EFFECTS OF COLORING ON IMMEDIATE SHORT-TERM STRESS RELIEF

by

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ABSTRACT

Although research has not yet examined adult coloring books specifically, research suggests that artmaking can reduce negative affect, improve mood, and reduce anxiety (Drake & Hodge, 2015; Pizarro, 2004) and that coloring, specifically, can reduce anxiety on a short-term basis (Curry & Kasser, 2005; van der Vennet & Serice, 2012). These short-term effects are seen more strongly when participants are using art as a form of distraction from their negative feelings rather than as a way to vent (Dalebroux et al., 2008; De Petrillo & Winner, 2005; Drake & Winner, 2012). The present study seeks to expand upon this knowledge by comparing the effects of coloring adult coloring pages, children's coloring pages, or completing a coloring-related distraction task on subjective accounts of negative and positive emotions. Data were analyzed for 274 participants aged 18-24 enrolled at the University of Mississippi (84.7% female, 82.12% Caucasian, 99.23% single). Upon analysis, all distraction tasks relieved stress on an immediate short-term basis, and there was a borderline significant result for the interaction between time period and group, in regards to the Subjective Units of Distress Scale (Wolpe, 1990), but no significant group differences for the Positive And Negative Affect Schedule (Watson, Clark, & Tellegen, 1988). Participants in the coloring conditions enjoyed their tasks significantly more than participants in the control distraction task, while experiencing about the same amount of stress relief and participants in the adult coloring book condition or control task condition desired to pick up their packets after the study more than those who participated in coloring children’s pages. Although adult coloring books have become extremely popular for their stress-relieving reputation, use of a children’s
coloring book can likely be just as beneficial at reducing stress on an immediate short-term basis.
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INTRODUCTION

In recent years, adult coloring book sales have skyrocketed, with the 2015 U.S. Book Industry Year Review reporting 12 million copies sold in 2015 alone, a spike from the former 1 million sold in 2014 (Neilsen, 2016). The rise of these books has potentially been generated by their marketing as “stress relieving.” Many adult coloring book covers contain implications of therapeutic effects, such as "relaxation," and the ability to "stress less." The media has promoted the message of adult coloring books as stress relieving, but therapists are wary to give full support. Art therapist Cathy Malchiodi stated, “Some people are adamant that coloring books are a path to mindfulness, meditation and some kind of psychological nirvana. I find that many of the loudest proponents are actually those that create the coloring books” (Schwedel, 2015). Although NYU’s Drena Fagen says she has used adult coloring books in her sessions before, she is quick to make a distinction, “I don’t consider the coloring books as art therapy; I consider the coloring books therapeutic, which is not the same thing” (Schwedel, 2015). Although adult coloring books have had recent success in sales and could have stress reducing qualities, research has not yet been published that suggests adult coloring books, specifically, are an effective method for reducing stress.

Although research has not broached the topic of adult coloring books, specifically, research does suggest that artmaking can reduce negative affect, improve mood, and reduce anxiety (Drake & Hodge, 2015; Pizarro, 2004). For example, when Drake and Hodge (2015) compared drawing with writing, negative affect was
significantly lower after drawing, even when the participants’ reported their preferred activity as writing. Pizarro found in a 2004 trauma study that although participants in an art-making condition did not experience the same decrease in social dysfunction as participants in a writing condition, they “reported more enjoyment, were more likely to continue with the study, and were more likely to recommend the study to family and friends” (5).

It is important to note that this line of research does not suggest coloring as a beneficial long-term therapy method, but only vouches for its short-term effects. These short-term effects are seen more strongly when participants are using art as a form of distraction from their negative feelings rather than as a way to vent (Dalebroux et al., 2008; De Petrillo & Winner, 2005; Drake & Winner, 2012). Distraction and venting methods, which are also called redirection and catharsis, are described by De Petrillo and Winner as the reasons artists claim art as therapeutic. In a study where participants viewed a film that induced negative emotions and then participated in one of three interventions, participants who engaged in drawing their current mood (venting) and participants who scanned a sheet for specific symbols (distraction control) showed significantly less mood valence improvement than participants who engaged in a drawing depicting something happy (positive distraction).

It is also important to note that while art making may be more beneficial as a distraction method to reduce negative affect, it still seems to hold an inherent efficacy over other distraction methods. In one study, participants who completed a word puzzle as distraction did not show improved mood, whereas the participants who colored as distraction did (De Petrillo & Winner, 2005).
Although we do not yet have the aforementioned research regarding adult coloring books specifically, art therapy research suggests the use of coloring pages can reduce anxiety on a short-term basis (Curry & Kasser, 2005; van der Vennet & Serice, 2012). Both studies found that participants that colored pre-drawn images experienced more anxiety reduction than those that participated in unstructured coloring.

Coloring is not a new pastime. Coloring books date back to the 1800s art scene when the Realist movement was working to democratize art (“Drawn to Art,” 2003). During this movement, artists not only used common people as subject matter, but also worked to make art more available to the public. Coloring books were a way for common people, primarily children, to begin to express themselves artistically, a luxury previously reserved for the elites (“Drawn to Art,” 2003). The coloring book market, until recent years, has been aimed at children, casting the act of coloring a pre-drawn design in a childlike light and portraying it as a child’s task. Perhaps this new repurposing of the coloring book is one reason that adult coloring books have been so reportedly calming. Perhaps children’s coloring books are seen as too basic or commonplace for enjoyment or stress-relief among adults.

Another difference between adult and children’s coloring books is the variance of subject matter. One could argue that adult coloring books reduce stress more effectively than children’s because the subject matter itself is more calming, e.g., nature scenes and mandalas, rather than popular animated characters.

Another potential explanation for the supposed calming nature of adult coloring books is the potential aesthetic pleasure received from design that children’s coloring books may not achieve. In one study, participants who colored mandalas after writing
about a past fearful scenario for 4 minutes reported lower anxiety ratings than participants that colored plaid designs or colored on blank paper (van der Vennet & Serice, 2012). Intricacy was controlled for with the use of mandala and plaid designs with an equal amount of parts to color. These results suggest that interesting design may affect stress relief. Thus the first hypothesis of the present study is that the use of adult coloring books as distraction will reduce stress more effectively than the use of children's coloring books and a control condition as distraction on an immediate short-term basis.

Because of the aforementioned ability of art to reduce negative affect, improve mood, and reduce anxiety, and because of coloring’s ability to improve mood, it is also hypothesized that participants in the coloring conditions will report more enjoyment than participants in the control condition.

Finally, because of the potential perceived novelty and interest in design of adult coloring books, it is hypothesized that participants in the adult coloring condition will want to pick up their packets following the study more than participants in the children’s coloring condition.
METHOD

Participants

Data were collected from 278 undergraduate students enrolled in psychology classes at the University of Mississippi. Four participants’ data were removed: two were removed from the children’s coloring book condition due to reporting to the experimenter they realized the anagram task was impossible and two were removed from the control condition because they reported “I think that I may have colorblindness but have not been diagnosed.” The remaining 274 participants ranged in age from 18 to 24 ($M = 18.64$, $SD = 1.12$), and were 84.7% female and 82.12% Caucasian. Another 16.69% identified as a different single ethnicity and 2.19% identified as being multiple ethnicities. The majority of participants (99.23%) reported their relationship status as single. When asked if they had taken an art class during college, 89.05% reported that they had not, yet 46.35% of participants reported having used an adult coloring book in the past.

Participants were recruited through the online SONA system as well as two psychology professors’ classes by providing information on SONA or Blackboard about the study to potential participants and giving them information for how to participate. Participants who were recruited through the online SONA system received 1 SONA credit for their participation and participants recruited through other classes received the equivalent of one hour class credit for their participation. Participants were randomly assigned to one of three conditions using a block-random assignment procedure to ensure
roughly even numbers of participants in each condition. See below for further information about random assignment.

**Procedure**

A mixed design was used in order to measure the differences between adult coloring, children's coloring, and a control distraction task on negative and positive affect. In order to minimize the likelihood that participants would become aware of and influenced by the different tasks being completed in other conditions, participants’ chairs were turned to face walls where they could only potentially see packets of other participants in their own group. Each time the study was run, only one specific condition was seated along each wall. Because there were three conditions and four walls, the fourth wall’s participant base rotated based on which condition had additional participants during that run. As participants entered the room, they were assigned to a condition using a pre-determined randomly assigned order such that during each run there was roughly an even number of participants in each group.

Upon entering the lab, participants were seated at desks which contained packets containing all materials along with an informed consent form, which participants read and signed before the study began. All participants then completed the demographic information, the Subjective Units of Distress Scale (SUDS; Wolpe, 1990), and the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) in order to test their incoming stress levels. After the pre-study measures, participants were given five minutes to complete a worksheet of impossible anagrams for the purpose of inducing stress. Participants then completed the SUDS (Wolpe, 1990) and PANAS (Watson et al., 1988) for a second time after the stress-induction task.
Participants then completed one of three tasks to which they were randomly assigned upon arriving. The conditions included the following: adult coloring, children's coloring, or a distraction task that served as a control. In the adult coloring book condition, participants were given 3 nature-themed adult coloring pages and a set of colored pencils with their packets and were instructed to color for 10 minutes. In the children's coloring book condition, participants were given 3 corresponding nature-themed children's coloring pages and a set of colored pencils and were instructed to color for 10 minutes. Participants in the adult and children’s coloring book conditions were instructed: “Please color the first image you see (the owl). If you have time remaining, please color the second page (the jellyfish). If you still have time remaining, please color the third page (the whale).” In the control condition, participants were given colored pencils and instructions to look over the coloring pages and complete the instructions. See Appendix A for condition stimuli.

Following the experimental manipulation, participants completed the SUDS (Wolpe, 1990) and PANAS (Watson et al., 1988) scales for the third time to measure for potential effects on positive and negative affect. Afterwards, debriefing occurred in which the study and its purposes were explained. During this time, the deception of the impossible anagram task was made transparent and the experimenter ensured participants were not distressed as a result of the deception. Re-consent forms were then signed. Participants received course credit for their participation in the study.

Measures

Demographic questionnaire. A brief questionnaire was created to measure demographic elements such as age, gender, race, and marital status. This questionnaire
also included study-specific elements that would allow us to analyze for group
differences, such as questions regarding color blindness and whether participants had
taken art classes in college. See Appendix A for the demographic questionnaire.

**Subjective Units of Distress Scale.** A 10-point SUDS (Wolpe, 1990) was used to
measure distress. Participants were given instructions to “Circle one number on the scale
below that you feel best describes your current level of negative emotions (for example,
stress, frustration, sadness) at the present moment.” The scale ranged from 1 (*no negative
emotions*) to 10 (*extreme negative emotions*) with additional anchors between 2 and 3
(*mild negative emotions*), at 5 (*moderate negative emotions*), and between 7 and 8 (*very
strong negative emotions*).

**Positive and Negative Affect Schedule.** The PANAS (Watson, et al., 1988) was
used to measure current affect at three time points throughout the study. For this measure,
participants ranked 20 affective items (e.g., interested, distressed) on a 5-point Likert
scale that ranged from 1 (*very slightly or not at all*) to 5 (*extremely*). When participants
are given instructions to report on their feelings at this moment, as they were in this
study, the PANAS shows internal consistency with reliability for positive affect and
negative affect (Watson, et al., 1988).

**Materials**

**Stress induction task.** In order to induce stress, a worksheet of 20 impossible
anagrams (e.g., “WEAEOTNRM,” “RTOEC,” “SUSIOUIST”) was created and
distributed to participants with the instructions to unscramble all 20 anagrams in an
allotted time period of 5 minutes. See Appendix B for the stress induction worksheet.
**Coloring and distraction task stimuli.** Nature-themed adult and children's coloring pages were used for all three conditions. For the adult coloring book condition, participants were given adult coloring sheets of an owl, whale, and jellyfish provided by Blue Star Coloring, LLC. Participants in the children’s coloring book condition were given children’s coloring sheets of an owl, whale, and jellyfish that resembled those given to the participants in the adult condition; obtained from the internet. For the control condition, participants were given three pages each containing 4 pre-colored and shrunken adult coloring sheets. The pre-colored sheets included the exact same adult coloring images used in the adult coloring book condition along with additional distraction task pages. They were printed with instructions for participants to use colored pencils to follow a set of directions associated with the stimuli provided. See Appendix C for each condition’s task stimuli.
RESULTS

Prior to analyses, data were examined for inaccuracies and to determine if they violated any of the assumptions of the relevant inferential statistics. PANAS negative affect scores were significantly skewed and kurtotic with multiple outliers. Therefore, all PANAS negative affect scores were square root transformed, resulting in a reduction in skewness and kurtosis as well as the number of outliers. One participant in the adult condition's pre-PANAS negative affect score was removed for failure to complete the measure correctly (reporting multiple items as a 0 when the scale ranged from 1 – 5).

In order to evaluate whether there were any significant group differences on demographic variables, a series of one-way ANOVAs was conducted. No significant group differences were found on age, current GPA, high school GPA, or how much people thought about the anagram task during the distraction task. A series of Chi-Square non-parametric tests were conducted on the categorical demographic variables. There were no significant group differences on gender, ethnicity, marital status, whether they had taken an art class while in college, or whether participants had ever used an adult coloring book.

To test whether the manipulation effectively modified participants’ emotional state at the three time points, a mixed-model ANOVA was conducted on each of the major outcome variables. Box’s Test of Equality of Covariance Matrices was significant, therefore the more conservative Greenhouse-Geisser correction was utilized. The within-subjects $F$ was significant for all major outcome variables: SUDS ($F(1.86) = 192.78, p =$
.000, $\eta^2 = .42$), negative affect (square root) ($F(1.89) = 148.60$, $p = .000$, $\eta^2 = .36$)\(^1\), and positive affect ($F(2) = 96.67$, $p = .000$, $\eta^2 = .26$). See Table 1 for means by group of all major outcome variables.

A mixed-model ANOVA was conducted to test the first hypothesis with respect to the change in SUDS from post-mood induction to post-manipulation. Box’s Test of Equality of Covariance Matrices was not significant. There was a main effect of SUDS ($F(1, 268) = 286.41$, $p = .000$, $\eta^2 = .52$) but no main effect for group ($F(2, 268) = .377$, $p = .69$, $\eta^2 = .003$). There was a borderline significant result for the interaction between SUDS and group ($F(2, 268) = 2.64$, $p = .073$, $\eta^2 = .019$). A post-hoc between groups ANOVA comparing change in SUDS from post-mood induction to post-manipulation across groups with a one-tailed Tukey HSD post hoc test found the adult coloring book condition ($M = -2.69$, $SD = 1.94$) reported significantly greater change in SUDS ($p = .058$) than either of the other conditions [children’s coloring ($M = -1.93$, $SD = 2.43$) and control condition ($M = -2.30$, $SD = 2.32$)] and no significant difference in either of the other conditions (see Figure 1).

A mixed-model ANOVA was conducted to test the first hypothesis with respect to negative affect utilizing the square root of negative affect scores. Box’s Test of Equality of Covariance Matrices was significant, therefore the more conservative Greenhouse-Geisser correction was utilized. There was a main effect of negative affect ($F(1, 270) = 239.15$, $p = .000$, $\eta^2 = .47$) but no main effect for group ($F(2, 270) = .38$, $p = .682$, $\eta^2 = .003$). There was not a significant result for the interaction between negative affect and group ($F(2, 270) = 1.40$, $p = .25$, $\eta^2 = .01$).\(^1\)

\(^1\) Results did not differ using raw negative affect data.
Table 1

 Means and Standard Deviations by Group for All Major Outcome Variables

<table>
<thead>
<tr>
<th></th>
<th>Adult Coloring Book Condition (n = 90 – 93)</th>
<th>Children’s Coloring Book Condition (n = 90 – 92)</th>
<th>Control Condition (n = 88 - 89)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>SUDS baseline</td>
<td>2.8</td>
<td>1.851</td>
<td>2.92</td>
</tr>
<tr>
<td>SUDS post mood induction</td>
<td>4.57</td>
<td>2.018</td>
<td>4.32</td>
</tr>
<tr>
<td>SUDS post manipulation</td>
<td>1.87</td>
<td>1.694</td>
<td>2.39</td>
</tr>
<tr>
<td>Negative Affect (PANAS) factor score baseline</td>
<td>14.95</td>
<td>4.827</td>
<td>15.27</td>
</tr>
<tr>
<td>Negative Affect (PANAS) factor score post mood induction</td>
<td>17.84</td>
<td>5.484</td>
<td>17.74</td>
</tr>
<tr>
<td>Negative Affect (PANAS) factor score post manipulation</td>
<td>12.28</td>
<td>2.876</td>
<td>13.27</td>
</tr>
<tr>
<td>Positive Affect (PANAS) factor score baseline</td>
<td>27.46</td>
<td>7.015</td>
<td>27.90</td>
</tr>
<tr>
<td>Positive Affect (PANAS) factor score post mood induction</td>
<td>21.59</td>
<td>8.188</td>
<td>21.86</td>
</tr>
<tr>
<td>Positive Affect (PANAS) factor score post manipulation</td>
<td>25.62</td>
<td>8.488</td>
<td>25.18</td>
</tr>
</tbody>
</table>

Notes. For ease of interpretation, raw negative affect scores are shown rather than square-root. n varies by variable due to some missing data.
Figure 1

Change in SUDS by Group Post Mood Induction to Post Intervention
A mixed-model ANOVA was also conducted to test the first hypothesis with respect to positive affect. Box’s Test of Equality of Covariance Matrices was not significant. There was a main effect of positive affect \( (F(1, 271) = 56.07, p = .000, \eta^2 = .17) \) but no main effect for group \( (F(1, 271) = .74, p = .48, \eta^2 = .005) \). There was not a significant result for the interaction between positive affect and group \( (F(2, 271) = .76, p = .47, \eta^2 = .006) \).

A one-way ANOVA was computed to compare groups on how enjoyable they found the task. A significant difference was found between groups, \( F(2, 271) = 5.45, p = .005 \). A Tukey HSD post-hoc test revealed a significant difference between both of the coloring conditions and the control group, but no significant difference between the coloring conditions, such that the control condition \( (M = 4.53, SD = 1.18) \) enjoyed the task significantly less than the children’s coloring book \( (M = 5.01, SD = 1.29) \) and adult coloring book conditions \( (M = 5.04, SD = 1.04) \).

A Chi-Square non-parametric test was conducted to determine if groups differed significantly on desire to pick up their packet once the study was completed. A significant difference was found between groups, \( \chi^2(2) = 9.63, p = .008 \). Percentage of individuals who wanted to pick up their packet by group was 11.8% for adult coloring, 1.1% for children’s coloring, and 12.4% for the control group.
DISCUSSION

Following the experimental manipulation, participants’ negative affect levels and SUDS decreased and positive affect levels increased. Therefore, the stress induction task and distraction tasks were effective in raising and consecutively lowering stress and decreasing and consecutively increasing positive affect. When examining changes in affect from baseline to post-mood induction and then to post-manipulation, the changes did not differ significantly between groups.

There was mixed support for the first hypothesis, that the use of adult coloring books as distraction will reduce stress more effectively than the use of children's coloring books and a control condition as distraction on an immediate short-term basis. There was a borderline significant result for the interaction between time period (post-induction to post manipulation) and group in regards to SUDS, such that adult coloring lowered SUDS scores post-manipulation more than children’s coloring and control. However, there was no significant group difference seen in PANAS scores. Although there was a slight change in level of distress between groups as measured using SUDS, there is not a large enough effect size ($\eta^2 = .019$) to conclude that use of adult coloring books is an obvious choice when choosing a distraction method.

Although we did not find strong evidence suggesting coloring adult coloring book pages reduces stress more than coloring children’s coloring book pages, we did find that both coloring conditions, as well as the distraction task, succeeded in reducing stress on an immediate short-term basis. Thus, as shown by Curry & Kasser (2005) and van der
Vennet & Serice (2012), coloring did reduce stress; children’s coloring books just had the potential to reduce stress on an immediate short-term basis as well as adult coloring books did. This is beneficial because although adult coloring books can be expensive and more difficult to acquire, children’s coloring books and other distraction methods are easier and less expensive to acquire and perhaps just as beneficial for reducing stress.

We did not see a consistency with studies such as De Petrillo and Winner’s (2005) study in which participants in a control distraction condition (e.g., a word puzzle) did not show improved mood, while participants who colored did show improved mood. Perhaps the lack of difference between groups in regard to stress relief in the present study stems from the artistic nature of our control condition, in which participants were actively viewing artistic images and using colored pencils in the same way that our adult and children’s coloring condition were.

The second hypothesis, that participants in the coloring conditions would report more enjoyment than participants in the control condition, was supported. A significant difference was found between groups; such that the control condition enjoyed the task significantly less than the children’s coloring book and adult coloring book conditions and there was no difference in enjoyment between those coloring adult pages and those coloring children’s pages. We saw a consistency with Pizarro’s (2004) result that art-making produced more enjoyment than a control task, such that participants in the present study enjoyed coloring more than completing a control task, as well. This could be a consideration when choosing a distraction task for short term stress relief.

The third hypothesis, that participants in the adult coloring book condition would want to pick up their packets more than participants in the children’s coloring book
condition, was supported, as a significant difference was found between groups. From this we can speculate that participants who encountered adult coloring pages, either by coloring them in the adult condition or viewing pre-colored ones in the control condition, were more interested in picking them back up after the study in a way that participants with children’s coloring pages were not. This suggests that participants may have been aware of the potential perceived novelty and interest in design of adult coloring books, and thus more interested in encountering them again.

A limitation for this study may have included a restrictive sample that may not generalize well to a wider population. Because we took data from a convenient college student population, our sample was aged 18-24, 84.7% female, 82.12% Caucasian, and 99.23% single. It would be beneficial to study a sample based on a more general population to get a more well-rounded view of coloring’s effects on the public at large. Another limitation included the lack of resources to study psychophysiology in a way that may better explain stress relief by studying the body (e.g., heart rate).

For future study, it would be beneficial to examine stress relief on a longitudinal basis in regards to coloring in order to see if coloring’s effects of immediate short-term stress relief generalize to relieve day-to-day stressors. For example, participants could color for different lengths of time and in different intervals to examine efficacy of coloring as a method for daily stress relief. Also, since coloring has been mainly marketed to females as a stress reducing tactic, it could be interesting to examine gender differences in regards to stress relief and enjoyment after coloring to examine the extent to which tactics that are marketed as “female” produce the same effects for both genders in a sample.
In the same way that one expects humans to react to medicinal treatments differently, it is understandable that one could expect personalized levels of stress relief for participants when given one form of therapy. These variations in efficacy may occur because of differences in personality. For future study, personality could be measured, perhaps with The Big Five Inventory (BFI), which measures openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. This direction would allow us to further explore the effects of coloring, or any distraction task, on people whose personalities differ and give us a more well-rounded view of personalized intervention options for short-term immediate stress relief.

In conclusion, although data did not firmly suggest that adult coloring books were a more successful stress reliever than children’s coloring or a control distraction task after completion of a stress-inducing impossible anagram task, all three conditions relieved stress on an immediate short-term basis and are potential options for short-term stress relief. Data did suggest that participants in the coloring conditions enjoyed their tasks significantly more than participants in the distraction task, while experiencing about the same amount of stress relief. Also, participants who experienced adult coloring book pages in some capacity desired to pick up their packets more than participants who experienced children’s coloring book pages. Therefore, if a person is looking to reduce some stress through coloring, they could go buy a popular adult coloring book that promises stress relief, but if they have a children’s coloring book lying around, that would likely be just as beneficial.
LIST OF REFERENCES


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APPENDIX A

Demographic Questionnaire

The American Psychological Association recommends that researchers report major demographic characteristics of all research participants (e.g., age, gender, etc.). To assist us in collecting this information, we request that you complete this brief questionnaire. All data are confidential, and will not be used in any manner that identifies you.

If you are uncomfortable responding to any of the items, feel free to disregard them.

Age: __________    Gender: __________________

Year in school: [ ] Freshman       [ ] Sophomore       [ ] Junior       [ ] Senior
[ ] Other (please specify) ________________

Major(s): ________________________________________________________________________

Minor(s): ________________________________________________________________________

What is your best estimate of your current GPA? __________

What was your high school GPA? __________

What is your cultural identity? Please check all that apply.
[ ] Asian or Pacific Islander [ ] Black/African American (not of Hispanic origin)
[ ] Hispanic [ ] Native American [ ] White (not of Hispanic origin)
[ ] Other (please specify) _______

Marital Status: ________________

Please check one of the following regarding color blindness:
[ ] I do not have color blindness.
[ ] I think that I may have color blindness but have not been diagnosed.
[ ] I have been diagnosed with color blindness.
[ ] I do not know what color blindness is.

Have you taken any art classes while in college?  ______ Yes     ______ No

Please stop and put your pen down, thank you!
APPENDIX B

Stress Induction Worksheet

Anagram Worksheet

Please unscramble these scrambled words, also called anagrams, on the corresponding lines provided. You will be given 5 minutes to unscramble them. These anagrams are likely to be difficult to solve, but please do not ask questions during the solving time, as we will be unable to answer. Please solve all 20 of the anagrams in the allotted time of 5 minutes.

<table>
<thead>
<tr>
<th>Anagram</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNMAKY</td>
<td></td>
</tr>
<tr>
<td>TGMABNEA</td>
<td></td>
</tr>
<tr>
<td>CBDUERE</td>
<td></td>
</tr>
<tr>
<td>MEMSIW</td>
<td></td>
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<tr>
<td>LSVSTIFAE</td>
<td></td>
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<tr>
<td>DINAPL</td>
<td></td>
</tr>
<tr>
<td>OXREMT</td>
<td></td>
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<tr>
<td>WEAEOTNRM</td>
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<td>RTOECE</td>
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<td>SUSIOUIST</td>
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<td>EPHTUC</td>
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<td>IPNNGUPE</td>
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<td>YUTFA</td>
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<td>BOKETTO</td>
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<td>INGRNU</td>
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<td>ADNEAMGIZ</td>
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<td>PNMOAMI</td>
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<td>TRAVEO</td>
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<tr>
<td>LEBIRRT</td>
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<td></td>
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</table>
APPENDIX C (Continued)

Children’s Coloring Book Condition
APPENDIX C (Continued)

Control Distraction Task Condition

Please look over the coloring pages. Using the colored pencils in your packet, circle your favorite part of each coloring page in green, circle your least favorite part in red, make blue check marks by pages you like, rate each coloring page on a (1-10) scale for how much you like each image by placing a number in each “Rating” space below the image, and mark a yellow star by your favorite of the 12 images.

Rating: _____  Rating: _____

Rating: _____  Rating: _____
APPENDIX C (Continued)

Rating: _____  Rating: _____

Rating: _____  Rating: _____