AN ABSTRACT OF THE THESIS OF

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Title: Does Coloring Increase the Ability to Cope with Stress?

Abstract approved:

This study examined if coloring activities reduced researcher-induced stress while influencing creativity, flow, and anxiety levels in college students. I utilized the Trier Social Stress Test for Groups (TSST-G) for stress induction, the State-Trait Anxiety Inventory (STAI) to measure anxiety levels, the Flow Short Scale (FSS) to measure current flow state, and the Creativity Experience Questionnaire to measure creativity and activity enjoyment. Participants for the current study included 84 students from a midsize Midwestern college (21 completed color-by-number mandalas, 21 colored plain circle mandalas, 21 completed template mandalas, and 21 read magazines as controls). Results of mixed factorial design ANOVAs showed that the TSST-G significantly increased STAI state scores while trait scores remained constant; however, there was no significant difference in post-TSST-G state scores between those who colored mandalas and those who read magazines. Therefore, coloring mandalas before stress induction did not increase the ability to cope with induced stress. Results of several MANOVAs showed that the type of activity (coloring or reading) significantly influenced activity creativity, activity enjoyment, and flow absorption state. Limited personal investment, lack of creative diversity, and timing of the coloring activity may have affected the lack of significance in post-TSST-G state scores. Additional studies that administer coloring

activities after stress induction may find that coloring soothes rather than prevents anxiety.

# DOES COLORING INCREASE THE ABILITY TO COPE WITH STRESS?

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A Thesis

Presented to

The Department of Psychology

EMPORIA STATE UNIVERSITY

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# CHAPTER 1

## INTRODUCTION

Creativity is "the ability to bring something new and unique into existence" (Malchiodi, 1998, p. 65), so engaging in a creative process can be as simple as choosing a new combination of colors to create a mandala. Previous research has shown that anxiety decreases when coloring and is significantly less when coloring a mandala or a plaid form as compared to coloring a blank sheet of paper (Curry & Kaiser, 2005). Creativity is an important component of both resilience and coping (Flach, 1988; Harms, 2005; Malchiodi, 1998; Wolin & Wolin, 1993). Resilience is a process that enables one to overcome adversity (Harms, 2005), and coping is one's striving to deal with challenging situations (Maluccio, 2002). Researchers have implemented programs based on these observations that utilize creativity to increase resilience and coping in traumatized individuals (Berger & Lahad, 2010; Jang & Choi, 2012; Prescott, Sekendur, Bailey, & Hoshino, 2008). However, there is not a quantitative study that compares anxiety levels in those engaging in creative activities before stress induction to those who do not.

Stress contributes to disease and mental illness (Dimsdale, 2008; Pflanz, 2001) and causes grave financial burdens to society (Bejean & Sultan-Taieb, 2005). Promoting creativity might be an economical solution for stress reduction and prevention. Using the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970), my colleagues and I found that, after stress induction with the Trier Social Stress Test for Groups (TSST-G; von Dawans, Kirschbaum, & Heinrichs, 2011), coloring a mandala significantly reduced state scores (Petersen, Wijata, Hajek, & Grover, 2015a). The TSST-G, a modification of the TSST, induces stress in a group of six by giving a speech

and performing an arithmetic task in front of peers and researchers, and is an effective and economical solution for stress induction that significantly increases cortisol levels, heart rate, and psychological stress (von Dawans et al., 2011). Historically, physiological tests detecting a stressful state induced by TSST-G are expensive and time-consuming. Participants self–reporting their perceived state and trait anxiety levels after TSST-G stress induction using the STAI can be a more economical and time efficient method to accurately and reliably measure stress (Metzger, 1976).

In my current study, I investigated if creativity, specifically coloring mandalas, increases resilience and enhances one's ability to cope with stress. Therefore, the purpose of this explanatory research study was to examine the relationship between coloring mandalas and coping with stress that compares anxiety scores, before and after stress induction, in those who engage in coloring mandalas compared to those who read magazines. The level of creativity and flow that participants experience while coloring mandalas might influence their ability to cope with stress. Consequently, participants colored different types of mandalas (plain circle mandalas, predrawn mandalas, or color-by-number mandalas) and then completed surveys on creativity, flow, and anxiety to ascertain if a more creative process that facilitates flow helps to cope more effectively with stress.

# Review of the Literature

Does engaging in a creative process aid in coping with stress? I explore the concepts and interactions of creativity, flow, coping with stress, and resilience by evaluating previous research on how creative processes, like coloring and art-making, influence anxiety levels and how creative activity programs and creative activities might aid in coping with stress and resilience. I discuss the methods of stress induction and the measurement of anxiety levels. Finally, I explain the focus of my current study while providing my research questions and hypotheses.

## *Creativity*

Creativity is, "the ability to bring something new and unique into existence (Malchiodi, 1998, p. 65),"or creativity is producing a creative product that is novel or original and useful or adaptive (Mumford, 2003). In contrast, creativity might only include a product that is both original and effective for society, depending on the current market to decide what is valuable and useful when comparing costs and benefits to society (Runco & Jaeger, 2012). When comparing the idea of creativity in artists versus psychology students, free artists, such as painters and sculptors, more constrained artists, such as architects and designers, and psychology students agreed that a creative person should have many ideas; however, psychology students saw creative processes evoking more positive feelings whereas artists associated creativity with hard work (Gluck, Ernst, & Unger, 2002). The concept of creativity has been difficult to study due to the lack of a consensus regarding the definition of creativity (Batey, 2012). The western perspective defines creativity as the original product of an individual, whereas the eastern perspective views creativity as self-growth or self-expression (Batey, 2012; Lubart, 1994). Both of

these creativity definitions are abstract, which creates difficulty in operationally defining "original product" and "self-growth or self-expression" measuring creativity. Creativity is difficult to measure and might only be assessed indirectly through self-report questionnaires or external judges (Piffer, 2012). Consequently, for the purposes of this study, creativity is creating something novel.

According to Malchiodi (1998), creativity is "a union of opposites, impressions, ideas, and concepts that initially seem unrelated; or as giving birth to a new idea," (p. 65), and she observed that creative people tend to be, "more independent, autonomous, self-sufficient, emotionally sensitive, assertive, self-accepting, resourceful, adventurous, and risk-taking" (p. 65). Csikszentmihalyi (1996) stated that the creative process involves five stages. The first stage, preparation, involves immersion into solving issues that inspire curiosity. Incubation occurs when the brain forms unusual associations below the conscious level of awareness. Insight is the "ah hah" moment when a connection is formed, and a solution is found. Evaluation involves deciding if the insight is feasible to pursue. Elaboration, the fifth stage, consists of time and work to transform the insight into a practical application. Flach (1988) identified better coping skills and greater inner resources in creative people like flexibility, high ego strength, responsibility, tolerance, self-control, intellectual efficiency, and openness to new experiences. Csikszentmihalyi (1996) stated that creative persons love the work they do and have found ways to achieve flow during the creative process.

*Creativity and flow.* Csikszentmihalyi (1975) researched flow by examining motivation of those committed to activities that did not have apparent external rewards, and he defined flow as "a psychological state in which the person feels simultaneously

cognitively efficient, motivated, and happy" (Moneta & Csikszentmihalyi, 1996, p. 277). Characteristics of the flow state include a balance between demands and skills that create an optimally challenging experience; no fear of failure; a merging of action and awareness; clear goals with immediate feedback and no contradictory demands; guidance by inner logic; intense concentration due to focused attention on a limited stimulus field and exclusion of distractions; an alteration in the experience of time; a loss of self-consciousness due to the merging of the activity and self; and participation in an intrinsically rewarding or autotelic activity (Csikszentmihalyi, 1975; Csikszentmihalyi, 1996; Rheinberg, 2008). Csikszentmihalyi's original model of flow proposed that the flow state occurs when there is an equal balance of challenge and skill when performing a task, so too much skill but too little challenge creates boredom while performing a task and too little skill but too much challenge creates anxiety while performing a task (Csikszentmihalyi, 1975). Consequently, flow could still occur regardless of the level of challenge or skill required in the task as long as skill and challenge were equal. However, Csikszentmihalyi M. and Csikszentmihalyi I. (1988) revised this idea of flow, shown as a quadrant model, and theorized that only high levels of skill and high levels of challenge result in the flow state (see Figure 1; Engeser & Rheinberg, 2008).

Several researchers investigated the link between flow and creativity. Moneta (2012) found that intrinsic motivation, modulated by the extent that a job provides opportunities for creativity, is associated with flow in work; high intrinsic motivation is associated with high opportunity for job creativity, compared to either no association or a negative association with low opportunity. Researchers found in a group musical

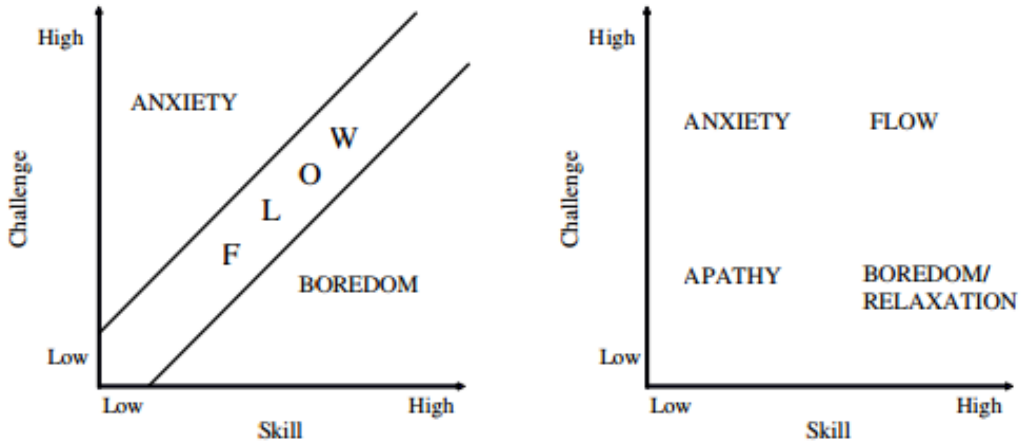


*Figure 1.* Left: The original flow model (Czikszentmihalyi, 1975) demonstrated that the flow state occurs during a task that requires equal amounts of skill and challenge, regardless of how high or low the levels are. Right: The adapted quadrant flow model (Czikszentmihalyi M. & Czikszentmihalyi I., 1988) exemplified that only a task requiring high levels of skill and challenge will produce the flow state. Figure from Engeser & Rheinberg (2008).

composition task that the creative quality of the musical composition, as assessed through creativity standards, was related to the students' group assessment of flow, gaining support for using flow as an assessment for creativity (Byrne, Carlton, & MacDonald, 2006; Byrne, MacDonald, & Carlton, 2003). Researchers found, through a computer system that analyzed the creativity of the mandala product and the degree of concentration while coloring, that concentration positively correlated with creativity (Kim, Kang, & Kim, 2009). Consequently, the flow state, with intense concentration involved, might be an important indicator of creativity, and because the experience of creativity is difficult to quantify, researchers might ascertain creativity by measuring flow. Rheinberg, Vollmeyer, and Engeser (2003; cf. Engeser & Rheinberg, 2008) developed the Flow Short Scale, a 16 question Likert scale inventory, that measures flow during a task, and the Flow Short Scale was recently validated in Turkish (Isiguzel & Cam, 2014). Consequently, measuring flow is important when studying the relationship between creativity, flow, and coping with stress.

*Creativity and stress.* Engaging in creative processes might help in coping with stress and increasing resilience. Wolin and Wolin (1993) identified creativity as one of seven resiliency "strengths" or builders because of creativity's function as a protective mechanism for those experiencing adversity. Specifically, creativity is a safe place for imagination, "where you can take refuge and rearrange the details of your life to your own pleasing" (Wolin & Wolin, 1993, p. 163). Being creative might positively impact the outcome of stressful and traumatic situations (Harms, 2005).

*Stress Induction*

Stress contributes to the development of cardiovascular disease (Dimsdale, 2008) and mental illness (Pflanz, 2001) and is creating a grave economic burden on society due to cost of care and loss of productivity (Bejean & Sultan-Taieb, 2005). By using a standardized stress induction technique and anxiety measure, I can ascertain if coloring a mandala increases the ability to cope with stress and enhances resilience.

A common stress induction method is the Trier Social Stress Test (TSST; Kirschbaum, Pirke, & Hellhammer, 1993). The TSST protocol consists of anticipating and giving a speech and performing an arithmetic task in front of judges. Several studies show that TSST induces a physiological stress response in participants with activation of the hypothalamus-pituitary-adrenal axis (HPAA) and the autonomous nervous system (ANS) leading to increases in stress hormones such as adrenocorticotropic hormone, cortisol, growth hormone, prolactin, and significant increases in heart rate (Hellhammer & Schubert, 2012; Kirschbaum et al., 1993). According to participants' self-reports, the TSST also increases psychological stress with significantly higher stress perception, anxiety, and emotional insecurity during the TSST protocol as compared to post-test (Hellhammer & Schubert, 2012). Importantly, personality traits of anxiety did not correlate with the increased cortisol release seen during the TSST, which means that participants with anxiety disorders did not respond differently than participants without anxiety disorders, strengthening the internal validity of using the TSST with random participants. Instead, the TSST induces personal responsiveness to stress (Kirschbaum et al., 1993). The key elements of the TSST that induce physiological stress are the uncontrollability of anticipating and giving a speech and the social-evaluative threat of

judges (Het, Rohleder, Schoofs, Kirschbaum, & Wolf, 2009). The TSST is an effective way to psychologically and physiologically induce stress; however, the TSST is inefficient to run when larger sample sizes are needed for statistical significance and multiple groups are required for comparisons because at least two researchers are needed to run the TSST on only one participant at a time.

Because the TSST induces stress in a single participant at one time, the TSST protocol can be costly in both time and research personnel. The Trier Social Stress Test for Groups (TSST-G; von Dawans et al., 2011), a modification of the original TSST, induces stress in six participants at one time while requiring only two researchers to serve as judges per group. The TSST-G is an effective and economical solution for stress induction that significantly raises cortisol levels, heart rate, and psychological stress (von Dawans et al., 2011). When comparing single participant responses from the TSST vs grouped participant responses from the TSST-G, both conditions cause equally intense stress reactions; however, participants undergoing the TSST-G have greater peak heart rates (Childs, Vicini, & De Wit, 2006). Therefore, the TSST-G might cause a greater stress reaction than the TSST because the social-evaluative component is more threatening with peers observing the speech and arithmetic assignments (Childs et al., 2006).

*Measurement of Anxiety*

The studies that developed and evaluated the protocols of the TSST (Kirschbaum et al., 1993) and TSST-G (von Dawans et al., 2011) showed that these protocols induce a physiologically stressed state as evidenced by the measurement and production of increased blood pressure, heart rate, and hormones. However, the physiological tests in

these studies are expensive and time-consuming. Consequently, participants self – reporting of their perceived anxiety level is more cost and time efficient than measuring the physiological indicators of stress. The STAI is a self-evaluative tool that measures anxiety (Spielberger et al., 1970). The STAI is a two-part survey with the same 20 questions repeated in the state and trait sections that prompt the participant to evaluate anxiety as a general characteristic in the trait section and as a current state of mind in the state section using Likert-scale items. Higher scores on the STAI signify increased stress, and lower scores indicate greater relaxation. An investigator found that the STAI is both a reliable and valid measure of stress, and the STAI discriminates between high and low-stress situations (Metzger, 1976). My study will draw on both the STAI and the TSST-G, developing a standardized and economical stress measurement and induction technique to reliably and efficiently measure and induce stress. Creative processes might decrease stress perception and aid in coping with stress, leading to resilience.

*Resilience and Coping*

Wolin and Wolin (1993) defined resilience as "the capacity to channel your pain rather than exploding" (p. 165). Resilience is a complex phenomenon involving individuals, the environment, and risks and protective factors that enable individuals to overcome the adversity they experienced (Harms, 2005). Coping occurs when an individual strives to deal with new and different situations, and adaptation occurs when an individual's potential develops in response to situations (Maluccio, 2002). Coping is dependent on an individual's effort to deal with stress and other challenging situations; consequently, resilience is a natural process of coping (Assimakopoulos, 2001). Resilience is a process that enables individuals to overcome stress, trauma, and adversity,

and both external factors such as one's environment and internal factors such as one's personality determine one's resilience (Assimakopoulos, 2001; Maluccio, 2002). Gnanaprakash (2011) found that brainstorming, as a creativity development intervention, helped improve creativity and decreased perceived stress compared to the control group without intervention, showing a negative correlation between creativity and perceived stress. Reynolds and Prior (2006) found in a qualitative study that women living with cancer reported their experiences of flow and creativity during art-making which helped "banish intrusive thoughts about cancer, provided valued experiences of mastery and control, and encouraged the participants to engage in positive journeys into the unknown, thereby alleviating some of the stress of cancer (p.1)." Because art-making experiences that generated flow and creativity helped women cope with the stress of cancer, processes that evoke creativity and flow might help those to cope with ongoing stress.

*Coloring a Mandala and Art-making*

Drawing a mandala and drawing on a piece of paper significantly lowered stress levels (Allen, 2011). After stress induction, anxiety, measured by a state anxiety inventory adapted from the STAI, not only decreased upon coloring but was significantly less in groups that colored the mandala or a square plaid form as compared to coloring a blank sheet of paper (Curry & Kaiser, 2005). Babouchkina and Robbins (2015) found that, after stress induction by writing stressful events, those who colored a blank circle (freely or with instructions to express feelings) reported significantly greater mood improvement compared to those coloring a square (freely or with instructions to express feelings) utilizing the Profile of Mood States inventory (McNair, Lorr, & Droppleman, 1971) for a total negative mood score. Engaging in an art-making activity, such as

painting or coloring a mandala, collage-making, still life drawing, sculpting with clay, or free-form painting, significantly decreased post-art-making STAI state anxiety scores in the experimental group compared to pre-art-making scores; however, there was no significant difference in the non-art-making control group's pre and post STAI state anxiety scores (Sandmire, Gorham, Rankin, & Grimm, 2012). Researchers found that engaging in a 30 minute creative art activity, such as playing the piano, molding a piece of clay, or writing with calligraphy, significantly reduced stress levels as measured by the STAI and cortisol before and after the session, compared to the control group (remaining silent), that did not have a significant difference pre and post session. Importantly, the effect of playing the piano was significantly greater than the other art activities (Toyoshima, Fukui, & Kuda, 2011). These previous research studies did not use the TSST-G and the STAI together in a creativity study to reliably and efficiently induce stress, measure stress, and relieve stress. Consequently, a previous pilot study showed that after TSST-G induced stress, anxiety levels, as measured by the state portion of the STAI, significantly decreased when coloring a mandala (Petersen et al., 2015a). Such findings give support to the utilization of creative processes, such as coloring a mandala, in treatment plans after a stressful event has occurred. However, stress prevention is ideal, and the current research question is if engaging in a creative process, specifically coloring mandalas, helps in coping with induced-stress and increases resilience to the pathologic effects of stress. Another previous pilot study (Petersen, Wijata, Hajek, & Grover, 2015b) did not yield significant results when comparing anxiety levels, as measured by the state portion of the STAI, of participants who engaged in coloring a mandala prior to TSST-G stress induction to those who read magazines prior to TSST-G

stress induction (15 min). I suspect that coloring a mandala in that pilot study did not affect coping with induced stress due to the brevity of the creative activity, only 15 min. In spite of this previous pilot study's conflictual results, the results from many studies suggest that programs with creative processes might help in coping with stress.

*Creative Activity Programs*

Through observations, therapy sessions, and case studies, researchers theorize that creativity is an important component of coping with stress and enhancing resilience and have implemented creative activity programs with the goal of increasing participant's ability to cope with stress and to develop resilience (Berger & Lahad, 2010; Jang and Choi, 2012; Prescott et al., 2008). Berger and Lahad (2010), who developed and implemented The Safe Place programme in Israeli kindergartens, used creative therapy techniques and Nature Therapy to help 6000 children cope with stress after the second Lebanese war. They gained support for their Basic PH resiliency model, which identifies imagination as being one of the six channels of resiliency. Imagination helps individuals to create a preferred reality, "the Fantastic Reality," to cope with unavoidable situations. Specifically, metaphors can alter inner reality, which changes the view of outer reality (Berger & Lahad, 2010). Prescott et al. (2008) analyzed creativity and resilience in homeless youth who attended a drop-in art center and found that attendance in the art center positively correlated with the number of the youth's life achievements. Those who attended regularly had a higher incidence of discontinuing drug use, securing housing, seeking employment, pursuing academics, and increasing social skills. They theorized that creativity, specifically engaging in art activities, increases self-esteem, improves coping skills, addresses existing concerns, distracts from existing circumstances, and

reshapes reality (Prescott et al., 2008). Jang and Choi (2012) found that low SES adolescents in Korea, who engaged in a clay-based art therapy group for 80 min sessions once a week for 18 sessions, had increased ego-resiliency, defined as a "personal trait that helps with mental and emotional adaptation in a changing and conflicting environment" (p. 245). Clearly, creative activities might correlate with greater resilience and better coping skills.

*Current Study*

To date, there has not been a quantitative study that implemented creative processes, like coloring a mandala, before stress induction to see if creativity or experiencing flow during an activity increases one's ability to cope with stress and possibly increase resilience. The purpose of this explanatory research study was to examine the relationship between coping with stress, creativity, and flow. It compared anxiety scores after stress induction of those who colored a predrawn or template mandala, to those who colored a plain circle, to those who colored a color-by-number mandala, to those who read magazines. The independent variables were the multiple conditions of coloring or reading magazines and time (before and after stress induction). The dependent variables were the level of anxiety in the control and experimental groups as measured by the STAI state scores after TSST-G stress induction, the level of creativity of each activity as measured by the Creativity Experience Questionnaire, and the level of flow of each activity as measured by the Flow Short Scale.

*Research questions and hypotheses.* Based on previous research, I developed the following questions and tested the following hypotheses:

Research question 1: How will coloring different types of mandala (plain circle, predrawn mandala, or color-by-number mandala) or reading magazines influence state anxiety scores before and after stress induction?

Hypothesis 1: For the plain circle and the predrawn mandala coloring groups, pre and post anxiety scores within the groups would not be different; however, both groups' pre and post scores would be lower than the color-by-number mandala coloring group and magazine reading group. Additionally, the pre-state anxiety scores of the color-by-number mandala group would or would not be different from the post scores, and in the magazine reading group, the pre-state anxiety scores would be lower than the post scores.

Research question 2: Does coloring different types of mandala (plain circle, predrawn mandala, or color-by-number mandala) or reading magazines influence trait anxiety scores before and after stress induction?

Hypothesis 2: Coloring different types of mandala (plain circle, predrawn mandala, or color-by-number mandala) or reading magazines would not influence trait anxiety scores before and after stress induction.

Research question 3: Will coloring different types of mandala (plain circle, predrawn mandala, or color-by-number mandala) or reading magazines differ in flow scores using the Flow Short Scale?

Hypothesis 3: Coloring the plain circle mandala or the predrawn mandala would result in significantly higher flow scores than the flow scores of the color-by-number mandala and magazine reading groups.

Research question 4: Will coloring different types of mandala (plain circle, predrawn mandala, or color-by-number mandala) or reading magazines differ in creativity scores using the Creativity Experience Questionnaire?

Hypothesis 4: Coloring the plain circle mandala or the predrawn mandala would result in significantly higher creativity scores than the creativity scores of the color-by-number mandala and magazine reading groups.

Research question 5: Will there be a correlation between creativity and flow scores before stress induction?

Hypothesis 5: There would be a positive correlation between creativity and flow scores before stress induction.

Research question 6: Will there be a correlation between flow scores and anxiety scores before and/or after stress induction?

Hypothesis 6: There would be a negative correlation between flow scores and/or anxiety scores before and after stress induction.

Research question 7: Will there be a correlation between creativity scores and anxiety scores before and/or after stress induction?

Hypothesis 7: There would be a negative correlation between creativity scores and/or anxiety scores before and after stress induction.

# CHAPTER 2

# METHOD

Previous studies lend support to the theory that creativity correlates with greater resilience and better coping skills (Berger & Lahad, 2010; Jang & Choi, 2012; Prescott et al., 2008). However, there was a lack of quantitative research showing that creative processes increase one's ability to cope with induced stress. Therefore, this research project evaluated if coloring activities reduced researcher-induced stress and influenced creativity, flow, and anxiety levels in college students. To assess these differences, I used the following methodology.

## *Participants*

I used a convenience sample of 84 students enrolled in undergraduate psychology classes at Emporia State University who volunteered by signing up for a section time through the Psychology Department research pool in Canvas. I discouraged those diagnosed with an anxiety disorder or prescribed anxiety medication in the sign-up information from participating. Students may have earned some form of course credit, but instructors made other alternatives available. Because this study involved only students enrolled in undergraduate psychology courses at a small Midwestern university, I cannot generalize results to other types of students enrolled at smaller or larger universities that are not in the Midwest.

The mean age for 84 participants was 20.52 years ($SD$ = 2.23 years). Additional demographic information for participants is located in the following tables: Table 1 for gender, ethnicity, education, and breakdown of age, and Table 2 for anxiety demographic information.

Table 1

*Gender, Ethnicity, Education, and Age Information for All Participants*

| | *n* | Percentage |
|---|---|---|
| Gender | | |
| Men | 44 | 52.4% |
| Women | 40 | 47.6% |
| Ethnicity | | |
| American Indian/Alaskan Native | 1 | 1.2% |
| Asian/Pacific Islander | 10 | 11.9% |
| Black/African American | 6 | 7.1% |
| Hispanic | 10 | 11.9% |
| White | 54 | 64.3% |
| Other | 3 | 3.6% |
| Education | | |
| Freshman | 44 | 52.4% |
| Sophomore | 21 | 25.0% |
| Junior | 8 | 9.5% |
| Senior | 7 | 8.3% |
| Other | 4 | 4.8% |
| Age | | |
| 18 – 22 years old (*n* = 70) | | 83.3% |
| 18.00 | 10 | 11.9% |
| 19.00 | 29 | 34.5% |
| 20.00 | 10 | 11.9% |
| 21.00 | 11 | 13.1% |
| 22.00 | 10 | 11.9% |
| 23 – 28 years old (*n* = 70) | | 16.7% |
| 23.00 | 7 | 8.3% |
| 24.00 | 1 | 1.2% |
| 25.00 | 2 | 2.4% |
| 26.00 | 2 | 2.4% |
| 27.00 | 1 | 1.2% |
| 28.00 | 1 | 1.2% |

Table 2

*Anxiety Demographic Information for All Participants*

| | *n* | Percentage |
|---|---|---|
| Diagnosed Anxiety Disorder | | |
| Yes | 5 | 6.0% |
| No | 79 | 94.0% |
| | | |
| Initial Anxiety Level: "At this moment, I am anxious" | | |
| Strongly Disagree | 24 | 28.6% |
| Disagree | 13 | 15.5% |
| Slightly Disagree | 5 | 6.0% |
| Neutral | 32 | 38.1% |
| Slightly Agree | 8 | 9.5% |
| Agree | 2 | 2.4% |
| Strongly Agree | 0 | 0.0% |

There were approximately equal percentages of men (52.4%) and women (47.6%) participants. The dominant ethnicity was white (64.3%) with a fair number of nonwhite (35.7%) participants. The majority were freshmen (52.4%) or sophomores (25%) in college. Even though those with a diagnosed anxiety disorder were discouraged from signing up to participate, there were five individuals (6%) who participated in the study who indicated they had a diagnosed anxiety disorder (one in the predrawn mandala group, two in the color-by-number mandala group, and two in the magazine group). However, only 10 students (11.9%) stated that they were anxious at the beginning of the study with the vast majority (88.1%) claiming they felt neutral or not anxious at the start of the study.

*Instruments and Materials*

The Demographics Survey (Appendix A) consisted of items about gender, age, ethnicity, year in college, and anxiety disorders. The same sized plain circle mandalas, predrawn mandalas, or color-by-number mandalas (Appendix B) were on 21.59 cm by 27.94 cm white paper. The magazines consisted of *Rolling Stone* from September 24, 2015; *Prevention: Big Book of Walking Workouts* from December 8, 2015; *Forbes* from September 28, 2015; *Scientific American* from October 2015; *Backpacker* from October 2015; *Martha Stewart Living* from August 2006; *Writer's Digest: Writer's Workbook* from November 9, 2015; *Counseling Today* from October 2015; *Counseling Today* from September 2014; and *National Geographic* from July 2015.

The original STAI discriminates between both high- and low- scoring subjects and is both reliable and valid for measuring state and trait anxiety levels with Kuder-Richardson Formula 20 scores of .92 for state anxiety low scores, .81 for state anxiety

high scores, .87 for trait anxiety low scores, and .67 for trait anxiety high scores and test-retest reliability *r* scores of .97 for total trait scores and .45 for total state scores (Metzger, 1976). The State-Trait Anxiety Inventory has 20 Likert-scale items (e.g., "I feel calm - Not at all (1), A little (2), Somewhat (3), Very Much (4)") repeated twice. Original instructions for the state portion of the STAI Form Y (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) are, "A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right now*, that is, at *this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best." The original instructions for the trait portion of the STAI Form Y-2 are the following, "A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel." I only modified the instructions, and they are in Appendix C (mSTAI).

The Flow Short Scale consists of 16 Likert-scale items (e.g., "My thoughts/activities run fluidly and smoothly - Not at all, Partly, Very much"). I modified the instructions for The Flow Short Scale (mFSS; Appendix D) which state, "Please answer these questions according to how you felt while you were coloring. Fill in the appropriate circle." I created the Creativity Experience Questionnaire (see Appendix E) which consists of 7 Likert-scale items with instructions that state, "Please answer these questions by circling the appropriate number," and questions such as, "during this

activity, you would describe yourself as being highly creative (1), creative (2), somewhat creative (3), not creative at all (4)."

*Design*

This research study was a quasi-experimental design. Because students at Emporia State University volunteered for the study by signing up for a section time online, a random selection of participants and random assignment to groups was not feasible. However, I randomly assigned the sessions to receive the control condition of reading magazines or the treatment conditions of coloring a type of mandala (plain circle mandala, predrawn mandala, or color-by-number mandala). Each hypothesis utilized a different research design as indicated below.

*Hypothesis 1 and 2.* I used a 2 Time (pre-TSST-G and post-TSST-G) x 4 Group (predrawn mandala, plain circle mandala, color-by-number mandala, and magazine) mixed factorial design to determine if the control condition of reading magazines or the treatment conditions of coloring a type of mandala (plain circle mandala, predrawn mandala, or color-by-number mandala) influenced the dependent variable STAI state and trait scores before and after stress induction.

*Hypothesis 3 and 4.* I used a multiple groups design (4 Group: plain circle, predrawn mandala, color-by-number mandala, and magazines).

*Hypothesis 5, 6, and 7.* I used a correlational research method.

*Procedure*

Before I conducted this multi design study, I received IRB approval (Appendix F). I began the study by reading the Informed Consent form (Appendix G; see Figure 2) and acquired participants' signatures before beginning any experimental procedures.

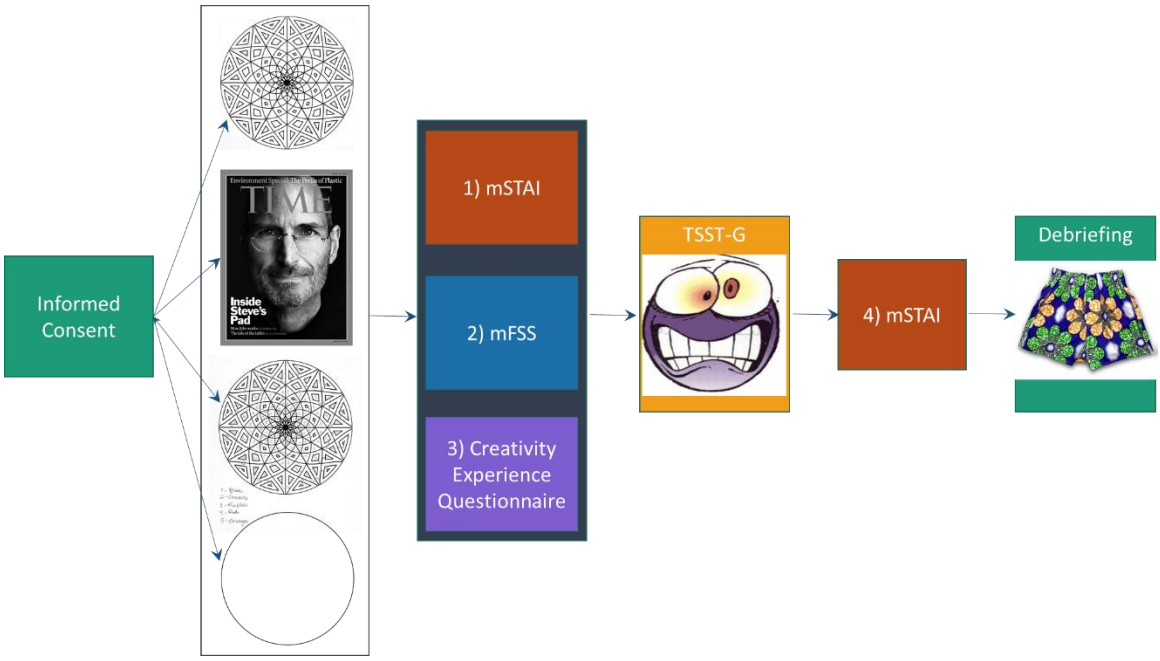


*Figure 2.* Chart of procedures.

I kept identifying information strictly confidential by assigning participants an identification number on a nametag to use throughout the experiment. Only the Informed Consent document contained the participant's name, which in no way could be linked to their identification number. Participants used only their identification numbers on questionnaires, and when experimenters called for an individual, they used the identification number on the participant's nametag. The maximum number of participants in each session was six with a minimum of two.

Participants then completed a demographic survey. Next, the experimental groups colored mandalas for 30 min, and the control group read magazines for 30 min. Next, participants completed the pre-TSST-G (induced stress activity) mSTAI, the mFSS, and the Creativity Experience Questionnaire in a counterbalanced order. Participants then completed the TSST-G consisting of 10 min to prepare a speech for a job interview using notecards, 2 min to perform a speech without notecards to two judges (research assistants), and 80 s to count backward out loud from a four-digit number in multiples of 13. They then completed the post-TSST-G mSTAI. Finally, I gave and read the debriefing form (Appendix H) to participants.

# CHAPTER 3

# RESULTS

The current study strove to determine if coloring activities reduced researcher-induced stress while influencing creativity, flow, and anxiety levels in college students. Eighty-seven students enrolled in undergraduate psychology courses at Emporia State University signed up for the study; however, one participant did not complete the questionnaire packet, one left in the middle of the experiment, and one had difficulty understanding the questionnaires. Therefore, I used data from a total of 84 students with equal numbers of participants in each group (color-by-number mandalas, plain circle mandalas, predrawn mandalas, and magazines). I used participants' identification numbers to organize the data in a PASW statistical analysis program and analyzed the inferential and descriptive statistics. I found the following results.

## *Hypothesis 1*

I predicted that for the plain circle and the predrawn mandala coloring groups, pre and post anxiety scores within the groups would not be different when compared to one another; however, both groups' pre and post anxiety scores would be lower than the color-by-number mandala coloring group and magazine reading group. Additionally, the pre-state anxiety scores of the color-by-number mandala group would or would not be different from the post scores, and in the magazine reading group, the pre-state anxiety scores would be lower than the post scores.

*mSTAI state scores.* The results of a 2 Time (pre-TSST-G and post-TSST-G) x 4 Group (plain circle mandala, predrawn mandala, color-by-number mandala, and magazine) mixed factorial ANOVA indicated some support for the hypothesis. Results

indicated there was a significant main effect for Time on state anxiety scores, $F(1, 80) = 124.02$, $p < .001$, partial $\eta^2 = .61$, with pre-TSST-G state scores ($M = 36.10$, $SD = 9.00$, $n = 84$) being significantly lower than post-TSST-G state scores ($M = 50.82$, $SD = 10.85$, $n = 84$). Results indicated there was not a significant main effect for Group on state anxiety scores, $F(3, 80) = 0.65$, $p = .59$. Additionally, there was no significant interaction between Time and Group on state scores, $F(3, 80) = 1.41$, $p = .25$ (see Figure 3). Mean pre-TSST-G state scores for all groups are as follows: predrawn mandala ($M = 37.38$, $SD = 9.78$), plain circle mandala ($M = 34.81$, $SD = 7.72$), color-by-number mandala ($M = 35.14$, $SD = 9.03$), and magazine ($M = 37.05$, $SD = 9.69$). Mean post-TSST-G state scores for all groups are as follows: predrawn mandala ($M = 50.38$, $SD = 8.89$), plain circle mandala ($M = 54.14$, $SD = 10.36$), color-by-number mandala ($M = 47.67$, $SD = 12.37$), and magazine ($M = 51.10$, $SD = 11.26$). Post-TSST-G state scores were higher than pre-TSST-G state scores; however, there was no difference in state scores between the groups.

*Hypothesis 2*

I predicted that coloring different types of mandala (plain circle, predrawn mandala, or color-by-number mandala) or reading magazines would not influence trait anxiety scores before and after stress induction. Hence, the trait scores would remain constant throughout.

*mSTAI trait scores*. The results of a 2 Time (pre-TSST-G and post-TSST-G) x 4 Group (plain circle mandala, predrawn mandala, color-by-number mandala, and magazine) mixed factorial ANOVA supported the hypothesis. Results indicated there

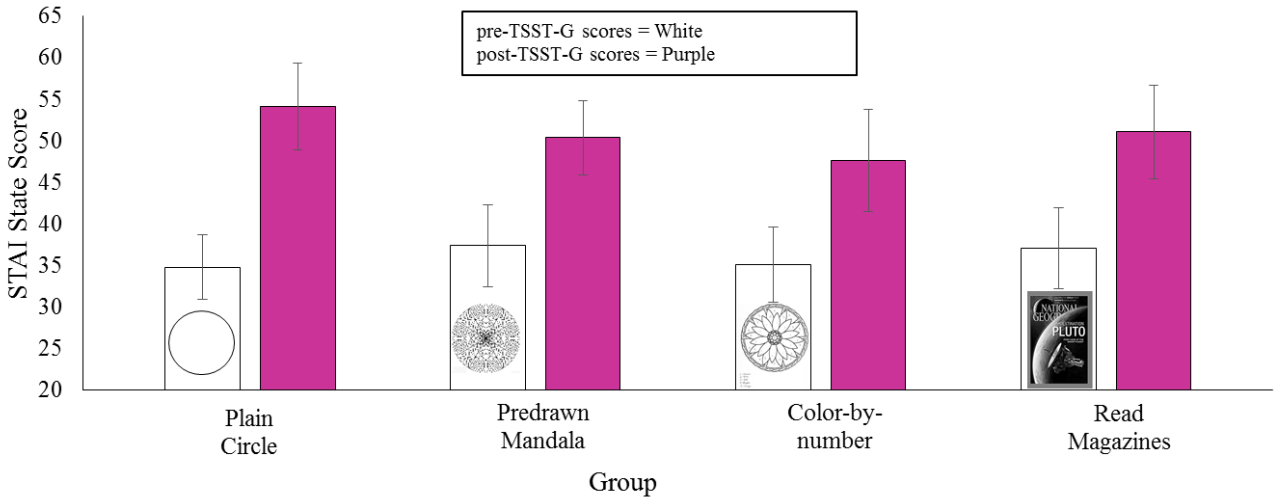


*Figure 3.* Mean state anxiety scores for groups who either colored a plain circle (*n* = 21), predrawn mandala (*n* = 21), color-by-number mandala (*n* = 21), or read magazines (*n* = 21). Higher scores indicate greater anxiety. Error bars depict standard deviations.

was not a significant main effect for Time on trait anxiety scores, $F(1, 80) = 1.25$, $p = .27$, with pre-TSST-G trait scores ($M = 51.57$, $SD = 3.32$) being similar to post-TSST-G trait scores ($M = 51.15$, $SD = 3.69$). Results indicated there was not a significant main effect for Group on trait anxiety scores, $F(3, 80) = 1.64$, $p = .19$. Additionally, there was no significant interaction between Time and Group on trait scores, $F(3, 80) = .79$, $p = .50$ (see Figure 4). Mean pre-TSST-G trait scores for all groups are as follows: predrawn mandala ($M = 51.48$, $SD = 2.89$), plain circle mandala ($M = 50.81$, $SD = 3.50$), color-by-number mandala ($M = 52.14$, $SD = 3.75$), and magazine ($M = 51.86$, $SD = 3.18$). Mean post-TSST-G trait scores for all groups are as follows: predrawn mandala ($M = 51.38$, $SD = 3.58$), plain circle mandala ($M = 49.48$, $SD = 3.64$), color-by-number mandala ($M = 51.71$, $SD = 3.73$), and magazine ($M = 52.05$, $SD = 3.51$). TSST-G did not affect trait scores.

*Hypothesis 3.*

I predicted that coloring the plain circle mandala or the predrawn mandala would result in significantly higher flow scores than the flow scores of the color-by-number mandala and magazine reading groups.

*Flow absorption, fluency, and outcome scores.* I ran a MANOVA analyzing the dependent variables of flow for four Groups. Using Pillai's trace, there was a significant effect of Group on flow absorption, fluency, and outcome, $V = .23$, $F(9, 240) = 2.26$, $p = .02$. However, separate univariate ANOVAs on the outcome variables revealed mixed results. Univariate ANOVAs revealed that Group had a significant effect on flow absorption $F(3, 80) = 2.73$, $p = .05$, partial $\eta^2 = .09$, but a nonsignificant effect on flow fluency, $F(3, 80) = 1.19$, $p = .32$, and a nonsignificant effect on flow outcome $F(3, 80) =$

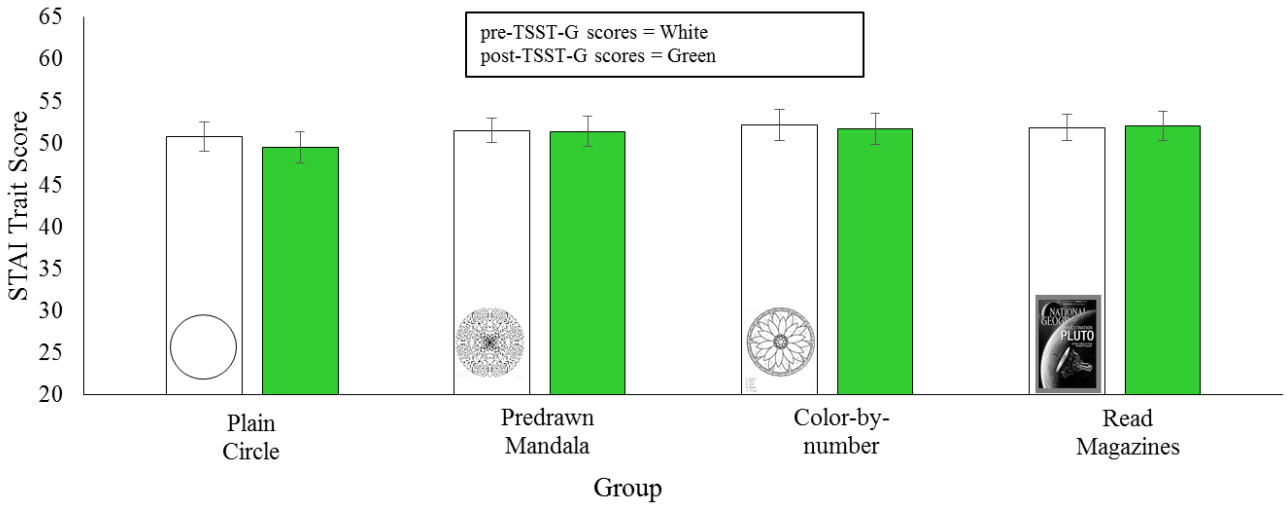


*Figure 4.* Mean trait anxiety scores for groups who either colored a plain circle (*n* = 21), predrawn mandala (*n* = 21), color-by-number mandala (*n* = 21), or read magazines (*n* = 21). Higher scores indicate greater anxiety. Error bars depict standard deviations.

1.24, $p = .30$. Tukey HSD *post hoc* tests revealed that those who colored plain circle mandalas ($M = 17.43$, $SD = 5.68$) had significantly higher levels of absorption than those who read magazines ($M = 13.29$, $SD = 3.73$), $p = .04$, but the other Groups showed no significant difference in levels of absorption ($ps > .05$; see Figure 5). Group means for absorption are as follows: predrawn mandala ($M = 16.48$, $SD = 5.58$), plain circle mandala ($M = 17.43$, $SD = 5.68$), color-by-number mandala ($M = 15.79$, $SD = 4.38$), and magazine ($M = 13.29$, $SD = 3.73$). Group means for fluency are as follows: predrawn mandala ($M = 28.52$, $SD = 6.77$), plain circle mandala ($M = 26.62$, $SD = 7.25$), color-by-number mandala ($M = 29.05$, $SD = 5.60$), and magazine ($M = 25.43$, $SD = 8.35$). Group means for outcome are as follows: predrawn mandala ($M = 8.52$, $SD = 4.11$), plain circle mandala ($M = 7.57$, $SD = 5.13$), color-by-number mandala ($M = 10.38$, $SD = 4.93$), and magazine ($M = 8.76$, $SD = 5.01$).

*Task difficulty, competency, and demand scores.* I used a MANOVA to analyze the dependent variables of flow for four Groups. Using Pillai's trace, there was not a significant effect of Group on task difficulty, competency, and demands, $V = .12$, $F(9, 240) = 1.08$, $p = .38$ (see Figure 6). Group means for task difficulty are as follows: predrawn mandala ($M = 2.10$, $SD = 1.37$), plain circle mandala ($M = 1.52$, $SD = .75$), color-by-number mandala ($M = 2.14$, $SD = 1.46$), and magazine ($M = 2.57$, $SD = 1.83$). Group means for competency are as follows: predrawn mandala ($M = 5.90$, $SD = 2.02$), plain circle mandala ($M = 5.86$, $SD = 1.93$), color-by-number mandala ($M = 5.81$, $SD = 1.94$), and magazine ($M = 6.05$, $SD = 1.96$). Group means for demands are as follows: predrawn mandala ($M = 4.57$, $SD = 1.54$), plain circle mandala ($M = 4.43$, $SD = 1.47$), color-by-number mandala ($M = 3.95$, $SD = 1.36$), and magazine ($M = 4.29$, $SD = 1.15$).

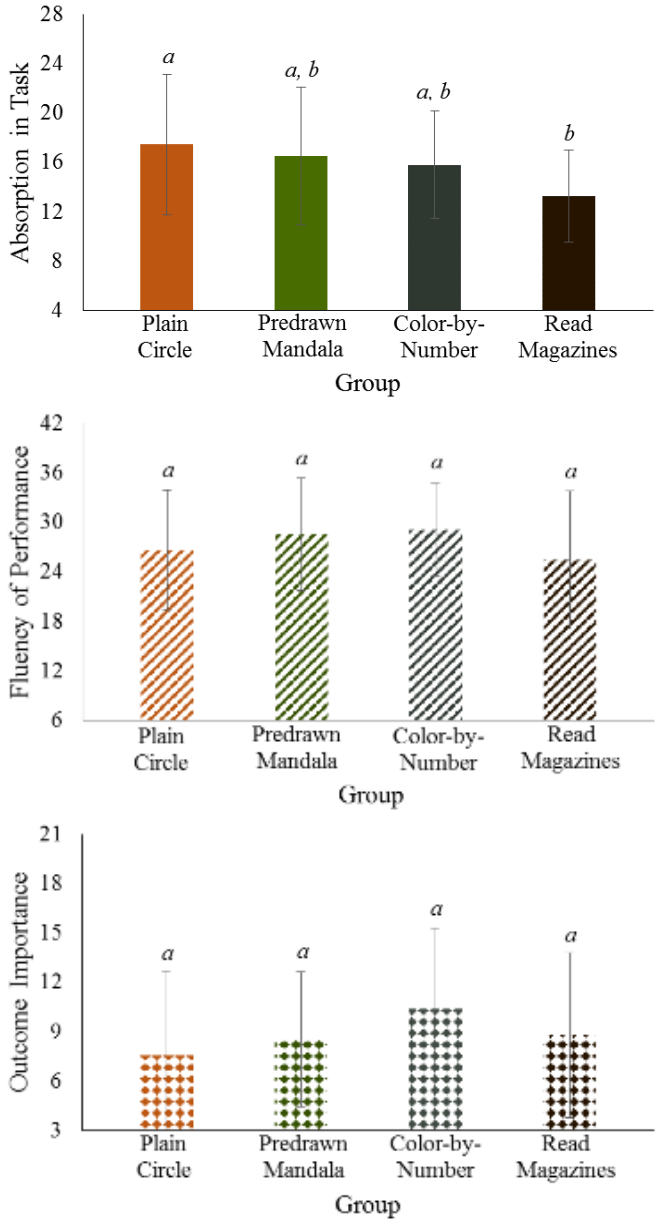


*Figure 5.* Top: Mean absorption in task scores for groups who either colored a plain circle ($n$ = 21), predrawn mandala ($n$ = 21), color-by-number mandala ($n$= 21), or read magazines ($n$ = 21). Middle: Mean fluency of performance scores for each of the groups. Bottom: Mean perceived outcome importance scores for each of the groups. Higher scores indicate greater absorption, greater fluency, and greater perceived importance of the activity's outcome, respectively. Error bars depict standard deviations. Different lower case letters indicate significant differences ($p \leq .05$).

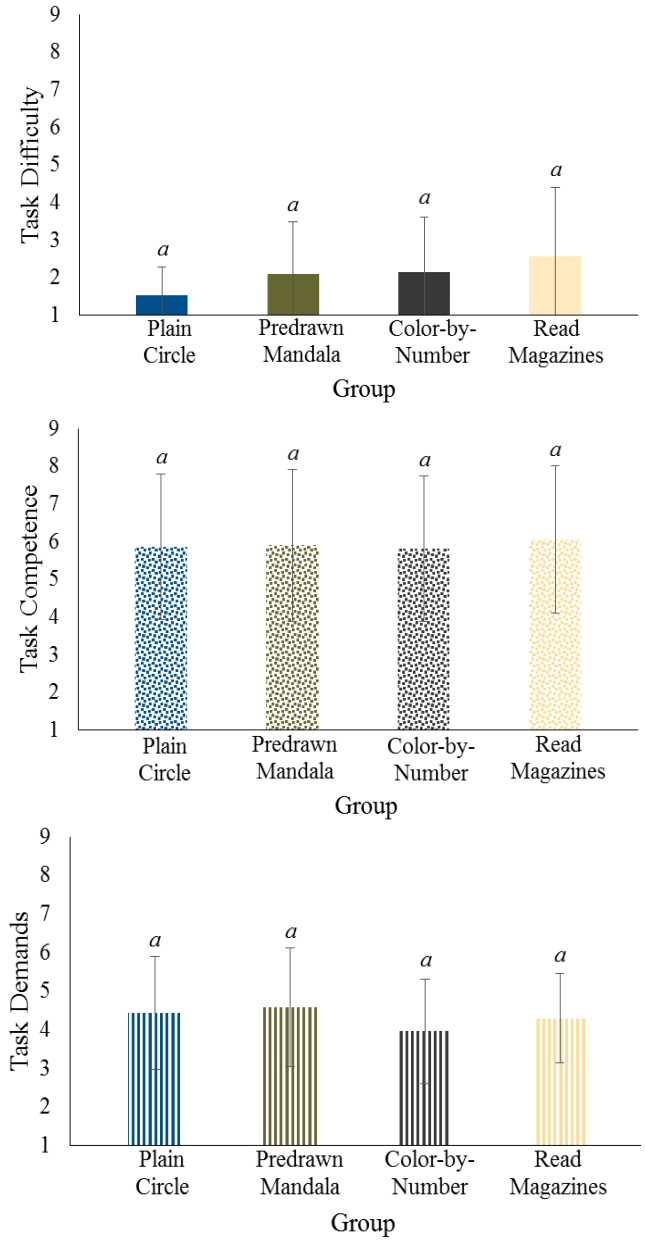


*Figure 6.* Top: Mean task difficulty scores for groups who either colored a plain circle (*n* = 21), predrawn mandala (*n* = 21), color-by-number mandala (*n*= 21), or read magazines (*n* = 21). Middle: Mean task competence scores for each of the groups. Bottom: Mean task demands scores for each of the groups. Higher scores indicate greater difficulty, greater competence, and greater demands when performing the task, respectively. Error bars depict standard deviations. Different lower case letters indicate significant differences ($p \leq .05$).

*Hypothesis 4*

I predicted that coloring the plain circle mandala or the predrawn mandala would result in significantly higher creativity scores than the creativity scores of the color-by-number mandala and magazine reading groups.

*Activity creativity, activity enjoyment, and trait creativity scores.* I ran a MANOVA analyzing the dependent variables of creativity for four Groups. Using Pillai's trace, there was a significant effect of Group on activity creativity, activity enjoyment, and trait creativity, $V = .45$, $F(9, 240) = 4.65$, $p < .001$. However, separate univariate ANOVAs on the outcome variables revealed mixed results. Univariate ANOVAs found that Group had a significant effect on activity creativity, $F(3, 80) = 10.12$, $p < .001$, partial $\eta^2 = .28$, and a significant effect on activity enjoyment $F(3, 80) = 5.33$, $p = .002$, partial $\eta^2 = .17$, but a nonsignificant effect on trait creativity $F(3, 80) = .79$, $p = .51$ (see Figure 6). Tukey HSD *post hoc* tests revealed that those who colored plain circles ($M = 8.48$, $SD = 1.21$) had significantly higher levels of activity creativity (lower scores indicate higher creativity) than those who read magazines ($M = 9.98$, $SD = 1.60$), $p = .04$. Those who colored predrawn mandalas ($M = 6.91$, $SD = 2.23$) had significantly higher levels of activity creativity than those who read magazines ($M = 9.98$, $SD = 1.60$, $p < .001$), than those who colored color-by-number mandalas ($M = 8.67$, $SD = 2.03$, $p = .01$), and those who colored plain circle mandalas ($M = 8.48$, $SD = 1.21$, $p = .03$). Tukey HSD *post hoc* tests revealed that those who colored plain circles ($M = 2.43$, $SD = 1.74$) had significantly greater activity enjoyment (lower scores indicate greater activity enjoyment) than those who read magazines ($M = 4.19$, $SD = 1.03$), $p = .001$ (see Figure 7). Group means for activity creativity are as

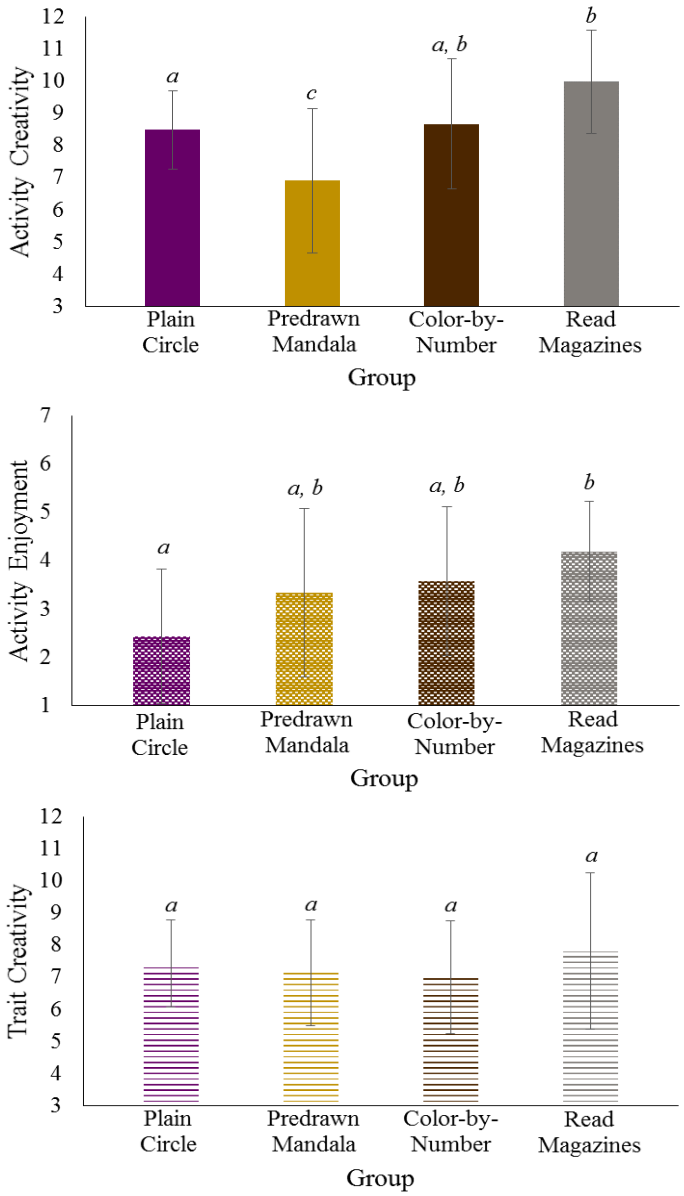


*Figure 7.* Top: Mean activity creativity scores for groups who either colored a plain circle ($n$ = 21), predrawn mandala ($n$ = 21), color-by-number mandala ($n$= 21), or read magazines ($n$ = 21). Middle: Mean enjoyment of activity scores for each of the groups. Bottom: Mean creativity as a general trait scores for each of the groups. Lower scores indicate greater activity creativity, greater activity enjoyment, and greater creativity as a general trait. Error bars depict standard deviations. Different lower case letters indicate significant differences ($p \leq .05$).

follows: predrawn mandala (*M* = 6.90, *SD* = 2.23), plain circle mandala (*M* = 8.48, *SD* = 1.21), color-by-number mandala (*M* = 8.67, *SD* = 2.03), and magazine (*M* = 9.98, *SD* = 1.60). Group means for activity enjoyment are as follows: predrawn mandala (*M* = 3.33, *SD* = 1.74), plain circle mandala (*M* = 2.43, *SD* = 1.40), color-by-number mandala (*M* = 3.57, *SD* = 1.54), and magazine (*M* = 4.19, *SD* = 1.03). Group means for trait creativity are as follows: predrawn mandala (*M* = 7.14, *SD* = 1.65), plain circle mandala (*M* = 7.43, *SD* = 1.36), color-by-number mandala (*M* = 7.00, *SD* = 1.76), and magazine (*M* = 7.81, *SD* = 2.44).

*Hypothesis 5*

I predicted that there would be a positive correlation between creativity and flow scores before stress induction. A Pearson correlational analysis of the variables of total flow scores (the total for flow absorption, fluency, and outcome scores; *M* = 51.96, *SD* = 11.72) and activity creativity scores (*M* = 8.51, *SD* = 2.09) revealed a small but significant correlation with greater creativity correlating with greater flow, $r(82) = -.34$, $p = .001$ , $R^2 = .12$ (see Figure 8; lower activity creativity scores indicate greater creativity and higher total flow scores indicate greater flow).

*Hypothesis 6*

I predicted that there would be a negative correlation between flow scores and anxiety scores before and after stress induction. A Pearson correlational analysis of the variables of total flow scores (the total for flow absorption, fluency, and outcome scores; *M* = 51.96, *SD* = 11.72) and pre-TSST-G state anxiety scores (*M* = 36.10, *SD* = 9.00) revealed a small but significant negative correlation with increasing flow scores

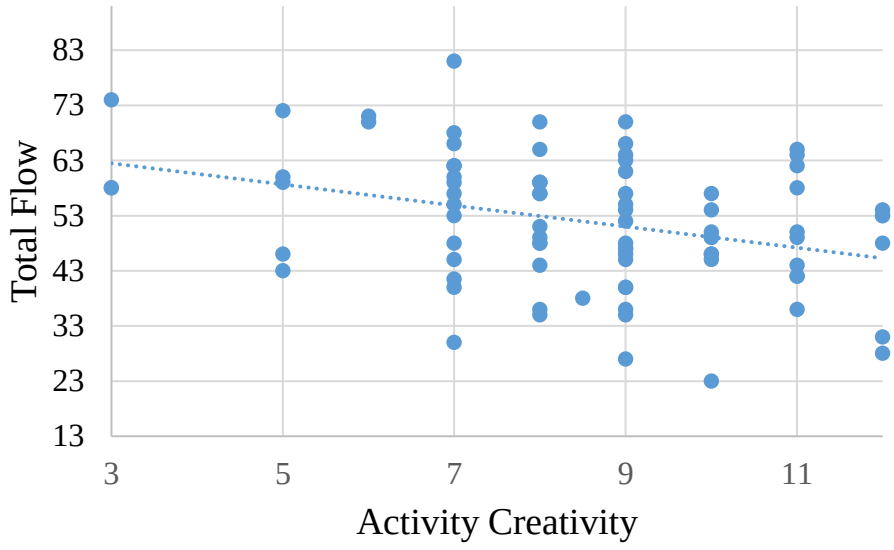


*Figure 8.* Hypothesis 5 correlation between activity creativity scores and total flow scores before stress induction ($n$ = 84). Possible activity creativity scores range from 3 to 12, and possible total flow scores range from 13 to 91. Lower activity creativity scores indicate greater creativity and higher total flow scores indicate greater flow.

correlating with decreasing state anxiety scores, $r(82) = -.23$, $p = .04$ , $R^2 = .05$ (see Figure 9). A Pearson correlational analysis of the variables of total flow scores and post-TSST-G state anxiety scores ($M = 50.82$, $SD = 10.85$) showed no correlation, $r(82) = -.12$, $p = .29$.

*Hypothesis 7*

I predicted that there would be a negative correlation between creativity scores and anxiety scores before and after stress induction. A Pearson correlational analysis of the variables of activity creativity scores ($M = 8.51$, $SD = 2.10$) and pre-TSST-G state anxiety scores ($M = 36.10$, $SD = 9.00$) revealed no correlation, $r(82) = .17$, $p = .12$. A Pearson correlational analysis of the variables of activity creativity scores and post-TSST-G state anxiety scores ($M = 50.82$, $SD = 10.85$) showed no correlation, $r(82) = -.04$, $p = .73$. A Pearson correlational analysis of the variables of trait creativity scores ($M = 7.35$, $SD = 1.84$) and pre-TSST-G state anxiety scores ($M = 36.10$, $SD = 9.00$) revealed no correlation, $r(82) = .14$, $p = .22$. A Pearson correlational analysis of the variables of trait creativity scores and post-TSST-G state anxiety scores ($M = 50.82$, $SD = 10.85$) showed no correlation, $r(82) = .05$, $p = .69$.

*Additional Analyses*

A Pearson correlational analysis of the variables of activity enjoyment ($M = 3.38$, $SD = 1.56$) and pre-TSST-G state anxiety scores ($M = 36.10$, $SD = 9.00$) revealed a small but marginally significant correlation with increasing activity enjoyment (lower scores represent higher activity enjoyment) correlating with decreasing state anxiety, $r(82) = .19$, $p = .08$ , $R^2 = .04$ (see Figure 10). A Pearson correlational analysis of the

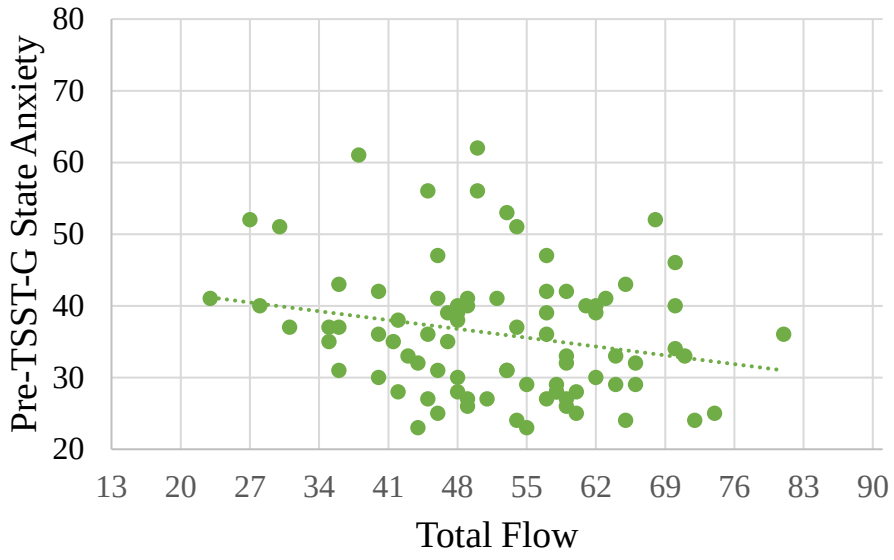


*Figure 9.* Hypothesis 6 correlation between total flow scores and pre-TSST-G state anxiety scores before stress induction ($n$ = 84). Possible total flow scores range from 13 to 91, and possible pre-TSST-G state anxiety scores range from 20 to 80. Higher total flow scores indicate greater flow, and higher pre-TSST-G state scores indicate greater current/state anxiety levels.

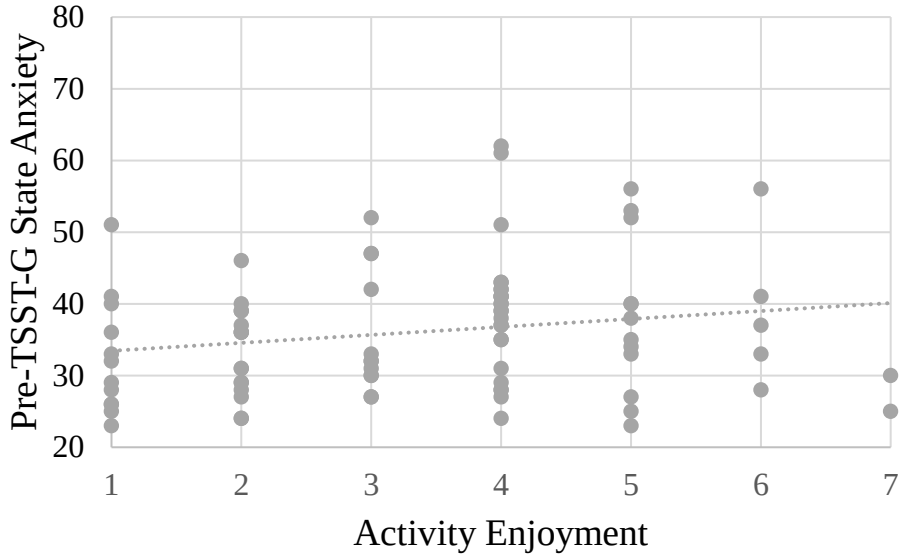


*Figure 10.* Correlation between activity enjoyment scores and pre-TSST-G state anxiety scores before stress induction ($n$ = 84). Possible activity enjoyment scores range from 1 to 7, and possible pre-TSST-G state anxiety scores range from 20 to 80. Lower activity enjoyment scores indicate greater enjoyment, and higher pre-TSST-G state scores indicate greater current/state anxiety levels.

variables of activity enjoyment ($M$ = 3.38, $SD$ = 1.56) and post-TSST-G state anxiety scores ($M$ = 50.82, $SD$ = 10.85) showed no correlation, $r(82) = -.10$, $p = .36$.

A Pearson correlational analysis of the variables of activity enjoyment scores ($M$ = 3.38, $SD$ = 1.56) and activity creativity scores ($M$ = 8.51, $SD$ = 2.09) revealed a significant correlation with increasing activity enjoyment correlating with decreasing activity creativity (lower activity creativity scores indicate greater creativity), $r(82) = .39$, $p < .001$ , $R^2 = .15$ (see Figure 11). A Pearson correlational analysis of the variables of activity enjoyment scores ($M$ = 3.38, $SD$ = 1.56) and total flow scores (the total for flow absorption, fluency, and outcome scores; $M$ = 51.96, $SD$ = 11.72) revealed a small but significant positive correlation with increasing activity enjoyment correlating with increasing flow (greater flow scores indicate great flow), $r(82) = -.31$, $p = .005$ , $R^2 = .09$ (see Figure 12).

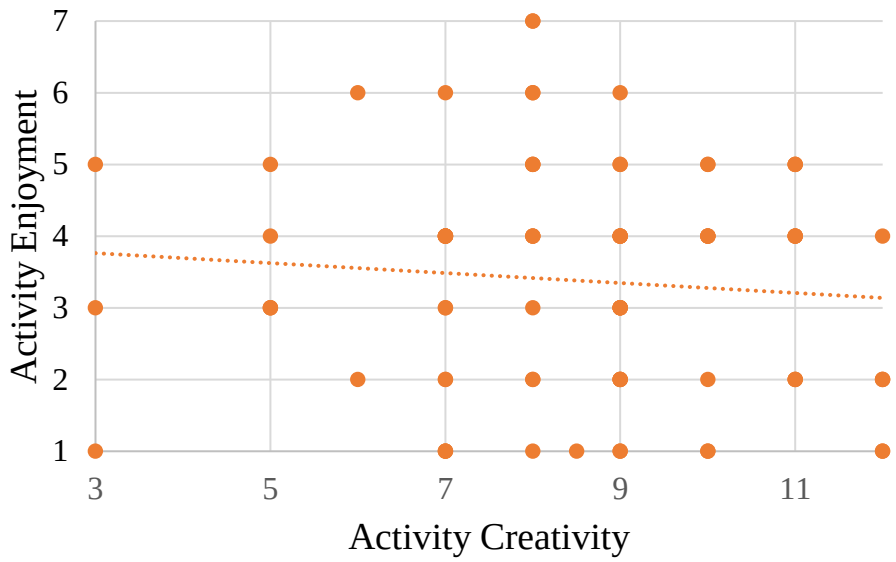


*Figure 11*. Correlation between activity creativity scores and activity enjoyment scores before stress induction ($n$ = 84). Possible activity creativity scores range from 3 to 12, and possible activity enjoyment scores range from 1 to 7. Lower activity creativity scores indicate greater creativity, and lower activity enjoyment scores indicate greater enjoyment.

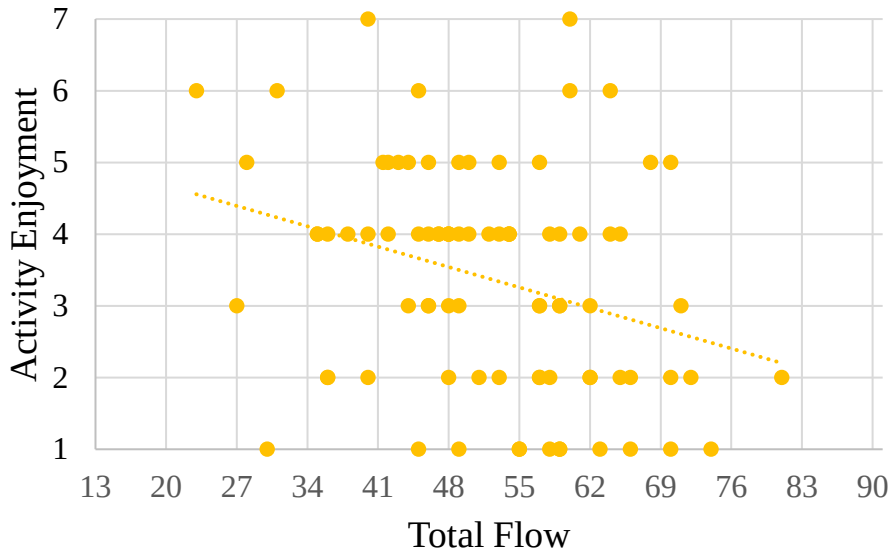


*Figure 12.* Correlation between total flow scores and activity enjoyment scores before stress induction ($n$ = 84). Possible total flow scores range from 13 to 91, and possible activity enjoyment scores range from 1 to 7. Higher total flow scores indicate greater flow, and lower activity enjoyment scores indicate greater enjoyment.

# CHAPTER 4

# DISCUSSION

Stress contributes to disease and mental illness (Dimsdale, 2008; Pflanz, 2001) and causes grave financial burdens to society (Bejean & Sultan-Taieb, 2005). Promoting creativity might be an economical solution for stress reduction and prevention. Creativity is "the ability to bring something new and unique into existence (Malchiodi, 1998, p. 65)," so engaging in a creative process can be as simple as choosing a new combination of colors to create a mandala. Previous research has shown that anxiety decreases when coloring and is significantly less when coloring a mandala or a plaid form as compared to coloring a blank sheet of paper (Curry & Kaiser, 2005). Creativity is an important component of both resiliency and coping (Flach, 1988; Harms, 2005; Malchiodi, 1998; Wolin & Wolin, 1993). Resilience is a process that enables one to overcome adversity (Harms, 2005), and coping is one's striving to deal with challenging situations (Maluccio, 2002). Researchers have implemented programs based on these observations that utilize creativity to increase resilience and coping in traumatized individuals (Berger & Lahad, 2010; Jang & Choi, 2012; Prescott, Sekendur, Bailey, & Hoshino, 2008). However, there was not a quantitative study that compared anxiety levels in those engaging in creative activities before stress induction to those who did not engage in creative activities before stress induction. The current investigation examined the relationship between coping with stress and creativity and flow by coloring a type of mandala (plain circle, predrawn, or color-by-number) or reading magazines before stress induction while comparing anxiety, creativity, and flow scores before stress induction and anxiety scores after stress induction. The operational definition of creativity was production of a novel product or

idea, such as deciding on different color combinations in a mandala. In order to measure creativity, participants self-reported their level of creativity during the activity by answering Likert scale questions on the Creativity Experience Questionnaire.

## Hypothesis 1

The data lent little support for the first hypothesis. I predicted that for the plain circle and the predrawn mandala coloring groups, pre and post anxiety scores within the groups would not be different when compared to one another; however, both groups' pre and post anxiety scores would be lower than the color-by-number mandala coloring group and magazine reading group. Additionally, I predicted that the pre-state anxiety scores of the color-by-number mandala group would or would not be different from the post scores, and in the magazine reading group, the pre-state anxiety scores would be lower than the post scores. Instead, the data showed that coloring different types of mandalas (plain circle, predrawn mandala, or color-by-number mandala) or reading magazines had little influence on state anxiety scores before and after stress induction. There was a significant main effect for Time on state anxiety scores as state anxiety scores before stress induction were significantly lower than state anxiety scores after stress induction. Consequently, because the state anxiety scores after stress induction were significantly higher than state anxiety scores before stress induction, the TSST-G stress induction method seemed to successfully produce anxiety in participants, lending support to prior research on the effectiveness of inducing stress with the TSST-G protocol (von Dawans et al., 2011). However, there was no significant main effect for Group on state anxiety scores, indicating no difference in state anxiety scores for those who colored a plain circle mandala, a predrawn mandala, or a color-by-number mandala,

or those who read magazines. There was no significant interaction between Time and Group on state anxiety scores. Therefore, regardless of group, the state anxiety scores after stress induction were higher than state anxiety scores before stress induction; hence, the type of group did not influence state anxiety scores before or after stress induction. Consequently, the TSST-G stress induction method seemed to be successful in significantly increasing state anxiety levels; however, the type of activity, coloring a mandala or reading magazines, before stress induction did not appear to alter state anxiety scores before or after stress induction.

These findings seem to contradict prior research findings that participation in a coloring activity significantly reduced anxiety levels (Allen, 2011; Babouchkina and Robbins, 2015; Curry & Kaiser, 2005; Petersen et al., 2015a; Sandmire, Gorham, Rankin, & Grimm, 2012). However, this current study did not compare baseline anxiety levels with anxiety levels after coloring or reading due to concerns that giving the STAI three times during a 90 min period would lead to participant bias due to familiarity with the measurement tool. A previous pilot study found that engagement in coloring activities after stress induction significantly decreased anxiety levels (Petersen et al., 2015a), which suggests that coloring may be a calming mechanism used to self-sooth by distracting the stressed individual rather than a preventive tool completed prior to stress exposure. This current study compared anxiety levels after participation in coloring activities (with differing levels of creativity) to magazine reading. Consequently, previous studies might actually be showing that any activity, regardless of creativity level, may reduce anxiety levels from baseline due to distraction rather than creativity. These previous studies

might also show that participants need to be stressed or be experiencing a greater level of anxiety before engaging in creative activities in order to see a calming effect.

### Hypothesis 2

Results supported the second hypothesis. I predicted that coloring different types of mandala (plain circle, predrawn mandala, or color-by-number mandala) or reading magazines would not influence trait anxiety scores before and after stress induction. The data showed there was not a significant main effect for Time on trait anxiety scores with pre-TSST-G trait scores being similar to post-TSST-G trait scores. There was not a significant main effect for Group on trait anxiety scores, and there was no significant interaction between Time and Group on trait scores. Therefore, coloring different types of mandala (plain circle, predrawn mandala, or color-by-number mandala) or reading magazines did not influence trait anxiety scores before and after stress induction; hence, the trait scores remained constant throughout. Consequently, the State-Trait Anxiety Inventory seemed to reliably assess anxiety as a trait as trait anxiety scores stayed the same throughout the experiment with multiple testings.

### Hypothesis 3

The data gave some support to the third hypothesis. I predicted that coloring the plain circle mandala or the predrawn mandala would result in significantly higher flow scores than the flow scores of the color-by-number mandala and magazine reading groups. The data showed that there was a significant effect of Group on flow absorption, fluency, and outcome; however, when analyzing these aspects of flow separately, Group had a significant effect on flow absorption, but not on flow fluency or flow outcome. Specifically, those who colored plain circle mandalas had significantly higher levels of

task absorption than those who read magazines. Other aspects of flow, specifically task difficulty, competency, and demands, were not significantly different between Groups. According to the Flow Short Scale results, none of the groups cared much about the outcome of the task (average answer for all the groups was less than "Partly") or had very fluent performance (average score for all the groups was around "Partly" or a little more than "Partly"). All of the groups viewed their task difficulty close to "easy" (average rating was around 2 on a task difficulty scale where "easy" was 1 and "difficult" was 9). All of the groups viewed themselves as competent in performing the task with the average score around 6 on a competency scale with 1 being "low" competence and 9 being "high." Finally, many viewed their task demands as being a little less than "just right," toward the "too low" side of the scale. In sum, the coloring tasks and reading magazines seemed to be too low on challenges while participants, on average, rated themselves as having higher levels of skills. Consequently, many participants might not have attained flow due to unbalanced challenges and skills, lending support to the original model of flow, or participants might not have achieved flow due to not experiencing high levels of both challenges and skills, lending support to the quadrant model of flow (Csikszentmihalyi, 1975; Csikszentmihalyi M. & Csikszentmihalyi I., 1988; Engeser & Rheinberg, 2008).

## Hypothesis 4

The data lend some support to the fourth hypothesis. I predicted that coloring the plain circle mandala or the predrawn mandala would result in significantly higher creativity scores than the creativity scores of the color-by-number mandala and magazine reading groups. The results showed there was a significant effect of Group on activity

creativity, activity enjoyment, and trait creativity. When analyzing these variables separately, Group had a significant effect on activity creativity, a significant effect on activity enjoyment, but a nonsignificant effect on trait creativity. Those who colored plain circles had significantly higher levels of activity creativity than those who read magazines. Those coloring a predrawn mandala rated their task as more creative than those who read magazines, colored a plain circle, or colored a color-by-number mandala. Those coloring plain circles had significantly greater activity enjoyment than those reading magazines. Therefore, coloring different types of mandala (plain circle, predrawn mandala, or color-by-number mandala) or reading magazines differed in activity creativity and activity enjoyment scores but did not influence trait creativity scores using the Creativity Experience Questionnaire. Those who colored a predrawn mandala showed the highest amount of activity creativity and had significantly higher activity creativity levels than all other groups. Consequently, those who colored the predrawn mandala seemed to be given a task that inspired the most creativity by giving some parameters of lines to color within (compared to the plain circle mandala condition) but not dictating which colors go where (compared to the color-by-number mandala condition) and requiring the production of a product (compared to reading a magazine). Those who colored the plain circle mandala enjoyed the activity the most and had significantly higher levels of activity enjoyment than those who read magazines, possibly due to being given the most freedom with the least parameters. Finally, there was not a significant difference in individuals who identified as being highly creative as a general trait. Consequently, no group had the advantage of having more individuals who

identified as being highly creative or the disadvantage of having more individuals who identified as being uncreative.

## Hypothesis 5

I predicted there would be a positive correlation between creativity and flow scores before stress induction. The data showed a positive correlation between activity creativity and total flow scores (total for flow absorption, fluency, and outcome scores), giving support to the fifth hypothesis. Increasing activity creativity positively correlated with increasing flow, lending support to previous studies which found an association between flow or aspects of flow and creativity (Byrne, Carlton, & MacDonald, 2006; Byrne, MacDonald, & Carlton, 2003; Kim, Kang, & Kim, 2009; Moneta, 2012). However, in this study compared to others, I found an association in the subject's perception of task creativity and their experience of flow. In previous studies, researchers assessed participants' level of creativity, which is subject to researcher bias. It may be difficult for researchers to measure consistently and accurately the creativeness of the product when each subject has unique creativity skills and potential. In this study, participants assessed their level of creativity during the activity, taking into account their individual creativity skills and potential; however, participants may not have accurately gauged if the product they produced was truly novel. The purpose of this study was to understand how a coloring activity influences flow, creativity, and anxiety, and how these variables influence one another, so it was more important to measure how participants perceived their process of creating than how novel their products were.

## Hypothesis 6

I predicted there would be a negative correlation between flow scores and/or anxiety scores before and after stress induction. Total flow scores negatively correlated with anxiety scores before stress induction, giving some support to the sixth hypothesis. However, there was no association found between total flow scores and anxiety scores after stress induction. Consequently, right after the activity, as flow increased, anxiety decreased. This might mean that activities generating flow could help one to relax, or that as stress gets higher, then flow is harder to attain. These results lend support to the original flow model, proposed by Czikszentmihalyi (1975), that predicted flow can occur at various levels of skill and challenge, as long as skills and challenges are balanced; however, flow is less likely to occur when skills are lower than the challenges, causing anxiety in this unbalanced state, or boredom, if skills are high and challenges are low. This means that at even low levels of skill or challenge, flow can occur, which seems to be the case in this study. Many participants rated their competency (skills) performing the task as slightly above average, and the task demands (challenges) as a little below "Just Right." Consequently, it seems like competency (skills) and demands (challenges) were around average and somewhat balanced, producing the flow state. However, participants rated task difficulty as too low, which, when combined with task demands to estimate task challenges, could cause the challenges of the tasks to be lower than the skills needed to complete the task, thus creating an unbalanced state, theoretically stopping flow. However, in this study, flow scores increased as anxiety decreased. Consequently, these results seem mixed. The quadrant model of flow, proposed by Czikszentmihalyi and Czikszentmihalyi (1988), also suggests if challenges are higher than skills, anxiety occurs; however, the quadrant model predicts that flow only occurs

when skills and challenges are at equally high levels. Consequently, the quadrant model seems to deny the linear relationship of balanced challenges and skill, at any level, produce flow, and that anxiety only occurs when skills are low and challenges are high. Because in this study the data shows there is a correlational relationship with anxiety and flow, this seems to discredit the quadrant model of flow.

### Hypothesis 7

Data did not support the seventh hypothesis. I predicted there would be a negative correlation between creativity scores and/or anxiety scores before and after stress induction. The data showed there was no correlation between creativity scores and anxiety scores before or after stress induction. These findings seem to contradict previous research that suggests creative processes decrease perceived stress (Gnanaprakash, 2011; Reynolds and Prior, 2006). However, previous studies gave participants options as to which creative activity they might like to engage in, and choice might make a difference.

## Conclusions and Future Directions

For the most part, this study did not lend support to the hypothesis that engaging in a coloring activity before stress induction helped to cope with stress during stress induction as compared to the control group who read magazines. Consequently, because this study did not support utilizing a creative activity as a stress prevention tool, future studies might examine if participating in these coloring activities after stress induction significantly reduces anxiety levels compared to reading magazines and compared to not participating in an activity to see if a creative activity, or if any activity at all, produces a

self-soothing effect, or if the passage of sufficient time after a stressful event might induce calm without needing an activity.

There was no difference in trait anxiety scores before and after stress induction, but there was a significant increase in state anxiety scores after stress induction compared to before. Consequently, this study's findings suggest that the STAI accurately and reliably measured state and trait anxiety levels, supporting previous research (Metzger, 1976; Spielberger et al., 1970). Future studies could utilize the STAI to accurately and reliably measure current anxiety and trait anxiety.

Because there was a significant effect of coloring the different types of mandalas or reading magazines on activity creativity, this shows that there was a difference in each task's creative "demands." However, there were not significant correlational findings regarding activity creativity and anxiety levels pre and post stress induction. However, greater enjoyment of the activity correlated with less anxiety before stress induction. This may mean that enjoying the activity makes more of a difference than if the activity requires creativity. Another probable explanation is that creativity and anxiety might not have a linear relationship, but instead, different creativity levels might produce differing amounts of anxiety. Possibly a task requiring much creativity might lead to perceptions of high demands causing increased anxiety, and tasks requiring little creativity might lead to boredom also resulting in increased stress. Tasks requiring the right amount of creativity that the individual feels capable of producing may be more enjoyable and might lead to decreased anxiety.

In the present study, participants were limited to coloring a type of mandala rather than engaging in a creative process of their choosing. This might cause stress in some

participants who are uncomfortable with art-making or coloring. Ideally, participants could choose a creative process to engage in. However, the duration of each experimental session was 90 min with an allotment of 30 min for engaging in a creative process, so for the sake of simplicity and efficiency, it was more convenient to have a single creative activity of coloring. If given numerous options, participants might have spent too much time deciding on which activity to engage in, and participants might have felt increased anxiety to make this decision quickly. Consequently, future research might investigate if a chosen creative activity helps in coping with stress.

Previous research also suggests that creative individuals are better able to cope with adversity (Flach, 1988; Harms, 2005; Wolin & Wolin, 1993); however, this study found that there was not a significant correlation of trait creativity on pre or post-TSST-G state anxiety scores. This might mean that individuals in this study inaccurately reported or assessed their creativity potential or that participants did not feel they were creative in a particular field. These results could also mean that those who are creative are not inherently better at responding to stress, but creative individuals might cope with stress more effectively when searching for and utilizing resources outside of a laboratory setting.

There was only a significant difference in one aspect of flow, absorption, so those coloring a plain circle mandala were significantly more absorbed in their task than those reading magazines. Even though the groups felt some level of absorption while engaging in the activity, the average results of the Flow Short Scale show that task demands were a little low, their competence for completing the task was a little too high, the task was too easy, they only had some fluency in performing the task, and participants cared little

about the outcome of the task. According to the quadrant model of flow (Csikszentmihalyi M. and Csikszentmihalyi I., 1988), the flow state could not occur without requiring high challenges and expertise. So for some, the coloring or reading activity did not produce high levels of flow because participants might not have felt challenged by these particular coloring tasks or the activities required too few skills. Future research on flow could utilize a larger sample size, more time to engage in the activity, and more diverse tasks that participants can choose from based on skills and preferred challenges.

Increasing activity enjoyment positively correlated with increasing total flow scores, so it seems like those who felt more flow during the process enjoyed the activity more. Consequently, future studies might have participants choose the activity they would like to engage in which might produce greater levels of flow.

Increasing flow significantly correlated with decreasing state anxiety before stress induction which could mean that processes inducing flow might calm and soothe. Additionally, increasing activity creativity correlated with increasing flow. Future research might explore participants engaging in a creative and flowful activity - of their choosing based on enjoyment (intrinsically rewarding/autotelic), challenges, skills, and outcome importance - after stress induction.

Many resiliency studies analyze participants coping with stress over longer periods, such as months or even years. A single 30 min session of coloring a mandala might have implications for coping with stress in the short-term, but long-term resilience might require many longer-duration sessions of engaging in activities that facilitate

creativity and flow. Consequently, this study analyzed the short-term effects of creativity on coping with stress rather than measuring long-term resilience.

Because participants were undergraduate students at Emporia State University, generalizability is limited. The sample is only representative of my population of students taking undergraduate psychology classes at Emporia State University in the spring of 2016.

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# APPENDICES

# Appendix A

## Demographics Survey

## Demographics Survey

1. **Age:_____ years**
2. **Gender: Woman Man Other**
3. **Ethnicity:**

   **American Indian/Alaska Native**

   **Asian/Pacific Islander**

   **Black or African American**

   **Hispanic**

   **Unknown**

   **White**

4. **Major:**

   **1st Major_____**

   **2nd Major_____**

   **Minor_____**

5. **College Classification:**

   **Freshman Junior Graduate**

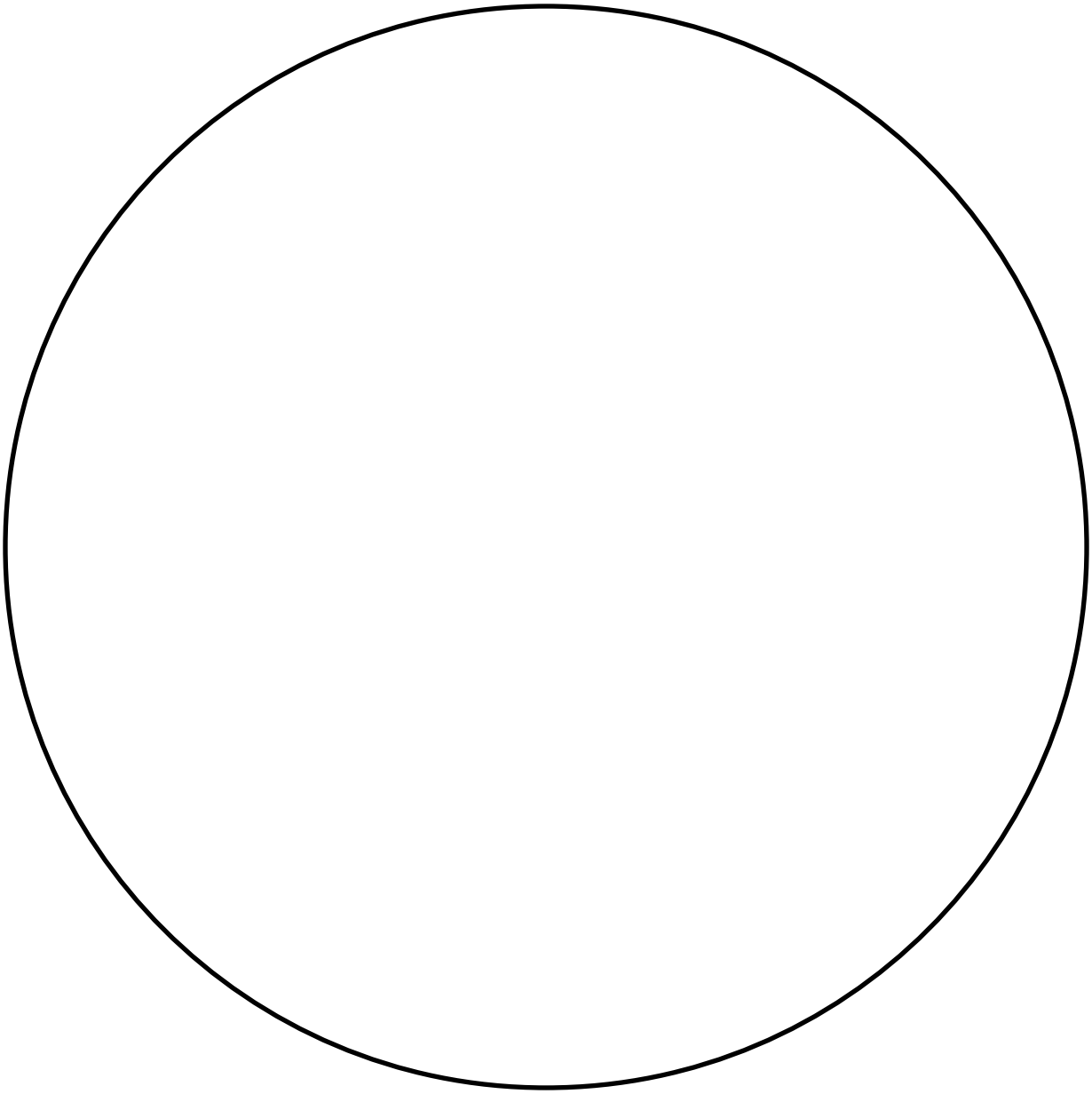
   **Sophomore Senior Other**

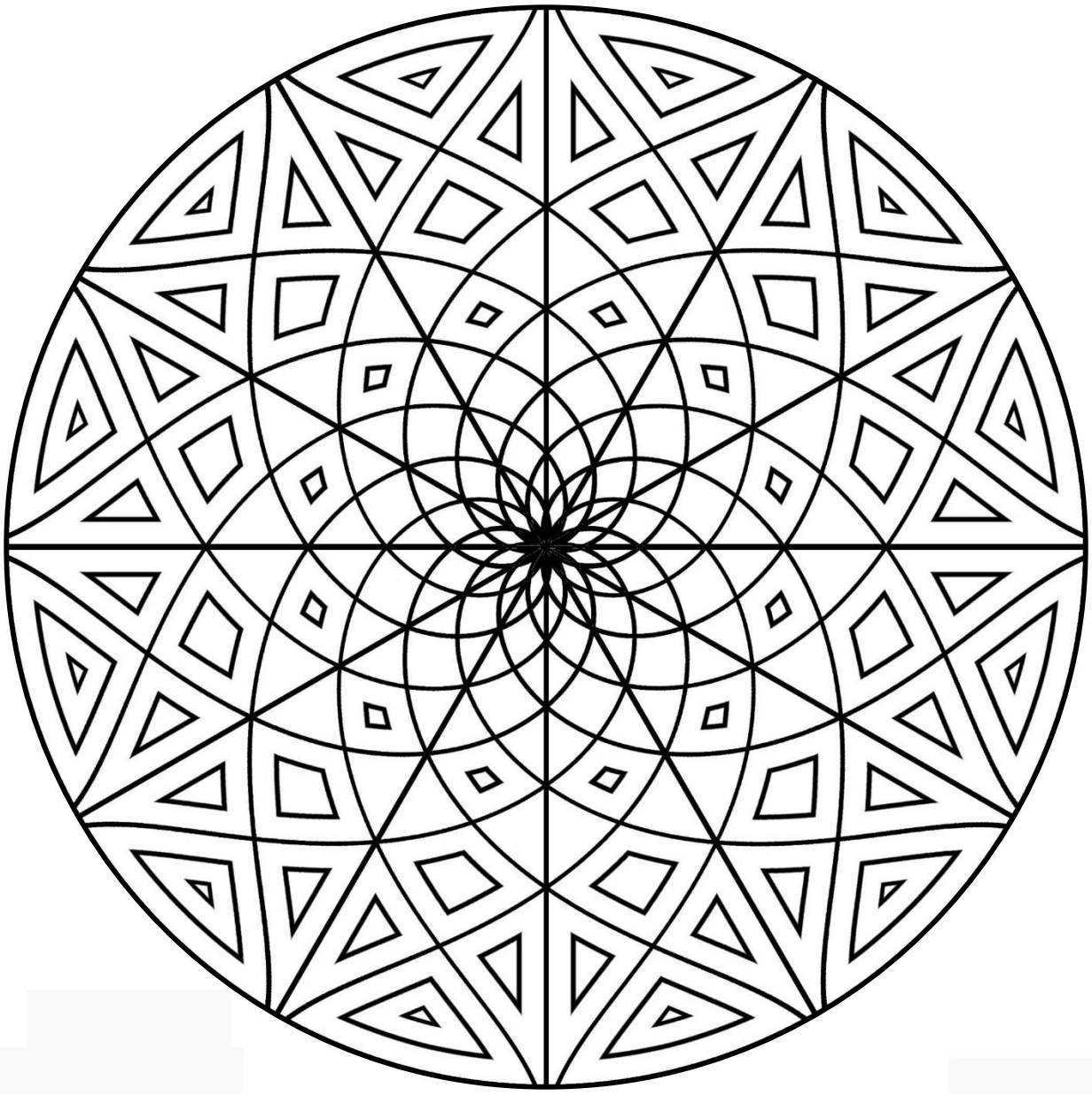
6. **Diagnosed Anxiety Disorder: Yes No**
7. **At this moment, I am anxious.**

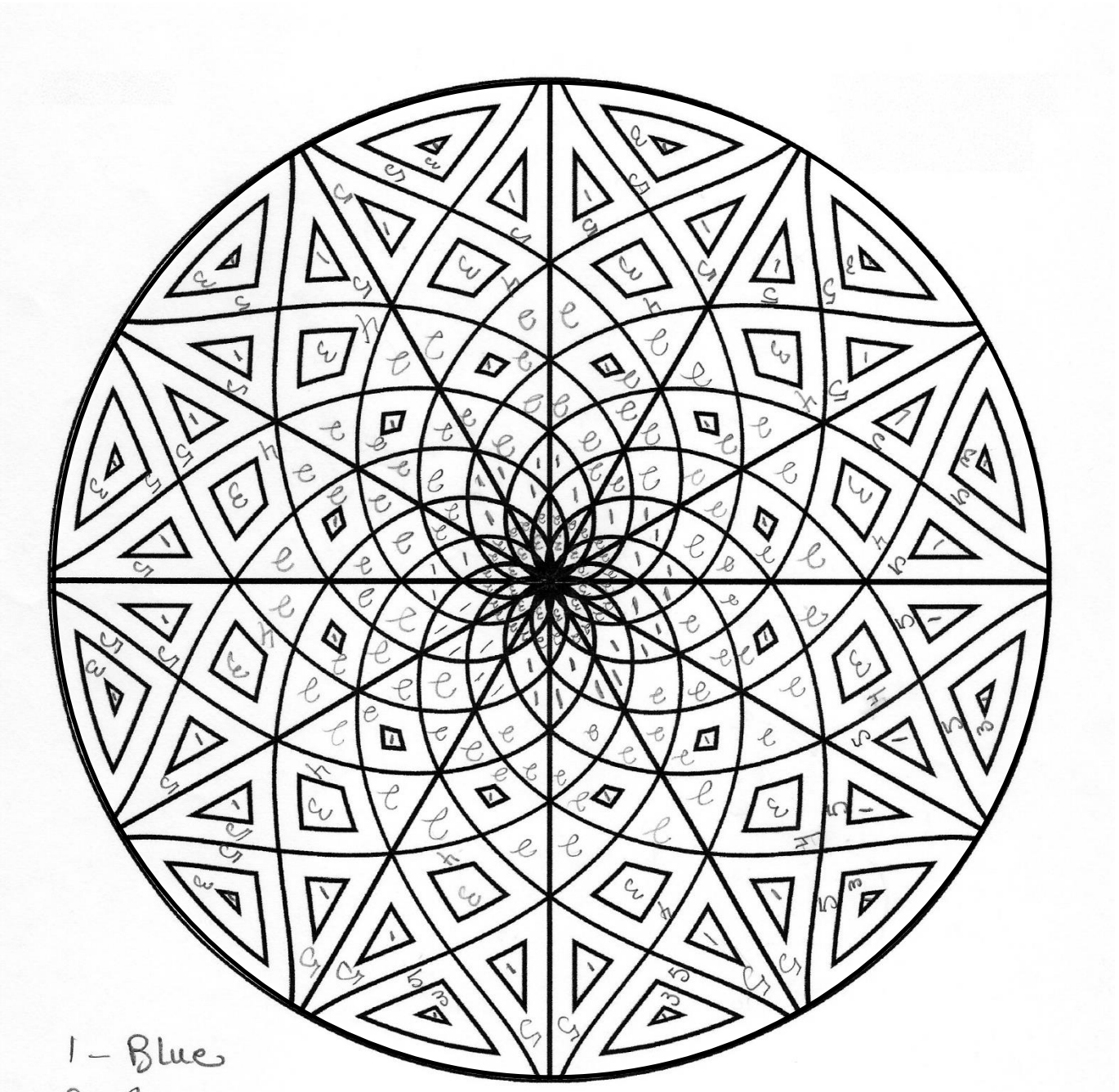
| Strongly Disagree | | | Neutral | | | Strongly Agree |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

# Appendix B

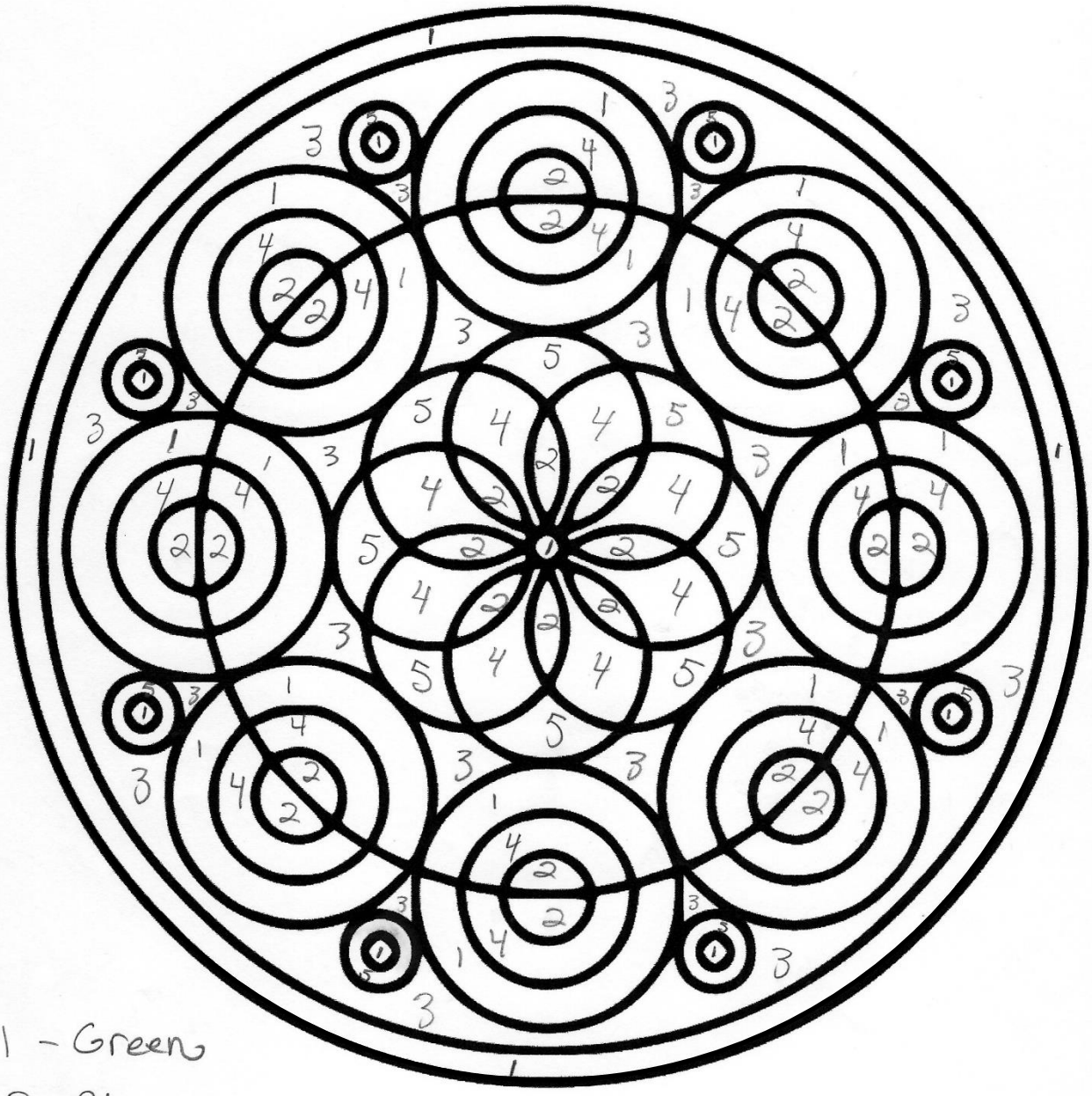
## Mandalas







1 – Blue
2 – Green
3 – Purple
4 – Red
5 – Orange



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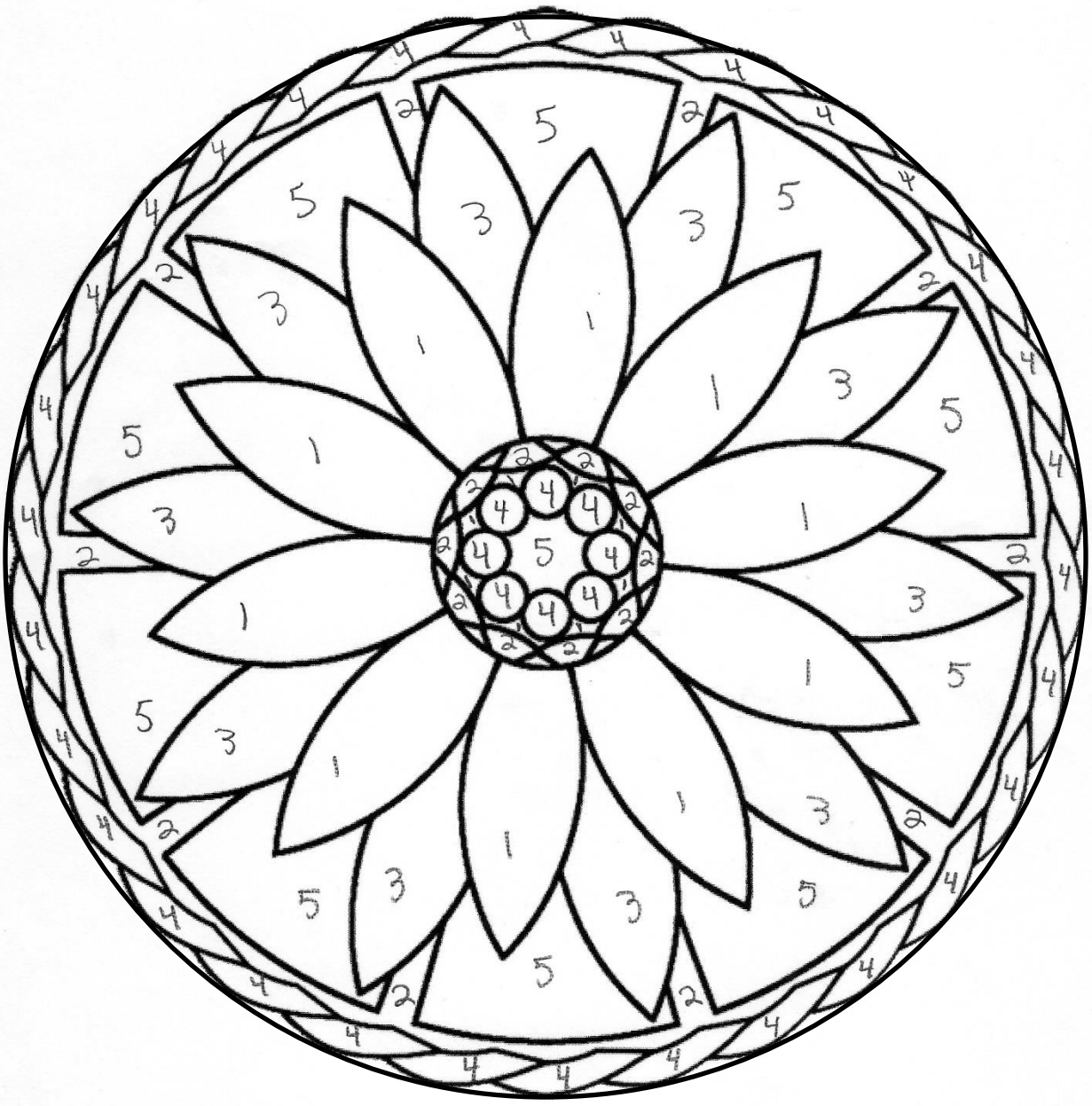
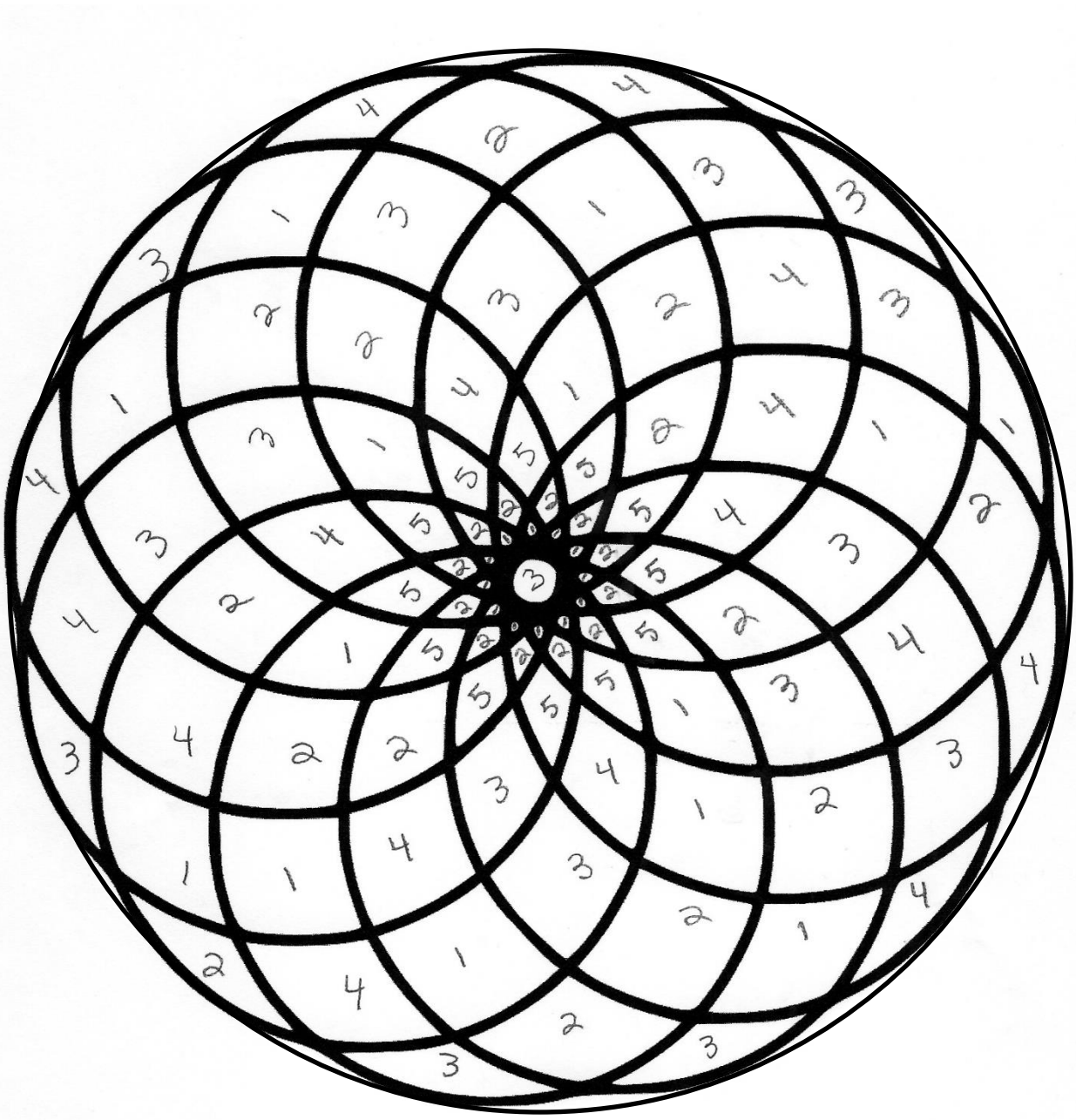
3 - Red

4 - Orange

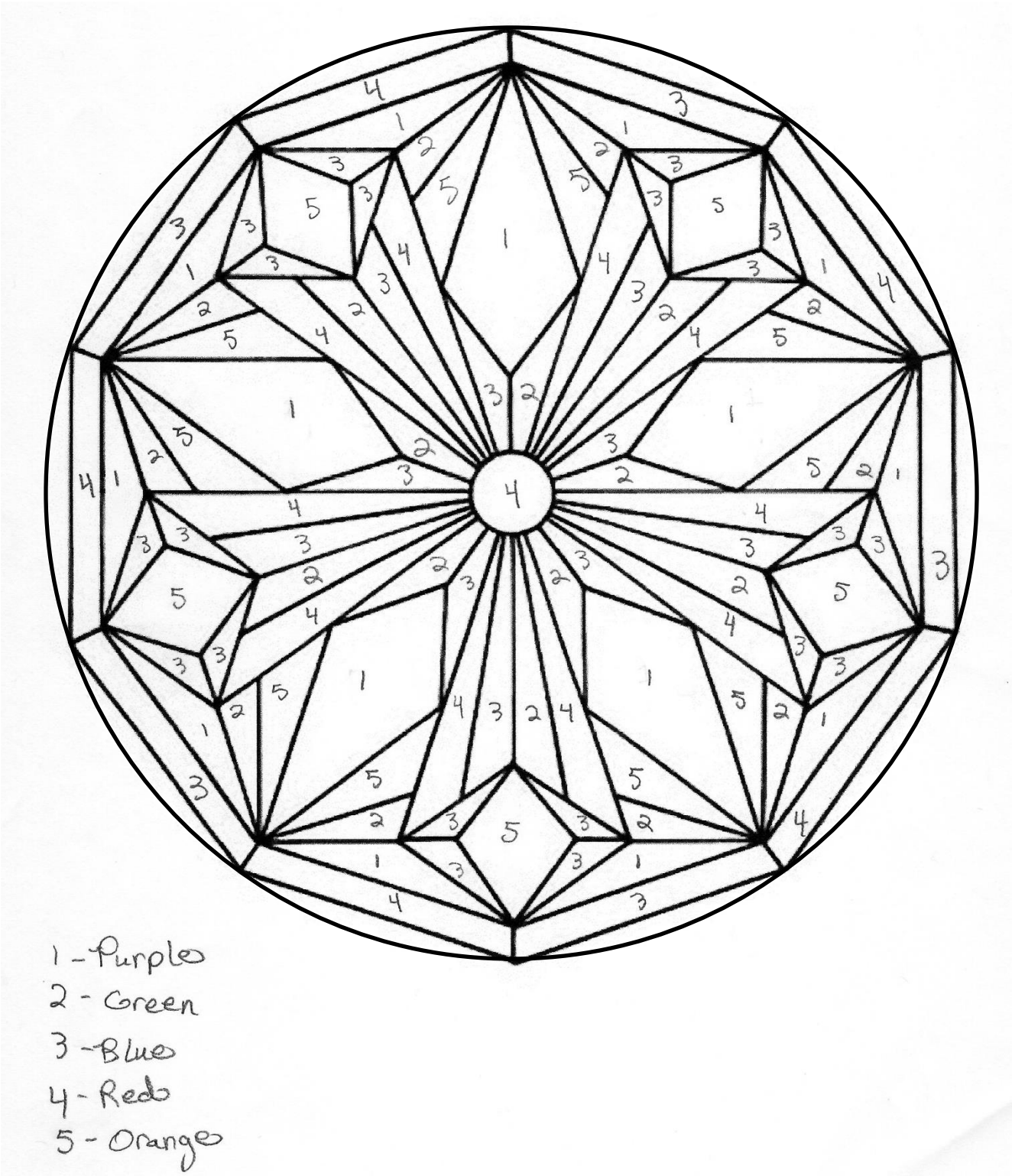
5 - Purple

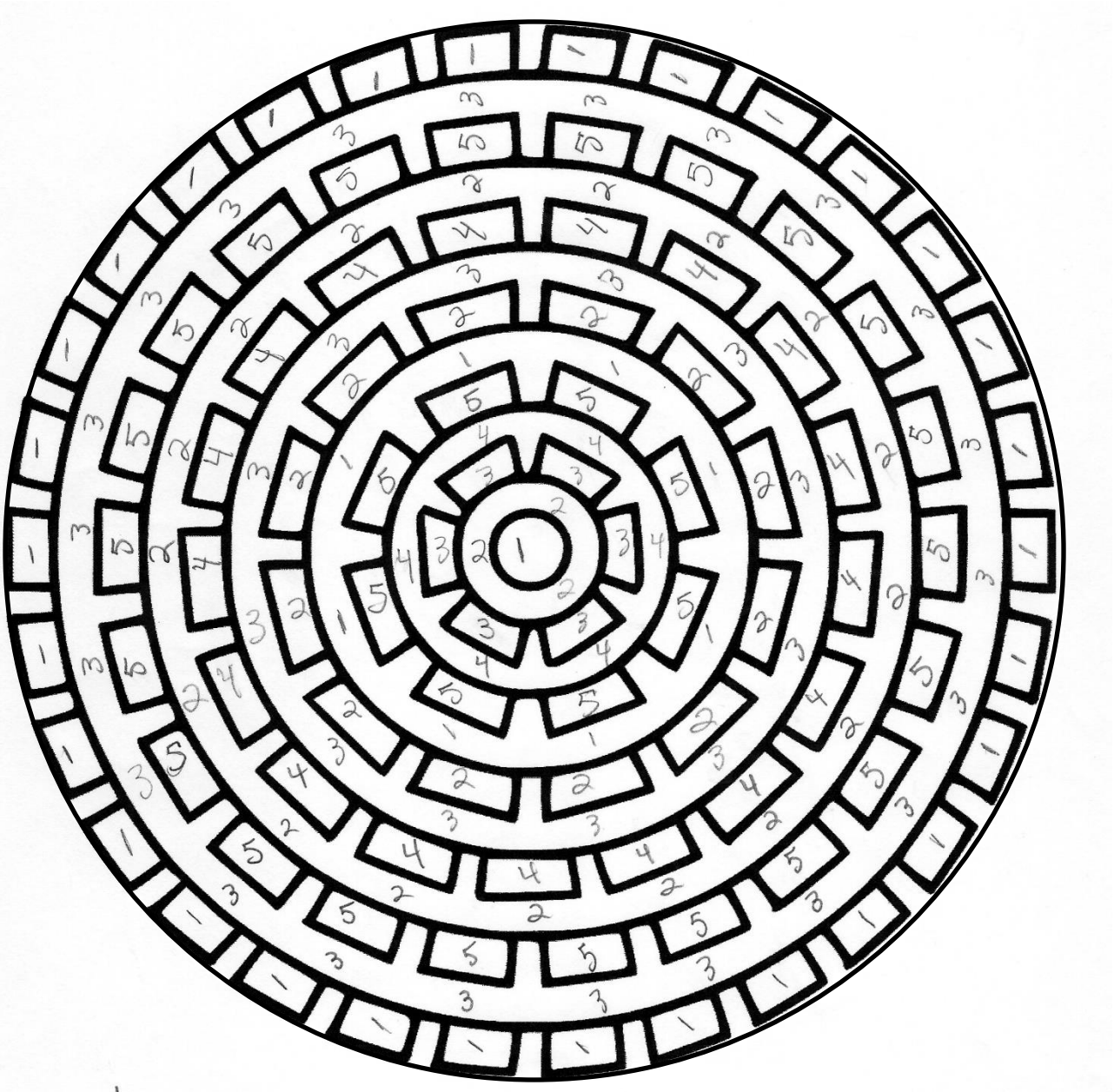


1 - Green
2 - Blue
3 - Red
4 - Purple
5 - Orange



1 - Red
2 - purple
3 - orange
4 - green
5 - blue


1 - Purple
2 - Green
3 - Blue
4 - Red
5 - Orange



1 – Orange
2 – Purple
3 – Green
4 – Red
5 – Blue

# Appendix C

## Modified State-Trait Anxiety Inventory

## Your Present Feelings

Read each statement and select the appropriate response to indicate **how you feel right now, at this very moment.** This is your present state of anxiety. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer that describes **your present feelings.**

| | **1** Not at all | **2** A little | **3** Somewhat | **4** Very Much |
|---|---|---|---|---|
| 1. I feel calm | 1 | 2 | 3 | 4 |
| 2. I feel secure | 1 | 2 | 3 | 4 |
| 3. I feel tense | 1 | 2 | 3 | 4 |
| 4. I feel strained | 1 | 2 | 3 | 4 |
| 5. I feel at ease | 1 | 2 | 3 | 4 |
| 6. I feel upset | 1 | 2 | 3 | 4 |
| 7. I am presently worrying over possible misfortunes | 1 | 2 | 3 | 4 |
| 8. I feel satisfied | 1 | 2 | 3 | 4 |
| 9. I feel frightened | 1 | 2 | 3 | 4 |
| 10. I feel uncomfortable | 1 | 2 | 3 | 4 |
| 11. I feel self-confident | 1 | 2 | 3 | 4 |
| 12. I feel nervous | 1 | 2 | 3 | 4 |
| 13. I feel jittery | 1 | 2 | 3 | 4 |
| 14. I feel indecisive | 1 | 2 | 3 | 4 |
| 15. I am relaxed | 1 | 2 | 3 | 4 |
| 16. I feel content | 1 | 2 | 3 | 4 |
| 17. I am worried | 1 | 2 | 3 | 4 |
| 18. I feel confused | 1 | 2 | 3 | 4 |
| 19. I feel steady | 1 | 2 | 3 | 4 |
| 20. I feel pleasant | 1 | 2 | 3 | 4 |

## Your Feelings in General

Read each statement and select the appropriate response to indicate **how you feel on average**. This is testing anxiety as a personality trait. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer that seems to describe **your general characteristics**.

| | **1** Not at all | **2** A little | **3** Somewhat | **4** Very Much |
|---|---|---|---|---|
| 1. I feel calm | 1 | 2 | 3 | 4 |
| 2. I feel secure | 1 | 2 | 3 | 4 |
| 3. I feel tense | 1 | 2 | 3 | 4 |
| 4. I feel strained | 1 | 2 | 3 | 4 |
| 5. I feel at ease | 1 | 2 | 3 | 4 |
| 6. I feel upset | 1 | 2 | 3 | 4 |
| 7. I am presently worrying over possible misfortunes | 1 | 2 | 3 | 4 |
| 8. I feel satisfied | 1 | 2 | 3 | 4 |
| 9. I feel frightened | 1 | 2 | 3 | 4 |
| 10. I feel uncomfortable | 1 | 2 | 3 | 4 |
| 11. I feel self-confident | 1 | 2 | 3 | 4 |
| 12. I feel nervous | 1 | 2 | 3 | 4 |
| 13. I feel jittery | 1 | 2 | 3 | 4 |
| 14. I feel indecisive | 1 | 2 | 3 | 4 |
| 15. I am relaxed | 1 | 2 | 3 | 4 |
| 16. I feel content | 1 | 2 | 3 | 4 |
| 17. I am worried | 1 | 2 | 3 | 4 |
| 18. I feel confused | 1 | 2 | 3 | 4 |
| 19. I feel steady | 1 | 2 | 3 | 4 |
| 20. I feel pleasant | 1 | 2 | 3 | 4 |

# Appendix D

## Modified Flow Short Scale

## Flow Short Scale Inventory

*Please answer these questions according to how you felt while you were coloring. Fill in the appropriate circle.*

| **Flow Short Scale Inventory** | Not at all | Partly | Very much |
|---|---|---|---|
| 1. I feel just the right amount of challenge | | | |
| 2. My thoughts/activities run fluidly and smoothly | | | |
| 3. I do not notice time passing | | | |
| 4. I have no difficulty concentrating | | | |
| 5. My mind is completely clear | | | |
| 6. I am totally absorbed in what I am doing | | | |
| 7. The right thoughts/movements occur of their own accord | | | |
| 8. I know what I have to do each step of the way | | | |
| 9. I feel that I have everything under control | | | |
| 10. I am completely lost in thought | | | |
| 11. Something important to me is at stake here | | | |
| 12. I must not make any mistakes here | | | |
| 13. I am worried about failing | | | |

Compared to all other activities which I partake in, this one is... Easy — Difficult

I think that my competence in this area is... Low — High

For me personally, the current demands are... Too Low — Just Right — Too High

# Appendix E

## Creativity Experience Questionnaire

## Creativity Experience Questionnaire

*Please answer these questions by circling the appropriate number.*

During this activity, you would describe yourself as being:

| Highly Creative | Creative | Somewhat Creative | Not Creative At All |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

During this activity, you would describe your experience as:

| Highly Creative | Creative | Somewhat Creative | Not Creative At All |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

During this activity, the product you made was:

| Highly Creative | Creative | Somewhat Creative | Not Creative At All |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

In general, you would rate your personality as:

| Highly Creative | Creative | Somewhat Creative | Not Creative At All |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

In general, you would rate your ability in art making as:

| Highly Creative | Creative | Somewhat Creative | Not Creative At All |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

In general, you would rate your ability in areas other than art making as:

| Highly Creative | Creative | Somewhat Creative | Not Creative At All |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

I enjoyed this activity:

| Strongly agree | | | Neither agree nor disagree | | | Strongly disagree |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

# Appendix F

## IRB Approval

EMPORIA STATE
UNIVERSITY
GRADUATE SCHOOL AND
DISTANCE EDUCATION

Research and Grants Center
Campus Box 4003
1 Kellogg Circle
Emporia, Kansas 66801-5415
620-341-5351
620-341-5909 fax
www.emporia.edu/research

April 11, 2016

Rachel Peterson
Psychology
Campus Box 4031, 1 Kellogg Circle
Empria, KS 66801

Dear Ms. Peterson:

Your application for approval to use human subjects has been reviewed. I am pleased to inform you that your application was approved and you may begin your research as outlined in your application materials. Please reference the protocol number below when corresponding about this research study.

| | |
|---|---|
| Title: | Express Yourself |
| Protocol ID Number: | 16074 |
| Type of Review: | Expedited |
| Time Period: | April 11, 2016 to April 11, 2017 |

If it is necessary to conduct research with subjects past this expiration date, it will be necessary to submit a request for a time extension. If the time period is longer than one year, you must submit an annual update. If there are any modifications to the original approved protocol, such as changes in survey instruments, changes in procedures, or changes to possible risks to subjects, you must submit a request for approval for modifications. The above requests should be submitted on the form Request for Time Extension, Annual Update, or Modification to Research Protocol. This form is available at www.emporia.edu/research/irb.html.

Requests for extensions should be submitted at least 30 days before the expiration date. Annual updates should be submitted within 30 days after each 12-month period. Modifications should be submitted as soon as it becomes evident that changes have occurred or will need to be made.

On behalf of the Institutional Review Board, I wish you success with your research project. If I can help you in any way, do not hesitate to contact me.

Sincerely,

Dr. John Barnett
Chair, Institutional Review Board

pf

cc: Cathy Grover

EMPORIA STATE
UNIVERSITY
GRADUATE SCHOOL AND
DISTANCE EDUCATION

Research and Grants Center
Campus Box 4003
1 Kellogg Circle
Emporia, Kansas 66801-5415
620-341-5351
620-341-5909 fax
www.emporia.edu/research

April 22, 2016

Rachel Petersen
Psychology
Campus Box 4031, 1 Kellogg Circle
Emporia. KS 66801

Dear Ms. Petersen:

The modification of research protocol #16074 has been approved and you may continue your research as outlined in your application materials.

Please remember that if it is necessary to conduct research with subjects past your approved expiration date, it will be necessary to submit a request for a time extension. If the time period is longer than one year, you must submit an annual update. If there are additional modifications to the approved protocol, such as changes in survey instruments, changes in procedures, or changes to possible risks to subjects, you must submit a request for approval for modification.

Requests for extensions should be submitted at least 30 days before the expiration date. Annual updates should be submitted within 30 days after each 12-month period. Modifications should be submitted as soon as it becomes evident that changes have occurred or will need to be made.

I wish you continued success with your research project. If I can help you in any way, do not hesitate to contact me.

Sincerely,

John Barnett pf

Dr. John Barnett
Chair, Institutional Review Board

pf

cc: Cathy Grover

# Appendix G

## Informed Consent

# Informed Consent

**Study Name: Job Talk**

**Faculty Researcher:** Dr. Cathy Grover
**Telephone Number:** (620) 341-5813
**E-mail:** cgrover@emporia.edu

**Student Researcher:** Rachel Petersen
**Telephone Number:** 406-223-6549
**E-mail:** rpeterse@emporia.edu

The Department of Psychology at Emporia State University supports the practice of protection for people participating in research and related activities. This study has been reviewed to determine that it poses little or no risk of harm to you. Any information obtained from you will be kept strictly confidential. Although you may be assigned an arbitrary participant number to assist in data collection, I assure you that neither your name nor participant number will be associated in any way with any reportable results. The following information will help in your decision to participate in the present study.

You will take a demographic survey, engage in an activity, take three surveys, prepare and perform a job interview, participate in an arithmetic exercise, and complete one final survey. Your participation should take approximately 90 minutes and will be worth two research points. **You should be aware that even if you agree to participate, you are free to withdraw at any time, and that if you do withdraw from the study, you may do so without penalty.**

You will gain no benefits by participating in this study other than educational (or credit if it is offered by your instructor), and other options are available from your instructor. The researchers are obligated to tell you as much as you care to know about the study after your part in the study is complete. If you would like a written summary of the results, please include your name and address in the space provided, and the researchers will send you a copy when it is available.

All persons who take part in this study must sign this consent form. In addition, persons under the age of 18 also must include the signature of a parent or legal guardian. Your signature in the space provided indicates that researchers informed you of your rights as a participant, and that you agree to volunteer on that basis.

*"I have read the above statement and have been fully advised of the procedures to be used in this project. I have been given sufficient opportunity to ask any questions I had concerning the procedures and possible risks involved. I understand the potential risks involved and I assume them voluntarily. I understand that I can withdraw from the study at any time without being subjected to reproach."*

_____ _____
Signature of Participant Date

For persons under the age of 18:
*"With my signature, I affirm that I have read and understand my child's rights and the study described on this page, and voluntarily agree to allow my child (or legal guardian) to participate in this research study."*

_____ _____
Signature of Parent or Guardian (if participant is a minor) Date

For written summary of results:
Printed Name_____

ESU student e-mail_____

# Appendix H

## Debriefing Statement

**Debriefing Statement**

Job Talk

Spring 2016 – PSYC #

Thank you for participating in my study. Researchers have found that participants' stress levels significantly rise during the practice job interview (TSST-G; Von Dawans, Kirschbaum, & Heinrichs, 2011). I performed this study to see if coloring mandalas increases the ability to cope with induced stress. I would greatly appreciate your confidentiality in not sharing the information contained within this study, so it will not influence others' behavior. If you have any questions, you can contact Rachel Petersen at rpeterse@g.emporia.edu. If you are still experiencing anxiety, the following services are available:

The Student Illness Center, 250 SE Morse Hall, 620-341-5221

Mental Health Center of East Central Kansas, 1000 Lincoln St, 620-343-2211

I greatly appreciate your participation in my study. Thank you!

# PERMISSION TO COPY

I, Rachel Ann Petersen, hereby submit this thesis to Emporia State University as partial fulfillment of the requirements for an advanced degree. I agree that the Library of the University may make it available to use in accordance with its regulations governing materials of this type. I further agree that quoting, photocopying, digitizing or other reproduction of this document is allowed for private study, scholarship (including teaching) and research purposes of a nonprofit nature. No copying which involves potential financial gain will be allowed without written permission of the author. I also agree to permit the Graduate School at Emporia State University to digitize and place this thesis in the ESU institutional repository.

_____

Signature of Author

_____

Date

_____

Title of Thesis

_____

Signature of Graduate School Staff

_____

Date Received