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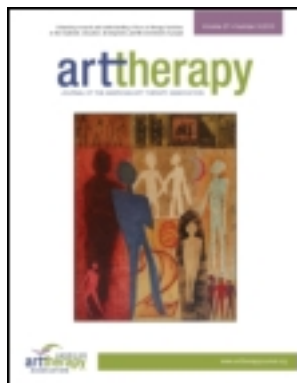
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Art Therapy: Journal of the American Art Therapy Association

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/uart20>

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Available online: 13 Jun 2012

To cite this article: David Alan Sandmire, Sarah Roberts Gorham, Nancy Elizabeth Rankin & David Robert Grimm (2012): The Influence of Art Making on Anxiety: A Pilot Study, Art Therapy: Journal of the American Art Therapy Association, 29:2, 68-73

To link to this article: <http://dx.doi.org/10.1080/07421656.2012.683748>

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The Influence of Art Making on Anxiety: A Pilot Study

David Alan Sandmire, Sarah Roberts Gorham, Nancy Elizabeth Rankin, and David Robert Grimm, Biddeford, ME

Abstract

This study examined the psychological effects of art making in a sample of 57 undergraduate students. One week prior to final examinations, participants were randomly assigned to either an art-making group or a control group. The State-Trait Anxiety Inventory was administered before and after participation. Art making activities included painting or coloring pre-designed mandalas, free-form painting, collage making, still life drawing, and modeling with clay. The mean state anxiety score between pre-activity and post-activity decreased significantly in the art-making group, whereas no difference was found in the control group. Similarly, the mean trait anxiety score between pre-activity and post-activity in the art-making group was significantly lower, and no difference was observed in the controls. These findings suggest that a brief period of art making can significantly reduce a person's state of anxiety, which may have implications for art and art therapy programs that offer methods for helping college students and others coping with stress.

Introduction

Anxiety disorders are the most common mental disorders in the United States, with 18.1% of adults suffering from one of the six anxiety disorders identified in the *Diagnostic and Statistical Manual of Mental Disorders* (as cited in Kessler et al., 2005). According to a report by the Anxiety Disorders Association of America (2010), 40 million adults in the United States suffer from an anxiety disorder, 75% of whom experience their first symptoms of anxiety by age 22. Many young adults are anxious about themselves, their relationships, and their future. Among college students, academic performance is one of several sources of stress, and the means by which students relieve stress are many. This study examined the effects of art making on stress levels in undergraduate students and purported that the process

of art making would effectively reduce anxiety and stress, as measured by the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983).

Although it may seem intuitive that art making is stress relieving, few studies have addressed this claim. DeLue (1999), who monitored heart rate in school-aged children during a 15-minute period of art making, found that drawing within a circle produced a physiologically measurable relaxation response. Walsh, Chang, Schmidt, and Yoepp (2005) reported that college students who participated in art-making activities experienced less stress and anxiety than those who did not engage in art making. The authors suggested that “creative arts corners” could be established in lobbies or other areas, and argued that for students with test anxiety such centers might be particularly helpful prior to test taking. Curry and Kasser (2005) examined the effects of a 20-minute period of art making on stress-induced undergraduate students. They found that coloring in previously prepared mandalas (i.e., circular geometric designs) and plaid designs following a stress-inducing event significantly reduced the participants’ “state” anxiety level, whereas free-form coloring (i.e., on a blank sheet of paper) did not.

Curry and Kasser’s (2005) findings suggest that the level of anxiety reduction afforded by art making may be related to the degree of free expression and creativity inherent in the medium used. It is possible that simply coloring a prepared mandala design requires little creative thought and thus encourages a “trance-like” state of relaxation, whereas the perceived expenditure of creativity required to make an original artwork may be more stress inducing to the artist. Presumably, arts and crafts centers in universities offer college students a variety of art-making opportunities from free-form expression to copy work. Therefore, it would be informative to study the potential anxiety-reducing effect of any art medium.

The current study took place during a highly stressful time in the semester: the week prior to final exams. We hypothesized that participants who engaged in an art-making activity of their choice for 30 minutes would experience a significant reduction of anxiety compared to a control group that did not participate in art making.

Method

Participants

Fifty-seven first-year undergraduate students (45 females, 12 males) attending a small liberal arts college in the U.S. Northeast were solicited for participation through

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announcements in several sections of introductory psychology courses during the fall and spring semesters. The majority of the students were Caucasian, and the mean age was 18.8 years. Students who reported having any anxiety disorder or other documented mental illness were excluded from participating, as were students currently using a prescribed or over-the-counter medication known to influence the central nervous system, such as drugs for the treatment of depression or attention deficit disorders. All participants were required by their professors to write a brief summary of their participation in the study as part of their course requirements.

Procedure

Prior to participation in the study students attended a brief informational meeting to review the exclusion criteria and to sign consent forms, which were approved by the Institutional Review Board. Data were collected during the week prior to final examinations during both the fall and spring semesters in two adjacent rooms in the Campus Center divided by a retractable wall. This setting was purposefully chosen to mimic an environment that students would find comfortable and included a general atmosphere of random noise. An aim of the study was to create an environment that simulated an art center where students could utilize art materials to relieve stress. When participants arrived at the Campus Center the investigators randomly assigned them to one of two groups. Participants first completed the STAI, after which the experimental subjects began the art-making activity in their assigned room while the control subjects sat in comfortable chairs in the other room. Participants in both groups were allowed to socially interact but were not permitted use of electronic devices.

The investigators instructed the participants in the experimental group to choose one of five art-making activities, read the simple instructions to guide them in the art-making activity, and begin their art making. In addition, a very simple example was provided to aid the subjects in their art making. The art-making activities and their instructions were as follows:

- **Mandala Design:** Choose a pre-designed mandala and use colored pencils, tempera paints, watercolors, crayons, or markers to complete the design.
- **Painting Free Form:** Choose one sheet of white paper and use that paper to create an image from your imagination using tempera or watercolor paints. Upon completion of the initial painting, you can add detailed design work with fine-tip permanent markers, crayons, colored pencils, and/or pastels.
- **Collage Making:** Take a white piece of paper and choose precut images and text to design a collage. Use the scissors provided to further cut images before gluing them to the paper surface, or to cut additional images from the provided magazines.
- **Clay:** Choose a lump of clay and work it with your hands until it becomes warm and pliable. Then mold the clay into a pleasing form. A pinch pot with etched

designs, coil pot, and small animal figurine are examples of clay forms.

- **Drawing:** Take a large piece of white paper and choose from the variety of still life objects. Arrange the objects you choose into a pleasing assembly and begin drafting the still life in pencil. When done with your drawing, you can use diluted sepia ink to paint in tonal values to help give the subject form and dimension.

At the end of the 30-minute period, all participants again completed the STAI, followed by a debriefing session.

Instrument

For the pre- and post-art-making testing, participants were required to complete the State Trait Anxiety Inventory (STAI) Form Y (Spielberger, Gorsuch, & Lushene, 1970), an administered analysis of reported anxiety symptoms. The instrument is divided into two sections, each having 20 questions. The first subscale measures state anxiety (i.e., a person's current level of anxiety); the second measures trait anxiety (i.e., a person's long-term disposition toward anxiety). The range of scores is 20–80, with higher scores indicating greater anxiety. The STAI, which is appropriate for adults who have at least a sixth-grade reading level, contains items on a 4-point Likert scale. The number on the scale is positively correlated with the anxiety identified in the question. In a review of the STAI, Tilton (2008) noted that the STAI's validity and reliability were comparable to other similar measures. Spielberger et al. (1983) reported reliability and validity alpha coefficients of 0.92 and 0.90, respectively, for both the state and trait portions of the inventory, and McEwan and Goldenberg (1999) reported reliability coefficients of 0.92 and 0.89 for the state and trait portions, respectively.

Data Analysis

Two-tailed paired and unpaired Student's *t* tests, where appropriate, were performed to determine differences within and between groups. Because the mean data for pre-activity trait anxiety scores were not normally distributed, as assessed by an *F* statistic, a *t* test for unequal variances was applied to that data set. All data are reported as means $\pm$ *SD*. A two-by-two factorial ANOVA determined whether the type of activity performed or the subject's sex influenced the pre- to post-activity STAI scores. Probability values less than 0.05 were considered significant, and data analyses were conducted using Systat software version 11 (Wilkinson, 2005).

Results

The random assignment of participants into the experimental ($n = 29$) and control ($n = 28$) groups was effective as assessed by a two-tailed, unpaired Student's *t* test that revealed no significant difference in mean pre-activity state, $p = .20$, $t = 1.29$, or trait, $p = .70$, $t = 0.39$, anxiety scores between the experimental and control groups. Furthermore, the state and trait anxiety scores and mean values for the two groups were comparable to the normative data for

Table 1 Comparison of Pre- and Post-Activity Mean State Anxiety Scores for Control and Experimental Groups

Group	Mean Pre-Activity State Score ($\pm$ SD)	Mean Post-Activity State Score ($\pm$ SD)	<i>p</i>	<i>t</i>
Control Group (No art making)	36.2 $\pm$ 8.8	36.0 $\pm$ 10.9	<i>p</i> < .001	0.08
Experimental Group (Art making)	39.3 $\pm$ 9.4	29.5 $\pm$ 8.6		3.98

Note. Student's *t*-test *p* value is indicated for significant pre- to post-activity mean score differences.

female college students reported by Spielberger et al. (1983). With the exception of two experimental participants who neglected to fill out the "trait" questions of the survey prior to the art-making activity, all surveys were completed in their entirety for both the pre-activity and post-activity segments of the protocol. Experimental and control group sample sizes were just below 30, and an *F* statistic ascertained that there was homogeneity of variances between the two groups for pre-activity state anxiety scores, $F(29, 28) = 1.14$, $p = .38$, but not for pre-activity trait anxiety scores, $F(27, 28) = 3.11$, $p < .01$). Hence, for the latter comparison, the Student's *t* test used was that for samples of unequal variance.

State Anxiety

Pre-activity state anxiety mean scores $\pm$ SD for the control (non-art making) and experimental (art making) groups were 36.2 $\pm$ 8.8 and 39.3 $\pm$ 9.4, respectively. Post-activity state anxiety mean scores for the control and experimental groups were 36.0 $\pm$ 10.9 and 29.5 $\pm$ 8.6, respectively. A one-tailed, paired Student's *t* test revealed a significant decrease in the experimental group's mean state anxiety score between the pre-activity and post-activity surveys, $p < .001$, $t = 3.98$. In contrast, a two-tailed, paired Student's *t* test for the control group showed no significant difference in mean state anxiety score between the pre-activity and post-activity surveys, $t = 0.08$ (Table 1).

Trait Anxiety

For trait anxiety analysis, pre-activity mean scores $\pm$ SD for the control and experimental groups were 38.2 $\pm$ 10.2 and 39.1 $\pm$ 5.8, respectively. Post-activity trait anxiety mean scores for the control and experimental groups were 37.3 $\pm$ 11.2 and 33.3 $\pm$ 6.1, respectively. A two-tailed, paired Student's *t* test revealed a significant decrease in the experimen-

tal group's mean trait anxiety score between the pre-activity and post-activity surveys, $p < .001$, $t = 4.20$. However, a two-tailed, paired Student's *t* test for the control group showed no significant difference in mean trait anxiety score between the pre-activity and post-activity measures, $t = 1.19$ (Table 2).

A two-by-two factorial ANOVA test was performed on the data from all participants to determine the extent to which (a) a participant's activity type (art making or no art making), and (b) a participant's sex (female or male) contributed to the variation in the pre- to post-activity change in state anxiety score. This test revealed that only the participation (or lack thereof) in art making significantly contributed to the variation in pre- to post-activity change in state anxiety score (Table 3). A similar two-by-two factorial ANOVA test was conducted to determine the extent to which (a) a participant's activity type, and (b) a participant's sex contributed to the variation in the pre- to post-activity change in trait anxiety score. This test revealed that only the participation (or lack thereof) in art making significantly contributed to the variation in pre- to post-activity change in trait anxiety score (Table 4).

Implicit in the design of the STAI is that participants' trait anxiety scores would be relatively stable over a long period of time, whereas their state anxiety scores would fluctuate based on the details of their current environment. However, in this study, art making significantly decreased both the state and the trait anxiety scores. To assess whether participants were adequately distinguishing between the state-related and trait-related questions on the inventory, a Pearson correlation coefficient was calculated for the combined group of experimental and control participants to determine whether the pre- to post-activity change in a person's state anxiety score correlated to the pre- to post-activity change in the trait anxiety score. This test revealed a positive correlation, with a Pearson correlation coefficient (*r*) of 0.63,

Table 2 Comparison of Pre- and Post-Activity Mean Trait Anxiety Scores for Control and Experimental Groups

Group	Mean Pre-Activity Trait Score ($\pm$ SD)	Mean Post-Activity Trait Score ($\pm$ SD)	<i>p</i>	<i>t</i>
Control Group (No art making)	38.2 $\pm$ 10.2	37.3 $\pm$ 11.2	<i>p</i> < .001	1.19
Experimental Group (Art making)	39.1 $\pm$ 5.8	33.3 $\pm$ 6.1		4.20

Note. Student's *t*-test *p* value is indicated for significant pre- to post-activity mean score differences

Table 3 Two-by-Two Factorial ANOVA for Pre- to Post-Activity Change in State Anxiety Score

Source	SS	df	MS	F	p
Sex (female/male)	2.5	1	2.5	0.05	.83
Activity (art/no art)	710.8	1	710.8	12.72	.001
Sex $\times$ Activity	1.0	1	1.0	0.02	.89
Error	2962.5	53	55.9		

$p < .01$. Thus, participants who had greater reductions in state anxiety between the pre- and post-activity generally also had greater reductions in trait anxiety. This suggests that participants may have been equating questions on the state anxiety inventory with those on the trait anxiety inventory. Nonetheless, despite this potential blurring of responses, it is important to note that a two-tailed, paired Student's t test revealed that the experimental group's mean state anxiety score dropped to a significantly greater degree than its mean trait anxiety score, $p < .001$, $t = 4.20$, suggesting that art making contributed to the participants' reduction in state anxiety independent of the problem of blurred distinctions mentioned above.

Discussion

The first-year college students participated in this study in the week prior to their final examinations for the semester, a time when they are presumably under pressure to succeed academically. The study results support the hypothesis that 30 minutes of art making would significantly reduce participants' state-related anxiety, as measured by the State-Trait Anxiety Inventory. Interestingly, art making also was associated with a significant drop in the participants' trait-related anxiety, suggesting that the students were not adequately distinguishing between state-related and trait-related questions on the inventory. Nonetheless, the fact that the art making group's mean state anxiety score dropped to a significantly greater extent than their mean trait anxiety score suggests that there is a real state anxiety-reducing effect of a short period of art making. Because the sample sizes of both the experimental group ($n = 29$) and the control group ($n = 28$) were small, the findings should be considered pilot data warranting further investigation.

For people who have the opportunity to attend college, these years can be at once the most rewarding and the most anxiety-provoking phase of their lives. Although this period entails an exciting chapter of personal and career explo-

ration, separation from their families, development of new social networks, and the pressure to perform well in academically challenging classes can be sources of great angst for young adults. Our finding that a short period of art making may significantly reduce a person's current state of anxiety has important ramifications for these students, given the role that anxiety plays in academic success. King, Heinrich, Stephenson, and Spielberger (1976) found that anxiety level was inversely correlated with academic performance. Similarly, Grinnell and Kyte (1979) showed a link between lower "trait" anxiety scores and higher first-semester grade point average among first-year graduate students. Culler and Holahan (1980) demonstrated that students with higher levels of test anxiety not only had lower test scores but also had poorer study skills and higher dropout rates. Lo (2002) showed that students who could lower their level of stress had better study techniques and time management strategies as well as an increased fund of knowledge.

However, a close analysis of the effects of anxiety on academic performance reveals that differential effects occur depending upon the type of student and the nature of the academic task. For example, anxiety is positively associated with rapid learning and performing simple tasks (because rapid execution reduces the level of anxiety), whereas similar feelings of stress may impair performance on more complex and challenging academic tasks (Mander & Sarason, 1952; Spielberger, 1966). Although anxiety may impair academic performance in students of lesser academic ability, it may enhance performance in students with higher academic ability (Spielberger, 1962). In recognition of the possible detrimental effects of anxiety on various college students, some universities offer extracurricular outlets that serve a stress-relieving role, such as intramural athletics, student clubs, and such art-making centers as the Crafts Studio at the University of New Mexico, the Studio Arts and Craft Centre at the University of Wisconsin-Milwaukee, the Workspace at Iowa State University, and the Crafts Center at North Carolina State University. The anxiety-reducing effects of art making

Table 4 Two-by-Two Factorial ANOVA for Pre- to Post-Activity Change in Trait Anxiety Score

Source	SS	df	MS	F	p
Sex (female/male)	3.0	1	3.0	0.18	.67
Activity (art/no art)	150.5	1	150.5	9.08	.004
Sex $\times$ Activity	1.0	1	1.0	0.06	.80
Error	2962.5	53	55.9		

suggested by our study certainly help justify the establishment of these art centers on college campuses.

In this study, experimental participants were allowed to choose one of five different types of art making. Although our intention was to simulate the environment of a campus art-making center, it meant that there were unequal numbers of participants for each art medium. Twelve participants chose to paint or color a pre-designed mandala, 8 chose to create a 3-dimensional clay object, 5 chose free-form painting, 3 chose collage making, and only 1 chose still-life drawing. It was not possible to assess the differential anxiety-reducing effects of specific types of art making with any statistical certainty due to these small and uneven groupings. Future studies might benefit from such analysis, given [Curry and Kasser's \(2005\)](#) findings that the level of anxiety reduction afforded by art making may be related to the degree of free expression and creativity inherent in the activity.

One confounding variable in this study may be the varying degrees of social interaction among both the experimental and the control participants. Although each 30-minute session between testing measures had equal numbers of experimental and control participants, the total number of participants varied from session to session. The overall degree and nature of social interaction among participants in the experimental groups appeared to be similar to that of the control groups; however, some individuals were more talkative than others. Although such variety of interaction would be typical of most art centers on university campuses, it nonetheless could have influenced the degree of anxiety felt by the participants over the course of the experiment. To alleviate this problem, future experimental designs might ensure equal numbers of participants for each session and limit participant social interactions in either group, which would more completely isolate art making as the only independent variable on which the degree of anxiety reduction depends.

Further investigation of the influence of art making on anxiety might include other age groups and settings. For example, studies suggest that art making may reduce anxiety in family caregivers of cancer patients ([Walsh, Martin, & Schmidt, 2004](#); [Walsh & Weiss, 2003](#)). [Walsh, Radcliffe, Castillo, Kumar, and Broschard \(2007\)](#) also found that art making significantly reduced anxiety in adult family caregivers of cancer patients; however, their study did not include a control group, making it difficult to determine whether art making, rather than social interaction among subjects, was the anxiety-relieving factor. Nonetheless, if an anxiety-reducing effect of art making does exist, and if it stretches across all ages, it may have profound implications for society, given that the relationship between anxiety and a person's mental and physical health has been well documented ([Rahe, 1988](#); [Sareen et al., 2006](#)).

Although we found that anxiety scores decreased significantly for participants who engaged in art making, we cannot know whether such changes were long-lasting or transient, as the STAI was given immediately after art making but not again any time later. The anxiety-relieving effect of art making may be only temporary, with anxiety scores returning to baseline a week or two after an art making session, as [Mercer, Warson, and Zhao \(2010\)](#) found. Despite

this possibility, the anxiolytic effects of art making, even if only transient, might be useful for individuals seeking relaxation during short, well-defined periods of stress, such as during examinations at the end of a college semester. Establishing drop-in arts and crafts studios on college campuses would allow students to take advantage of anxiety-relieving art activities during such periods of increased stress.

Another potential limitation of this study relates to the assignment of participants into art-making (experimental) and non-art-making (control) groups. It is possible that the control participants were disappointed that they could not engage in the art-making process, which could have caused their anxiety level to rise and inadvertently increased the difference in anxiety scores between the two groups. However, it should be noted that all participants were told prior to their consent that there was a chance that they would be assigned to the non-art-making group. Informal observations of participant behavior during the study did not reveal marked differences in nonverbal behavior or outward expression of emotion among members of the experimental and control groups during the study.

It is possible that the degree of anxiety reduction afforded by art making was influenced by participant awareness that their activities were being monitored for experimental purposes, as compared to typical, unobserved students in a drop-in art center who might not focus as intently on their art making. Similarly, there was potential in this study for response bias in that experimental participants may have answered the STAI according to what they thought would be socially desirable or expected rather than according to their actual current level of anxiety. Students may have assumed that the investigators were predicting an anxiety-reducing effect of art making and answered the inventory questions accordingly. Although we did not reveal the hypothesis of the study to the participants, it would be difficult to completely eliminate this possibility. [Podsakoff, MacKenzie, Lee, and Podsakoff \(2003\)](#), in their extensive review of common method biases in behavioral research, have argued that social desirability bias may be reduced by using two or more instruments to measure the dependent variable. Therefore, any future study of the effect of art making on anxiety should utilize not only the STAI (or a comparable inventory) but also corroborating measures, such as physiological indicators of anxiety (e.g., beat-to-beat heart rate variability analysis). Such a study would contribute to the growing body of literature regarding the connection between the mind and the body.

This study and others suggest that art making is a means for reducing commonly experienced anxiety through a temporary, relaxing escape from reality. When comparing approaches to the treatment of anxiety, [Sarid and Huss \(2010\)](#) noted that cognitive behavioral intervention aims to address anxiety in a "top-down" direction through the mind via imaginal exposure, whereas art therapy, with its actual manipulation of art materials, offers a "bottom-up" approach to anxiety in a nonverbal, tactile, and visual manner. [Csikszentmihalyi \(1997\)](#) described a trance-like state (i.e., "in flow") that occurs during the process of art making. He found that the finished artistic product tends to be regarded as less important to the maker than the process of doing the work

itself. This may be due, in part, to the tactile and visual experience as well as the repetitive muscular activity inherent in art making. Indeed, Benson (1975), in his research of the mind/body connection, reported a link between repetitive activity and the state of relaxation. Our study suggests that the relaxing effect of art making is significant, which reinforces the notion that entering a flow-like state can decrease anxiety. Given the high incidence of anxiety among college students, it may be beneficial to establish campus-based art centers to promote and enhance student relaxation. These benefits have important implications for art and art therapy programs in other settings and populations where anxiety is a major health care issue.

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