.10	1	.10	.24
Error	25.94	60	.432	

Note. * $p < 0.05$

A 2 (primary language) x 2 (stress condition) ANOVA was also conducted on speech length. Table 15 displays the means and standard deviations of speech length. As can be seen in the table, participants whose primary language was English had longer uninterrupted speech length ($M = 220.27$, $SD = 95.73$) than their non-English-speaking counterparts ($M = 136.00$, $SD = 89.19$). The ANOVA results showed that there was a main effect for primary language, $F(1, 57) = 8.71$, $p < 0.05$ but did not show an effect for stress condition, $F(1, 57) = .25$, *ns*. There was no interaction between primary language and stress condition, $F(1, 57) = 1.20$, *ns*. Overall ANOVA results showed that primary language had an effect on speech length. Table 16 displays an ANOVA summary table.

Table 15

Mean Speech Length Scores of English and Non-English Speaking Participants on Two Stress Conditions

Primary Language	Stress	Stress with Co-rumination	Total
English			
<i>n</i>	28	16	44
<i>M</i>	226.21	209.88	220.27
<i>SD</i>	94.62	99.88	95.73
Non-English			
<i>n</i>	9	8	17
<i>M</i>	115.44	159.13	136
<i>SD</i>	106.43	63.92	89.19
Total			
<i>n</i>	37	24	61
<i>M</i>	199.27	192.96	136.00
<i>SD</i>	107.49	91.36	100.71

Table 16

ANOVA Summary Table

Source	SS	df	MS	F
Condition	2235.98	1	2235.98	.25
Language	78033.73	1	78033.73	8.71*
Condition x Language	10775.08	1	10775.08	1.20
Error	510565.56	57	8957.29	

Note. * $p < 0.05$

Discussion

Stress has become an inevitable part of a modern day life style. It is costly to individuals, organizations, and society at large. Numerous studies in the field of I/O psychology have concluded that stress can have several negative consequences including job dissatisfaction, reduced organizational commitment, absenteeism, and turnover (e.g., Khatibi et al., 2009; Orly et al., 2009; Donald et al., 2005). The investigation of the effect of stress on creativity has seldom been conducted. This topic is quite important since creativity provides a competitive advantage to modern organizations (Cook, 1998). Furthermore, investigators in the field of social support research argue that a type of social support, called co-rumination, does not always produce positive effects (e.g., Rose et al., 2007; Heinrichs et al., 2003; Rosal et al., 2004). This is because co-rumination is known to evoke maladaptive thought patterns that prevent people from using effective problem solving strategies (Hoeksema et al., 2000; Schulberg, 2001). There is limited research in the field of I/O psychology that examines the effect of co-rumination on creativity or performance. Thus, the major purposes of this study were to determine the effect of stress and co-rumination on creativity and performance.

The first hypothesis of the study predicted that stress and co-rumination would impair creativity. More specifically, we expected that creativity would be lowest for the stress with co-rumination condition, followed by those in the stress group and then those in the control group. The second hypothesis predicted that those in the stress with co-rumination group would perform poorer in a speech task followed by those in the stress group. The results of the study did not support either hypothesis. The mean creativity

score of the participants who were in the stress with co-rumination condition were higher than those in the stress and control condition, which was the opposite of what we predicted. However, the creativity scores did not differ significantly across three experimental conditions. The mean performance ratings were similar for the participants in the stress and the stress with co-rumination condition. In other words, they did not differ significantly between these two conditions.

The lack of support for the two hypotheses could be due to a variety of reasons. Firstly, the TSST has been shown to affect individuals physiologically, by increasing their cortisol levels (Kirschbaum, Pirke, & Hellhammer, 1993), but not cognitively. Secondly, the stress and co-rumination sessions which lasted for 10 min each, might not have been long enough to affect the creativity and performance of the participants. Furthermore, in our experiment, participants co-ruminated with a stranger (a confederate for the experiment) rather than with their friends. Rose (2002) asserts that a longer friendship might produce more stress responses than newly formed friendships. The negative talk with a stranger might not have been negative enough to produce strong stress responses that would decrease the creativity and performance of participants in the stress with co-rumination condition. Hence, the lack of significant effect of stress on creativity and performance is consistent with Rose's assertion (2002) that co-ruminating with a stranger may lead to weak stress responses.

We obtained some interesting findings when we examined the potential effects of sex of participants and stress conditions on creativity and performance. Although not statistically significant, female participants had the highest mean creativity score in the

stress with co-rumination condition compared to the other two conditions. In contrast, the opposite was true for male participants. They had the lowest mean creativity score in the stress with co-rumination condition compared to the other two conditions. Moreover, female participants in the stress with co-rumination condition had the longest speech length. Given these findings, it is speculated that females' better performance in creativity and speech length in the stress with co-rumination condition might be due to perceived social support obtained from co-rumination with the confederate. In other words, social support might have buffered the negative effect of stress for women. These results seem to reinforce the findings of Rose (2002) that females tend to obtain stronger feelings of support and emotional well-being and a greater friendship quality from the co-rumination process than males.

Additionally, we observed that male participants performed better in the speech task. Previous research findings indicate that while men excel in mental rotation and spatial perception, women perform better in verbal memory tasks, verbal fluency tasks, and speed of articulation (Linn & Peterson, 1985 as cited in Sommer, Aleman, Bouma, & Khan, 2004). Therefore the better performance displayed by men in creativity and the speech task was counterintuitive. Perhaps, better performance by men could be just capitalization on chance due to the small sample size we used and the possibility that the creativity task did not require much verbal memory or verbal fluency.

The analysis revealed that those whose primary language was English had a higher mean creativity score, received a higher mean performance rating, and spoke longer than those whose primary language was not English. Obviously, these tasks were

heavily language-laden, requiring a strong command of the English language. Hence, participants whose primary language was not English were clearly disadvantaged.

Theoretical and Practical Implications

Our findings indicated that stress did not have a significant effect on creativity and performance. As far as cognitive tasks were concerned, it is argued that creativity and performance may have remained more or less at the same level in the presence and absence of stress. This implied that in the workplace, even if individuals are under stress, their creativity and performance levels are not negatively affected. Our experiment also suggested that even if individuals co-ruminated with their co-workers in the workplace, it would not result in reduced creativity and task performance.

Interestingly our study indicated a potential gender difference on the effect of co-rumination on creativity and performance. Female participants in the stress with co-rumination condition had higher mean scores in creativity and performance compared to the other two conditions, while male participants in the stress with co-rumination condition had the lowest score in the stress with co-rumination condition. Hence it is reasonable to assume that females benefit from social support obtained even through co-rumination. Social support obtained through co-rumination may have had a buffering effect on stress responses for these women and thus led them to perform better both in the creativity task and in the speech task. From these findings, we speculate that co-rumination had a positive effect on women and negative effect on men. Perhaps it is culturally acceptable and expected for women to seek social support, but for men it may be perceived as a sign of weakness, especially when obtaining support from a female.

When men seek out social support, they may perceive it to be stressful because of what society deems that behaviour to indicate.

Strengths, Weaknesses, and Future Research

Although the hypotheses were not supported in the present study, there were several strengths in the study. Research on stress in I/O psychology has seldom manipulated stress. Therefore, even if there are negative relationships between stress, work attitudes, and behaviors, it is not known whether stress actually leads one to develop negative work attitudes and behaviors. Our study was the first of its kind to induce stress among participants and investigate its effects on creativity and performance. Secondly, not much research on co-rumination has been done in I/O psychology. To the author's knowledge, this is the first study that examined the effects of co-rumination on work-related outcomes (i.e., creativity and task performance). The construct of co-rumination is important because of its association with adjustment trade-offs (Rose, 2002). Furthermore, earlier studies have conceptualized co-rumination as an extreme and negative form of self-disclosure which might have negative effects on individuals who involve in the process (Rose, 2002). Interestingly, the results of our study indicate that co-rumination might not affect those who co-ruminate in terms of creativity and performance. In fact, we speculate that co-rumination might have a positive effect, especially on women.

Despite the strengths of the study, it is not without limitations. Firstly, the confederates were trained to adhere to the script as closely as possible, while adjusting their conversational style to fit the personality of participants. Although they strictly

adhered to the script, they might not have altered their conversational style according to the personality of the participants. Hence, there is a possibility that the quality of confederates' performance affected the stress responses of participants.

Secondly, it is worthwhile to note that all of the confederates were women in our study. According to Rose et al. (2007), females tend to evoke stronger feelings of support and greater amount of friendship quality than males. Hence the social support received during the co-rumination session could have acted as a buffer against stress, rather than a source of stress, especially for female participants.

Thirdly, judges urged participants to continue speaking when they paused for more than a set amount of time. However, if participants did not speak for a particular amount of time, the judges asked them questions about their ideal job. This kind of an interaction between the judges and the participants might have influenced the participants stress responses and consequently their speech performance and creativity.

Fourthly, we did not have a manipulation check for stress and co-rumination. We do not know if participants in the stress and stress with co-rumination condition actually felt stress and experienced social support from co-rumination. The lack of support for the hypotheses might have been due to the insufficient stress experienced by participants. We suggest that future research should keep the interaction between the judges and the participants to a minimum in order to evoke stronger stress responses as well as include the manipulation check.

The creativity test that we used might have been difficult. Out of 66 items, the maximum number of correct answers that the participants obtained was 19. Given the

relatively low number of correct answers, the task itself might have been difficult. This might have contributed to the lack of support for our first hypothesis. Future research in the area of stress and creativity can be done with an easier task to measure creativity.

Future research should address the limitation of the study. Even though our study has limitations, a few changes may improve the design of the experiment and may even provide a new experimental path for research in creativity, co-rumination, and stress. One factor that should be addressed is the length of co-ruminating sessions. It is possible that longer sessions produce greater stress responses. Instead of using a confederate, future research can use participant friends. Future research should include manipulation checks by asking participants about the impact co-rumination had on them. It would also be intriguing to learn if the severity (or the perception of severity) of the problem in discussion influenced the negative effects of co-rumination. Since females seemed to excel in the co-ruminating condition, it would be worthwhile to conduct a study in workplace settings to find out how co-rumination, gender of employees, and exposure to stress affect the overall performance in organizations. While all these suggestions cannot be addressed in a single study, our results clearly indicate that co-rumination is an important construct for studying performance.

Conclusion

This study extended our knowledge of the impact of stress on creativity and performance by inducing stress on participants. We took a novel approach to the study of social support by exploring whether the construct of co-rumination, adopted from the developmental psychology literature (Rose, 2002 & Rose et al. 2007), can provide useful theoretical guidance to understand how an intensive discussion of problems can have negative effects on performance and creativity. Although many studies have shown that stress can have a negative effect on creativity (e.g., Shanteau & Dino, 1993), our study showed that stress did not affect creativity or performance. Additionally, our results showed that females in the stress with co-rumination condition had a higher mean score for creativity and a longer speech length. Contrary to earlier findings of negative effects of co-rumination on women (Rose et al, 2007), we speculate that women might benefit from co-rumination and exhibit increased creativity and performance. These findings might open new opportunities for research on the effect of sex and social support on performance and creativity. In closing, despite the findings and the limitations of the current study, the present research stimulates an interest in the study of co-rumination in the workplace.

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