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Nancy A. Curry BA & Tim Kasser PhD

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# Can Coloring Mandalas Reduce Anxiety?

Nancy A. Curry and Tim Kasser, Galesburg, IL

## Abstract

*This study examined the effectiveness of different types of art activities in the reduction of anxiety. After undergoing a brief anxiety-induction, 84 undergraduate students were randomly assigned to color a mandala, to color a plaid form, or to color on a blank piece of paper. Results demonstrated that anxiety levels declined approximately the same for the mandala- and plaid-coloring groups and that both of these groups experienced more reduction in anxiety than did the unstructured-coloring group. These findings suggest that structured coloring of a reasonably complex geometric pattern may induce a meditative state that benefits individuals suffering from anxiety.*

## Introduction

The experience of anxiety is common to all humans and, for many, can lead to problems such as phobias, panic disorder, or generalized anxiety disorder. Indeed, anxiety disorders are the most common class of all psychological disorders (Kessler et al., 1994), and anxiety levels have increased significantly over the last half of the 20th century (Twenge, 2000). As such, it is important to develop a variety of effective means to help people decrease anxiety.

The present study examined a method of decreasing anxiety called "coloring therapy" (Belchamber, 1997) that combines elements of art therapy and meditation. The basic idea of coloring therapy is that when individuals color complex geometric forms, they are provided an opportunity to suspend their "inner dialogue" and to deeply engage in an activity that removes them from the flow of negative thoughts and emotions that can sometimes dominate their lives. Belchamber recommends that individuals color mandalas, which are symmetrical figures that have long been used as meditative objects in spiritual traditions (Cornell University Program of Computer Graphics, 2002; Jung, 1959).

**Editor's note:** Nancy A. Curry, BA, completed this project while an undergraduate at Knox College in Galesburg, Illinois; she is now a graduate student in social work at Loyola University in Chicago. Tim Kasser, PhD, was her mentor for the project and is an associate professor of psychology at Knox College. The authors wish to thank J. Boostrom, J. Ellegood, C. E. Fundakowski, R. Mowers, S. Salyards, and K. H. Sawicka for their constructive criticism, encouragement, and feedback. This study was partially funded by small grants from the Richter Memorial Fund and the Bumstead Fund at Knox College. Address correspondence concerning this article to Dr. Kasser, Box K-83, Knox College, Galesburg, IL 61401 or via e-mail at tkasser@knox.edu.

Coloring the symmetrical form of the mandala with its repeating patterns and complexity purportedly helps to draw individuals into a state similar to meditation. Although, to our knowledge, coloring therapy has not been empirically tested or widely discussed in scholarly discourse, other research suggests that it may indeed hold promise as an effective tool for alleviating anxiety, as it combines elements of art therapy (i.e., coloring a form) and meditation (i.e., deeply concentrating on an experience that is soothing).

Several authors have documented the effectiveness of art therapy in the treatment of anxiety. Grossman (1981), for example, held that art therapy can help to organize and calm the "inner chaos" that is anxiety because one is allowed to make sense of the confusion of daily life and to communicate without having to find the perfect words. Similarly, Christenfeld and Creager (1996) suggested that nonspeaking therapies are best for individuals with anxiety as they help people avoid the self-consciousness that often accompanies talking. Other clinicians using art therapy with women in prison (Cronin, 1994), children in public schools (Keve, 1995), and children of parental violence (Kozłowska & Hanney, 2001) have found similar beneficial results.

Meditation, or the practice of calmly limiting attention and thought through the use of mental exercises (Smith, 1975), has also proven beneficial for anxiety. Over 40 studies have been conducted to examine the use of meditation on the reduction of general anxiety (Taylor, 2002). Though some studies show no reduction in anxiety through meditation (Boswell & Murray, 1979; Goldman, Domitor, & Murray, 1979), many others have concluded that aspects of meditation can be effective (Arcari, 1997; Brown & Ryan, 2003; Flinton, 1998). For example, Kabat-Zinn et al. (1992) had 22 individuals with anxiety disorders go through a training session of mindfulness meditation; 20 of these people successfully decreased their anxiety. Other work by Brown and Ryan (2003) has shown that people who cultivate "mindfulness," or awareness and attentiveness to the present moment, also experience lower levels of anxiety.

## The Present Study

Although coloring therapy does not encompass all elements of either art therapy or meditation, it may help encourage a state of deep engagement brought about through artistic expression and thus may help to decrease people's experiences of anxiety. To test this idea, we designed an experiment in which anxiety was measured at

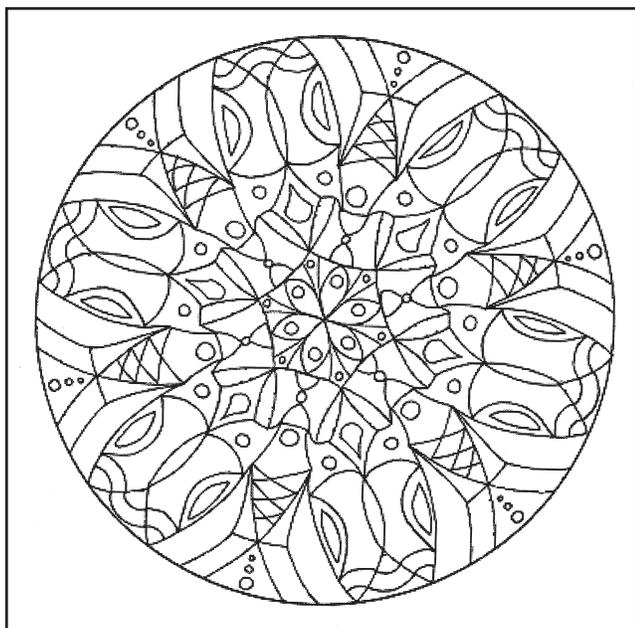


Figure 1 Mandala Design

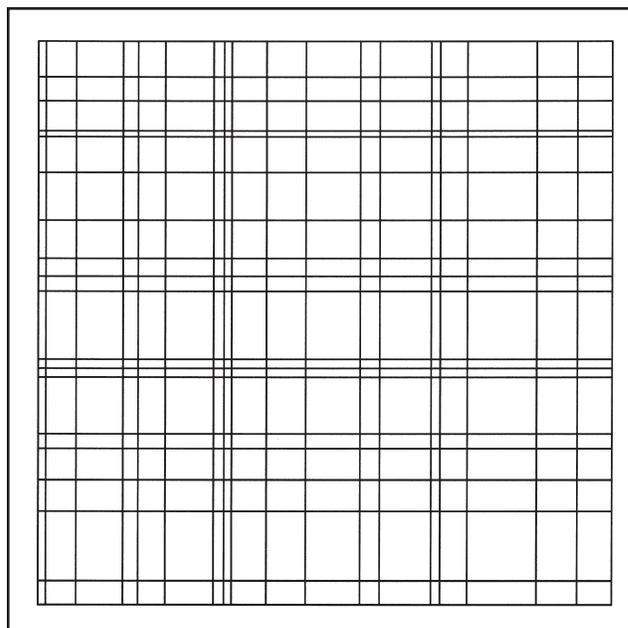


Figure 2 Plaid Design

three points: immediately upon entering the laboratory, after a brief anxiety-induction experience, and after 20 minutes of coloring. We hypothesized that people who colored a mandala for 20 minutes would experience greater reductions in anxiety than would people who engaged in free-form coloring for 20 minutes, as the mandala's geometric complexity and meditative significance would help individuals to disengage from their feelings of anxiety and attain a more soothing state. To examine whether the geometric form of the mandala had any unique effects on anxiety reduction, we also asked a third group of individuals to color a plaid geometric pattern that was as complex as the mandala. If mandalas have special properties beneficial for anxiety-reduction, then the mandala group would experience larger decrements in anxiety than the plaid group. On the other hand, if coloring a prestructured, reasonably complex form is key to inducing the meditative-like state, the plaid and the mandala conditions might be equally effective in reducing anxiety, and both would be more effective than a free-form condition.

## Method

### Participants

Eighty-four (55 female, 29 male) undergraduate students attending a small, Midwestern liberal arts college were solicited for participation through courses or during meals in the college cafeteria. The vast majority of participants were Caucasians between the ages of 18 and 22. Some participants received extra course credit for their involvement, and three prizes of \$15 were awarded via a lottery procedure as additional incentives to participate.

### Procedure

Participants came to a classroom in groups of two to seven. After completing consent procedures, participants completed the 14 items of the State Anxiety Inventory (Goolkasian, n.d.), which was adapted from Spielberger, Gorsuch, and Lushene's (1970) measure. Respondents rated their current level of anxiety on a 9-point scale, ranging from "not at all" to "extremely." Two sample items are "I feel anxious" and "I am relaxed." High scores indicated greater baseline or Time 1 (T1) anxiety levels.

Participants then went through an anxiety induction. They were asked to think about the time that they felt most fearful, then write for 4 minutes about that experience on a piece of 8.5" x 11" unlined paper. Immediately afterward, the State Anxiety Inventory was readministered in order to assess Time 2 (T2) anxiety before the coloring procedure began.

The participants were then randomly assigned to one of three conditions; all participants during a particular testing session were assigned to the same condition to decrease the likelihood that participants would see that others were coloring something different than they were coloring. The mandala group ( $n = 30$ ) was given an outline of a mandala (Figure 1) on 8.5" x 11" paper. The plaid group ( $n = 27$ ) was given an irregular plaid design (Figure 2) on a piece of 8.5" x 11" paper. The free-form group ( $n = 27$ ) was given a blank piece of 8.5" x 11" paper. Both the mandala and the plaid design were composed of 324 areas of various shapes and sizes; the mandala was taken from Freeman (n.d.) whereas the plaid design was developed specifically for this study. Regardless of whether they were given a geometric design or a blank piece of paper, all participants were instructed to color the paper in front of them for 20 min-

**Table 1**  
Means (and Standard Deviations) of T1, T2, T3 and Changes from T2 to T3 Anxiety Levels  
for the Mandala, Plaid, and Free-Form Groups

Group	T1 Anxiety	T2 Anxiety	T3 Anxiety	T3-T2 Anxiety
Mandala	39.97 (16.47)	49.17 (20.10)	32.07 (11.66)	-17.10 (18.19)
Plaid	41.52 (14.06)	49.26 (18.74)	35.78 (16.06)	-13.48 (18.78)
Free-Form	41.11 (16.71)	55.15 (22.62)	55.07 (20.51)	0.07 (23.60)
Total	40.83 (15.64)	51.12 (20.47)	40.65 (19.03)	-10.46 (21.32)

utes using the six colored pencils (red, orange, yellow, green, blue, and purple) provided. All participants were asked to focus on their own coloring and to try to ignore any sounds they might hear from the other people in the room. After 20 minutes of coloring, all participants once again completed the State Anxiety Inventory to assess at Time 3 (T3) any changes in anxiety that occurred during coloring.

## Results

### Preliminary Analyses

We began by examining the effectiveness of our randomization and anxiety-induction procedures. To ensure that randomization to groups was effective, we examined T1 anxiety scores. As can be seen in Table 1, baseline anxiety was equivalent across the three groups,  $F(2,81) = .08$ ,  $p = .93$ . To test whether the anxiety-induction (i.e., writing for 4 minutes about a past fearful event) was successful, we conducted a paired samples  $t$  test comparing T1 and T2 anxiety scores. This yielded a highly significant result,  $t(83) = 6.63$ ,  $p < .001$ , showing that participants' anxiety did indeed increase significantly from T1 to T2. Notably, these changes in anxiety were essentially equivalent across the three conditions, as the three groups still had similar anxiety scores at T2,  $F(2, 81) = .77$ ,  $p = .47$ , before they commenced coloring.

### Primary Analyses

We conducted two sets of ANOVAs with follow-up  $t$  tests to examine the effects of the coloring manipulation on anxiety levels. First, we examined differences in T3 anxiety reports; results indicated a significant difference between the three groups,  $F(2,81) = 15.89$ ,  $p < .001$ . (See Table 1 for group means and standard deviations.) Follow-up  $t$  tests comparing the individual groups with each other showed that the mandala group had lower T3 anxiety scores than did the free-form group,  $t(55) = -5.27$ ,  $p < .001$ . The plaid group was also lower in T3 anxiety than was the free-form group,  $t(52) = -3.85$ ,  $p < .001$ . The plaid and mandala groups did not significantly differ from each other, however,  $t(55) = -1.01$ ,  $p = .32$ .

Second, we created a variable to represent changes in anxiety levels from T2 to T3 by subtracting T2 scores from T3 scores. Thus, positive scores represent increases in anxi-

ety after coloring whereas negative scores represent decreases in anxiety after coloring (see Table 1). Results with this more sensitive variable again showed differences among the three groups,  $F(2,82) = 5.46$ ,  $p = .006$ . Follow-up  $t$  tests revealed again that the mandala group showed larger decreases in anxiety than did the free-form group,  $t(55) = -3.07$ ,  $p = .003$ . The plaid group also decreased in anxiety more than the free-form group did,  $t(52) = -2.31$ ,  $p = .03$ . There was no significant difference, however, between the mandala and the plaid groups,  $t(55) = -.74$ ,  $p = .46$ .

Although we had made no predictions about the magnitude of the effects of coloring on anxiety reduction, examination of the means reported in Table 1 suggested that coloring for 20 minutes helped bring the T3 anxiety levels of the mandala and plaid groups below the baseline anxiety levels they reported upon entering the study at T1. To investigate this, we conducted two paired-samples  $t$  tests. T3 scores were indeed significantly lower than T1 scores in the mandala group,  $t(29) = 2.95$ ,  $p = .006$ ; this effect approached significance in the plaid group,  $t(26) = 1.74$ ,  $p = .09$ .

## Discussion

The results of this study clearly supported the hypothesis that coloring a mandala for 20 minutes is more effective at reducing anxiety than free-form coloring for 20 minutes. By measuring anxiety levels upon entering the study, after a brief anxiety induction and after 20 minutes of coloring, we were able to demonstrate that participants who colored on a blank piece of paper showed no reductions in anxiety, whereas those participants who colored a mandala actually decreased their anxiety levels to levels *below* that which they reported *before* the anxiety induction. Interestingly, the effects of coloring a mandala on the reduction of anxiety were little different from the effects of coloring a plaid design. That is, those participants who colored a plaid design for 20 minutes experienced approximately as much relief from anxiety as did the participants who colored a mandala. Only free-form coloring yielded no relief from anxiety.

Why might the plaid and the mandala design be equally effective and both better than free-form coloring for reducing anxiety? Several possibilities come to mind. First, like the mandala, the plaid design was complex enough that it required a certain amount of attention to complete, but it

was not so complex that it required excessive thought or focus (Belchamber, 2003). As such, the plaid design may have had enough interest-value to draw in participants and help distract them from their earlier anxiety-inducing experience. Another important similarity between the mandala and plaid designs is that they both provided structure and direction, whereas the free-form condition provided neither. If anxiety is a type of "inner chaos" (Grossman, 1981), it seems likely that a structured activity such as coloring a pre-determined, somewhat complex design would help to organize that chaos. In contrast, participants in the free-form condition had to find their own way to structure their experience for 20 minutes, and this may either have been anxiety-inducing itself or have failed to help them reduce their anxiety. Indeed, observations of the participants in the free-form group suggested that they desired more direction, as some frequently looked to the experimenter for further instruction after directions had been given. In addition, several of the participants in the free-form group stopped periodically during the coloring time to tap a pencil, apparently to think of what to color next. This lack of direction and structure may have kept the participants in the free-form condition from continuously coloring during the entire 20 minutes or may have made their coloring experience nonoptimal in other regards.

In sum, it seems that the complexity and structure of the plaid and mandala designs drew the participants into a meditative-like state that helped reduce their anxiety. In contrast, participants who had to decide what to draw for themselves may either have experienced confusion about what to draw or have not colored continuously for the 20 minutes for other reasons. Either of these experiences would be likely to detract from the meditative state necessary to reduce anxiety through coloring (Belchamber, 2003).

### Limitations, Future Research, and Potential Applications

Several important limitations of the present study should be addressed by future research. First, our sample consisted of undergraduate students from a small liberal arts college; such a sample, of course, does not provide a representative sample of people in general or of people who suffer from anxiety disorders. Future research with other individuals varying in age, education, and mental health status is warranted to determine the generalizability of these findings. Second, we relied on self-report measures of anxiety, which are subject to various flaws and response biases. It would be very interesting to assess psychophysiological indices (e.g., galvanic skin response) before, during, and after coloring to determine whether the present results replicate. Third, we measured only changes in anxiety. Would sadness, anger, or other unpleasant emotions be affected by coloring? Fourth, it would be of interest to determine whether the geometric designs of the plaid and mandala forms are necessary components for anxiety reduction to occur or whether other structured figures that individuals might color (e.g., landscapes, simple designs)

also yield similar anxiety-reducing benefits. Fifth, participants colored previously prepared mandala and plaid designs rather than creating their own, which would be more typical of most art therapy interventions. Future studies could test the possible anxiety-reducing effects of creating rather than coloring mandalas (or plaid designs). Finally, we assessed anxiety immediately after coloring. How long do the benefits of coloring last? These and other questions may be fruitful paths for future research.

Pending replication in further studies, mandala (or plaid) coloring might be put into practice as a treatment for people who experience difficulties with anxiety. The fact that the group who colored mandalas significantly decreased their anxiety levels below baseline suggests that coloring such designs may be useful for helping individuals who chronically experience anxiety. At the least, coloring mandalas or other complex designs may be useful in lessening other stress-related problems if conducted before or immediately after the stressful activity. For example, people with test anxiety could color mandalas prior to taking the test, or people who fear flying on airplanes might color before, or even during, their flight.

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