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The Effectiveness of Structured Coloring Activities for Anxiety Reduction

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Abstract

The present study compared the effects of four different coloring activities on state anxiety scores to determine whether adult coloring books are as effective as other coloring activities in reducing anxiety. Participants included 160 undergraduates attending a private, Christian, liberal arts university. After engaging in an anxiety induction activity, participants completed an anxiety inventory, engaged in an assigned coloring activity, and then completed the anxiety inventory again. Results indicated that all four conditions significantly reduced anxiety; however, none of the conditions differed significantly from each other in their effectiveness, suggesting that coloring books are as effective as other coloring activities in reducing anxiety. Implications for coloring book use and its relationship to the field of art therapy are discussed.

The Effectiveness of Structured Coloring Activities for Anxiety Reduction

Anxiety disorders are among the most prevalent mental health concerns today, affecting 18.1% of the United States population, according to the National Institute of Mental Health (NIMH, n.d.). Though anxiety is the number one mental health concern for women and the second for men, its prevalence is probably underestimated, given that the statistics do not typically include people who are struggling with anxiety but do not seek help, those who have been misdiagnosed, and those who do not realize they have a problem (Chambala, 2008). Anxiety seems to be particularly prevalent among college students. The American College Health Association's (ACHA) National College Health Assessment (ACHA, 2018) found that in the fall semester of 2017, 21.6% of undergraduate students reported having been diagnosed with or treated for an anxiety disorder in the past 12 months, and 26.2% reported that anxiety had negatively impacted their academics. The present study focused on the use of coloring books among college students as a relatively new activity purported by retailers and publishers to reduce anxiety. We aimed to explore the effectiveness of various coloring methods for anxiety reduction, to determine whether coloring books are as effective as other coloring methods previously established to reduce anxiety. Our findings have potential implications for the non-clinical use of coloring books for anxiety reduction, as well as for art therapy theory and practice.

Structured Coloring Activities and Anxiety Reduction

The most common clinical treatments for anxiety include Cognitive Behavioral Therapy, medication, or a combination of the two (NIMH, 2016). However, the NIMH reports that only 42.2% of those with anxiety disorders are receiving any form of treatment, and 14.3% of those with anxiety are receiving only minimally adequate treatment (NIMH, n.d.). People suffering from day-to-day anxiety may search for methods to reduce their anxiety beyond costly healthcare

approaches, such as turning to more holistic methods including supplements, yoga, or meditation (Kessler et al., 2001).

In 2015-2016, a wave of adult coloring books advertised as "art therapy for adults" hit commercial shelves. In bookstores, department stores, and even the checkout aisles of grocery stores, coloring books of varying themes and patterns were promoted. Five of the top 20 best-selling books of 2015 on Amazon were adult coloring books, whereas only four were adult fiction (Amazon, 2015). Although art as therapy has been used in clinical settings since the origins of psychotherapy (Pisarik & Larson, 2011), distributors of coloring books purport that they can be used non-clinically among consumers to reduce daily anxiety at home. A statement published on behalf of the American Art Therapy Association (AATA) addressed this trend, clarifying that coloring books can be a useful tool for art therapists to recommend to clients for personal use, to engage in the creative process, and to enjoy art-making and center one's self. However, the statement noted that these coloring books are not to be misconstrued as a form of art therapy. Indeed, solitary use of coloring books does not include the fundamental relational aspects of art therapy (i.e., the relationship between the client and therapist and the client and his/her art products). Although coloring books may be a useful supplement to one's self-care, they cannot replace the relational component of art therapy and the work of an art therapist (Carolan & Betts, 2015).

In an effort to explore the utility of coloring books for anxiety reduction, we sought to compare coloring books to other coloring methods, including those most commonly used by art therapists, to determine the everyday implications of adult coloring books for anxiety reduction. Additionally, the present study adds to the literature regarding the therapeutic effects of coloring by examining coloring books along with other coloring activities of varying structures and

designs, which may in turn advance the ways in which credentialed art therapists may utilize these activities as an adjunct to treatment in the future.

The patterns in adult coloring books look similar in complexity and design to many pre-designed mandala patterns. Mandala, the Sanskrit word for "circle," was originally used as a meditative device in ancient religious rituals (Jung, 1969). The mandala, at its base, is a radial pattern. Many diverse cultural and religious groups have used round patterns and images similar to mandalas to express important cultural symbols and meaning. Jung believed that the mandala could be used to bring the unconscious to light and achieve individuation. He considered the center of the image to represent the self, and the pattern each individual created to contain unconscious symbolism representing the true inner being (Jung, 1969).

Some research evidence is available supporting the role of creating mandalas in affecting psychological well-being and mood. Pisarik and Larson (2011) studied mandala creation to determine its effect on college students' authenticity and psychological well-being. These researchers instructed 68 first-year college students to create mandalas in two separate sessions. Sessions included worksheets with directions for creating and interpreting their mandalas. Pisarik and Larson found that creating a mandala was associated with greater self-awareness, suggesting that mandalas are an effective tool for students struggling with the transition into college.

Babouchkina and Robbins (2015) compared different types of coloring activities to determine whether the circular shape and structure of the mandala made a difference in its impact on momentary mood state. After a negative mood induction, which involved 47 adult participants listing three stressful things on their mind at the present moment, participants were given instructions to complete a coloring activity (either a circle or a square outline) and to color according to how they were feeling, or to color freely. The results suggested that compared to

square drawings, regardless of whether the pattern inside was freely designed or if participants were instructed to create something related to their emotions, the circular patterns had a significantly more positive effect on participants' self-reported mood compared to square patterns. The images in adult coloring books tend to look very similar to mandalas in pattern and complexity, but tend to appear as shapes other than circles, such as animals, flowers, or abstract geometric designs. Based on Babouchkina and Robbins' findings, these differences may affect whether or not coloring book patterns have the same effect on negative mood state as do traditional mandalas.

Past research has not only linked coloring activities to various measures of psychological well-being and general mood. Research also suggests that a variety of coloring activities can be effective for anxiety reduction. Curry and Kasser (2005) studied the anxiety-reducing outcomes of multiple coloring methods among 84 undergraduate students at a Midwestern university. The participants completed a baseline anxiety inventory and then were instructed to write for four minutes about a past stressful or fearful event. After the writing exercise, participants completed the inventory again before being randomly assigned to color either a pre-printed mandala, a pre-printed plaid pattern, or to draw free-form on blank paper. The findings indicated that the mandala and the plaid pattern, which were of similar complexity, did not differ significantly from each other in anxiety reduction; however, both were significantly more anxiety-reducing than was free-form coloring. In fact, the mandala coloring activity resulted in significantly lowering participants' anxiety levels below their baseline scores, whereas the plaid pattern did not (Curry & Kasser, 2005)

Van der Vennet and Serice (2012) attempted to replicate Curry and Kasser's (2005) findings by exposing 50 graduate psychology students from a southwestern university to the

same coloring activities; however, their results differed when considering post-intervention anxiety scores alone, in which the groups did not differ significantly from each other. However, the change scores (pre- to post- coloring anxiety levels) for each group did differ significantly, with the mandala pattern resulting in significantly more anxiety reduction than the plaid pattern, even though they were of similar complexity. The researchers pointed to Jung's use of the mandala to center one's self and suggested that the effect was due to the circular shape and traditional meditative quality of mandala coloring. Because creating one's own mandala rather than coloring in a structured mandala is a more commonly used art therapy technique, the researchers suggested that future research compare mandala creation to coloring a pre-printed mandala. They also observed that participants assigned to the free-form group seemed to struggle with not knowing what to draw, which could have impeded the anxiety-reducing effects as compared to the other pre-printed designs (van der Vennet & Serice, 2012).

Sandmire, Gorham, Rankin, and Grimm (2012) suggested an alternative interpretation to the findings of van der Vennet and Serice (2012). These researchers suggested that perhaps it was the trance-like effect of completing such structured and repetitive coloring activities, like the mandala, which reduced anxiety among participants. Sandmire and colleagues (2012) found that first-year college students who completed 30 minutes of art-making activities in general (including coloring a pre-designed mandala, free-form painting, collage making, clay work, and still-life drawing), exhibited a significant decrease in mean anxiety levels at the end of the semester (when most students are experiencing stress over exams) compared to a control group. Another study examining the mindfulness component of coloring compared mandala coloring and free-form coloring in elementary school students (Carsley, Heath, & Fajnerova, 2015). Contrary to the researchers' hypothesis, both groups had a significant decrease in test anxiety,

though further exploratory analyses revealed an interaction effect for gender between groups which approached significance, suggesting that perhaps certain gender-related traits like fine motor development led girls to experience more anxiety reduction from the mandala coloring than free-form coloring, whereas boys experienced similar effects in both conditions (Carsley et al., 2015).

Why Are Structured Coloring Activities Effective?

Previous studies suggest varying reasons for the differential impacts of coloring activities on anxiety. Neurologically, recent literature has examined the effects of visual art on the brain. Bolwerk, Mack-Andrick, Lang, Dörfler, and Maihöfner (2014) found that among retired adults, there were notable differences in psychological resilience and brain connectivity between those who cognitively evaluated visual art and those who created art. However, most studies examining structured coloring activities point to theories of mindfulness in art-making to explain its effects. However, some critics of the adult coloring book movement are skeptical of its benefits, suggesting that coloring books actually promote mind*less*ness by simply letting people distract themselves from whatever is on their mind (Mossman, 2015).

Whereas Curry and Kasser (2005) and van der Vennet and Serice (2012) asserted that the structure of the coloring activity played a role in anxiety reduction, Sandmire et al. (2012) suggested that it was simply the trance-like effect of any repetitive creative activity and the effect of time spent interacting with peers during the activity that led to anxiety reduction. Others, including Carsley et al. (2012), based their hypotheses on theories of mindfulness, and the idea that art-making can have many positive effects on mood and affective state in addition to anxiety reduction.

Eaton and Tieber (2017) suggested that coloring is beneficial because it promotes mindfulness by engaging in a structured, detailed activity that also allows for some creativity. These researchers exposed 85 undergraduate students to a pre-printed abstract design from a mindfulness-themed adult coloring book. Half of the participants were told to color the abstract design freely (free-choice condition), and the other half were given a pre-colored version of the abstract design and asked to copy the colors from it onto a blank version of the abstract design (forced-choice condition). Citing the differences found in the studies by Curry and Kasser (2005) and van der Vennet and Serice (2012), the researchers examined whether the level of creative choice involved in the activity impacted anxiety reduction (Eaton & Tieber, 2017). The results showed that although all participants reported the coloring task to be both engaging and enjoyable, there were group differences in anxiety. Despite a main effect for time, and a significant decrease in anxiety for both groups, the magnitude of the decrease in anxiety for the free-choice group was significantly greater than for the forced-choice group. Negative mood was also significantly lower after coloring for both groups. This study corroborated previous research showing that coloring in general is useful for adults to reduce anxiety and improve mood. It seems that the beneficial effects of coloring may be due to the mindfulness and mood regulation promoted by physically engaging in these activities.

Purpose of the Present Study

The present study sought to determine how coloring books may be similar to or different from other previously studied coloring activities in their effectiveness for reducing anxiety. We employed a modified replication of the study designs of Curry and Kasser (2005) and van der Vennet and Serice (2012) by comparing the relative effectiveness of different forms of coloring activities (mandala creation and free-form coloring), with the added condition of coloring pages

from a best-selling adult coloring book. We also included a condition in which participants created their own mandala (with instructions), a coloring activity suggested by van der Vennet and Serice for further study. We sought to answer the following research question: How do adult coloring books compare to other coloring activities in their effectiveness at reducing anxiety? If coloring books can significantly reduce anxiety, they may become a valuable resource in settings where accessible and affordable anxiety management techniques may be helpful. Additionally, although coloring alone cannot be equated with clinical art therapy, if coloring books are found to be as effective as other coloring activities, perhaps they could be used within the field of art therapy in conjunction with a powerful therapeutic relationship, self-exploration, and guidance by a professional art therapist.

Method

Participants

Participants were 160 undergraduate students from a private, Christian, liberal arts university in Southern California. Participants were recruited from foundational psychology courses through an online research management system and received research participation credit for participating in the study. Participants in the sample were between the ages of 18 and 25 years (M = 18.85, SD = 1.17). One hundred fourteen participants identified as female (71.3%), 44 as male (27.5%), and 2 as other (1.3%). Eighty-nine participants identified as Caucasian (55.6%), 25 as Asian (15.6%), 24 as Latino/a (15%), 18 as Other or Mixed (11.3%), and 3 as Black (1.9%). The majority of participants identified as Christian/Catholic (n= 131, 81.9%). Seventeen participants were Atheist/Agnostic (10.6%), 3 participants were Muslim (1.9%), 1 was Buddhist (0.6%), 1 was Jewish (0.6%), and 7 identified their religious affiliation as “other” (4.4%). Participants also self-identified with a variety of socioeconomic statuses

(42.5% upper-middle class, 28.7% middle class, 15% upper class, 8.1% lower-middle class, 3.1% lower class).

Measures and Materials

State-Trait Anxiety Inventory. The state portion of the State-Trait Anxiety Inventory for Adults (STAI) (Spielberger, Gorusch, Jacobs, Lushene, & Vagg, 1977) was used to determine anxiety levels. The inventory includes 20 items relating to state anxiety (a person's current level of anxiety). Participants were asked to endorse statements regarding their present feelings of anxiety with a 4-point Likert scale, ranging from 1 (*low degree of endorsement*) to 4 (*high degree of endorsement*) with possible scores ranging from 20-80. High scores indicate higher levels of anxiety. The inventory has shown high internal consistency, but sometimes poor validity in discriminating between anxiety and depression (Julian, 2011). Some items in this inventory are reverse coded, and items from the inventory were intermixed with filler items to avoid practice effects. For the current sample, the State Anxiety subscore of State-Trait Anxiety Inventory demonstrated excellent reliability, with a Cronbach's Alpha of .92.

Coloring materials. Four different types of coloring materials were utilized. The Pre-Printed Mandala intervention group was given a pre-printed mandala (retrieved from www.free-mandala.com), which was the same one used in previous studies (Carsley et al., 2015; Curry & Kasser, 2005; van der Vennet & Serice, 2012). The Coloring Book intervention group received a page from one of the top-selling adult coloring books of 2015, chosen to match the complexity of the mandala used in the Pre- Printed Mandala intervention group based on the number of spaces in the image (Adult Coloring Book: Stress Relieving Animal Designs, 2015). The mandala had 569 spaces and the coloring book page had 567 spaces. The Mandala Creation and Free-Form Drawing groups were given blank sheets of paper on which to complete their activities.

Participants in each group were given instructions for completing their assigned coloring activity intervention, and each participant received a box of 12 colored pencils of varying shades. In addition, the Mandala Creation group was given graphite pencils to create the mandala, as well as a circular stencil to create an outline.

Anxiety induction task. We used the anxiety induction technique utilized by Curry and Kasser (2005). Participants were asked to think about the time they were most fearful and write about it for four minutes. A baseline anxiety measure was not administered prior to the anxiety induction task to avoid any potential practice effects.

Procedure

This study was approved by the affiliated university's Internal Review Board. After signing an informed consent form, participants were randomly assigned to one of the four intervention groups: Free-Form Drawing group (n = 39), Pre-Printed Mandala group (n = 41), Mandala Creation group (n = 38), and Coloring Book group (n = 42). All students in the same intervention group completed the same activity. We did not include a control group because previous intervention studies established no effect for the control or non-art-making group compared to various coloring activity interventions (De Petrillo & Winner, 2005; Sandmire et al., 2012) and because Curry and Kasser (2005) and van der Vennet & Serice (2012) did not use a non-art control group. Research sessions varied from 3-12 participants per intervention group and lasted approximately 50 minutes. The sessions were conducted in empty classrooms by research assistants under the supervision of two clinical psychologists. Though participants were in groups, they were instructed to remain quiet and avoid distractions from cell phones, etc. during the activity. Participants completed a brief demographic questionnaire before completing the anxiety induction task. Participants then completed the state (situational) anxiety items from

the STAI (Time 1). The intervention groups were given 20 minutes to complete their assigned coloring activity, and upon completion, responded to the STAI again to determine anxiety scores following the intervention activities (Time 2). Before leaving the room, participants were reminded that if they were upset by the anxiety induction activity that they could contact the university counseling center or one of the investigators.

Results

Preliminary Analysis

The mean anxiety score for the sample pre-intervention was 43.026 (SD = 11.014), and the mean score post-intervention was 33.746 (SD = 9.466). The change in mean anxiety score for the sample overall was significant, $t(159) = 12.741$, $p = .000$. Chi-square and ANOVA analyses examining differences among intervention groups on demographic variables were not significant, indicating successful random assignment.

Group Comparisons Across Intervention Conditions

An ANOVA to compare intervention conditions on Time 1 anxiety scores was not statistically significant, $F(3,156) = 1.68$, $p = .174$, $\eta^2 = .031$, indicating that the intervention groups did not significantly differ from each other on anxiety levels before the intervention, allowing us to assume that any differences in anxiety scores after the coloring activity would indicate an effect of the intervention. Next, a 2 (Time) by 4 (Intervention Condition) repeated measures ANOVA demonstrated a significant main effect for Time (pre- vs. post- intervention anxiety scores) for the entire sample, Wilks' Lambda = .486, $F(1, 156) = 165.164$, $p = .000$, $\eta^2 = .514$. No interaction effect was observed between Time and Intervention Condition (Wilks' Lambda = .971 $F(3, 156) = 1.577$, $p = .197$, $\eta^2 = .029$). Subsequent paired-samples t-tests

determined that although each group had a significant reduction in anxiety (see Table 1), the conditions did not differ significantly from each other in their effectiveness in anxiety reduction.

Insert Table 1 here.

An ANOVA comparing Time 2 anxiety scores across intervention conditions did not demonstrate a significant difference in anxiety scores, $F(3,156) = 2.394$, $p = .070$, $\eta^2 = .044$. Since the intervention groups did not differ at Time 1, differences in anxiety reduction between groups would have been reflected by a significant difference at Time 2. However, it is notable that the model was approaching significance, $F(3,156) = 2.394$, $p = .070$, $\eta^2 = .044$, with the free-form coloring condition tending towards less effectiveness compared to the other, more-structured conditions.

Additionally, an ANOVA comparing change scores from Time 1 to Time 2 by condition did not demonstrate significant differences in the mean decrease in anxiety levels for any of the groups, $F(3,156) = 1.577$, $p = .197$, $\eta^2 = .029$. Examination of the means across groups suggests that the free-form coloring book condition appeared to have a smaller impact than the other conditions, however, this difference was not statistically significant.

Discussion

Anxiety is a pervasive problem in the United States today (NIMH, n.d.). Previous studies have attempted to examine anxiety reduction by comparing mandala patterns to free-form coloring and other structured coloring techniques and found that mandalas and other structured coloring activities are associated with significantly reduced anxiety levels compared to free-form coloring activities (Curry & Kasser, 2005; van der Vennet & Serice, 2012). We sought to answer the question: How do adult coloring books compare to other coloring activities in their effectiveness at reducing anxiety?

The results of the current study suggest that adult coloring books are as effective as other coloring activities, including mandala creation and pre-printed mandala coloring, at reducing anxiety. These results imply that adult coloring books are not just for entertainment; they are actually effective at reducing anxiety. Although they may not necessarily be more anxiety reducing than other art activities or free-form coloring, a coloring book may provide a way for individuals who might not be inclined to draw their own designs to have access to anxiolytic benefits. Therefore, providing coloring books in settings where people regularly experience stress, such as colleges, hospital waiting rooms, airports, and airplanes, may be helpful for the management of anxiety. This research also has implications for the coloring book industry, as their products have the potential to not only provide entertainment, but to also be effective anxiety-reduction methods for those dealing with some forms of anxiety. Lastly, the findings have implications for the field of art therapy, because as art therapists work to educate the public on the benefits and salient aspects of professional art therapy, it is also important to consider the changing landscape in which they practice. Kaimal, Mensinger, Drass, and Dieterich-Hartwell (2017) sought to compare the efficacy and outcomes of adult coloring books to an art therapist-facilitated studio session and found that whereas both activities reduced stress and negative affect among the 29 participants, only the therapist-facilitated session had a significant impact on positive affect, self-efficacy, and creative agency. The authors suggested that although coloring books are indeed useful, they may be used as a gateway into the more in-depth processes of clinical art therapy (Kaimal et al., 2017). These findings, along with future research in the areas of coloring and creativity, may provide insight into ways to integrate coloring books and other popular activities as helpful adjunctive tools to art therapy, while maintaining the integrity of professional art therapy.

Contrary to previous research (e.g., Curry & Kasser, 2005; van der Vennet & Serice, 2011), our results did not suggest that structured coloring activities were significantly more anxiety-reducing than free-form coloring. Although coloring books and other structured activities were not found to be significantly more effective than free-form coloring, a structured or pre-printed coloring activity may be a convenient option for those who have a difficult time thinking of ideas for a free-form coloring activity.

It has been suggested that art-making has an inherently therapeutic quality (Favara-Scacco, Smirne, Schiliró, & Di Cataldo, 2001), which is supported by the idea that the repetitive nature of coloring or creating art can have a calming, almost trance-like effect (Sandmire et al., 2012). In fact, Forkosh and Drake (2017) suggested that coloring a pre-printed design as opposed to drawing one's own picture or design may lead to a specific flow-like state as it is an activity that is not cognitively demanding and allows individuals to become completely immersed in the activity. Whereas some studies suggest that the mindfulness aspect of the mandala or the structure of the activity reduces anxiety, our results and some previous research suggest that perhaps all coloring potentiates enhanced mood and psychological functioning (Eaton & Tieber, 2017; Sandmire et al., 2012). These findings imply that coloring books may be used to relax or center one's self at home, and also provide insight into the possibilities of using these designs in similar settings in which one may typically use or create a mandala. Mandala work is one coloring activity that may be used by professional art therapists, so it is possible that coloring books may provide a similar structure and degree of complexity if used therapeutically. These coloring book patterns may also assist inexperienced artists or those who are unfamiliar with creating art in becoming more comfortable with the creative process. However, individual differences in areas such as fine motor skills, personality, or experience may lead some people to

respond better to different coloring activities than others (Carsley et al., 2015). The findings of the current study affirm that a variety of art activities may be effective for reducing anxiety and can therefore be selected on the basis of individual differences and preferences.

Implications for Future Research

There were several limitations to the current study that might direct future research. Because the current study only included college students, it cannot be concluded that adult coloring books are effective across other populations. Future research should examine more heterogeneous samples and would benefit, in particular, from more racially and religiously diverse samples and a greater variety of ages, including children and older adults, to determine whether the effects are the same across different groups, since the types of stress experienced by different groups may be impacted differently by various coloring activities. Future research should also continue to examine the impact of individual differences such as art-making experience, preference, and perceived levels of creativity on the impact of various coloring activities, as Drake and Hodge (2015) have considered.

The present study would have been improved by examining additional variables associated with creativity and art therapy that have been examined in other art therapy literature (e.g. flow, whether participants were using the activities to express or to distract, and self-perceived artistic ability) in order to better understand and explain the findings of the current study. Future research should include these and other variables to determine more about the mechanisms at play in coloring book usage. Future studies should also compare other meditative activities, such as mindfulness training, and other structured and repetitive art forms, such as knitting, to coloring activities to explore the possibility that the anxiety-reducing nature of coloring is specifically due to its meditative qualities. Finally, the present study should be

replicated in a clinical setting to determine whether clinicians should explore using adult coloring books as a strategy for their clients adjunctive to traditional methods of anxiety reduction and art therapy. Since coloring books do not require any elaborate instructions or reflection on creation to be effective, they can be used and tested with people of a broad range of intellectual and verbal abilities who may benefit from coloring activities of this kind.

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Table 1:
Results of Paired-Samples t-Tests for Each Experimental Condition on Mean Anxiety Scores

Outcome	Group						95% CI for Mean Difference	t	df	d
	T1 Anxiety			T2 Anxiety						
	M	SD	n	M	SD	n				
Free-Form Coloring	44.79	11.06	39	36.89	10.14	39	4.253, 11.555	4.383*	38	0.70
Pre-printed Mandala	40.08	11.88	41	31.51	8.84	41	5.992, 11.139	6.728**	40	1.05
Coloring Book	42.66	11.28	42	33.90	9.44	42	5.988, 11.515	6.396**	41	0.98
Mandala Creation	44.81	9.27	38	32.76	8.91	38	9.401, 14.690	9.229**	37	1.49

*p<.01, **p<.001