

THE INFLUENCE OF MENTAL SIMULATION IN AN
EXPRESSIVE WRITING CONTEXT ON ACADEMIC
PERFORMANCE AND THE MODERATING
INFLUENCE OF SELF-EFFICACY,
OPTIMISM, AND GENDER

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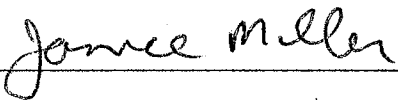
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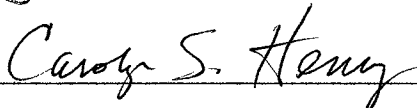
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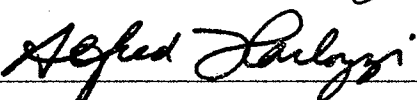
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CHAPTER I

INTRODUCTION

Educational psychologists seek to understand the thinking and affective processes of learners and the socially and culturally complex processes in which individuals find themselves. In practice, educational psychologists strive to develop effective strategies to enhance personal development and improve academic performance (Wittrock & Farley, 1989). The topic of this study is academic performance and whether the use of expressive writing exercises in conjunction with mental simulation techniques will have an influence on performance for undergraduate students. College is a useful setting for this type of practical research because students are starting to take on characteristics of adult learners, such as the adoption of self-directed goals and self-regulated learning techniques (Elias & Merriam, 1995). In light of these signs of developmental maturity, college undergraduates represent an interesting population for an investigation of whether a combination of writing exercises and mental imagery can be successfully utilized in order to influence academic performance. This introductory chapter defines and explains the concepts utilized in this study, such as mental simulation and expressive writing, and moves from a broader overview to a more specific explanation of the detailed questions this study addresses.

Background

Expressive writing refers to the process of writing about the thoughts and emotions surrounding an important personal experience or future life goal (King, 2001;

Pennebaker, 1990). Some researchers hypothesize that these writing interventions trigger important self-regulatory processes that help organize and integrate life experiences, help develop effective coping strategies, and in turn lead to higher levels of well-being and life satisfaction (King, 2001). Research spanning the last fifteen years has demonstrated that expressive writing about emotional experiences for as little as 20 minutes over the course of four days can significantly reduce illness-related health center visits (Cameron & Nicholls, 1998; Greenberg, Wortman, & Stone, 1996; King, 2001; King & Miner, 2000), enhance immune system competence (Petrie, Booth, & Pennebaker, 1998), and increase levels of self-reported mental well-being (Pennebaker & Seagal, 1999). Expressive writing has also been found to improve college adjustment (Cameron & Nicholls, 1998) and the chances of re-employment following job loss (Spera, Buhrfeind, & Pennebaker, 1994).

An exciting development in recent work on expressive writing is the effort of researchers to stretch the boundaries of the expressive writing paradigm. Much of the early research on expressive writing was focused on dealing with the effects of negative life events, such as past trauma (Pennebaker & Seagal, 1999), chronic illness (Petrie, Booth, & Pennebaker, 1998) and job loss (Spera, Buhrfeind, & Pennebaker, 1994). Participants in these studies were instructed to write expressively about personal negative life events and results showed that these types of expressive writing exercises could positively influence the health and well-being of participants. In addition, expressive writing interventions are inexpensive and of short duration, supporting the view that this type of intervention may represent an effective, low-cost health promotion strategy. However, more recent studies have shown that writing about positive life events and

experiences is also associated with the health benefits of expressive writing for some people. For example, subjects in a recent study who wrote about their personal life goals experienced similar health benefits as those who wrote about their most traumatic life event (King, 2001). In other recent work researchers found that talking about life goals provides similar health benefits associated with writing about past experiences (Harrist, Carlozzi, McGovern & Harrist, in review).

One significant advantage of writing about future goals is that it decreases the transient negative affect associated with disclosure of unpleasant life events (King & Miner, 2000). Another advantage is that participation in expressive writing exercises is no longer limited to those who have experienced significant negative life events. Instead, people writing about life goals and positive hopes for the future have been shown to experience similar benefits as those writing about experiences relating to job loss, chronic illness, or stress, so the potential population of people who could benefit from this type of intervention may be greatly expanded.

Theoretical Framework

Mental simulation represents the theoretical framework for this study. Mental simulation, sometimes referred to as visualization, refers to the imitative representation of events, including both cognitive construction of hypothetical future scenarios and the reconstruction of actual past events (Taylor, Pham, Rivkin & Armor, 1998). There is a significant body of research in this area associating mental simulation with health benefits (Taylor & Schneider, 1989), academic improvements (Taylor & Pham, 1996), and improved coping skills (Rivkin & Taylor, 1999).

How does mental simulation work? Taylor has consistently contended that the

process of mental simulation has three major components which influence behavior (Taylor & Schneider, 1989; Pham & Taylor, 1999). The first is that mental simulation of an experience increases the perceived truth or reality of that experience. Mental simulation of a hypothetical event increases the perceived likelihood of that event. This is supported by studies to be detailed in Chapter 2, showing that imagining an event results in physiological activation associated with the actual event (Bonnet, Decety, Jeannerod & Requin, 1997). Second, it is suggested that mental simulation provides a framework for organizing, rehearsing, and mentally manipulating the experience. In this way coping strategies can be developed and a sense of meaning can be derived from the experience. Mental simulation of actual past events provides a method for a person to mentally reconstruct past behavior in order to manipulate past events and mentally alter them. Researchers hypothesize that this process allows a person to understand and manage the emotions associated with those past life events and develop coping strategies to deal with the aftermath of those events (Rivkin & Taylor, 1999). When mental simulation is focused on hypothetical future scenarios such as goals, it can help a person to formulate and rehearse strategies for achieving those goals (Taylor & Pham, 1996). Third, emotions and levels of arousal can be manipulated through the visualization of events that help translate thought into action by providing direction, purpose and increased levels of optimism about the specific steps needed to achieve the desired goals (Taylor & Schneider, 1989).

Mental simulation techniques are used in a variety of settings where performance improvements are desired. For example, in the sports psychology literature on visualization, a meta-analysis of 60 studies shows that mental simulation of motor skills

improved subsequent performance (Feltz & Landers, 1983). Studies have found that mental simulation of a physical activity increases physiological markers such as heart and respiratory rates, and these markers covary with the degree of imagined effort (Bonnet, Decety, Jeannerod & Requin, 1997). An example of this is a study that found the physiological activation of a subject mentally simulating running at 12km/h was similar to that of a subject actually walking at 5km/h (Decety, Jeannerod, Germain & Pastene, 1991). This principle is also used in therapeutic settings such as Cognitive-Behavior Therapy (CBT) interventions. Several CBT intervention strategies use techniques that incorporate mental simulation of events, such as flooding and systematic desensitization. Clients dealing with phobias, for example, can use visualization techniques to regulate their responses to feared stimuli in order to manage and eventually overcome their fears (Witmer & Young, 1985).

Mental simulation, like expressive writing, has been found to be an effective method for dealing with ongoing stressful events or past traumas (Taylor & Schneider, 1989; Taylor & Pham, 1996; Pham & Taylor 1999; Taylor Pham, Rivkin, & Armor, 1998). As with expressive writing, participants using mental simulation techniques are asked to spend a few minutes imaging an emotional event such as a past trauma. This process is then repeated for five minutes over several days, and participants often attempt to refine or modify the imagined event in order to gain insight, trigger self-regulatory processes, and develop coping skills. In this way, mental simulation exercises are similar to expressive writing interventions without the actual writing, since both involve the cognitive construction of hypothetical future scenarios or the reconstruction of actual past events.

Mental simulation techniques have been found to be particularly effective when focused on desired future goals where planning and problem solving skills play an important role (Rivkin & Taylor, 1999). Effective planning and problem solving skills are vital in the development and maintenance of successful strategies for attaining those goals. Mental simulation allows people to project multiple versions of imaginary future events in order to plan and rehearse hypothetical behavior (Taylor & Pham, 1996). Thus, mental simulation of possible future situations is a way for people to identify goals, and formulate and rehearse goal attainment strategies. Additionally, simulation can evoke the arousal and motivation necessary for action, and helps to anticipate and manage potential emotional and cognitive factors involved in the goal attainment process (Taylor & Schneider, 1989).

Although recent research suggests that expressive writing about life goals is associated with health benefits, expressive writing that simply identifies goals may not significantly contribute to achieving those goals (King, 2001). As Taylor's work has emphasized for over a decade, simply imagining a desired outcome may not lead to that outcome unless the steps necessary to achieve the outcome are also imagined (Taylor & Schneider, 1989). Put another way, mental simulation research makes important distinctions between mentally simulating the process, or actions required to achieve some desired goal, and the outcome, or goal itself (Pham & Taylor, 1999). Visualizing a desired goal state, an outcome, is not the same as visualizing the steps or process it would take to attain that goal. Although the mental simulation of desired outcomes does provide some psychological benefits, these benefits may not translate into goal attainment. For example, outcome simulation may improve mood and increase perceived levels of

motivation, and it may provide a sense of direction, but without necessarily having much effect on effort or performance.

Problem Statement

The focus of this study was to ascertain whether academic performance can be improved by incorporating mental simulation techniques into an expressive writing intervention. While several studies have examined the effects of expressive writing on academic performance, there are limitations to the applicability of their results. First, the research examining the association between expressive writing and academic performance (Cameron & Nicholls, 1998; Francis & Pennebaker, 1992; Pennebaker, Colder & Sharp, 1990) has been based on participants writing about stressful events or trauma. Few studies have focused on expressive writing about goals and academic performance. Second, the results have been mixed. For example, Francis and Pennebaker (1992) found only a marginal association between expressive writing about ongoing stressful events and GPA ($p = .08$). An earlier expressive writing study also reported only a trend level association ($p = .11$) between writing about the emotional aspects of coming to college and academic performance (Pennebaker, Colder & Sharp, 1990). However, in both these studies researchers suggested that a relationship existed between expressive writing and academic performance and that future research could perhaps find stronger evidence of this relationship. Cameron and Nicholls (1998) found a statistically significant association between expressive writing and academic performance, but only for one of two expressive writing groups. Their study included three groups: one focused on simple disclosure, another included the additional emphasis on coping and problem solving strategies for dealing with stressful college experiences, and a control group who

wrote about a non-emotional topic. Researchers found that only those participants in the simple disclosure group experienced improved academic performance while those in the problem-solving group did not.

On the other hand, several studies have shown the efficacy of mental simulation techniques for improving academic performance (Taylor & Pham, 1996). In particular, findings show that both “outcome” simulation, which focuses on desired goals, and “process” simulation that emphasizes visualization of the necessary processes for achieving desired goals are associated with academic benefits. However, Taylor and associates (1996, 1998) have repeatedly found that simulation exercises instructing participants to focus on the process, that is, the development of plans and strategies pertaining to the attainment of academic goals, are associated with greater academic performance compared with participants who focus only on desired academic outcomes.

There is little evidence on whether the incorporation of mental simulation techniques specific to academic performance into an expressive writing intervention will influence academic achievement. For example, King’s (2001) study on expressive writing about life goals utilized only outcome-based writing instructions, and King identified the lack of process-based instruction as a potential limitation of the study. She further recommended that future studies examine a process-based intervention in the context of life goals. King study did not report any academic findings, however, and the life goals that participants simulated were long-term and not necessarily related to academic achievement. In Cameron & Nicholls (1998) study a process-based emphasis was included, but again it was not specifically focused on academic performance. As their results showed, those in the process-based group did no better than the control group in

terms of academic outcomes, but the authors' hypothesized that this finding was due to participants focusing on social issues rather than academic issues.

This gap in our understanding of whether mental simulation techniques specific to academic achievement may strengthen the association between expressive writing and academic performance represents the problem that this study addressed. The purpose of this study was to investigate whether mental simulation techniques incorporated into an expressive writing intervention were associated with academic benefits. Further, process-based and outcome-based simulation techniques were compared in order to determine their individual influences on academic performance. It should be noted that this study did not investigate the combination of both types of simulation techniques in an expressive writing context since recent studies have found that the combination increases anxiety among participants while providing only minimal benefit (Taylor & Pham, 1996).

This study also explored the roles of self-efficacy, optimism, and gender as potential moderators on academic performance. In general, moderators are qualitative or quantitative variables that influence the strength and/or direction of the relationship between an independent variable and a dependent variable (Baron & Kenny, 1986). The present study investigated whether self-efficacy, optimism, and/or gender influenced the relationship between mental simulation in an expressive writing context and measures of academic performance. An investigation of these potential moderators may shed light on the self-regulatory processes involved in expressive writing and mental simulation. For example, research on expressive writing has shown that optimists tend to benefit more than pessimists when writing about stressful events (Cameron & Nicholls, 1998). This suggests that individual differences in self-regulation could contribute to differences in

academic outcome in conjunction with the intervention. First, the influence of self-efficacy was examined. There is compelling evidence that level of self-efficacy is predictive of academic performance (Lane & Lane, 2001). Based on this evidence, this study examined whether levels of self-efficacy were associated with differences in academic performance.

It was also of interest whether levels of self-efficacy changed due to the intervention. Although Pham and Taylor (1999) found no correlation between mental simulation and self-efficacy, there was reason to investigate further. Since mental simulation increases the perceived reality of a desired hypothetical event (Taylor & Schneider, 1989), then this characteristic alone may influence perceptions of self-efficacy. Bandura's model of self-efficacy states that persons need to believe that they are competent in order for them generate the motivation and expend the effort and persistence required to perform successfully in a situation (Bandura, 1997). Self-efficacy is this belief in one's capabilities. Hartley (1986) found that children asked to pretend they were competent performed more successfully than children in the control group. This task of "pretending to be clever" may be thought of as a form of mental simulation. Hartley suggested that this process encouraged the children to apply images of a hypothetical competence to their own performance, adopting the same beliefs that they perceived a "clever person" would hold about themselves. These findings suggest that mental simulation can improve perceptions of self-efficacy and this was explored in the study.

There is also evidence that optimism may moderate the effects of expressive writing. Optimists tend to exhibit adaptive behaviors such as active coping and positive

reinterpretations of past events while pessimists tend to develop negative outcome expectancies leading to decreased motivation (Aspinwall & Taylor, 1992). In their study on expressive writing, Cameron and Nicholls (1998) found that optimism was a moderating variable affecting academic performance outcomes, such that participants with higher scores on a measure of optimism also had higher semester GPAs and better college adjustment scores. These findings suggest that optimism may be a significant moderating variable and it was explored in this study.

Finally, research has shown that gender can moderate the influence of expressive writing on health outcome. For example, Smyth's (1998) meta-analysis of studies on expressive writing indicates that men tend to derive greater benefit from expressive writing than women. However, there is disagreement over the influence of gender in the context of academic performance. Some studies report that girls outperform boys in school particularly in stereotypically feminine subjects (Pomerantz, Altermatt, & Saxon, 2002). On the other hand, an older study examined the degree results of all UK universities over a 12-year period and concluded that there were no differences in the mean performance of males and females (Hoskins, Newstead, & Dennis, 1997). However, when gender differences in the use of self-regulated learning strategies have been reported, they typically favor female students (Pajares, 2002). These mixed findings suggested that an examination of any potential moderating effects of gender on academic performance and the potential interaction effects of gender and self-efficacy on academic performance would provide useful knowledge in this study.

Research Questions

The purpose of this exploratory study was to investigate whether an expressive

writing intervention that incorporates mental simulation techniques would be associated with differences in academic performance. To that end, this study utilized a cross-sectional experimental research design using quantitative measurements in order to address a number of specific research questions.

Question 1: Would an expressive writing intervention that incorporates mental simulation techniques focused on academic achievement influence academic performance? Three types of writing condition were examined; a process-based condition, an outcome-based condition, and a control condition. Academic performance was operationalized as final semester grades for the course from which the participants were recruited. Statistically significant differences among the process-based condition, outcome-based condition, and the control condition would indicate an association between the type of condition and grades. Such a finding would disconfirm the null hypothesis that no significant group differences in grades will be found among participants in the three conditions.

Question 2: Would there be a significant difference between an expressive writing exercise that stimulates process-oriented mental simulation and one that focuses only on a desired outcome? If significant differences among the conditions were found, indicating a main effect showing an association between the type of condition and grades, a post-hoc analysis of the simple effects would be used to determine which conditions differ significantly in terms of final grades as well as the strength and direction of differences. The null hypothesis assumes that no significant group differences would be found between the two experimental conditions.

The following two research questions focused on the potential association between levels of self-efficacy and academic outcomes. These questions were answered by

measuring whether pre-intervention levels of self-efficacy among participants were significantly different from post-intervention levels. Levels of perceived self-efficacy were operationalized as scores on the Self-Efficacy for Self-Regulated Learning Scale such that higher scores indicate higher levels of perceived self-efficacy.

Question 3: Would the perceived self-efficacy of participants moderate the influence of an expressive writing intervention that incorporates mental simulation techniques on academic performance? A regression equation that included a multiplicative interaction term representing the interaction of the experimental variable (writing condition) with self-efficacy was computed to determine whether self-efficacy had a moderating effect on final grades. A significant result from this analysis would disconfirm the null hypothesis that pre-intervention levels of perceived self-efficacy among participants would not have a moderating effect on semester grades.

Question 4: Would the utilization of mental simulation in the context of an expressive writing intervention increase the perceived academic self-efficacy of the participants? To answer this question, a repeated measures analysis was used to determine whether there were significant changes in post-intervention levels of self-efficacy among participants based on the condition, using pre-intervention levels of self-efficacy as a covariate.

Significant differences for post-intervention levels of self-efficacy among the conditions would indicate an association between the type of condition and post-intervention levels of self-efficacy. A post-hoc analysis would be used to determine which conditions differ significantly in terms of self-efficacy as well as the strength and direction of differences. The null hypothesis assumes that levels of post-intervention self-efficacy for participants would not be significantly different among the conditions.

Finally, two additional questions explored the potential moderating influence of optimism and gender.

Question 5: Would differences in levels of optimism among participants be associated with differences in academic performance? This question was answered by measuring whether levels of optimism had a moderating effect on semester grades. Levels of optimism were operationalized as scores on the Life Orientation Test-Revised such that higher scores indicate higher levels of optimism. A regression equation that included a multiplicative interaction term representing the interaction of the experimental variable (writing condition) with optimism was computed to determine whether optimism had a moderating effect on final grades. A significant result from this analysis would disconfirm the null hypothesis that pre-intervention levels of optimism among participants would not moderate semester grades.

Question 6: Was the gender of participants associated with differences in academic performance? This question was answered by examining the main effects analysis of variance from the MANCOVA to determine whether significant differences existed for semester grades in this study. A significant finding would disconfirm the null hypothesis that there were no differences in semester grades based on gender.

Definition of Terms

- **Expressive writing** refers to the process of writing about the thoughts and emotions surrounding an important personal experience or future life goal (King, 2001; Pennebaker, 1990).
- An **expressive writing exercise** refers to a single instance of the writing process, generally lasting twenty minutes.

- An **expressive writing intervention** refers to the overall expressive writing process, which generally consists of a series of four writing exercises, usually contiguous, spread over four days.
- **Mental simulation**, sometimes referred to as visualization, refers to the imitative representation of events, which can include both cognitive construction of hypothetical future scenarios and the reconstruction of actual past events (Taylor, Pham, Rivkin & Armor, 1998).
- **Process-based mental simulation** identifies simulation that emphasizes visualization of the necessary processes for achieving desired goals such as planning and the development of strategies pertaining to the attainment of goals.
- **Outcome-based mental simulation** focuses only on desired goals or past outcomes.
- **Self-efficacy** theory states that a person needs to believe that they are competent in order for them generate the motivation and expend the effort and persistence required to perform successfully in a situation (Bandura, 1997). Self-efficacy refers to this belief that one's capabilities are adequate to the task.
- **Optimism** refers to the tendency to exhibit adaptive behaviors such as active coping, positive assumptions about the future, and positive reinterpretations of past events (Aspinwall & Taylor, 1992). Pessimism, on the other hand, refers to the tendency to develop negative outcome expectancies that may lead to decreased motivation and subsequent decreases in achievement.

Summary

Research has demonstrated that expressive writing about emotional experiences is

associated with improved health and well-being as well as academic performance, college adjustment and the chances of re-employment following job loss. Research in the area of mental simulation reveals similarities to the expressive writing paradigm, and these similarities may represent an opportunity to combine the two techniques for greater effect. Basically, when mental simulation is focused on hypothetical future scenarios such as goals, it allows a person to formulate and rehearse strategies for achieving those goals. There is a significant body of research in this area associating mental simulation with health benefits and improved coping skills. Studies have also shown the efficacy of mental simulation techniques for improving academic performance, especially when “process” simulation, the emphasis on visualizing the necessary processes of achieving desired goals, is utilized. The central focus of this study was to determine whether a series of expressive writing exercises incorporating specific mental simulation techniques focused on academic performance would result in academic benefits.

CHAPTER II

LITERATURE REVIEW

Expressive Writing

Over 15 years of research supports the idea that most people feel happier and healthier after writing about traumatic memories. Psychologist James Pennebaker has largely guided this research, whose interest in the potential of writing therapy first became piqued while talking to government polygraph operators. The people giving the “lie detector” tests reported a commonly occurring phenomenon: a criminal’s heart rate and breathing are slower immediately following a confession (Pennebaker, 1989). Since then, Pennebaker and his colleagues have consistently shown the benefits of confronting fears, trauma, and pain through writing.

One of Pennebaker’s earlier studies (Pennebaker, Kiecolt-Glaser, & Glaser, 1988) found that college students had more active T-lymphocyte cells, indicating immune system stimulation, up to six weeks after writing about stressful life events. Similarly, Smyth and associates found that expressive writing could ease the symptoms of asthma and rheumatoid arthritis (Smyth, Stone, Hurewitz & Kaell, 1999). According to Smyth, “Writing gives you a sense of control and a sense of understanding. To write about a stressful event, you have to break it down into little pieces, and suddenly it seems more manageable” (Smyth et al., 1999, p. 1420).

Expressive Writing and Coping

Much of the expressive writing research is focused on efforts to help people deal with stressful life events. Expressive writing has been shown to help people deal with life events that range from the anxiety related to college adjustment all the way to chronic illness and job loss. Often, the theorized mechanism for these benefits has focused on disclosure, or disinhibition (Greenberg, Wortman & Stone, 1996; Pennebaker & Beall, 1986; Francis & Pennebaker, 1992; Spera, Buhrfeind, & Pennebaker, 1994). This concept reaches back to Freud, who emphasized the need to release old emotions to become a fully functioning human being. Freud's psychoanalytic theory asserted that holding in pent-up feelings would result in the development of psychic tension. Freud believed that people were capable of "letting go" of emotional baggage through self-exploration and thereby work through their emotions in order to cope with stress and dysfunction.

Typical research on the expressive writing paradigm includes instructions to the participants to experience the emotion associated with the trauma (King & Miner, 2000). These instructions are based on the belief that people have essentially been holding back pent-up emotions. The disinhibition theory suggests that the inhibition of thoughts or feelings is a form of psychological and physiological stress (Pennebaker, 1989). When an individual avoids talking about an emotionally salient experience, short-term increases in autonomic nervous system activity occur, increasing the likelihood of psychosomatic diseases. Also, inhibition reduces individuals' ability to cognitively process or work through the various aspects of emotional experiences. The inability to resolve the experiences through emotional or cognitive self-regulation results in continued negative emotions, which in turn exacerbate health and psychological problems. Therefore,

confronting the upsetting experiences should reduce autonomic nervous activity and allow for coping processes to help resolve the negative impact of the emotional experience. Over time this stress reduction will lower the frequency of stress-related illness. It is important to recognize, however, that the benefits of expressive writing do not lie in simple cathartic venting of information about the event. Pennebaker and Beall (1986) have shown that participants who only describe the traumatic experience do not gain the same benefits as those who describe the event and express their feelings about it.

Although disclosure and disinhibition have been found to contribute to health benefits, studies that investigate variations of the expressive writing intervention suggest that the stress reduction associated with disclosure of negative life events may not be the only significant method for promoting health benefits. For example, writing about the perceived benefits of traumatic experiences (King & Miner, 2000) has been found to provide the same health benefits as writing about the traumatic events themselves. The significant advantage is that writing about the positive aspects of a traumatic experience may be sufficient to engage self-regulatory processes needed to organize thoughts and feelings about a trauma without having to re-experience the associated negative emotions of the trauma. Short-term increases in negative affect associated with disclosure of unpleasant life events are one of the side effects in the expressive writing paradigm. In a recent study (King & Miner, 2000), however, expressive writing that focused on the positive aspects of a past trauma eliminated the negative mood associated with previous expressive writing research without diminishing the longer-term health benefits.

In King's 2001 study, participants were instructed to imagine themselves in the future having attained all of their goals and then to write expressively about what they

imagined. This type of expressive writing was found to be associated with health benefits for participants and also increased positive mood, thereby completely eliminating the need to focus on some aspect of a negative life event. Instead, King found that expressive writing about life goals could provide health benefits.

Expressive Writing and Academic Performance

In King's (2001) expressive writing study, participants engaged in an outcome oriented mental exercise – imagining their “best possible” future and then writing about it. Apparently, this was enough to produce health benefits. However, the influence of expressive writing on academic performance or other near term goals is not very strong. For example, in Francis & Pennebaker's 1996 study, first year college students were randomly assigned to write about their deepest thoughts and feelings about coming to college, or, in the control condition, to write about superficial topics. Participants were asked to write for 20 minutes on each of three consecutive days. Researchers reported academic benefits for those engaging in the experimental expressive writing condition, but the differences in GPA between groups were not actually statistically significant ($p=.08$). In an earlier similar study, results showed even less of an association, with the researchers reporting only a trend level effect ($p = .11$) of expressive writing about the stress of coming to college on academic performance (Pennebaker, Colder & Sharp, 1990). However, an interesting aspect of the 1990 study was that the writing interventions were staggered throughout the semester so that the first wave of participants wrote in early September while the last wave of participants wrote during the first week of December. The marginal improvement in GPA that this study found occurred in the semester following the writing intervention.

There are similarities between the results of these expressive writing studies and the research in mental simulation as it applies to academic performance. These findings that show a lack of statistically significant influence is in line with the mental simulation literature which argues that simply identifying performance objectives is associated with only minimal improvements in goal attainment at best (Rivkin & Taylor, 1999).

Cameron and Nicholls (1998) found a statistically significant association between expressive writing and academic performance, but only for one of two expressive writing groups. Their study included three groups, one focused on simple disclosure of stressful events, another included the additional emphasis on the development by the subject of active coping and problem solving strategies, and a control group who wrote about a non-emotional topic. The researchers found that the expressive writing group that included the emphasis on active coping and problem solving strategies was not significantly different from the control group in terms of academic performance. Only those participants in the simple disclosure group experienced improved academic performance while those in the self-regulation group did not. One possible explanation, however, is that a majority of participants in the self-regulation group developed strategies aimed at improving social engagement instead of academic performance.

Mental Simulation

Broadly defined, mental simulation, visualization, and mental imagery can be considered synonymous concepts (Rieber, 1995; Taylor & Schneider, 1989). According to the Stanford Encyclopedia of Philosophy, mental imagery refers to perceptual experience that occurs in the absence of the appropriate stimuli for the relevant perception (Thomas, 2001). These experiences are commonly understood as

reconstructions of actual perceptual experiences from the past or they may anticipate possible future experiences. Based on this understanding, mental imagery is believed to play a pivotal role in memory, spatial reasoning, and inventive and creative thought (Paivio, 1986; Rieber, 1995).

Historically, the classical Greek philosophers are credited with introducing the notion of a mental faculty that integrated imagination and perception and was responsible for producing and recalling imagery (Wilson & Keil, 1999). Aristotle is often thought of as the first systematic cognitive theorist, because of his contention that mental imagery had a central role in cognition. He maintained that the representational power of language is dependent on the links between language and imagery, pointing out that words were actually symbols of inner images. This ancient Greek conceptualization is very similar to the more generic conceptualization of mental imagery or mental simulation in modern cognitive science.

In the area of cognitive psychology, there is also an increasing interest in the role that mental simulation plays in our cognitive ability to understand others as intentional agents, that is, to interpret their minds in terms of intentional states such as beliefs and desires (Davies & Stone, 1995). The understanding each of us has about how other people think and why they behave the way they do is often referred to as our “theory of mind.” Traditionally, philosophers and psychologists have suggested that the everyday ability to predict and explain the actions and mental states of others is grounded in our possession of a primitive folk, or commonsense, psychological understanding of our minds and the minds of others. Recently however, the folk psychology theory has come under increasing challenge from those who promote a theory of mind based on mental

simulation. This alternative view says that human beings are able to predict and explain each other's actions by using their own cognitive, affective, and physiological resources to simulate the psychological states that arise in other people and that lead to the actions of others.

Mental Simulation and Performance

The focus of this study involves the effect of mental simulation on goal-directed performance. In this context, mental simulation refers to the imitative representation of events, including both cognitive construction of hypothetical future scenarios and the reconstruction of actual past events (Taylor, et al., 1998). When dealing with past events, mental simulation allows a person to reconstruct past behavior in order to manipulate past events and alter them. This process allows a person to understand and manage the emotions associated with those past life events and develop coping strategies to deal with the aftermath of those events. When mental simulation is focused on hypothetical future scenarios such as goals, it allows a person to formulate and rehearse strategies for achieving those goals. There is a significant body of research in a number of fields associating mental simulation with health benefits (Taylor & Schneider, 1989), academic improvements (Taylor & Pham, 1996), improvements in sports performance, and improved coping skills (Rivkin & Taylor, 1999).

Mental simulation techniques are particularly effective when focused on desired future goals where planning and problem solving skills play an important role. Effective planning and problem solving skills are vital in the development and maintenance of successful goal attainment strategies (Rivkin & Taylor, 1999). Mental simulation allows people to project multiple versions of imaginary future events in order to plan and

rehearse hypothetical behavior. Thus, mental simulation of possible future situations is a way for people to identify goals, and formulate and rehearse strategies for attaining those goals. Simulation can also evoke the arousal and motivation necessary for action, and helps to anticipate and manage potential emotional and cognitive factors involved in the goal attainment process (Taylor & Schneider, 1989).

Academic Performance

In one study Taylor and Pham (1996) compared the effects of outcome and process simulation on academic performance. Four groups were evaluated on their performance on an exam. Before the exam, one group engaged in process simulation, in which they imagined themselves reading and studying for the exam. Another group focused solely on the successful outcome, imagining themselves doing well on the exam. A third group engaged in both types of simulation, and a fourth group acted as the control. Participants in the experimental groups engaged in the simulation exercises for five minutes each day for a period of 5 to 7 days before the exam. During the simulation trials, no differences were found in levels of anxiety, expectations, or attitudes among the groups. However, study results showed significant differences among the groups in terms of exam performance. Participants in the combination group scored the highest on the exam with an average of 10 points above the control group mean, process participants scored next highest with an average of 8 points above the control group mean, while outcome participants scored only 2 points over the control group mean.

Taylor and Pham's (1996) study also revealed interesting differences between perceived motivation among participants and actual behavior. During the simulation trials, participants in the outcome group reported a higher motivation to study than the

other groups, but the exam results suggest that feelings of being motivated are not the same as behaving in a motivated manner. A focus on the steps needed to achieve the desired outcome was superior to an emphasis on the outcome alone. These findings further confirm the notion that no plan of action necessarily evolves from simply envisioning a positive outcome. The combination of outcome-process simulation produced the highest academic outcome, but at some expense. Participants in the combination group reported higher anxiety and lower self-confidence the night before the exam. In contrast, process participants reported the least anxiety and worry, suggesting that the process simulation produced solid academic gains in addition to low levels of stress.

In a second study investigating potential mediators, Taylor and Pham (1996) found similar results on academic performance. Participants who engaged in process simulation did better on the exam than those engaged in outcome simulation. They also found that process simulation influenced two specific components of self-regulation, emotion regulation and problem solving. By engaging these components, process simulation reduced anxiety and facilitated planning, both of which contributed to improved performance.

In another study, the effects of mental simulation on the planning fallacy were investigated with similar results (Pham & Taylor, 1999). The planning fallacy is considered to be a type of self-regulatory dysfunction in which people underestimate the resources necessary to complete a project and overestimate the ease of completion. Generally, this phenomenon is associated with gross underestimation of time and money necessary to complete a project. In Taylor's study, students were asked to select a project

and identify a clear time deadline for completion. Students who engaged in process simulation were significantly more successful in completing the project on time and were also more likely to start working on the project sooner than those who engaged in outcome simulation. Not only was procrastination reduced, but students in the process group also reported that the projects were easier than they initially predicted, while those in the outcome group reported the opposite. In another similar study, process-based mental simulation on effective essay writing was found to enhance performance and also the planning of the essay (Pham & Taylor, 1999).

Sports Performance

In the sports psychology literature on visualization, meta-analyses show that mental simulation of motor skills improved subsequent performance (Feltz and Landers, 1983). Studies have found that mental simulation of a physical activity increases physiological markers such as heart and respiratory rates, and these markers covary with the degree of imagined effort (Bonnet, Decety, Jeannerod & Requin, 1997). A great example of this phenomenon is an earlier study that found the physiological activation of a subject mentally running at 12km/h was similar to that of a subject actually walking at 5km/h (Decety, Jeannerod, Germain & Pastene, 1991).

Mental simulation also has been shown to enhance intrinsic motivation and self-efficacy in an athletic performance context as well (Martin & Hall, 1995; McMahon, 1973). For example, in one study that tested the influence of mental simulation on performance (Martin & Hall, 1995), 39 beginner golfers were randomly assigned to one of two groups, a mental simulation group or a control group. For three sessions, both groups were taught how to hit golf balls. The simulation group then practiced in an

imagery training session designed to help the subjects mentally rehearse this specific golf skill. Both groups were then told that the purpose of the study was to measure performance and were observed for three more training sessions. The results showed that the subjects in the simulation group practiced more than those in the control group, had more realistic self-expectations, set higher goals to achieve, and adhered more to their training programs outside the experimental setting than subjects in the control group.

Other sports psychologists have found that the use of mental imagery as a training tool is useful for modifying cognitions and can be used as an effective tool to regulate arousal and competitive anxiety (Martin , Moritz, & Hall, 1999). Motivational general-arousal imagery, which focuses on effective coping and mastery of challenging situations, draws attention to feelings such as relaxation, stress, arousal and anxiety in conjunction with sport competition. This form of mental simulation is an effective method for regulating arousal and competitive anxiety.

Lang's Bio-information Model

Taylor has suggested that one of the main reasons that mental simulation is effective is that it increases the perceived reality of the imagined event (Taylor & Schneider, 1989). Sports psychologists and cognitive scientists agree, and one popular theoretical construct to explain this phenomenon is Lang's bio-informational theory (Martin et al., 1999; Bonnet, et al., 1997). Bio-informational Theory (Lang, 1977, 1979) offers a theoretical explanation for why methods like motivational general-arousal imagery can influence actual performance. Lang's theory is identified as a cognitive theory of emotion that conceptualizes emotion as action tendencies stored in memory and accessed through information-processing systems (Barlow, 1988). According to Lang's

theory, all knowledge is represented in memory as processed, abstract units of information regarding objects, relationships, and events. These knowledge propositions can be divided into three basic categories: stimulus, response, and meaning propositions. Stimulus propositions consist of descriptive referents concerning the external environment. External stimuli prompt the access in memory of related response propositions, and these response propositions result in action. The response propositions include a variety of physiological and psychological reactions such as autonomic nervous system arousal and increased motor activity, approach-avoidance behaviors, and emotional priming. Meaning propositions provide the analytical and interpretive components to the combination of external stimuli and the associated response propositions, providing contextual information about the situation, such as its significance and the potential consequences of action. An example of this information processing system is when a phobic person is confronted with some feared object such as a snake. The snake is the stimulus, and the response is rapidly increased physiological arousal. Meaning propositions are then accessed in order to recognize the situation and interpret the response: "This is a situation where I'm confronted by a dangerous, unpredictable thing, and my response tells me that I'm afraid." Accessing propositions in memory that are connected through associative memory links, therefore, triggers emotions (Barlow, 1988).

Lang's theory was initially developed to explain anxiety disorders, but researchers in sports psychology have successfully applied his theory to athletic performance as well (Martin, Moritz, & Hall, 1999; Bonnet, Decety, Jeannerod & Requin, 1997). In this context, the processing of response propositions initiates the motor program for the

imagined action, and leads to physiological responses, known as efferent leakage, in relevant muscles and organs. The combination of response and meaning propositions in mental simulation can access and strengthen associated motor programs, which in turn improves performance. These improvements can be generalized to include self-regulation activities that directly impact other types of performance. In the context of the present study, Lang's theory can help explain the mechanisms that link the mental simulation of goal-directed actions with successful goal attainment.

Mental Simulation and Coping

Traditionally, research on coping has distinguished between problem-focused and emotional-focused coping, and the distinction is an important one (Aspinwall & Taylor, 1997). Problem-focused coping involves efforts aimed at altering or managing the source of stress, and emotion-focused coping is aimed at regulating emotional responses elicited by the situation. Research has shown that problem-focused coping is an effective individual coping strategy and is negatively related to distress symptoms (Greenglass, 1988). For example, research has found negative relationships between job anxiety and problem-focused coping. Levels of job anxiety were generally lower and reports of job satisfaction were higher for individuals who engaged in problem-focused coping strategies. On the other hand, emotional coping strategies, including wishful thinking and self blame, may actually increase levels of anxiety and depression, and are negatively associated with job satisfaction.

Studies have found significantly negative correlations between job anxiety and preventive, or proactive, coping (Aspinwall & Taylor, 1997). Proactive coping is a multidimensional, future-oriented coping strategy that relies on self-regulatory skills such

as planning, goal setting, organization, and mental simulation processes. Proactive coping involves the mental simulation of hypothetical future scenarios so that people can anticipate potential problems or stressors and act in advance to prevent or reduce them. Traditional coping strategies tend to be reactive in that they mostly deal with stressful events that have already occurred, with the aim of compensating for the results of past trauma. In contrast, proactive coping skills can eliminate a great deal of stress before it occurs by leading to behavior that avoids, reduces, or modifies potential stressful events.

Researchers have found that mental simulation techniques are also effective ways to trigger the disinhibition of emotional expression in order to manage emotion and strengthen coping skills (Rivkin & Taylor, 1999). In one study, participants were given instructions patterned after those used in Pennebaker and Beall's (1986) expressive writing study. Participants were instructed to visualize a stressful event in as much detail as possible, paying close attention to their own actions and feelings. Results showed that these participants experienced greater positive affect compared to a control group. Additionally, one week after the intervention, these participants reported greater use of emotion based coping skills and problem solving strategies than those in the control group.

Self-Regulation

There are a number of psychological factors that may be influential in outcomes related to expressive writing and mental simulation. These individual differences are difficult to isolate but seem to center around problem-solving and self-regulation skills (King, 2001; Rivkin & Taylor, 1999; Taylor & Schneider, 1989). For example, there is reason to believe that individuals who have well developed psychosocial resources such

as a sense of personal control, high self-efficacy, or optimism are more likely to cope proactively with problems or setbacks (Aspinwall & Taylor, 1997). Also, high levels of self-regulation and/or optimism may contribute to performance outcomes by minimizing the effects of stress on attitude and motivation (Taylor & Brown, 1994). A review of some of the relevant psychological constructs may help clarify the underlying connection between simulation, writing, and changes in behavior.

Self-regulation is conceptualized as a series of volitional episodes characterized by a recursive flow of information (Kuhl & Goschke, 1994). Individuals possess a self-system that includes the abilities to symbolize, learn from others, plan alternative strategies, regulate behavior, and engage in self-reflection. Self-reflection mediates between knowledge and action by providing an evaluative mechanism for experiences and thought processes (Pajares, 1996). Individuals draw on knowledge and beliefs to identify and evaluate goals. Evaluation includes the values and requirements of goals, and individuals form expectations and set concrete goals based on these interpretations. Strategies are then applied that generate psychological and behavioral tools used to attain those goals.

Goals can range from immediate and mundane goals to larger, more abstract life goals. Research shows that the ability to create and maintain stable life goals is critical for positive adjustment and an important predictor of life satisfaction (Robbins, Lee & Wan, 1994). These life goals are based in part on a person's expectations, or anticipated future circumstances. Expectations for the future establish a sense of personal continuity and also contribute to the motivation necessary in the present to bring about these future

expectations (Roberts, 1992). In this way, considerations of the future can alter a person's present life-course and shape the future.

Possible Selves

The self-system includes self-reflective constructs, known as possible selves, which are future oriented representations of a person's self-concept. They represent who we might be in the future and include expected, ideal and feared selves. Possible selves, or future selves, are "personalized images, conceptions, or senses of the self in the future" (Cross & Markus, 1991, p. 233). These personalized representations of our future selves are considered useful psychological resources that act as motivational and evaluative cues that can facilitate self-regulation and goal attainment.

The ideal possible self is considered to be a strong motivator for approach oriented action (Markus & Nurius, 1986; Cross & Markus, 1991; Higgins, 1996). This ideal, or best, possible self is the construct used by King (2001) in her study of expressive writing about life goals. This type of expressive writing was found to be associated with health benefits for participants. However, in terms of goal attainment, envisioning an ideal possible self may not be sufficient for getting there.

According to Carver & Scheier (1998), human behavior is a continual process of moving toward, and away from, various kinds of mental goal representations, and that this movement is regulated by a process of feedback control. Positive feedback loops, or avoidance loops, guide movement away from comparison values, and provide direction when influenced by the effects of negative feedback loops, or approach loops. They suggest that feared selves serve as reference points for avoidance loops and ideal possible selves serve as reference points for approach loops.

According to Higgins' discrepancy based feedback system, "ideal" discrepancies relate to a promotion focus while "ought" discrepancies trigger prevention strategies. Higgins (1987, 1996) describes the "ought self" as a sort of possible self, but a self that reflects a duty or obligation rather than an intrinsically sought future self. These tend to derive from a punishment orientation. The person strives toward a sense of self to avoid disapproval. In this way it represents a combination of avoidance and approach loops – moving toward the "ought" as a way of moving away from unwanted comparison. Higgins found that people dominated by ought selves preferentially encode information pertaining to negative outcomes. They're also more likely to choose goal attainment strategies based on avoidance of unwanted outcomes.

Optimism

The expressive writing literature suggests that positive health outcomes are more likely than positive performance outcomes in expressive writing interventions (Francis & Pennebaker, 1992; Cameron & Nicholls, 1998). In part, this may relate to the influence of pessimism on expressive writing outcomes. Individuals with pessimistic orientations may represent one group for whom writing may not be beneficial unless self-regulatory processes can be engaged to promote adaptive coping and goal attainment strategies (Cameron & Nicholls, 1998). Writing about life goals appears to help the writer address issues of meaning, potential risks, and benefits. By contemplating and ordering these elements, one desensitizes and restructures underlying mediating psychological schemas (King, 2001). However, expressive writing may also foster maladaptive representations of events that inhibit the development of coping strategies depending on the psychological orientation of the writer. Therefore, individuals with pessimistic

orientations may represent one group for whom writing may not be beneficial unless self-regulatory processes can be engaged to promote adaptive coping and goal attainment strategies (Cameron & Nicholls, 1998).

There is general agreement about the characteristics of optimism and pessimism (Peterson & Seligman, 1984; Aspinwall & Taylor, 1992). Optimism can be conceptualized as the tendency to expect positive outcomes under conditions of uncertainty (Peterson & Seligman, 1984). In terms of traumatic experiences, optimists tend to exhibit adaptive behaviors such as active coping and positive reinterpretations of past events (Aspinwall & Taylor, 1992). On the other hand, pessimists tend to develop negative outcome expectancies leading to decreased motivation. In terms of traumatic events, pessimists also tend to engage in maladaptive coping strategies such as helplessness, avoidance and disengagement (Peterson & Seligman, 1984).

Research suggests those expressive writing tasks that explicitly promote self-regulatory processes and active coping strategies may be necessary in order to provide the health benefits of writing for pessimistic individuals (Cameron & Nicholls, 1998). Evidence from Cameron and Nicholls' research indicates that dispositional pessimism has a negative impact on the therapeutic effects of writing about traumatic events. In contrast to the general benefits found in most of the recent studies on expressive writing, Cameron and Nicholls (1998) found that pessimistic subjects showed none of the health benefits from writing tasks that emphasized simple disclosure of stressful events. Instead, benefits for pessimistic subjects were found only when the writing task included the additional emphasis on the development by the subject of active coping and problem solving strategies. These findings suggest that the moderating influence of pessimism

may be counteracted through the emphasis of active coping and problem solving strategies.

Self-Efficacy

Pham and Taylor (1999) found no correlation between process simulation, academic performance, and self-efficacy. They have suggested that reduced anxiety and the planning and maintenance of goal aspirations (e.g., a high grade) were the significant self-regulatory components. However, a large body of evidence supports the notion that self-efficacy is indeed a significant moderator for performance.

Self-efficacy refers to individuals' "beliefs about their capabilities to exercise control over their own level of functioning and over events that affect their lives" (Bandura, 1993, p. 118). Efficacy perceptions are based on comparing actual to expected performance outcomes (Bandura, 1997). These beliefs play a central role in regulating motivation and performance achievement. Individuals interpret the results of their performance attainments, and these interpretations inform and alter their self-beliefs. Self-beliefs will then affect their subsequent performances in a recursive loop.

Self-efficacy is said to derive from a variety of sources. Primarily, it is derived from the mastery of tasks. Success builds high self-efficacy for a given task, while failure lowers self-efficacy. It also derives from vicarious experiences, i.e. the comparison of the performance of other people perceived as similar to oneself. Self-efficacy is also derived from social persuasion, or verbal feedback. For example, the feedback an instructor gives after a student has performed a task can be crucial in enhancing their perceived efficacy (Pajares, 1998).

In the context of the present study, one of the most intriguing components of Bandura's self-efficacy theory (1997) is that it identifies imaginal experiences as a significant determinant of self-efficacy. In sports psychology, researchers have shown that motivational general-mastery imagery can be used to modify cognitions, regulate emotions, and specifically increase self-efficacy and self-confidence (Martin et al., 1999). Consistent with Bandura's theory, athletes who undergo mental simulation exercises aimed at generating images of competence and performing better than their opponent report higher expectations of success and greater self-confidence than those in a control group (Feltz and Riessinger, 1990).

Self-Efficacy and Academic Performance

Knowledge, skill, and prior attainments are often poor predictors of subsequent achievement because beliefs about abilities and outcomes strongly influence behavior (Pajares, 1996). Efficacy beliefs influence the choices people make, their aspirations (goal setting), the level of effort they will sustain on a given task (persistence), the amount of stress they experience when coping with change (resilience), and even vulnerability to depression (Bandura, 1997).

Studies have shown that levels of perceived self-efficacy are predictive of academic performance (Lane & Lane, 2001). In fact, a significant body of research (Pajares, 1996; Pajares & Kranzler, 1995) has shown that the direct effect of self-efficacy on performance is as strong as the effect of ability. For example, mathematics self-efficacy has been shown to influence math performance both directly through problem-solving performance and indirectly through persistence (Schunk, 1984). Similarly, Pajares and Johnson (1996) investigated the influence of writing self-efficacy, writing

self-concept, and writing apprehension on high school students' essay writing, and found that students' self-efficacy perceptions had a direct effect on their writing performance. One interesting study (Hartley, 1986) found that children asked to pretend they were competent performed better than children in a control group. This task of 'pretending to be clever' is a form of mental simulation. Hartley suggested that this process encouraged the children to apply images of a hypothetical competence to their own performance, adopting the same beliefs that they perceived a "clever person" would hold about themselves.

Self-Efficacy and Controllability

An important aspect of self-efficacy is the perception of controllability. Perceived control refers to the belief that one can influence the environment and is an essential aspect of self-regulation. Research has found that individuals high on self-efficacy are more likely to feel they are able to control challenging environmental demands by taking adaptive action (Bandura, 1997). Individuals who believe that outcomes are within their own control are more likely to employ active coping strategies, and the perceived ability to control challenges or threats makes successful action more likely (Schwarzer, 1992). Situational appraisals of controllability are linked to the use of active problem-solving strategies, proactive coping, and performance in general. These strategies reflect a proactive approach that often involves developing a plan of action, focusing on the problem at hand, and then taking direct action. Studies have shown that employees who believe that they have little control over work domains are less likely to engage in active coping strategies and more likely to employ emotion-focused strategies (Abraham, 2000). Research indicates that perceived control is also associated with decreased stress levels

and improved worker health and buffers the potentially deleterious effects of stress on mental and physical health (Schwarzer, 1992).

Learning versus Performance Self-Efficacy

There is a distinction between self-efficacy for performance and self-efficacy for learning (Schunk & Cox, 1986). Familiar task demands allow the use of the task-specific self-efficacy beliefs that closely correspond to the required performance. However, unfamiliar task demands force people to generalize from prior achievements similar to the required task, since no specific perceptions of competence exist for these tasks. Perceived performance competence is therefore loosely based on self-beliefs that correspond to the novel requirements. Learning self-efficacy, or perceptions of the ability to learn required skills in an unfamiliar performance domain, however, is not only positively related to performance but to subsequent skill and self-efficacy assessments as well (Schunk & Cox, 1986). This suggests that efforts to improve learning self-efficacy may be preferable to performance self-efficacy when novel task demands are likely.

Summary

There is a great deal of support for the efficacy of expressive writing. Expressive writing has been shown to help people deal with life events that range from the anxiety related to college adjustment all the way to chronic illness and job loss. Although disclosure and disinhibition have been found to contribute to health benefits, studies that investigate variations of the expressive writing intervention suggest that writing about the perceived benefits of traumatic experiences or desired life goals provide the same health benefits as writing about the traumatic events themselves.

Several studies have shown the efficacy of mental simulation techniques in promoting a number of benefits, including academic performance. In particular, findings related to “process” simulation, the emphasis on visualizing the necessary processes of achieving desired goals, might make a significant contribution to the expressive writing paradigm. Mental simulation techniques are particularly effective when focused on desired future goals where planning and problem solving skills play an important role. Mental simulation allows people to project multiple versions of imaginary future events in order to plan and rehearse hypothetical behavior. Thus, mental simulation of possible future situations is a way for people to identify goals, and formulate and rehearse strategies for attaining those goals. A large body of research evidence in educational psychology, sports psychology, and counseling psychology suggest that the positive influences of mental simulation can be utilized across a wide spectrum of applications that involve goal-directed performance and therapeutic improvements in self-regulation.

There are a number of psychological factors that may be involved in producing the beneficial outcomes associated with expressive writing and mental simulation. These individual differences are difficult to isolate but seem to center around problem-solving and self-regulation skills. Research shows that the ability to create and maintain stable life goals is critical for positive adjustment and an important predictor of life satisfaction. These life goals are based in part on a person’s expectations, or anticipated future circumstances. Expectations for the future establish a sense of personal continuity and also contribute to the motivation necessary in the present to bring about these future expectations.

Possible selves, which are future oriented representations of a person's self-concept, are also important components in the use of mental simulation. They represent who we might be in the future and include expected, ideal and feared selves. These personalized representations of our future selves are considered useful psychological resources that act as motivational and evaluative cues that can facilitate self-regulation and goal attainment.

Taylor has suggested that one of the main reasons that mental simulation is effective is that it increases the perceived reality of the imagined event. Sports psychologists and cognitive scientists agree, and one popular theoretical construct to explain this phenomenon is Lang's bio-informational theory. Bio-informational Theory offers a theoretical explanation for why methods like motivational general-arousal imagery can influence actual performance. Lang's theory is identified as a cognitive theory of emotion which conceptualizes emotion as action tendencies stored in memory and accessed through information-processing systems.

In the context of the present study, one of the most intriguing components of self-regulation is self-efficacy. Specifically, Bandura's self-efficacy theory identifies imaginal experiences as a significant determinant of self-efficacy. In sports psychology, researchers have shown that motivational general-mastery imagery can be used to modify cognitions, regulate emotions, and specifically increase self-efficacy and self-confidence. Consistent with Bandura's theory, athletes who undergo mental simulation exercises aimed at generating images of competence and performing better than their opponent report higher expectations of success and greater self-confidence than those in a control group.

Another potential moderator for mental simulation and expressive writing is optimism. Research suggests that expressive writing tasks which explicitly promote self-regulatory processes and active coping strategies may be necessary in order to provide the health benefits of writing for pessimistic individuals. This is precisely what Taylor's research on process-based mental simulation has shown: that explicitly promoting self-regulatory processes and active coping strategies, in terms of both coping with stress and academic tasks, yields optimal benefits.

In summary, a review of the relevant literature supports the conclusion that the combination of expressive writing and process based mental simulation exercises focused on academic tasks such as studying and preparing for exams may improve academic performance. Additionally, psychological factors such as optimism and self-efficacy may exert additional influence on performance.

CHAPTER III

METHODS

This chapter provides an overview of the methods used in this study, including research design, data collection procedures, and statistical techniques. Solicitation and recruitment procedures for participants are described. The procedures for the application of an expressive writing intervention are identified, as well as the specific instructions for each of the conditions. A number of measures were administered and these are also described below. Finally, an outline of the analyses used in this study is provided.

The purpose of this study was to investigate whether two different expressive writing exercises might influence academic performance by measuring between group differences based on the type of expressive writing condition to which they are assigned. This study utilized both between-subject and within-subject measures making it a mixed design. In order to measure group differences associated with writing about different topics, participants were randomly assigned to one of three writing conditions: 1) a writing intervention incorporating process-based mental simulation techniques in which participants were given explicit instructions to visualize themselves formulating plans and developing methods to improve academic performance, 2) a writing intervention incorporating outcome-based mental simulation techniques in which participants were instructed to visualize academic success, and 3) a control condition. This study also examined within-subject variance among participants on psychological measures before and after the writing intervention. Post-intervention psychological measures were

collected from participants two weeks after the writing intervention via an on-line follow-up survey.

Participants

Participants in the study were undergraduate students at a Midwestern state university, recruited from a single course with a large number of students. Participants were recruited via direct solicitation by the research investigator in class at the beginning of the semester. A solicitation script approved by the university IRB was read to potential participants during the recruitment and is included in Appendix B. All students were offered the option of participating in the study for course credit in lieu of another course requirement. Participants filled out an online consent form that verified their agreement to participate in the study and allow the collection of data, and the analysis of all data collected, including the collection and analysis of their course grades. A copy of the consent form is included in Appendix A.

Roughly 285 undergraduate students were solicited in a chemistry course for participation in this study. Almost 100 students filled out consent forms for the study on the first day of data collection. The consent form was linked to the first day's writing exercise and only 92 completed the writing exercise for that first day of the study. Additionally, 33 participants dropped out during the next three days so that only 60 participants completed all for days of the writing intervention. Of these, 7 participants were excluded because they "crossed" groups, that is, they switched from one condition to another during the writing phase of the study, or because they dropped the course with a resulting loss of academic data. Previous research on expressive writing has shown significant results from only three days of treatment (Pennebaker, Colder & Sharp, 1990;

Pennebaker & Francis, 1992) and researchers using a four-day writing intervention have on occasion included participants who had only completed three days of writing (Pennebaker & Beall, 1986). Based on this and the high drop-out rate for this study, the data from 3 participants who completed only three days of writing are also included. As a result, a total of 56 participants who completed three or four days of the writing study were included in the analyses. Of the participants who completed three or four days of the writing exercises, only 47 participants completed the follow-up survey that provided post-intervention data for optimism and self-efficacy. Further investigation found one outlier in the grades data, that is, one grade was over 3 standard deviations from the mean. This outlier was excluded from the analyses because of the dramatic skewing effect it would have in the analyses. The final sample size (N) of participants was 55 for analyses that involved only academic outcome and 46 for analyses that included post-intervention measures (see Table 1).

Procedures

Participants were randomly assigned to one of three conditions at the beginning of the study through the randomized distribution of a series of flyers that directed each participant to the specific Web page assigned to each condition. Conditions included writing about process-based mental simulation, outcome-based mental simulation, and a control condition. Data were collected on-line during the Fall Semester of 2003, using Microsoft Frontpage Web design software and a fileserver provided by the university to host Web sites. Web pages were created and configured for each of the three writing conditions with three separate sets of pages. Participants for each condition were assigned to a set of specific web pages for data collection, and participants completed the study by

logging on to the appropriate web page for each day of participation, filling out the various instruments, and engaging in the writing exercise. Participation in this study required approximately 30 minutes per day for 4 consecutive days – a total of about 2 hours. A follow-up survey was administered approximately two weeks after participants completed the four days of writing in order to collect post-intervention psychological measures. For the follow-up survey, participants were notified via email and directed to the survey web page used to collect the follow-up data. Academic data in the form of numeric final grades for the course were collected from the instructor at the end of the semester, in order to assess any academic benefits associated with expressive writing about academic goals. The utility of using numeric scores (i.e. 77, 89) was that more sensitive measures of variance could be analyzed compared with letter grades (i.e. C, B). Collection of course grades was organized with the instructor at the start of the semester.

Data for this study were stored in the form of Microsoft Excel worksheet files. Data were collected from participants online via the three web pages. At the end of the semester, the researcher entered the academic data collected from instructors so that they became part of an SPSS dataset. These files were located within a secure folder on the web-server (fp.okstate.edu) that was accessible only to the researcher and the web-server administrators. The web-server utilized both Novell and Microsoft security measures for folders and the data stored within them. These security measures ensured that the data for this study were secure and private. However, data on a server cannot be absolutely secure. Therefore, after the data collection was completed, the data were downloaded for analysis and data files were then deleted from the server. Identifying information (names

and ID numbers) was removed from the records prior to data analysis and only group data are reported.

The web pages for each condition described the specific writing topic and provided instructions on how to engage mental simulation techniques specific to the topic. These instructions are fully described below. These procedures were intended to incorporate distinct mental simulation techniques into an expressive writing intervention so that group differences could be examined and evaluated. Because one of the dependent variables in this study consisted of grades from a specific course, instructions focused attention on the course from which participants were recruited in order to strengthen the relationship between the writing intervention and the academic measures used in this study. One group of participants was assigned to the outcome-based condition. Instructions for outcome-based mental simulation directed participants to focus on their desired academic goals. In this condition, participants accessed the appropriate website for the study where they were asked to visualize and then wrote about their immediate academic goals for 20 minutes on each of four consecutive days. The instructions for this condition were based on the training instructions for outcome-based mental simulation techniques utilized in other studies (Taylor & Pham, 1996). The instructions were also similar to the instruction provided to participants in expressive writing studies that focus on life goals (King, 2001).

Instructions for the first condition were:

Having a clear goal is important if you want to succeed. Focus on the course where you agreed to participate in this study. Picture yourself doing well in this course this semester. Be as realistic as possible. Spend a

few moments and visualize yourself checking your grade for this course at the end of the semester and seeing the grade you hoped for. Now imagine the feelings you will experience when you see that grade. Imagine yourself enjoying your academic success. Now describe in writing this image of academic success this semester. Spend as long as you want writing, but write for at least 20 minutes. Don't worry about grammar or spelling too much, just express yourself. Focus on that mental image of yourself doing well in your class and describe that image.

A second group of participants represented the process-based condition.

Instructions for process-based mental simulation directed participants to visualize ways to achieve their desired academic goals. In this condition, participants accessed the website for the study and followed specific instructions that changed each day. Instructions varied for this condition so that over the course of the four days a number of different self-regulatory skills could be emphasized, such as goal setting, planning, and the development of good study habits. After reading the following instructions, participants in the second condition visualized and then wrote about plans and strategies for achieving their academic goals for 20 minutes on each of four consecutive days. The instructions for this condition were based on the training instructions for outcome-based mental simulation techniques utilized in other studies (Taylor & Pham, 1996). These instructions were intended to help participants visualize methods that would actually help them achieve their academic goals.

Instructions for the second condition were:

Day 1

Having a clear goal is important if you want to succeed. Focus on the course where you agreed to participate in this study. Picture yourself doing well in your class this semester. Be as realistic as possible. Spend a few moments and visualize yourself doing all the things that will lead to your success this semester, such as reading, studying, and completing course assignments. Imagine the various habits that contribute to academic success. Create a mental image of yourself engaging in those habits. Picture yourself making a list of the things you can do that will help you do well in this course. Now describe in writing all the things you can do that will lead to academic success this semester. Spend as long as you want writing, but write for at least 20 minutes. Don't worry about grammar or spelling too much, just express yourself. Focus on that mental image of yourself doing well in your classes and describe that image.

Day 2

Effort is just as important as ability for achieving your goals. Like last time, focus on the course where you agreed to participate in this study. Picture yourself doing well in your class this semester. Be as realistic as possible. Spend a few moments and visualize yourself making time to read, study, and complete course assignments, all the things that will lead to your success this semester. Imagine the various habits that contribute to academic success. Create a mental image of yourself engaging in the methods. Picture yourself doing things like meeting with other students to study. Imagine yourself checking over your work before turning it in. Now

describe in writing all the things you can do that will lead to academic success this semester. Spend as long as you want writing, but write for at least 20 minutes. Don't worry about grammar or spelling too much, just express yourself. Focus on that mental image of yourself making the effort to do well in your classes and describe that image.

Day 3

Sometimes things happen that interfere with our efforts, but usually we can draw on internal resources that will get us past any problems in order to achieve our goals. Like last time, focus on the course where you agreed to participate in this study. Picture yourself doing well in your class this semester. Spend a few moments and visualize yourself making time to read, study, and complete course assignments, all the things that will lead to your success this semester. Be as realistic as possible. Imagine the various habits that contribute to academic success. Create a mental image of yourself engaging in the methods. What can you do to achieve a good grade? Also take a few moments to visualize yourself dealing with the distractions that may interfere with your efforts. How can you avoid those distractions? How will you improve your ability to stay focused? Picture yourself doing things to reduce distractions like turning off a loud radio or TV. Now describe in writing all the things you can do that will lead to academic success this semester. Spend as long as you want writing, but write for at least 20 minutes. Don't worry about grammar or spelling too much, just express yourself. Focus on that mental

image of yourself being determined to deal with distractions throughout the semester and describe that image.

Day 4

Believing you can accomplish your goals is important for achieving your goals. Like last time, focus on the course where you agreed to participate in this study. Picture yourself doing well in your class this semester. Be as realistic as possible. Spend a few moments and visualize yourself making time to read, study, and complete course assignments, all the things that will lead to your success this semester. Imagine the various things you can do that contribute to academic success. Create a mental image of yourself engaging in those things. Create an image in your mind of yourself being confident and believing in your abilities. Visualize how that feels. Take a few more moments to visualize yourself as being confident about your abilities to study and do well. Now describe in writing all the things you can do that will lead to academic success this semester. Spend as long as you want writing, but write for at least 20 minutes. Don't worry about grammar or spelling too much, just express yourself. Focus on that mental image of yourself confidently doing well in your classes and describe that image.

A third group of participants were assigned to a control condition. The control condition resembled the first and second conditions except that participants in the third condition wrote about a non-emotional topic, such as their plans for the following day or a description of their shoes. The instructions for this condition were similar to instruction

provided to the control conditions in expressive writing studies (King, 2001) and also to mental simulation studies that included control groups (Taylor & Pham, 1996). The purpose of this condition was to provide a baseline for comparison with the other groups.

Instructions for the third condition were:

Describe your plans for tomorrow. Be as realistic and thorough as possible. Spend a few moments and visualize yourself doing the things that you think you will do throughout the day. Now describe those things in writing. Spend as long as you want writing, but write for at least 20 minutes. Don't worry about grammar or spelling too much, just express yourself. Focus on that mental image of yourself doing things tomorrow and describe that image. If you run out of things to write about, then describe a pair of shoes that you own in as much detail as possible.

Instruments

The following psychological measures were utilized in this research in order to examine individual differences and also to measure any pre- and post-intervention differences in levels of dispositional optimism and self-efficacy among participants. All were administered online.

Life Orientation Test Revised (LOT-R) (Scheier, Carver, & Bridges, 1994). The LOT-R is a measure of dispositional optimism—the extent to which individuals expect favorable outcomes—and contains ten items (6 salient items and 4 fillers) rated on a 5-point scale ranging from 1 (“I disagree a lot”) to 5 (“I agree a lot”). This assessment has been found to be reliable and valid by a number of researchers (e.g. Scheier, Carver, & Bridges, 1994), and a recent study found the test-retest reliability to be high ($r=.84$)

(Cameron & Nicholls, 1998). The LOT-R instrument was used to examine whether optimism moderated the influence of the expressive writing intervention on academic performance since there is evidence that dispositional optimism may moderate the effects of expressive writing (Cameron & Nicholls, 1998). Reliability scores for this instrument in the present study are reported in Table 2 in Appendix B. One hypothesized characteristic of the mental simulation process is that mental simulation of a hypothetical future event increases the perceived truth or reality of that event (Taylor & Schneider, 1989; Taylor & Pham, 1998). It is thus conceivable that mental simulation may also increase the levels of task specific optimism. Therefore, both pre- and post-intervention measures of optimism were collected for analysis.

Self-efficacy for Self-regulated Learning Scale (SE-SRL) (Gredler, & Schwartz, 1997). The SE-SRL is a 24-item scale that measures perceived capability for using self-regulatory strategies, with questions such as “How well can you finish homework assignments by deadline?” Responses to the SE-SRL questionnaires are rated on a 7-point Likert scale, ranging from 1 (not well at all) to 7 (very well). Reliability scores for this instrument in the present study are reported in Table 2 in Appendix B. This scale measures the perceived levels of self-efficacy specific to self-regulated learning, which provides a method of assessing levels of self-efficacy that closely correspond to academic performance among participants rather than more generalized perceptions of self-efficacy.

On the first day of data collection, participants completed the LOT-R and the SE-SRL Scale after completing the consent form and before completing the first writing exercise. This administration of the LOT-R and SE-SRL was used to measure pre-

intervention levels of optimism and self-efficacy. Over the next four days, participants completed the three additional writing exercises. An online follow-up survey was administered approximately two weeks after the participants completed the four-day writing intervention. Participants were sent an email instructing them to access the appropriate web page and complete a follow-up survey that consisted of the LOT-R and the SE-SRL Scale. This second administration of the LOT-R and SE-SRL was used to measure post-intervention levels of optimism and self-efficacy.

Participants were asked to identify their gender on the first day of data collection for the study. Gender was hypothesized to be a potential moderator for academic performance (Pajares, 2002) and was therefore included in the data analyses.

Analyses

Analysis of the data consisted of a number of statistical procedures from the Statistical Procedures for Social Sciences (SPSS) software package. First, an analysis of variance/covariance (ANCOVA) test was used to examine whether there were significant differences in semester grades based on the type of condition (Research question 1 and 2), and whether gender acted as a moderator on academic performance by examining the interaction effect of gender and condition on semester grades (Research question 6). A 2 x 3 repeated measures ANOVA test was used to examine whether post-intervention levels of perceived self-efficacy differed from pre-intervention levels based on the type of writing intervention (Research question 4). To examine optimism and self-efficacy as potential moderators of the relation between type of writing intervention (condition) and semester grades (Research questions 3 and 5), regression equations were computed that included a multiplicative interaction terms representing the interaction of the

experimental variable (condition) with optimism and self-efficacy, respectively. For example, to evaluate the moderating influence of optimism, a multiple regression equation was computed with semester grades as the dependent variable, and condition, pre-intervention levels of optimism, and a multiplicative interaction term (condition X optimism) as independent variables. Moderator effects would be indicated by the significant effect of the multiplicative interaction term. Additionally, a chi-square test was used to examine whether drop-out rates among participants were significantly different based on the type of writing intervention they were assigned.

Initially, a multivariate analysis of variance (MANOVA) test was planned because the research questions involve multiple dependent variables that were theoretically correlated (semester grades and post-intervention self-efficacy). ANOVA only tests differences in means, whereas MANOVA is sensitive not only to mean differences but also to the direction and size of correlations among the dependents. Put another way, MANOVA will test groups to determine if they differ in correlation among the dependents even though their means are the same on the dependents (Stevens, 2002). However, no significant correlation was found between semester grades and self-efficacy in the present study, $n = 47$, $r = .181$, $p = .224$, and the plan to use MANOVA was abandoned.

During the analyses, the data were examined for adherence to ANOVA assumptions, and outliers were also investigated. No significant violations of assumptions were discovered. An analysis of standardized scores was performed and any scores that exceeded a value of ± 3 were examined for possible exclusion. The resulting standardized scores revealed one outlier based on semester grade and this score was excluded from the

analyses.

The high rate of participant drop out and resulting small sample size (N=46) was cause for concern because it would limit the degree of power for the analyses. According to Stevens (2002), power is heavily influenced by sample size. Analyses in studies with small group sizes ($n \leq 20$) must be sensitive to the possibility of poor power and the potential for making Type II errors. One suggested method of improving power in studies with small group sizes is to adopt a more lenient alpha level, such a .10 or even .15 (Stevens, 2002). Accordingly, all significance tests were computed at an alpha level of .10 in this particular study. This is not to suggest that avoiding a Type II error is more important than the risk of making a Type I error. Instead, the goal was to achieve an appropriate balance between the two types of errors and to increase the potential for making a correct decision when determining whether to reject or retain the null hypothesis.

CHAPTER IV

RESULTS

The present study explored a number of research questions regarding the influence of an expressive writing intervention that incorporates mental simulation techniques on academic performance, and the potentially moderating influence of self-efficacy, optimism, and gender. To that end, this study utilized a cross-sectional experimental research design using quantitative measurements in order to address a number of specific research questions. Descriptive statistics for the dependent variables are reported in Table 1 in Appendix B.

Insert Table 1 about here

Reliability scores for measures for pre- and post-intervention levels of optimism and self-efficacy are reported in Table 2 in Appendix B.

Insert Table 2 about here

Analysis of the data consisted of analyses of variance and tests of correlation in order to examine main effects and interactions among the variables. The results of the analyses are reported for each research question.

Research question 1: The central research question in this study was whether an expressive writing intervention that incorporates mental simulation techniques focused on academic achievement would influence academic performance. Three types of writing conditions were examined; a process-based condition, an outcome-based condition, and a control condition. The analysis of variance/covariance test (ANCOVA) was used to measure the influence of condition on semester grades. Since this analysis did not require data from the post-intervention follow-up survey, all 55 participants who completed the intervention and completed the course were included. Results from the ANCOVA test showed that semester grades did not significantly differ based on condition, $F(2,52) = .205, p = .815$ (see Table 3 in Appendix B).

Insert Table 3 about here

Research question 2: Question two focused on whether a significant difference would be found between the two experimental conditions, that is, between an expressive writing exercise that stimulated process-oriented mental simulation and one that focused only on a desired academic goal. Since the non-significant omnibus F value indicated that none of the three conditions differed significantly in terms of final grades, no post-hoc analysis of the simple effects was needed to determine that the two experimental conditions did not differ in terms of final grades.

Research question 3: Another question in this study asked whether pre-intervention levels of perceived self-efficacy among participants would moderate the influence of mental simulation in an expressive writing context on academic

performance. Regression equations were computed that included a multiplicative interaction term representing the interaction of the experimental variable (writing condition) with self-efficacy. More specifically, a regression equation was computed with semester grades as the dependent variable, and (a) writing condition, (b) pre-intervention self-efficacy, and (c) a multiplicative interaction term (condition X self-efficacy) as independent variables. Moderator effects would be indicated by the significant effect of the multiplicative interaction term. Results of the regression showed a significant effect for the multiplicative interaction term (self-efficacy X condition) on academic performance, $\beta = 2.246$, $t = 1.980$, $p = .053$, suggesting that self-efficacy did moderate the effects of the writing exercises on academic performance (see Table 4 in Appendix B).

Insert Table 4 about here

Research question 4: Did the utilization of mental simulation in the context of an expressive writing intervention differentially influence the perceived academic self-efficacy of the participants? A repeated measures test showed no significant within-subject interaction effect, $F(1, 43) = .157$, $p = .855$, indicating that there were no significant differences between pre- and post-intervention levels of self-efficacy among participants based on condition.

Research question 5: To determine whether levels of optimism among participants moderated the effect of writing condition on academic performance, a regression

equation was computed with semester grades as the dependent variable, and condition, pre-intervention levels of optimism, and a multiplicative interaction term (condition X optimism) as independent variables. Moderator effects would be indicated by the significant effect of the multiplicative interaction term. Results of the regression showed no significant interaction effect, $\beta = .783$, $t = .949$, $p = .347$, suggesting that optimism did not moderate the effects of condition on academic performance.

Research question 6: The data included in the analyses that included post-intervention scores had the following gender distribution: 15 males and 32 females. The final research question asked whether the participants' gender would be associated with differences in academic performance. The ANCOVA test found no significant interaction effect (gender X condition) on semester grades, $F(2, 42) = .673$, $p = .515$, indicating that the gender of participants did not moderate the influence of writing intervention on semester grades in this study (see Table 3 in Appendix B).

One final analysis examined whether the specific condition that participants were assigned influenced the number of drop-outs. A chi-square test was used to examine differences in the number of participants for the first and last days of the writing intervention based on the assigned condition, and results showed no significant differences in the frequency of drop-outs, $\chi^2(2, N = 61) = .13$, $p > .10$.

CHAPTER V

DISCUSSION

There is a great deal of evidence in the scientific literature showing that mental simulation exercises that focus on ways of achieving academic success can influence subsequent academic achievement (e.g. Taylor & Pham, 1997), and there are a number of studies that show an association between expressive writing in general and improvements in academic performance (see Francis & Pennebaker, 1996), so it seemed theoretically possible to combine the two in order to influence academic outcomes. However, this study failed to find any significant association between mental simulation in an expressive writing context and academic performance due to the low participation rates and the resulting small cell sizes. There are a number of possible factors that impacted the results of the present study, including a high rate of attrition, and the fact that data collection was Web-based instead of the traditional paper and pencil method. There is a remote possibility that the expressive writing exercises combined with mental simulation techniques somehow cancelled each other out in terms of effects, but this seems unlikely. Theoretically, expressive writing inherently includes the use of mental simulation, and most of the mental simulation research included some written documentation of the simulations by the participants as part of the process.

The single significant result of the present study was the statistically significant effect for self-efficacy as a moderator of academic outcome. Moderators are qualitative or quantitative variables that influence the strength and/or direction of the relationship

between an independent variable and a dependent variable (Baron & Kenny, 1986). In this study, self-efficacy was found to have a positive moderating effect on the relationship between the expressive writing conditions and academic performance. In other words, the level of perceived self-efficacy among participants was positively predictive of academic performance, and significantly influenced the direction of the relationship between the expressive writing conditions and semester grades. This finding is in line with the general research literature on the topic. For example, a number of studies (Pajares, 1996; Pajares & Kranzler, 1995) have shown that the direct effect of self-efficacy on academic performance is as strong as the effect of ability. The research literature on self-efficacy suggests that knowledge, skill, and prior attainments are often poor predictors of subsequent achievement because the beliefs that people have about their abilities strongly influence behavior. Self-efficacy beliefs influence the choices people make and the level of effort they will sustain on a given task, and level of effort or persistence has been shown to be as predictive of achievement as ability (Bandura, 1997).

One potential factor in the accurate measurement of self-efficacy is the level of specificity of the measure. Scales that measure generalized self-efficacy are considered to be less predictive than those that measure task-specific levels of self-efficacy (Bandura, 1997). Accordingly, the Self-Efficacy for Self-Regulated Learning (SE-SRL) scale (Gredler & Schwartz, 1997) used in this study was specifically tailored to college students. The scale measured the perceived levels of self-efficacy specific to self-regulated learning, which provided a method of assessing levels of self-efficacy that closely correspond to academic performance among participants rather than more generalized perceptions of self-efficacy.

However, this study found no significant association between levels of optimism and academic performance despite a great deal of research evidence suggesting a strong relationship between the two variables (Scheier, Carver, & Bridges, 1994; Cameron & Nicholls, 1998). The Life Orientation Test Revised (LOT-R) used in this study has been shown to be a reliable measure of dispositional optimism. Dispositional optimism is conceptualized as a generalized inclination to expect favorable life outcomes, and optimists tend to hold positive expectations for future performance. Like the influence of self-efficacy, optimistic performance expectations lead people to be more persistent or to expend more effort on attaining their goals (Carver & Scheier, 1985). For these reasons, studies often find that optimism is positively correlated with academic performance (e.g. Cameron & Nicholls, 1998). The lack of significant findings between optimism and performance in the present study is therefore puzzling, but may be due to potential limitations in the scope and design of the study and the small sample size.

Limitations

The results of the present study lead to a number of questions. Because of the general lack of significant findings in this particular study, it may be useful to speculate on the potential limitations that may have influenced the results, specifically about the methodology utilized in this study. One potential limitation of this study's design may involve the Web-based method of data collection, since few published studies have investigated the differences between Web-based data and data collected via more traditional methods. None of the recent research on expressive writing or mental simulation has used Web-based data collection methods. Instead, as far as can be determined, all of the mental simulation and expressive writing literature indicates that

researchers continue to use traditional “pencil and paper” methods for expressive writing exercises, mental simulation documentation, and collecting responses to questionnaires. One assumption is that this simply reflects a delay or lag among researchers in the implementation of technological improvements to their research methods. Although there are a number of initial “start-up” costs to designing and implementing a Web-based approach to research, the potential advantages would seem to make such an investment of time and effort worthwhile.

While Internet-based social science research is still relatively new, there are a number of advantages to this method over traditional methods. For example, the scheduling of participation is less problematic; participants can log-on to the website and do the expressive writing exercise at any convenient time or location. Another advantage to the researcher is that the content of the writing exercises as well as data from the psychological instruments are saved into data files without the need for transcription, thus avoiding the problem of transcription errors. In research comparing computer-assisted versions of surveys to traditional paper-and-pencil versions, researchers have reported advantages such as less costly data analysis using the computer-based survey and that incidences of incomplete or missing data were less likely to occur (Hallfors, Khatapoush, Kadushin, Watson, and Saxe, 2000).

In addition, there is growing evidence that the accuracy and reliability of computer-based data collection methods is comparable to traditional methods. For example, a meta-analysis of studies that compared traditional paper-and-pencil surveys with Internet surveys in a wide range of applications and in a number of settings concluded that the paper-and-pencil and the Internet surveys yielded similar results

(Rosenfeld, Booth-Kewley, and Edwards, 1993). The results of more recent comparison studies have also suggested that the scores on computerized and paper-and-pencil versions of psychological measures were comparable. For example, scores from computerized and paper-and-pencil versions of the Self-Description Questionnaire (SDQ) and the Rosenberg Self-Esteem scale have been shown to yield comparable results (Vispoel, 2000; Vispoel, Boo, and Bleiler, 2001). A study of almost 2300 middle school and high school students randomly assigned to either a paper-and-pencil version or a computer-based version of a survey on the issue of alcohol, tobacco, and drug use showed that reports of substance abuse did not differ significantly across survey methods (Hallfors, Khatapoush, Kadushin, Watson, and Saxe, 2000). Also, these studies have found that participants preferred the computerized versions of the assessment to the paper-and-pencil versions. Participants reported that the computerized versions were more enjoyable and comfortable and were easier and less fatiguing to use.

However, despite these conveniences associated with Web-based data collection, research continues to suggest a number of potential problems, including participant dropout (O'Neill & Penrod, 2001) and inhibition of participants (Joinson, 1999). One concern in the present study was whether participants completing the writing exercises via the Internet might be less motivated to complete the study compared to previous studies that involved supervised participation or whether their responses may have been affected by the presence of potential distractions. A review of recent research literature on the implications of Web based data collection sheds some light on these issues.

For example, there was a significant dropout rate in the present study resulting in a small sample size, posing a significant limitation in the present study in terms of

analytical power and representativeness. Participation in the present study dropped from 99 participants the first day to less than sixty by the fourth day. In a recent study, O'Neill and Penrod (2001) examined response differences in participants based on whether they completed a survey at home via the Internet or in a laboratory setting and found that responses were similar, which provides further evidence of the accuracy and reliability of computer-based data collection methods. However, the O'Neill and Penrod study also found that there were large dropout rates in the Web-based samples compared to those completing the survey in a laboratory setting. Similarly, a study of college students that compared both the form of administration (paper and pencil vs. Web-based) and whether participation was in a supervised classroom setting or at home found that the participants who were asked to complete the survey on the Web at home were substantially less likely to complete it than were those in the other conditions (Cronk & West, 2002). Researchers suggested that this dramatic decrease in response rates could be based on factors such as limited access to or convenience of using computer technology, and a lower level of comfort with technology among participants. Computer technology provides a multitasking environment that allows the computer user to do a number of things at the same time, and this may lead to distraction on the part of the participant. For example, a participant can be doing the writing exercise for the study and at the same time receiving email or Instant Messaging pop-up messages; they can play music videos within a smaller window on the same screen; they can even have multiple applications open and active on the computer such as news or entertainment websites, games, or a variety of other potential distractive activities. Basically, the use of a computer in this way in an unsupervised environment may involve a number of distractions that militate against

adherence to the instructions for the writing exercise or accurate responses to survey questions.

Another potential issue that can impact participation is when personal information is required in a study and participation is not anonymous. Some researchers have suggested that Web-based surveys can facilitate self-disclosure among research participants (Davis, 1999), but lack of anonymity may counteract this feature. Without anonymity, social anxiety and social desirability can increase and lead to increases in the dropout rates (Joinson, 1999). Specifically, social anxiety and social desirability has been shown to decrease when participants provide personal information via the Internet rather than in a supervised laboratory condition, but the same study found that social anxiety and social desirability increase when participation is non-anonymous when compared to anonymous participation. Another study found that requesting that participants to provide their email addresses significantly increased the attrition rate for a Web-based survey (O'Neill & Penrod, 2001). This issue could have contributed to the high dropout rate in the present study since participants were required to provide personal information such as their name and social security number each day of the study, as well as the personal nature of the psychological measures and writing exercises. Participants were informed at the beginning of the study that all personal information would be kept strictly confidential and that identifying information would be removed at the end of the study, but the influence of those assurances may have diminished over time while the immediate non-anonymous aspects of the study were made apparent by requiring them to provide their name and social security number for each day of participation. These daily requests for identifying personal information may have had an effect on participants' perceptions

of privacy despite the initial assurances of confidentiality.

Another potential limitation of this study involves the way that mental simulation techniques were applied. The research literature on mental simulation and academic performance evaluated the efficacy of mental simulation techniques in a relatively short-term time frame. To measure the effect of mental simulation on test scores, participants engaged in mental simulation for an average of 5 days prior to the exam (Taylor & Pham, 1996). Studies that measured the effect of mental simulation on project completion incorporated a longer time frame (Pham & Taylor, 1999), and the results of those studies showed that mental simulation techniques could influence academic performance over a number of weeks. But the time frames in those studies are still significantly shorter than the present study. Perhaps the mental simulation techniques that participants engaged in were effective, but simply not powerful enough to carry through the entire semester worth of assignments and exams in order to influence the final academic outcome. Also, researchers in the studies of mental simulation provided verbal instructions to the participants about how to engage in mental simulation techniques. In the present study, one potential limitation is that instructions were only provided in written form. Any misunderstanding or confusion regarding the instructions could not be addressed in the present study. Perhaps the inclusion of a Web page of frequently asked questions would help provide needed information to participants with concerns about the mental simulation techniques utilized in the study.

Yet another potential limitation of this study is related to the demographic composition of the participants. In the introductory chapter of his popular statistics textbook, Stevens (2002) warns, “Another problem, endemic in psychology, is the use of

college freshmen or sophomores. This raises real problems, in my mind, in terms of data integrity” (pg. 50). In the present study, 82% of the participants were freshmen and another 10% were sophomores. According to Stevens, these college students are unlikely to bring the necessary levels of attention and concentration to an experimental intervention that requires sustained effort and reflection, as this study does.

Implications for Future Research

One important question that arises from the non-significant findings of this study is whether the results would have been similar if the study was done using a “paper-and-pencil” method of data collection instead of the Web-based approach. Although the research literature suggests that computerized and paper-and-pencil versions of psychological measures are comparable, there may be differences in the impact of the writing exercises depending on method of collection. Future studies could examine this potential difference by comparing a “paper-and-pencil” method where participants engage in the writing exercises in a supervised setting with a Web-based writing intervention similar to the present study. This comparison between the two methods would help determine whether the efficacy of expressive writing is reduced when it is done on-line.

The same holds true for the efficacy of mental simulation. One issue that may have influenced the outcome of the present study is the potential for time to be a limiting factor in the efficacy of mental simulation. Participants engaged in 4 days of mental simulation at the beginning of the semester and the outcome was measured at the end of the semester. If the effects of mental simulation were relatively short in duration then a more effective research design would be to collect multiple measures of academic performance

throughout the semester. This design would reveal any potential immediate effects of the mental simulation exercises that may decline over time. For example, it might show that participants in the intervention group performed better on mid-term exams and assignments subsequent to the 4 days of mental simulation compared to the control group, but that these improvements diminished over time so that no significant differences would be seen in final grades.

Finally, analysis of the actual writing content generated by the expressive writing intervention represents another area for future research. Although beyond the scope of the present study, linguistic analysis of the daily writing exercises submitted by participants may provide additional insight into a number of areas related to mental simulation and academic performance. For example, content analysis might contribute to a better understanding of the specific mental simulation techniques used by participants that are associated with academic success. The potential relationship between word usage and academic performance could be explored, as well as the idea that word usage might be predictive of levels of optimism and self-efficacy among participants. Appendix B includes a number of typical and atypical writing samples from the study. A future study could focus on an analysis of the content to investigate whether a relationship exists between the number of words written each day and academic performance. In the present study, participants were required to write a minimum of 100 words each day. Typically, participants seemed to keep close to the minimum requirements. However, writing sample 9 in Appendix B is an example of an atypical submission in which the participant wrote almost 900 words. Also, writing samples 7 and 8 are atypical examples of writing exercises in which participants did not follow the instructions and, instead, complained

about the instructions or wrote about negative aspects of their academic experience. It would be interesting to investigate whether these differences in the number of words written or adherence to the instructions are associated with differences in academic performance or self-efficacy. Future studies could address these questions.

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Appendix A

Expressive Writing Study

Solicitation Script

We are investigating the psychological processes associated with writing about various topics on the Internet. Principle investigators for the study are Dr. Steve Harrist and Art McGovern in the School of Applied Health and Educational Psychology at OSU.

Participating in this study will require about 30 minutes per day for 4 consecutive days – a total of about 2 hours of your time. Your involvement will consist of writing for 20 minutes and filling out some brief questionnaires. Approximately 2 weeks later you will be asked to fill out a follow-up survey that will take approximately 20 minutes to complete. You can participate by going to the study website at the times you choose. You may receive credit for an optional assignment or extra credit in this course for participating in the study depending on the arrangements your instructor made with our research team.

Consistent with previous research in this area, we will also request your permission to find out academic achievement after the study. The information you submit can only be accessed by our research team and will remain private. All data collected in this study will remain strictly confidential and only group results will be reported. Risks associated with participating in this study are minimal.

Life Orientation Test – Revised (LOT-R)

Instructions:

Please answer the following questions about yourself by indicating the extent of your agreement using the following scale:

[0] = strongly disagree

[1] = disagree

[2] = neutral

[3] = agree

[4] = strongly agree

Be as honest as you can throughout, and try not to let your responses to one question influence your response to other questions. There are no right or wrong answers.

- _____ 1. In uncertain times, I usually expect the best.
- _____ 2. It's easy for me to relax.
- _____ 3. If something can go wrong for me, it will.
- _____ 4. I'm always optimistic about my future.
- _____ 5. I enjoy my friends a lot.
- _____ 6. It's important for me to keep busy.
- _____ 7. I hardly ever expect things to go my way.
- _____ 8. I don't get upset too easily.
- _____ 9. I rarely count on good things happening to me.
- _____ 10. Overall, I expect more good things to happen to me than bad.

Self-Efficacy for Self Regulated Learning Scale

Instructions:

Please answer the following questions about yourself by indicating the extent of your agreement using on a scale of 1 to 7, where:

[1 = not well at all] and [7 = very well]

How well can you...

- ___ 1. Finish assignments by deadline.
- ___ 2. Prepare for courses even when there are more interesting things to do.
- ___ 3. Concentrate on school subjects.
- ___ 4. Take class notes.
- ___ 5. Use appropriate resources to get information for class assignments.
- ___ 6. Plan your class work.
- ___ 7. Organize your class work.
- ___ 8. Remember information presented in class.
- ___ 9. Remember information presented in textbooks.

Questions continue on next page...

Please answer the following questions about yourself by indicating the extent of your agreement using on a scale of 1 to 7, where:

[1 = not at all] and [7 = very often]

How often do you...

- ___ 10. Arrange a place to study without distractions
- ___ 11. Motivate yourself to do your assignments.
- ___ 12. I turn off the TV/radio so I can concentrate on what I am doing.
- ___ 13. I write things down I want to remember.
- ___ 14. If I have problems with an assignment, I ask a friend to help.
- ___ 15. Before beginning a project, I get as much information as possible about the topic.
- ___ 16. When preparing for a test, I reread my textbook.
- ___ 17. I plan what I am going to do before I begin a class project.
- ___ 18. If I have problems with an assignment, I ask a teacher to help.
- ___ 19. I paraphrase written information when I am studying.
- ___ 20. When preparing for a class meeting, I reread my class notes.
- ___ 21. When preparing for a test, I reread my class notes.
- ___ 22. I check over my work to make sure I did it right.
- ___ 23. I isolate myself from anything that disturbs me.
- ___ 24. When preparing for a class meeting, I reread my textbook.

Appendix B

Table 1

Descriptive Statistics: Means of Dependent Variables and Sample Sizes

	Means of Dependent Variables							
	Condition 1 Males = 6 Females = 8 n = 14		Condition 2 Males = 3 Females = 12 n = 15		Condition 3 Males = 5 Females = 12 n = 17		Totals Males = 14 Females = 32 N = 46	
	Means	S.D	Means	S.D	Means	S.D	Means	S.D
Grades								
Males	67.33	5.20	64.00	8.88	65.64	21.45	65.64	12.90
Females	57.62	10.99	67.91	9.65	71.00	12.99	66.50	12.21
Totals	61.78	10.01	67.13	9.33	69.11	15.49	66.23	12.29
Self-Efficacy (post)								
Males	4.75	.84	5.13	1.11	5.15	1.01	4.97	.90
Females	5.05	.74	4.97	.67	5.15	.55	5.06	.63
Totals	4.92	.77	5.01	.73	5.15	.68	5.03	.72

Table 2

Reliability Scores for Self-Efficacy and Optimism Scales

Cronbach's Alpha		
Instrument	Pre-Intervention	Post-Intervention
Self Efficacy (SE-SRL)	.89	.89
Optimism (LOT-R)	.74	.68

Table 3

ANOVA Test results showing no significant effect for condition on academic performance and no significant interaction effect of gender with condition

(Research questions 1 and 6)

Source	Mean Square	F	Sig.
Condition	32.895	.205	.815
Gender	9.89	.062	.805
Condition * Gender	108.03	.673	.515

Table 4

Regression results for moderating effect of self-efficacy on academic performance

(Research question 3)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	105.051	33.635		3.123	.003
Self-Efficacy (SE)	-8.538	6.748	-.481	-1.265	.212
Condition	-28.625	15.326	-1.945	-1.868	.068
SE * Condition	6.043	3.053	2.246	1.980	.053

WRITING SAMPLES FROM PARTICIPANTS

The following are randomly selected examples of the writing samples that represent adherence to the instructions:

Writing Sample 1 (Outcome Simulation Condition)

I have an A!!! I first see myself with a big smile on my face. I have a good feeling in my heart. I feel that I have done what I needed to do... I've studied hard, done extra problems for my own self, read every chapter and taken my own notes for chapters we have done, done all the PLE, done all the assignments, and done well on all the tests. I know that I can do this on my own - I don't need a simple high school setting to fully exceed anymore! I am proud. I get up and do a little dance!! :O) And have this overwhelming feeling that I just can't control! I immediately call my boyfriend or go tell him the grade I have received! He congratulates me! :o) I call my dad and tell him the news - he will tell me well you worked hard, you deserve it! All this makes me think I can go on and succeed in the next course - Chem II. But I think to myself, you will have to study harder because a lot of this material in Chem II you have not had in high school. I know that I will need all of my knowledge from both my Chemistry in high school and Chem I in college as a strong basis to succeed in this class. I will have to probably study harder, but keep my habits. But then I think I have a month (Christmas Break!!!) until I have to think about that, so I smile again and think to myself, "Good job!" My A in this class will motivate me to get the same grade in Chem II. I then look at my other grades and hope that I see a 4.0 - that would be the best thing in the world!!! Being as close to perfect as possible in all of my work is my biggest goal. That's why I check every little detail a million times before I hand something in. It's just me! :O)

Writing Sample 2 (Outcome Simulation Condition)

I would be extremely joyful if I earned a good grade in Chemistry. Chemistry does not come very easy to me so I know that I had worked hard and put in the time to do well. I would feel a great sense of self worth and satisfaction that I did well in something that I wasn't necessarily good at. Accomplishing something through hard work is the best type of accomplishment to me. I know in high school I did not do very well in my chemistry class so I figure that I get another shot to do well in the course. Doing well in the course would give me confidence in knowing that I could earn a good grade in any class I take by working hard and preparing like I did for Chemistry. Setting a goal and accomplishing it would be something that would make me very proud. If I made a good grade in the class, that would mean I had gotten off to a good start in college. I want to earn a good grade point average my first year in order to keep the moment going throughout my years here.

Writing Sample 3 (Process Simulation Condition)

When I picture myself doing well in Chemistry this semester, it only comes from my visions of hard work and a lot of out of class studying. When I am studying in my room for chemistry, most of the time I like to have my door shut, and depending on what mood I'm in I will more than likely either have my window open or have some music on. I don't like to study in complete silence, but I do like to study by myself for the most part. I

seem to get the best work done when other people aren't distracting me. I have found from past experience that I seem to "zone out" when there are no background noises. Before my first exam in chemistry, which was today, I have had a couple of study sessions with the girl across the hall, who is also a biochem major and in her first year of chemistry. It helps because we can ask each other questions that I feel silly asking people who have been in chemistry in the past. I think that my ability to adapt to studying with a partner in this class will actually help me understand more because I will be reinforcing it when I am going over it with her.

Writing Sample 4 (Process Simulation Condition)

The main things that are essential in ensuring academic success are attending class regularly, studying everyday, turning in all assignments on time, and when studying take breaks. There are many obstacles that arise during study time and while I try to do my homework. Things such as Television, people, social events and just being unmotivated. There are things that I try to do to overcome these small bumps on my road to success. If I find a place to study away from the dorms that's quiet I usually don't have any interruptions and can get my studying finished. Also taking breaks keeps me from getting bored with what I am trying to do. I just have to keep the mind set that I have to get it done no matter what even if something else is a lot more fun than what I am doing. In doing these things I will be well on my way to success in college.

Writing Sample 5 (Control Condition)

Tomorrow I am going to wake up around 10:00 A.M. After that I am going to take a shower and go running. When that is over hopefully it will be around 11:00 a.m., and then I am going to study for some of my chemistry test. At 12:00 p.m. I am going to go eat some lunch down stairs in the cafeteria. After that I am going to read my English assignment. After that maybe I will take a break and watch some t.v. or play the guitar. At 2:30 p.m. I have English class and at 3:30 p.m. I have chemistry. After chemistry I am going to review some chemistry before the chemistry test at 5:30. After the test I am going to eat dinner, and then go to the fraternity house to hang out. After that I am going to go to study hall until I go to bed later on that night around 12 or 1 a.m.

Writing Sample 6 (Control Condition)

Tomorrow I am going to get up at 7:30. I am going to take a shower, get ready for class, eat, and then go to class. After class I am going to come back and study. I will eat and then go to another class. I will sit through that class, take notes, and talk to my friend. After that class I might go eat at the union with my friend or I will come back to my room and eat here. I will study then too. I have a test wed. that is going to kill me. I am going to force myself to study chem. more. I will drive myself insane but I have to do it! I will go to chem. at 3:30 and then come back and probably fall down on my bed after I scream. Chemistry is not my subject. I don't understand it very well and I cannot teach it to myself and others have not been too successful in their tries to teach me. I will call Tabitha to make sure she knows my schedule and to find out where I need to go on Tuesday. I will eat dinner with my suitemates. We will go downstairs, or somewhere else to eat. If neither of them have a one lined calculator I can borrow for my exam; I will go to Wal-Mart and buy one. I will be studying all night most likely try to understand

everything and to get everything done. I want to go to bed by 12 but I will just have to wait and see. The weather is supposed to be nice so I think I am going to wear my khaki capris, a tan/brown shirt, and my brown saucony shoes. That way I am comfy and I can still ride my bike. Those are my plans for tomorrow!

The following are randomly selected examples of the writing samples that represent violations of the instructions or extremes:

Writing Sample 7 (Process Simulation Condition)

Once again I am have a hard time doing that. I was finishing my homework that is due today in class and studying for my test in there on Wednesday. I was really ahead of the game and was doing well. I was finishing the homework that I had been working on for a couple of days and not any of the questions made since. It was two in the morning and I was getting very frustrated. Come to find out there was a mistake on the web site and my professor just posted a message the night before the homework was due. I had to go back and redo a lot of my problems, and they were problems that I could have done fairly quickly if the right problems were given to us in the first place. It is hard to do well in a class if the teach can't get the questions right on the homework in the first place and then he wants you to finish them the day they are due. That is a lot to ask.

Writing Sample 8 (Outcome Simulation Condition)

Okay I have discussed the same topic the first and the second day now the third? I am running out of things to say about this one topic. Is that part of the experimint or is my computer messing up on me and depriving me of valuable extra points. I hope I am doing everything correctly so that I can get my EC and therefore make it more possible for me to achieve my academic success that I have set for myself. I don't know if its just me but I think this is getting a little weird we are just supposed to talk about the same subject for four days straight what is that going to prove we can babble on and on about how great we can envision ourselves doing. We'll I for one can only ramble for so long before I just start becoming repetitive and it becomes dull and boring what I am talking or in this case typing about. But I will continue on and I will keep typing about how excited and overwhelmed I will feel when I see that I have received a very spectacular grade in my Chem 1314 class. I will be very happy and my self-confidence and self-esteem will go through the roof. I can almost picture it now I am just jumping up and down when I finally get the audacity to look at my final semester grade. But after going through the nervousness of the whole situation and of the fear of failure and finally look at what grade I have earned I am pleasantly surprised by the fact that I did remarkably well and that I succeeded in my academic goal. So therefore I am very happy and happy and even more happy. Along with more other academic success that I will encounter. The best thing to do is to enjoy the moment of pure joy and then let it pass so it does not block my thinking and strive to want to better myself academically and set more goals so I can accomplish them also.

Writing Sample 9 (Control Condition)

Hello again, tomorrow is going to be a better day than today. I'm going to get up around noon, cause I'm going to sleep in forever. Once I get up ill take a shower and get dressed, then ill do a lot of my homework. I cant wait to get it all done. I don't have any classes tomorrow, I think ill go out to the bike trail and ride my bike for a while with my girl friend. When were done riding our bikes, I'm going to play my guitar and we'll look at the stars. I'm going to watch a couple of movies throughout the day, but I'm mainly going to be doing homework. I'm going to do my psychology homework, because it will be the fastest. After that I'm going to read a chapter in history. I have six more chapters to read and I have a test on Thursday. I'm going to study a lot of biology too, because I have a biology test on Monday. I'm not prepared for that test and it's going to rip me apart just like my chemistry test did. I'm not in the right major, I should probly change it. I have forever to do that though so I'm not going to do that tomorrow. I plan on going to the football game tomorrow night. I think were playing South Missouri State. I hope we beat them, but not as badly as we beat whoever we played last week. Wisconsin. I'm going to read my Bible tomorrow. I haven't done that lately and I need to spend time with God. If preacher bob is outside I don't plan on arguing with him because I feel like god doesn't want me too. Its almost ten o'clock now, I only have like fifteen minutes left with this assignment. I'm going to do my PS4 tomorrow for chemistry and really buckle down and study even harder for that course. It is a hard course and I don't want to get really far behind. Tomorrow I'm going to eat a late breakfast at lunch. Ill probably eat a grilled smoked turkey sandwich from Stout Coffee, because that is where my girlfriend will be. Ill eat the sandwich then me and her will study. For dinner my girlfriend and me will order a pizza from little Caesars. They have this great deal where you can walk in and pick up a large pepperoni pizza for 5 dollars and crazy bread for 99cents. I cant wait to eat it. I love going there because the food is great and it's cheap. I have some of there pizza in the fridge right now. I'm thinking I might eat them for a snack tomorrow. I have to do my prelab activities for my Biology lab, its due on Thursday but I cant think of a better time to do it than tomorrow. I found that if I do the extra credit that is available then I will make up for all the points that I lose from simple mistakes. I plan on doing that extra credit tomorrow when I study. I'm not sure what all I have to study yet, but I know I got three tests next week. I plan on studying for those three classes mainly. Then again Chemistry is the one class I don't have a test for next week and it is my hardest class. I plan on doing this survey again tomorrow night probably about the same time I'm doing it tonight. Tomorrow is the day before my birthday, but me and my girlfriend are celebrating tonight. We went and bought all three of the Jurassic park movies and were going to watch them all tonight. This is the best way to spend a Friday night. I plan on going to sleep tomorrow around 3 or 4 in the morning. I like to stay up really late on the weekends because I can. Its great. I'll take another shower before I go to bed tomorrow night. I like to be clean before I get into bed. I shave at night because it is a pet peeve that I don't like to do in the morning. Especially before a 730 am class. It's the worst. Six more minutes and I'll be done with this survey for tonight. I can't wait. Then I get to get back to the movies I'm watching. Sometime tomorrow I may go out to Wal-Mart. I like to ride my bike out there because its good exercise. Sometimes my girlfriend comes with me but lately I've just been going by myself. I'm really nervous about getting over weight in college, but I don't do much about it. If I were to become

over weight then I would have failed myself because I never want to be that way. I'm not in awesome shape anymore but that's expected. I haven't done a sport since last fall and that was it. Tomorrow morning I'm going to go ride my bike. That is around 1245 after I get out of the shower. I'm going to watch king of the hill tomorrow, and the Simpsons because I really enjoy those two shows. There is a lot of truth in them and they are very entertaining. Well I'm just about done for tonight. I'll write again tomorrow around the same time. bye

Appendix C

**Oklahoma State University
Institutional Review Board**

Protocol Expires: 9/1/2004

Date: Tuesday, September 02, 2003

IRB Application No ED0422

Proposal Title: THE INFLUENCE OF MENTAL SIMULATION IN AN EXPRESSIVE WRITING CONTEXT
ON ACADEMIC PERFORMANCE AND THE MODERATING INFLUENCE OF SELF-
EFFICACY, OPTIMISM, AND GENDER

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Stillwater, OK 74078

Reviewed and
Processed as: Expedited

Approval Status Recommended by Reviewer(s): Approved

Dear PI :

Your IRB application referenced above has been approved for one calendar year. Please make note of the expiration date indicated above. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved projects are subject to monitoring by the IRB. If you have questions about the IRB procedures or need any assistance from the Board, please contact Sharon Bacher, the Executive Secretary to the IRB, in 415 Whitehurst (phone: 405-744-5700, sbacher@okstate.edu).

Sincerely,



Carol Olson, Chair
Institutional Review Board

VITA 

Arthur R. McGovern

Candidate for the Degree of

Doctor of Philosophy

Dissertation: THE INFLUENCE OF MENTAL SIMULATION IN AN EXPRESSIVE WRITING CONTEXT ON ACADEMIC PERFORMANCE AND THE MODERATING INFLUENCE OF SELF-EFFICACY, OPTIMISM, AND GENDER

Major Field: Educational Psychology

Biographical:

Educational: Graduated (Summa Cum Laude) from Northern Arizona University, Flagstaff, Arizona with a Bachelor of Science degree in Psychology in May, 1999. Graduated from Oklahoma State University, Stillwater, Oklahoma, with a Master of Science degree in Gerontology in May, 2001. Completed the requirements for the Doctor of Philosophy degree at Oklahoma State University in May, 2004.

Experience: Worked as a network engineer in the Washington, D.C. area for a number of years before returning to pursue an interest in psychology. Employed as Co-Director, Instructional Effectiveness Training Program, Oklahoma State University, from 2001 to 2003. Employed as a teaching associate, Oklahoma State University, from 2001 to the present. Member of a research team, School of Applied Health and Educational Psychology, involved in all aspects of the scientific research process, including the formulation of hypotheses, research design, data collection, analysis, and authorship.

Professional Memberships: Phi Kappa Phi National Honor Society, Association of Human Resource Development.