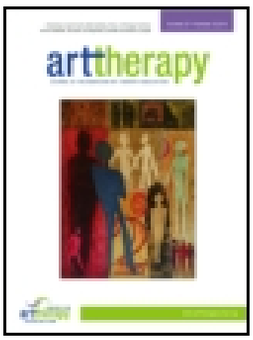

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Evaluating the Impact of a Brief Artistic Intervention on Cardiovascular Recovery From Acute Stress

Katharina Keogh and Ann-Marie Creaven

Abstract

In this study we tested whether drawing and coloring influence cardiovascular recovery and perceived stress following exposure to a stressor. In a mixed experimental design, participants ($N = 62$) completed an acute stress task before being randomly assigned to one of three brief activities: free-form drawing (full creative control), coloring (limited creative control), or a text copying activity (control group). Results revealed no significant effect of activity type on cardiovascular recovery or perceived stress. Artistic activities, both drawing and coloring, received significantly higher perceived creative control and task enjoyment ratings, but were not accompanied by stress-relieving effects.

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There has been increasing interest in the use of the arts in health care settings (Camic, 2008). The idea that artistic endeavors can benefit health has intuitive appeal: Coloring books for adults, for example, have become popular (Raphel, 2015) and are often marketed for reducing stress. However, there is little empirical data on the use of artistic activities for stress relief (Bell & Robbins, 2007; Sandmire, Gorham, Rankin, & Grimm, 2012), and only a few quantitative studies have looked at the effects of drawing and coloring in nonclinical samples (e.g., Abbott, Shanahan, & Neufeld, 2013; Bell & Robbins, 2007). Given the increasing popularity of these activities for alleviating stress and promoting health, empirical studies evaluating the mechanisms by which artistic activities are beneficial are required.

The limited quantitative research that does exist mostly pertains to mood and anxiety outcomes. Drawing has been found to improve mood significantly more than copying shapes (De Petrillo & Winner, 2005), art viewing (Bell & Robbins, 2007), and writing (Drake, Coleman, & Winner, 2011; Drake & Hodge, 2015). Research has also shown significant reductions in self-reported anxiety following artistic activities such as coloring a pattern (Aaron, Rinehart, & Ceballos, 2011; Curry & Kasser, 2005; Sandmire et al., 2012; van der Vennet & Serice, 2012). Moreover, artistic competency seems to be irrelevant to the mood improvement outcome (De Petrillo & Winner, 2005; Drake & Hodge, 2015), suggesting that artistic interventions could even be useful for individuals not typically interested in artistic activities. Overall, these findings suggest a beneficial effect of artistic activities on psychological well-being for nonclinical samples. To date, few studies have examined drawing and other artistic activities in relation to stress. For example, Abbott et al. (2013) found that artistic activities (i.e., drawing, art appreciation) reduced self-reported stress significantly more than nonartistic activities. However, art prints were shown to participants in the artistic conditions prior to task commencement (as drawing inspiration), but not to those completing the nonartistic conditions, making it impossible to attribute the stress relief specifically to the artistic activity. Therefore, the benefits of artistic activities for stress reduction remain to be established.

The neglect of stress in the limited literature on artistic activities and well-being is problematic, given that its detrimental effects on health are well established. Stress has, for example, been implicated in depression (Hammen, 2015) and cardiovascular disease (Steptoe & Kivimäki, 2013), and can affect health outcomes through maladaptive coping behaviors or directly through physiological responses. The cardiovascular reactivity hypothesis posits that exaggerated cardiovascular responses to stress are predictive of subsequent disease development (Treiber et al., 2003). Nevertheless, it has been proposed that insights from cardiovascular recovery might be of higher value, as it is the sustained nature of the stress response that results in compromised health (Brosschot et al., 2014). Cardiovascular recovery refers to the length of time it takes to return to cardiovascular baseline levels following stress reactivity (Linden, Earle, Gerin, & Christenfeld, 1997). Both reactivity and recovery have been linked to the development of cardiovascular disease (Chafin, Christenfeld, & Gerin, 2008; Linden et al., 1997), and recovery from psychological stress predicts blood pressure 3 years later (Steptoe & Marmot, 2005). To evaluate the impact of artistic activities on stress-related health outcomes, it could thus be of interest to assess whether artistic activities can ameliorate cardiovascular stress recovery and perceived stress.

Despite some empirical studies, the theoretical understanding of the links between artistic activities and well-being remains limited. Curl (2008) noted that artistic activities might facilitate a sense of control for individuals in therapeutic settings, creating "choice, freedom and power, which are experiences of agency often lacking in individuals in mental health settings" (p. 165). It seems plausible that establishing a sense of control through artistic activity could also benefit individuals in nonclinical settings.

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Some qualitative findings lend support to Curl's (2008) suggestion: In Reynolds and Prior's (2003) study of women suffering from disability or chronic illness "increasing choice and control" (p. 788) emerged as a key theme. They stated that "illness is often experienced as taking away control and choice" and that participants "found solace and positive joy in the control that they could exercise over their creative products" (p. 789). In Reynolds and Lim's (2007) study of women suffering from cancer, similar experiences are reported. Taken together, these findings suggest that control could be one mechanism by which artistic activities might alleviate stress. In addition, as the samples used in Reynolds and Lim (2007) and Reynolds and Prior (2003) were entirely female, gender differences should be taken into account, particularly as some prior studies have not considered this variable (e.g., De Petrillo & Winner, 2005).

To our knowledge, no study has yet evaluated the impact of visual artistic activities on cardiovascular recovery from acute stress. Our research tests two related hypotheses: first, that artistic activities enhance cardiovascular stress recovery and decrease perceived stress, and second, that perceived creative control mediates the relationships between artistic activities and cardiovascular recovery and perceived stress.

Method

Design

A mixed experimental design was used. Creative control (CC) was the independent variable, containing three levels: full creative control (FCC), limited creative control (LCC), and the control condition. The dependent variables were perceived stress postintervention, systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR). Additionally, task enjoyment, perceived drawing skill, perceived CC, perceived stress at baseline, and perceived stress poststressor were assessed.

CC was defined as the freedom to produce a drawing akin to personal wishes, without external constraints limiting the image's content. FCC was operationalized through a free drawing task and LCC through coloring a predrawn abstract shape, the underlying premise being that participants could exercise some CC through choosing colors, but could not control the picture's content. No CC was operationalized through a text copying exercise.

Participants

As part of a larger study on stress, health, and well-being, a convenience student sample ($N = 68$) was recruited through e-mail and word of mouth. One participant was excluded due to pregnancy, and 5 participants were excluded due to exceeding normal baseline SBP and HR (based on standards of the American Heart Association, 2015a, 2015b), leaving a final sample of $N = 62$. The majority of participants were young adults ($M_{age} = 22.32$ years, $SD = 4.84$) of White Irish ethnicity (94.90%) and female ($n = 41$). Nearly half indicated that they sometimes (45.2%) or often (11.3%) engaged in artistic activities, the most commonly listed activities being visual art (e.g., drawing, painting; 16.1%) and writing (17.7%).

Procedures

Figure 1 provides an overview of the procedure. Ethical approval for this research was obtained from the Education and Health Sciences Research Ethics Committee at the University of Limerick, Ireland (Ref. 2015_10_12_EHS). All participants provided informed consent, and were tested in a private room at the university. Participants were asked to refrain from (a) consuming alcohol 12 hours prior, (b) consuming nicotine and caffeine 2 hours beforehand, and (c) eating 1 hour prior to testing (based on Kaplan, Thomas, & Pohl, 2016; Smith, 2005). Participants were tested individually, seated at a desk in a quiet room with dimmed lights, facing two researchers.

Participants placed their feet in a box for the duration of the study (to avoid measurement errors through excessive movement) and a blood pressure cuff was fitted on their nondominant arm. Baseline blood pressure was established over a period of 10 minutes, 30 seconds (due to measurement constraints) during which participants completed unrelated psychometric tests. Following this, participants rated their perceived stress level before the stress task was

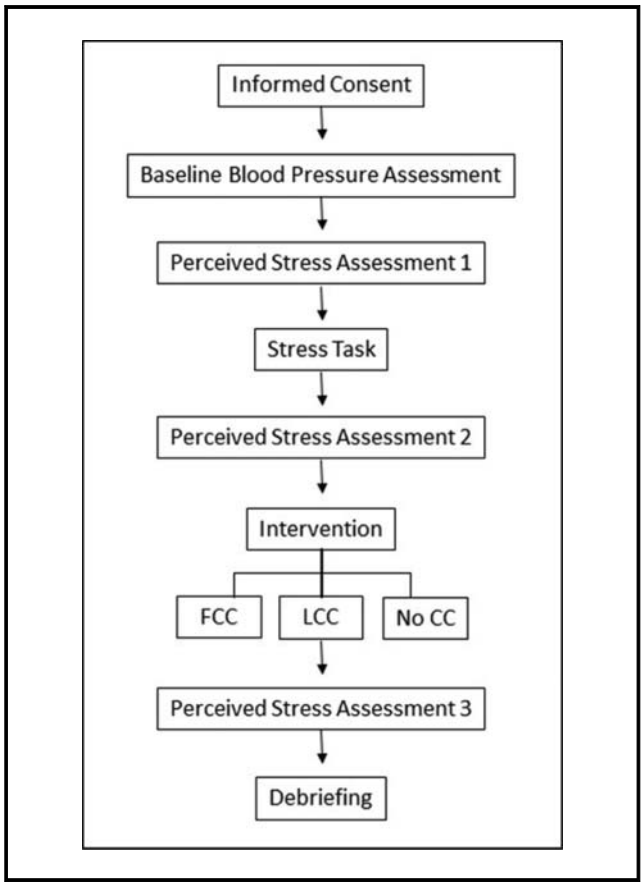

Figure 1. Overview of the Procedure
Note. FCC = full creative control; LCC = limited creative control; CC = creative control

administered, and again immediately after the task finished. A brief acclimatization period was introduced to the protocol after testing had already commenced, during which participants could relax and read magazines containing neutral content. Analyses evaluating the duration of this acclimatization period on baseline blood pressure levels indicated no significant effects.

Next, two art pictures (Klimt's *Church in Kassone*; Van Gogh's *Café Terrace at Night*) were presented to participants for approximately 10 seconds, to provide inspiration they could use if needed (due to observations by, e.g., Curry and Kasser [2005] that participants seemed anxious about what to draw). To avoid Abbott et al.'s (2013) confound, these pictures were presented regardless of condition. This was followed by the intervention. Immediately afterward, participants rated perceived stress, perceived CC, task enjoyment, and drawing skill, and provided information on their artistic activities. After completing (unrelated) questionnaires, participants were debriefed. Blood pressure was measured throughout the session.

Stress Task. Participants completed an adapted form of the arithmetic component of the widely used Trier Social Stress Test (TSST; Kirschbaum, Pirke, & Hellhammer, 1993) for 6 minutes. To ensure a sufficient stress response with only the arithmetic component, additional elements (video recording, leaderboard) were included. Based on Birkett (2011), participants were asked to undertake serial subtraction (1,022 – 13) while reporting answers verbally. A camera was set up in close proximity to participants, who were informed that their performance would be recorded and later reviewed by a panel of judges. Additionally, participants were alerted to a poster ranking the performances of fictional participants. Prompts adapted from Whited, Wheat, and Larkin (2010) were used at 1 minute, 30 seconds ("You're going too slowly. Please start again from 5,066") and at 3 minutes ("Sorry, I expected you to do better than this. Please start again from 6,190"). Participants were asked to start again if they made a mistake. The researcher delivering instructions kept a stern demeanor throughout.

Experimental Manipulation. Participants in the FCC group were provided with a variety of colored pencils and a blank A4 sheet (8.27 × 11.69 in.), and instructed to draw whatever they wanted and that no one would look at their picture later on (to ensure they felt uninhibited in expressing themselves creatively). Participants in the LCC group received the same pencils, and an abstract shape, which they were instructed to color in. This shape was printed in A4 format (8.27 × 11.69 in.), and consisted of a detailed pattern of ornamental shapes, which was obtained online. Finally, participants in the control group received a neutral text (on the history of punctuation; Houston, 2015), a pen, and lined A4 sheets, and were asked to copy the text. To ensure that this activity was not interpreted as an additional stressful task, participants were informed that they were not expected to copy the entire text. Each condition lasted 10 minutes and 30 seconds with instructions delivered verbally by a researcher.

Measures

Psychometric Measures. Perceived stress was assessed using an unmarked visual analogue scale (VAS) of 10 cm length, chosen for its ease of use and brevity. The opposite poles were labeled *not stressed at all* and *extremely stressed*. Written instructions asked participants to indicate how stressed they felt at the present moment. Scores ranged from 0 to 100, and were determined by measuring the distance (in mm) between the participant's mark on the scale and the left pole of the VAS, with a higher score reflecting higher perceived stress. The VAS has previously been used to assess perceived stress (Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004).

Perceived CC, task enjoyment, and perceived drawing skill were measured using a similar VAS. Typical artistic activities were assessed with the question "Do you engage in any creative activities? (e.g., painting, writing)," with the answer options *often, sometimes*, and *never*. Participants were then asked to specify those activities (if any) in an open-ended format.

Physiological Measures. Cardiovascular variables (SBP, DBP, and HR) were measured using a Dinamap Pro400 (GE Healthcare, Chicago, IL). Measurements during the baseline and intervention periods were taken at 2, 4, 6, 8, and 10 minutes over a period of 10 minutes and 30 seconds. Six measurements were taken throughout the stress task (at the start, and at 1, 2, 3, 4, and 5 minutes).

Results

Data Analysis

Our primary analyses tested the hypothesis that engagement in an artistic activity would be associated with improved cardiovascular recovery and reduced stress ratings postintervention. Parametric tests (one-way analyses of variance [ANOVAs] or t tests) were used when the assumption of homogeneity of variances (Levene's test, $p > .05$) was satisfied. Alternatively, nonparametric Kruskal–Wallis tests were used, in conjunction with multiple comparisons to test for differences between conditions. Effect sizes for omnibus ANOVA were calculated as $\eta^2 =$ Sum of Squares (Groups) / Sum of Squares (Total) (Pallant, 2013), and classified based on Cohen (1988) (small = .01, medium = .06, large = .138).

Data Reduction

An average score was calculated for the five SBP, DBP, and HR readings taken during the baseline and intervention periods, and the six SBP, DBP, and HR readings during the stress task, respectively. Cardiovascular recovery was assessed by subtracting each baseline average from the respective intervention baseline score (Stewart & France, 2001).

Preliminary Analyses

There were no significant differences between conditions at baseline or during the stress task for SBP, DBP,

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Table 1. Descriptive Statistics for Perceived Stress

	Baseline		Poststressor		Postintervention	
Condition	***M***	***SD***	***M***	***SD***	***M***	***SD***
FCC[a]	26.40	26.37	54.70	30.01	26.75	24.15
LCC[b]	20.95	18.30	62.98	21.87	20.64	16.31
Control group[c]	23.88	22.88	51.88	22.43	23.69	20.21
Total	24.29	22.19	57.04	24.78	23.59	20.17

Note. $N = 58$ (lower N due to missing values). FCC = full creative control; LCC = limited creative control. No significant differences for $p < .05$.
[a] $n = 20$.
[b] $n = 22$.
[c] $n = 16$.

HR or perceived stress. No significant differences were found between men ($M = 46.75$, $SD = 38.31$) and women ($M = 55.46$, $SD = 37.19$) for perceived CC, $F(1, 59) = .72$, $p = .40$, $\eta^2 = .01$. However, women reported significantly higher drawing skills ($M = 32.71$, $SD = 26.10$) than men ($M = 16.60$, $SD = 21.88$), $F(1, 59) = 5.66$, $p = .02$, $\eta^2 = .09$, and significantly higher task enjoyment ($M = 58.63$, $SD = 30.79$) than men ($M = 38.75$, $SD = 31.14$), $F(1, 60) = 4.89$, $p = .03$, $\eta^2 = .08$. Descriptive statistics are displayed in Table 1 and Table 2.

Manipulation Check: Stress and CC

Paired-samples t tests confirmed that the stress task elicited significant increases in SBP, $t(61) = 16.23$, $p < .001$; DBP, $t(61) = 14.35$, $p < .001$; and HR, $t(61) = 10.59$, $p <$

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Table 2. Descriptive Statistics for Cardiovascular Data Across Conditions

	SBP		DBP		HR	
	M	***SD***	***M***	***SD***	***M***	***SD***
Baseline						
FCC[a]	112.71	8.60	66.75	4.25	73.08	13.24
LCC[b]	116.25	11.87	68.47	6.86	75.60	11.53
Control group[c]	111.88	10.16	65.74	5.47	74.61	16.82
Total	113.78	10.38	67.09	5.70	74.46	13.62
Stress task						
FCC	129.73	13.63	74.18	5.47	87.68	17.02
LCC	133.53	15.70	75.67	6.48	89.14	15.99
Control group	129.04	11.24	74.50	5.23	91.36	20.62
Total	130.94	13.75	74.83	5.75	89.29	17.55
Intervention						
FCC	118.50	9.81	68.43	3.76	74.63	12.48
LCC	121.82	13.03	71.05	5.59	77.61	11.56
Control group	114.78	11.26	69.26	4.90	75.43	15.48
Total	118.65	11.68	69.64	4.89	75.97	12.95
Recovery						
FCC	5.79	7.16	1.69	3.05	1.55	4.31
LCC	5.56	6.90	2.58	3.83	2.01	3.89
Control group	2.91	8.02	3.51	2.91	0.82	6.16
Total	4.87	7.32	2.55	3.35	1.51	4.73

Note. $N = 62$. SBP = systolic blood pressure (in mmHg); DBP = diastolic blood pressure (in mmHg); HR = heart rate (in bpm). FCC = full creative control; LCC = limited creative control. No significant differences for $p < .05$.
[a] $n = 21$.
[b] $n = 23$.
[c] $n = 18$.

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.001, compared to baseline, and that perceived stress poststressor ($M = 57.04$, $SD = 24.78$) was significantly higher than at baseline ($M = 24.29$, $SD = 22.19$), $t(61) = 10.29$, $p < .001$. A Kruskal–Wallis test revealed significant differences in perceived CC between conditions, $H(2) = 36.22$, $p < .001$. Applying a Bonferroni correction ($\alpha = .017$), Mann–Whitney U tests revealed significant differences between the FCC condition ($Mdn = 82.5$) and the control ($Mdn = 3.5$), $U = 2.50$, $z = -5.20$, $p < .001$, $r = -.84$; and between the LCC condition ($Mdn = 80$) and the control ($Mdn = 3.5$), $U = 5.50$, $z = -5.30$, $p < .001$, $r = -.83$. No significant difference was found between the FCC and LCC conditions, $U = 202.50$, $z = -.67$, $p = .50$, $r = -.10$, indicating that CC distinguished artistic and nonartistic conditions, but not FCC and LCC.

Cardiovascular Recovery and Perceived Stress Postintervention

Contrary to our hypothesis, one-way ANOVAs revealed no differences between conditions for SBP recovery, $F(2, 59) < 1$, $p = .41$, $\eta^2 = .03$; DBP recovery, $F(2, 59) = 1.47$, $p = .24$, $\eta^2 = .05$; HR recovery, $F(2, 59) < 1$, $p = .73$, $\eta^2 = .01$; or perceived stress postintervention, $F(2, 55) < 1$, $p = .63$, $\eta^2 = .02$. Figure 2 depicts cardiovascular measures during the intervention.

Task Enjoyment

A one-way ANOVA revealed significant differences in task enjoyment between conditions, $F(2, 59) = 18.01$, $p < .001$, $\eta^2 = .38$. Applying Bonferroni's correction, significant differences occurred in perceived task enjoyment between the control condition and (a) the FCC condition ($p = .001$), and (b) the LCC condition ($p < .001$). Participants in the FCC ($M = 55.65$, $SD = 27.27$) and LCC ($M = 71.35$, $SD = 26.52$) conditions enjoyed their tasks significantly more than those in the control condition ($M = 23.61$, $SD = 22.60$).

Perceived Drawing Skill and Prior Artistic Activity

Results revealed significant differences in perceived drawing skill between conditions, $F(2, 58) = 5.78$, $p = .01$, $\eta^2 = .17$. Participants in the LCC condition ($M = 39.61$, $SD = 24.08$) rated their drawing skill significantly higher than those in the FCC condition ($M = 14.85$, $SD = 21.26$, $p = .004$). No significant differences with the control group ($M = 25.83$, $SD = 26.43$) were detected for either the FCC or LCC conditions. Finally, there was no effect for frequency of engaging in artistic activities for SBP recovery, $F(2, 58) = 1.59$, $p = .21$, $\eta^2 = .05$; DBP recovery, $F(2, 58) = 1.46$, $p = .24$, $\eta^2 = .05$; HR recovery, $F(2, 58) < 1$, $p = .82$, $\eta^2 = .01$; or perceived stress postintervention, $F(2, 54) = 2.65$, $p = .08$, $\eta^2 = .09$.

Impact of Gender

One-way ANOVAs revealed significantly lower SBP for women at baseline, $F(1, 60) = 7.93$, $p = .01$, $\eta^2 = .12$; during stress, $F(1, 60) = 4.91$, $p = .03$, $\eta^2 = .08$; and during the intervention, $F(1, 60) = 7.48$, $p = .01$, $\eta^2 = .11$. No significant differences showed for perceived stress at baseline, $F(1, 60) < 1$, $p = .48$, $\eta^2 = .01$; poststressor, $F(1, 60) = 2.76$, $p = .10$, $\eta^2 = .04$; or postintervention, $F(1, 56) < 1$, $p = .35$, $\eta^2 = .02$; or for DBP, HR, or at recovery. Descriptive statistics for perceived stress by gender are displayed in Table 3.

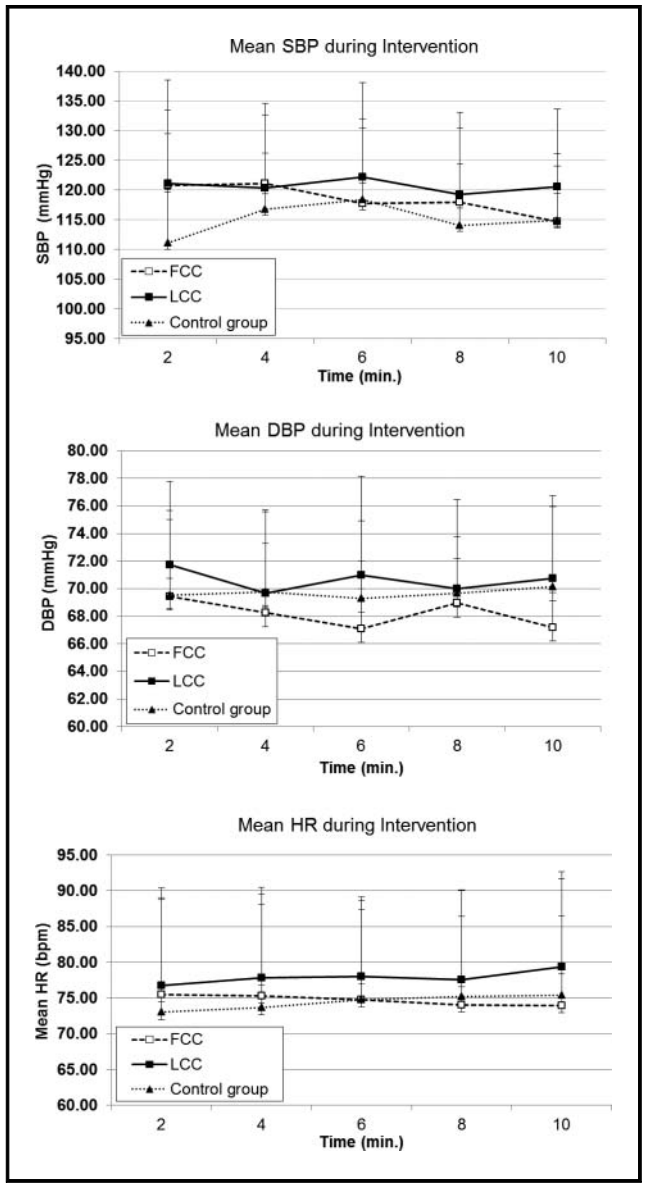

Figure 2. Mean Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), and Heart Rate (HR) by Condition, Measured at 2, 4, 6, 8, and 10 Minutes of the Intervention

Note. FCC = full creative control; LCC = limited creative control; error bars with standard deviation

Discussion

Previous studies have found drawing and coloring to enhance mood and reduce anxiety, and have suggested that artistic activities might also be beneficial for stress relief

Table 3. Descriptive Statistics by Gender

Perceived Stress	Baseline		Poststressor		Postintervention	
Male[a]	28.00	26.37	50.76	27.86	27.16	23.40
Female[b]	21.51	20.10	60.13	23.46	21.85	18.48
Total	24.29	22.19	57.04	24.78	23.59	20.17

Note. No significant differences for $p < .05$. $N = 58$ due to missing values. As conditions did not differ significantly, information on condition was excluded.
[a]$n = 19$.
[b]$n = 39$.

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(Abbott et al., 2013; Curry & Kasser, 2005; De Petrillo & Winner, 2005). This study was the first to assess the impact of drawing and coloring on cardiovascular recovery while also considering perceived stress and CC. Contrary to our expectations, these activities did not affect perceived stress or cardiovascular recovery, and CC did not affect outcomes. However, participants who engaged in drawing or coloring showed significantly higher task enjoyment and perceived CC than those in the control group. Results also revealed significantly lower perceived drawing skill in the free-form drawing condition (FCC) than the coloring condition (LCC) and significantly higher task enjoyment and perceived drawing skill among women. Overall, these results go against hypotheses that drawing and coloring might be stress relieving, and that perceived CC might act as a mediator.

Cardiovascular Recovery and Perceived Stress

Our findings do not support the contention that engagement in artistic activities is beneficial for stress, at least in terms of cardiovascular recovery from stress and perceived stress. There are several potential explanations for this. First, it is possible that the benefits of artistic activities are limited to psychological well-being other than perceived stress, such as mood or anxiety, and that any related effects on physiological and psychological function are too small to be detected. Second, it is possible that the stress-relieving effects of artistic activities accrue over time, and cannot be observed in a single session. However, the intervention duration was nearly identical to Abbott et al. (2013), which makes it unclear why perceived stress was not affected. Third, it is possible that engaging in artistic activities is beneficial for other aspects of the physiological stress response, besides cardiovascular recovery. Fourth, engagement in drawing and coloring tasks might have been physiologically stimulating, and perhaps even stressful, for participants, and could thus have counteracted cardiovascular recovery. For example, previous research has found correlations between increased task engagement and DBP reactivity (Maier, Waldstein, & Synowski, 2003). Consequently, it is possible that participants in this research who perceived the FCC or LCC tasks to be highly engaging showed increased cardiovascular reactivity, which could account for the observed lack of cardiovascular recovery. Finally, it remains a possibility that the drawing and coloring tasks were not perceived as sufficiently "artistic" by participants to produce effects. These drawing and coloring tasks were designed in part to align with the laboratory-based standardized stress-testing protocol and certainly, the description of these activities as artistic or creative could be challenged. However, both the FCC and LCC conditions received significantly higher ratings for perceived CC than the control condition. Of course, this is a purely correlational relationship, and no causality can be inferred, but this does suggest that these drawing and coloring activities were viewed as being artistic by participants, at least, relative to our "nonartistic" control activity.

Importantly, although our findings suggest that artistic activities might not be beneficial for physiological or psychological stress responses, our study focused on exposure to an acute (i.e., time-limited) stress task. Art therapy is typically prescribed for groups already experiencing elevated or extended levels of stress for a range of reasons, such as sexual abuse (Backos & Pagon, 1999) or posttraumatic stress disorder (PTSD; Chapman, Morabito, Ladakakos, Schreier, & Knudson, 2001), which reflect chronic rather than acute stress. Therefore, our findings do not refute the possibility that artistic activities are beneficial for individuals experiencing these chronically stressful contexts. However, given the underdeveloped theoretical model for the benefits of art therapy, and the null effects observed here, empirical tests of the benefits of art therapy are warranted.

Creative Control

CC was hypothesized to play a mediating effect in the relationship between artistic activities and stress outcomes. This was based on the premise that artistic activities might promote a sense of control, which could be of benefit when a person is faced with a stressor. However, results indicated that although CC ratings distinguished the artistic tasks from the control condition, it could not differentiate FCC from LCC, as anticipated, which makes it difficult to assess its impact. It is possible that drawing and coloring are not sufficiently different in their extent of CC to produce a detectable distinction. Alternatively, an artistic intervention might be better suited to a clinical sample, as Curl's (2008) original observation regarding control was limited to participants in clinical settings. In future research, it would be of interest to assess whether FCC and LCC tasks can causally influence CC, particularly in the context of structured or unstructured art therapy interventions.

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Rumination

Individual differences influencing cardiovascular recovery should also be considered. During debriefing, one participant mentioned being preoccupied with the stress task during the artistic activity, indicating that individual differences in rumination might be important to consider. For example, Glynn, Christenfeld, and Gerin (2002) demonstrated delayed cardiovascular recovery following rumination when an emotionally engaging stress task (mental arithmetic) was used. In our study, rumination during the intervention could thus have delayed cardiovascular recovery. This would account for the lack of significant differences between conditions, as the emotionally engaging nature of the stress task would have affected recovery for all participants. However, Glynn et al. (2002) also found participants who completed a distracting task to show significantly better cardiovascular recovery than those who did not, which they attributed to prevention of rumination through distraction. Although not statistically significant, an inspection of the mean values suggests that the control condition on average showed superior SBP and HR recovery. It could be possible that the text copying task used for the control condition proved more distracting than drawing or coloring, which could have prevented rumination and thus led to the (on average) superior recovery in the control condition. Future research should control for rumination, and test whether drawing or coloring can provide sufficient distraction to prevent rumination, and thus, in fact result in a positive effect on cardiovascular recovery.

Task Enjoyment

Although participants did not receive a choice regarding which shape to color in, both the FCC and LCC tasks were rated as significantly more enjoyable than the control condition task. This fits well with previous research findings of mood enhancement following drawing (e.g., De Petrillo & Winner, 2005) and anxiety reduction after coloring in a pattern (e.g., van der Vennet & Serice, 2012). Moreover, the fact that participants reported enjoying drawing and coloring suggests that engagement in artistic activities might hold intrinsic value regardless of their utility for psychological or physiological stress relief. It would be of interest to explore this enjoyment factor further in the context of art therapy interventions, which also involve highly distressing emotions, such as when working with individuals with PTSD (e.g., Hass-Cohen, Findlay, Carr, & Vanderlan, 2014).

Limitations

The limitations of this study should be acknowledged. First, the sample was relatively small. However, significant effects for task enjoyment were observed between groups, indicating that our study had sufficient power to detect effects. The laboratory setting might have inhibited participants' engagement in the artistic activities; however, this environment was necessary to evaluate the impact of artistic activities in a controlled setting.

Study methodology could also explain the finding of higher perceived drawing skill in the LCC compared to the FCC condition. As this rating was completed after the intervention, those in the drawing condition had to evaluate their skill after drawing, as opposed to participants in the LCC condition. Future research should avoid this confound by obtaining the rating before the intervention. Moreover, it is probable that rating a task's extent of CC was novel to participants. Hence, they might have lacked a frame of reference to make the expected ratings. In future research, a crossover design might be more suitable to manipulate perceptions of CC: Half the sample could first be assigned to the drawing task, the other half to the coloring task. Then, after perceived stress ratings, participants could switch tasks. This would enable a comparison between the tasks, and might produce the anticipated CC perceptions.

Finally, despite random assignment to conditions, the distribution of men and women across conditions was unbalanced, with a larger proportion of women in the LCC group. This is relevant, as men reported significantly lower perceived drawing skill and task enjoyment than women. Future researchers should aim for a balance of men and women in groups, as the disparities in enjoyment and perceived skill could indicate that men might derive fewer benefits from artistic activities than women. Although previous studies testing for differences between men and women found no effect (Dalebroux, Goldstein, & Winner, 2008; Drake & Hodge, 2015; Drake & Winner, 2012), some never took this variable into account (e.g., De Petrillo & Winner, 2005). Thus, these effects might have previously gone undetected.

Conclusions

In summary, engagement in drawing and coloring was not accompanied by enhanced cardiovascular recovery or reduced perceived stress following induction of acute stress in our study. However, participants perceived drawing and coloring as enjoyable. Overall, our findings do not support the use of drawing and coloring for stress reduction in nonclinical samples. However, given the novelty of our study, replications are required. Future research evaluating the impact of artistic activities on other dimensions of the psychophysiological response to stress, while accounting for related factors such as rumination and distraction, can increase our understanding of the potential benefits of drawing or coloring for health and well-being.

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References

Aaron, R., Rinehart, K., & Ceballos, N. (2011). Arts-based interventions to reduce anxiety levels among college students. *Arts & Health*, *3*(1), 27–38. doi:10.1080/17533015.2010.481290

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Abbott, K., Shanahan, M., & Neufeld, R. (2013). Artistic tasks outperform non-artistic tasks for stress reduction. *Art Therapy: Journal of the American Art Therapy Association*, *30*, 71–78. doi:10.1080/07421656.2013.787214

American Heart Association. (2015a). *All about heart rate (Pulse)*. Retrieved from http://www.heart.org/HEARTORG/Conditions/More/MyHeartandStrokeNew/All-About-Heart-Rate-Pulse_UCM_438850_Article.jsp#.VtWyjTcnzcs

American Heart Association. (2015b). *Understanding blood pressure readings*. Retrieved from http://www.heart.org/HEARTORG/Conditions/HighBloodPressure/AboutHighBloodPressure/Understanding-Blood-PressureReadings_UCM_301764_Article.jsp#.VtWxozcnzcs

Backos, A. K., & Pagon, B. E. (1999). Finding a voice: Art therapy with female adolescent sexual abuse survivors. *Art Therapy: Journal of the American Art Therapy Association*, *16*, 126–132. doi:10.1080/07421656.1999.10129650

Bell, C., & Robbins, S. (2007). Effect of art production on negative mood: A randomized, controlled trial. *Art Therapy: Journal of the American Art Therapy Association*, *24*, 71–75. doi:10.1080/07421656.2007.10129589

Birkett, M. A. (2011). The Trier social stress test protocol for inducing psychological stress. *Journal of Visualized Experiments*, *56*, e3238. doi:10.3791/3238

Brosschot, J., Geurts, S., Kruizinga, I., Radstaak, M., Verkuil, B., Quirin, M., & Kompier, M. (2014). Does unconscious stress play a role in prolonged cardiovascular stress recovery? *Stress and Health*, *30*, 179–187. doi:10.1002/smi.2590

Camic, P. (2008). Playing in the mud: Health psychology, the arts, and creative approaches to health care. *Journal of Health Psychology*, *13*, 287–298. doi:10.1177/1359105307086698

Chafin, S., Christenfeld, N., & Gerin, W. (2008). Improving cardiovascular recovery from stress with brief poststress exercise. *Health Psychology*, *27*(Suppl. 1), S64–S72. doi:10.1037/0278-6133.27.1(Suppl.).S64 https://doi.org/10.1037/0278-6133.27.1(Suppl.).S64

Chapman, L., Morabito, D., Ladakakos, C., Schreier, H., & Knudson, M. (2001). The effectiveness of art therapy interventions in reducing post-traumatic stress disorder (PTSD) symptoms in pediatric trauma patients. *Art Therapy*, *18*, 100–104. doi:10.1080/07421656/2001.10129750

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Curl, K. (2008). Assessing stress reduction as a function of artistic creation and cognitive focus. *Art Therapy*, *25*, 164–169. doi:10.1080/07421656.2008.10129550

Curry, N., & Kasser, T. (2005). Can coloring mandalas reduce anxiety? *Art Therapy: Journal of the American Art Therapy Association*, *22*, 81–85. doi:10.1080/07421656.2005.10129441

Dalebroux, A., Goldstein, T., & Winner, E. (2008). Short-term mood repair through art making: Positive emotion is more effective than venting. *Motivation and Emotion*, *32*, 288–295. doi:10.1007/s11031-008-9105-1

De Petrillo, L., & Winner, E. (2005). Does art improve mood? A test of a key assumption underlying art therapy. *Art Therapy: Journal of the American Art Therapy Association*, *22*, 205–212. doi:10.1080/07421656.2005.10129521

Drake, J., Coleman, K., & Winner, E. (2011). Short-term mood repair through art: Effects of medium and strategy. *Art Therapy: Journal of the American Art Therapy Association*, *28*, 26–30. doi:10.1080/07421656.2011.557032

Drake, J., & Hodge, A. (2015). Drawing versus writing: The role of preference in regulating short-term affect. *Art Therapy: Journal of the American Art Therapy Association*, *32*, 27–33. doi:10.1080/07421656.2015.995032

Drake, J., & Winner, E. (2012). Confronting sadness through art-making: Distraction is more beneficial than venting. *Psychology of Aesthetics, Creativity, and the Arts*, *6*, 255–261. doi:10.1037/a0026909

Glynn, L., Christenfeld, N., & Gerin, W. (2002). The role of rumination in recovery from reactivity: Cardiovascular consequences of emotional states. *Psychosomatic Medicine*, *64*, 714–726. doi:10.1097/01.PSY.0000031574.42041.23

Hammen, C. (2015). Stress and depression: Old questions, new approaches. *Current Opinion in Psychology*, *4*, 80–85. doi:10.1016/j.copsyc.2014.12.024

Hass-Cohen, N., Findlay, J. C., Carr, R., & Vanderlan, J. (2014). "Check, change what you need to change and/or keep what you want": An art therapy neurobiological-based trauma protocol. *Art Therapy: Journal of the American Art Therapy Association*, *31*, 69–78. doi:10.1080/07421656.2014.903825

Houston, K. (2015). The mysterious origins of punctuation. *BBC Culture*. Retrieved from http://www.bbc.com/culture/story/20150902-the-mysterious-origins-of-punctuation

Kaplan, N. M., Thomas, G., & Pohl, M. A. (2016). *Blood pressure measurement in the diagnosis and management of hypertension in adults*. Retrieved from https://www.uptodate.com/contents/blood-pressure-measurement-in-the-diagnosis-and-management-of-hypertension-in-adults

Kirschbaum, C., Pirke, K. M., & Hellhammer, D. (1993). The "Trier social stress test"—A tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology*, *28*(1–2), 76–81. doi:10.1159/000119004

Kudielka, B., Buske-Kirschbaum, A., Hellhammer, D., & Kirschbaum, C. (2004). Differential heart rate reactivity and recovery after psychosocial stress (TSST) in healthy children, younger adults, and elderly adults: The impact of age and gender. *International Journal of Behavioral Medicine*, *11*, 116–121. doi:10.1207/s15327558ijbm1102_8

Linden, W., Earle, T., Gerin, W., & Christenfeld, N. (1997). Physiological stress reactivity and recovery: Conceptual siblings separated at birth? *Journal of Psychosomatic Research*, *42*, 117–135. doi:10.1016/S0022-3999(96)00240-1

Maier, K. J., Waldstein, S. R., & Synowski, S. J. (2003). Relation of cognitive appraisal to cardiovascular reactivity, affect, and task engagement. *Annals of Behavioral Medicine*, *26*(1), 32–41. doi:10.1207/S15324796ABM2601_05

Pallant, J. (2013). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS* (5th ed.). Maidenhead, UK: Open University Press/McGraw-Hill Education.

Raphel, A. (2015). Why adults are buying coloring books (for themselves). *The New Yorker*. Retrieved from http://www.newyorker.com/business/currency/why-adults-are-buying-coloring-books-for-themselves

Reynolds, F., & Lim, K. (2007). Contribution of visual art-making to the subjective well being of women living with cancer: A qualitative study. *The Arts in Psychotherapy*, *34* (1), 1–10. doi:10.1016/j.aip.2006.09.005

Reynolds, F., & Prior, S. (2003). "A lifestyle coat-hanger": A phenomenological study of the meanings of artwork for women coping with chronic illness and disability. *Disability and Rehabilitation*, *25*, 785–794. doi:10.1080/0963828031000093486

Sandmire, D., Gorham, S., Rankin, N., & Grimm, D. (2012). The influence of art making on anxiety: A pilot study. *Art Therapy: Journal of the American Art Therapy Association*, *29*, 68–73. doi:10.1080/07421656.2012.683748

Smith, L. (2005). New AHA recommendations for blood pressure measurement. *American Family Physician*, *72*, 1391–1398.

Steptoe, A., & Kivimäki, M. (2013). Stress and cardiovascular disease: An update on current knowledge. *Annual Review of Public Health*, *34*, 337–354. doi:10.1146/annurevpublhealth-031912-114452

Steptoe, A., & Marmot, M. (2005). Impaired cardiovascular recovery following stress predicts 3-year increases in blood pressure. *Journal of Hypertension*, *23*, 529–536. doi:10.1097/01.hjh.0000160208.66405.a8

Stewart, J., & France, C. (2001). Cardiovascular recovery from stress predicts longitudinal changes in blood pressure. *Biological Psychology*, *58*, 105–120. doi:10.1016/S0301-0511(01)00105-3

Treiber, F., Kamarck, T., Schneiderman, N., Sheffield, D., Kapuku, G., & Taylor, T. (2003). Cardiovascular reactivity and the development of preclinical and clinical disease states. *Psychosomatic Medicine*, *65*(1), 46–62. doi:10.1097/00006842-200301000-00007

Van der Vennet, R., & Serice, S. (2012). Can coloring mandalas reduce anxiety? A replication study. *Art Therapy: Journal of the American Art Therapy Association*, *29*, 87–92. doi:10.1080/07421656.2012.680047

Whited, M., Wheat, A., & Larkin, K. (2010). The influence of forgiveness and apology on cardiovascular reactivity and recovery in response to mental stress. *Journal of Behavioral Medicine*, *33*, 293–304. doi:10.1007/s10865-010

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