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Outcomes of art therapy and coloring for professional and informal caregivers of patients in a radiation oncology unit: A mixed methods pilot study

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ABSTRACT

Purpose: Caring for cancer patients can be highly stressful for both family caregivers and oncology professionals. These high levels of stress can lead to poorer patient outcomes and increased risk of health problems for the caregivers themselves. Art therapy may help these caregivers as art-making can be a relaxing and enjoyable form of self-expression and art therapists can support individuals in expressing and processing challenging emotions. Research on art-making or art therapy with caregivers of cancer patients has shown some positive results, but its interpretation is limited by the use of multifaceted interventions.

Method: In this mixed-methods study we compared two brief arts-based approaches for both professional and informal caregivers: single sessions of coloring or open-studio art therapy, with a 45-minute session each. Assessments imcluded self-reports of affect, stress, self-efficacy, anxiety, burnout arnd creative agency alongside salivary biomarkers before and after the session. Open-ended questions, field notes and observations formed the qualitative part of the study.

Results: Thirty-four professional (n = 25) and informal (n = 9) caregivers participated. Participants in both conditions showed increases in positive affect, creative agency, and self-efficacy and decreases in negative affect, anxiety, perceived stress, and burnout. Participants in both conditions expressed enjoyment, relaxation, appreciation of time away from stressors, creative problem solving, a sense of flow, and personal and existential insight. The two approaches also elicited distinct experiences with participants reporting that they found improved focus in coloring and appreciated the support and freedom of expression in open studio art therapy.

Conclusions: These findings suggest that even brief art-making interventions can be beneficial for stressed caregivers of cancer patients. As experience with art-making increased the impact, repeated sessions may be even more useful. We recommend that oncology units have dedicated studio spaces with therapeutic support and different forms of art-making available to meet individual caregiver needs.

1. Introduction

1.1. Psychosocial needs of caregivers of patients with cancer

A cancer diagnosis can be devastating for not just the patient, but also their families. Caring for cancer patients is a particularly stressful type of caregiving for both informal caregivers such as family members (Catlin et al., 2016; Spatuzzi et al., 2017) and oncology professionals who have high rates of secondary traumatic stress and burnout (Pfaff et al., 2017; Wentzel and Brysiewicz, 2017). Family members need to deal with the emotional trauma of the potential loss of their loved one while also dealing with the stresses of treatment, any associated financial concerns, and possible additional caregiving responsibilities. Family caregiver needs, while an important part of patient and family centered care, are usually considered secondary to patient care and may be neglected in busy systems, despite the fact that addressing the

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informal caregiver's psychosocial and informational needs can improve treatment compliance and patient outcomes (Catlin et al., 2016).

Oncology professionals experience high rates of compassion fatigue due to the demands of caring for a population with substantial emotional distress, pain, and frequent deaths (Pfaff et al., 2017; Tjasink and Soosaipillai, 2019; Wentzel and Brysiewicz, 2017). This stress can include secondary traumatic stress and feelings of personal ineffectiveness particularly when staff are not taking sufficient time for self-care and recuperation (Pfaff et al., 2017; Yılmaz et al., 2018). Many oncology professionals can be reluctant to admit to these personal struggles due to cultural stigma (Tjasink and Soosaipillai, 2019) and this can result in avoidance of empathetic connection with patients, mistakes in patient care, high levels of staff turnover, health problems, and emotional distress (Pfaff et al., 2017; Wentzel and Brysiewicz, 2017).

High levels of chronic stress may increase the health risks for the oncology professionals and family caregivers themselves as chronic stress can contribute to chronic inflammation and increased risk of illness and cardiovascular disease (An et al., 2016; Park et al., 2018; Rohleder, 2019). When stress response pathways such as the hypothalamic–pituitary–adrenal (HPA)-axis are activated, molecules are released to send signals and produce responses in the body which can become maladaptive under chronic stress (Rohleder, 2019). Cortisol is the most commonly used biomarker to measure the activation of the HPA axis while other commonly studied biomarkers such as interleukin 6 (IL-6) or C-reactive protein (CRP) reflect inflammation and immune system responses (Park et al., 2018).

Interventions may help both informal and professional caregivers decrease stress, process emotional traumas, and help professional oncology teams support each other through sharing their challenges (Pfaff et al., 2017; Yılmaz et al., 2018). Current research into interventions for caregiver stress, burnout, and health is limited by highly varied interventions and small sample sizes with inconsistent results (Wentzel and Brysiewicz, 2017). Art therapy, which uses arts materials in sessions with a psychotherapeutically trained therapist, could be useful for addressing caregiver needs as the arts may allow these caregivers to “say the unsayable” and express their unmet emotional needs nonverbally before daring to state them aloud and then process these with the art therapist.

1.2. Art-based approaches for caregiver health

Providing arts-based interventions to support patients' and caregivers' psychological needs during medical treatment may decrease stress and increase compliance (Khan and Moss, 2017; Tjasink and Soosaipillai, 2019; Van Lith and Spooner, 2018). Group art making classes for family caregivers of cancer patients in active treatment have been found to help reduce stress and increase positive emotions (Lang and Lim, 2014). Family caregivers of patients in palliative experienced significantly increased positive affect and engaged in meaningful conversations about their experiences in single sessions of either narrative interviews or art therapy (Kaimal et al., 2018). While the group who engaged in narrative interviews also showed significant change in negative affect and spiritual well-being, the use of magazine images rather than photographs for collage-making may have led to more personal distance from the subject in the art therapy group. In contrast, Catlin et al. (2016) found that family caregivers were able to share more about their emotional needs when creating and processing artwork with an art therapist than they had in a verbal interview before the art session.

For hospital staff, “exposure to the arts also has a comforting effect that can offset stress associated with working in a healthcare environment, facilitate improved staff and patient interaction and rapport building, and create an encouraging hospital experience” (Khan and Moss, 2017, p. 1029). Tjasink and Soosaipillai (2019) found that six weeks of art therapy decreased emotional exhaustion and increased feelings of personal accomplishment in doctors in training. These trainee doctors expressed that they found art therapy helpful as it provided a safe space to share difficult emotions, helped them recognize signs of burnout, and offered a means to relieve stress, although they wished the hospital made it easier for them to take the time for their own therapeutic needs. The arts have also been used outside art therapy such as in a multi-pronged intervention for compassion fatigue and burnout in oncology nurses which incorporated arts experiences for relaxation and self-expression (Yılmaz et al., 2018).

Art therapists are trained in the psychotherapeutic use of art and tend to focus on supporting patients mental health through reflection, meaning making, and insight in addition to the benefits of the arts as they may be used by other professionals including promoting creative self-expression, positive feelings, relaxation, and overall well-being (Van Lith and Spooner, 2018). Claims around the stress reducing effects of coloring for adults have only recently been studied with some evidence found for coloring improving mood and lowering anxiety (Eaton and Tieber, 2017; Kaimal et al., 2017). Kaimal et al. (2017) explored the benefits of coloring in comparison to open studio art therapy with a psychotherapeutically trained therapist and found that single sessions of coloring and art therapy both showed similar reductions in perceived stress and negative affect, while open studio art therapy resulted in significantly larger increases in positive affect, self-efficacy, and creative agency.

Given the disparate designs of the few studies that incorporate art therapy or art-making in interventions for caregivers of cancer patients, it not known which aspects of these interventions are most effective. With caregivers' busy schedules, it is also important to consider if brief interventions can be helpful.

1.3. Study aims

This mixed methods study compared the effects of two brief visual arts interventions (open studio art therapy and coloring, as the active control group) for caregivers of patients undergoing radiation oncology treatment on measures of stress, anxiety, affect, self-efficacy, creative agency, and burnout. Participants included two groups of caregivers: 1) informal caregivers such as family members or friends and 2) professional healthcare providers such as nurses, therapists, and physicians. The caregivers' narrative descriptions of their experiences and the artworks themselves were analyzed for a deeper understanding of the psychosocial impact of each of these approaches on caregivers of cancer patients. While longer interventions are likely to support more lasting change (Wentzel and Brysiewicz, 2017), the relative impacts of brief independent art-making and professionally supported art therapy for this population are not known. This study could help with the development of short-term interventions for caregivers in outpatient oncology settings.

2. Methods

2.1. Participants and setting

This mixed methods study was conducted in the radiation oncology units of an urban hospital and satellite sites associated with a large university in the northeastern United States. Informed consent, data collection, and the coloring and art therapy sessions all occurred in a dedicated small side room right outside of the radiation oncology unit.

The room consisted of a desk, a small table, and several chairs and was decorated with wall art and plants (see Figs. 1 and 2). Participants were randomly assigned to receive either independent open studio art therapy or the active control coloring session and completed all scales and saliva collections immediately before and after the session.

The investigators received institutional review board approval and recruited caregivers both directly and through referrals. Recruitment procedures included publicly displayed flyers at the clinic, informational sessions in departmental meetings, referrals by other healthcare providers, and in person with researchers available on the unit and in the waiting area to explain the study to anyone interested. Recruitment was ongoing throughout the study. Inclusion criteria included being an adult (above 18 years old) and having direct patient contact as a

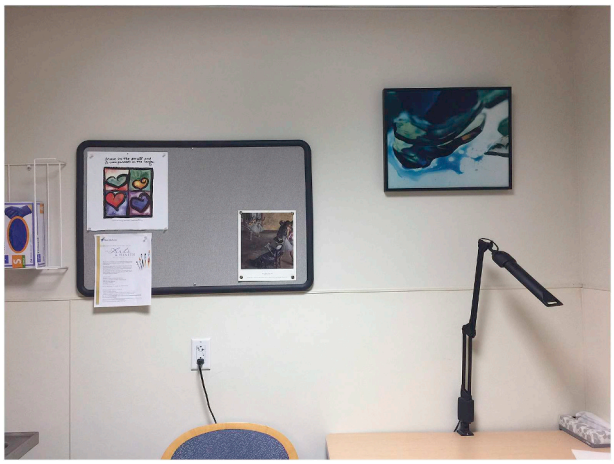

Fig. 1. Art room with desk.

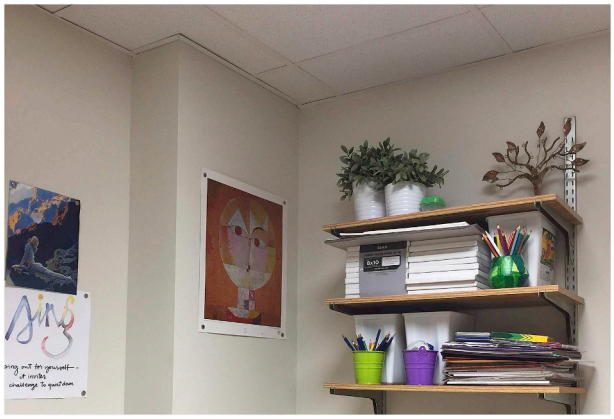

Fig. 2. Art room storage and décor.

professional or family caregiver. No prior artistic experience was required. Fifty-six caregivers inquired about participation, and of these 7 family caregivers and 15 healthcare professionals did not enroll in the study due to: 1) a lack of time and resources when balancing their own work/life with the care for a loved one for family caregivers, and 2) a lack of time or uncertain schedules for healthcare professionals. A total of 34 caregivers enrolled in the study including both healthcare professionals (25) and personal caregivers of cancer patients (9). Family caregivers included spouses (3), children of patients (3), parents of patients (2), and siblings (1). Healthcare professionals included radiation/oncology nurses (6), medical residents (2), therapists/social workers (3), staff in research positions (3), staff in directorial positions (2), and staff in other administrative and healthcare roles (9). There were 27 women and 7 men, between the ages of 22–72 years.

2.2. Assessment instruments

Before and after the intervention, the participants completed a packet with demographic information and several short measures and provided saliva samples. The saliva samples were tested for cortisol, interleukin 6 (IL-6), and C-reactive protein (CRP). The use of salivary biomarkers can be less invasive for participants in interventions and they have been shown to respond to changes in stress, although the methods are less well established and salivary levels of these biomarkers differ from the levels found in plasma (An et al., 2016; Rohleder, 2019). Cortisol is a frequently used biomarker for stress responses and has been successfully linked to change in some intervention studies, IL-6 reflects immune system response and has been shown to have a fairly consistent relationship to stress, and CRP shows a rapid response to inflammation and infection, allowing it to be another potential biomarker for immune function in a brief intervention (Park et al., 2018).

The 20-item Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) is frequently used to measure affect in research. In the general adult population, this self-report measure has been shown to have good internal consistency reliability in its two reasonably independent subscales of positive affect (Cronbach's $\alpha = 0.89$) and negative affect (Cronbach's $\alpha = 0.85$) as well as significant but distinct correlations of the subscales to depression and anxiety, supporting its convergent and divergent validity (Crawford and Henry, 2004).

The 10-item Perceived Stress Scale (PSS; Cohen et al., 1983) was used to measure the caregiver's perceptions of their level of stress in relation to their ability to cope with this stress. Studies have found it to have moderate to good convergent validity and good internal consistency reliability (Cronbach's $\alpha = 0.84$ in a sample of middle aged adults) (Taylor, 2015).

The General Self-Efficacy Scale (GSE; Schwarzer and Jerusalem, 1995) is used to measure an individual's self-perception of their ability to cope and deal effectively with stressors and challenging situations in general. This 10-item scale has high internal consistency reliability with studies finding Cronbach's α from 0.86 to 0.94 in diverse adult populations (Luszczynska et al., 2005). It has been found to have good content validity and discriminate validity given its strong correlations to self-regulation and general optimism and weaker correlations to measures of domain specific self-efficacy (Luszczynska et al., 2005).

Creative agency was assessed using a set of five questions taken from scales of Creative Self-Efficacy and Identity (Beghetto, 2006; Tierney and Farmer, 2002). This measure was developed for previous studies by several of the current authors and found to have high internal consistency reliability with a Cronbach's α of 0.90 (Kaimal et al., 2017).

To measure anxiety, we used the 4-item short version of the Patient-Reported Outcomes Measurement Information System (PROMIS®) tool for anxiety in adults. The nonproprietary PROMIS item-bank for anxiety was developed through a process of selection and testing of items from existing anxiety measures and calibrated against legacy measures with the anxiety short-form demonstrating an internal reliability of Cronbach's $\alpha = 0.93$ (Pilkonis et al., 2011).

We used the 9-item abbreviated Maslach Burnout Inventory (Maslach et al., 1986) which measures three aspects of burnout with good internal reliability in each of the subscales of emotional exhaustion (Cronbach's $\alpha = 0.83$), depersonalization (Cronbach's $\alpha = 0.85$), and personal achievement (Cronbach's $\alpha = 0.79$) as well as strong convergent and divergent validity when compared with other job related measures (Riley et al., 2018).

2.3. Procedures

After completing the informed consent, measures, and saliva collection, the participants immediately began with their randomly assigned individual coloring or open-studio art therapy session. All sessions were run by trained art therapists.

The open studio sessions merged art therapy concepts and art studio practices as described by Allen (1995, 2008). The room was prepared with a variety of art materials on display (see Kaimal et al. (2017) for further details). Participants were offered support on the use of the materials as desired and invited to use any or all of the art materials without any specific directions. The art therapist informed the participants that there were no expectations and that their art was not going to be judged for artistic quality. The art therapist made art alongside the participant, offered guidance on the art making process, invited participants to interact, and followed the participant's lead in engaging in verbal interaction. The participants were given 45 min to make art and told when there were 5 min remaining. The art therapist then verbally processed the artwork with the participant giving them an opportunity to discuss their work and reflect on the process.

Table 1
Model-based Means and Effect Sizes by Measure.

	Open Studio Art		Coloring		Time Main effect	Time by Condition effect
	N	Mean (SE)	N	Mean (SE)	*F*(df)	*F*(df)
Creative Agency						
Pre-intervention	19	16.95 (0.74)	15	18.80 (0.84)	16.46 (1, 32)	0.24 (1, 32)
Post-intervention	19	18.47 (0.85)	15	20.00 (0.95)	$p < .001$	$p = .631$
				Effect Size:	$\eta_p^{b} = 0.34$	$\eta_p^{b} = 0.007$
Self-efficacy						
Pre-intervention	19	32.84 (0.86)	15	34.00 (0.97)	6.60 (1, 32)	0.01 (1, 32)
Post-intervention	19	34.16 (0.95)	15	35.4 (1.07)	$p = .015$	$p = .937$
				Effect Size:	$\eta_p^{b} = 0.171$	$\eta_p^{b} = 0.000$
Positive Affect[a]						
Pre-intervention	19	34.53 (1.25)	14	37.86(1.45)	26.85 (1, 31)	1.34 (1, 31)
Post-intervention	19	38.58 (1.50)	14	40.43 (1.74)	$p < .001$	$p = .255$
				Effect Size:	$\eta_p^{b} = 0.464$	$\eta_p^{b} = 0.042$
Negative Affect[a]						
Pre-intervention	19	16.05 (1.41)	14	17.21(1.33)	16.37 (1, 31)	0.09 (1, 31)
Post-intervention	19	13.11 (0.702)	14	13.79 (0.82)	$p < .001$	$p = .762$
				Effect Size:	$\eta_p^{b} = 0.346$	$\eta_p^{b} = 0.003$
Perceived Stress[a]						
Pre-intervention	19	26.05 (0.87)	14	25.86 (1.02)	18.84 (1, 31)	0.70 (1, 31)
Post-intervention	19	24.32 (0.82)	14	22.57 (0.95)	$p < .001$	$p = .410$
				Effect Size:	$\eta_p^{b} = 0.378$	$\eta_p^{b} = 0.022$
Anxiety[a]						
Pre-intervention	19	9.53 (0.58)	14	9.21 (0.67)	11.51 (1, 31)	0.02 (1, 31)
Post-intervention	19	8.21 (0.55)	14	7.79 (0.64)	$p = .002$	$p = .890$
				Effect Size:	$\eta_p^{b} = 0.271$	$\eta_p^{b} = 0.001$
Burnout						
Pre-intervention	13	21.62 (1.92)	10	21.20 (2.19)	4.75 (1, 21)	0.09 (1, 21)
Post-intervention	13	20.85 (2.04)	10	19.50 (2.33)	$p = .041$	$p = .769$
				Effect Size:	$\eta_p^{b} = 0.184$	$\eta_p^{b} = 0.004$
Cortisol[b]						
Pre-intervention	18	0.41 (0.17)	14	0.20 (0.19)	0.01 (1, 30)	1.38(1, 30)
Post-intervention	18	0.30 (0.17)	14	0.32 (0.19)	$p = .944$	$p = .250$
				Effect Size:	$\eta_p^{b} = 0.000$	$\eta_p^{b} = 0.044$
IL-6[a,b]						
Pre-intervention	13	1.21 (0.25)	14	1.57 (0.24)	0.16 (1, 25)	0.668 (1, 25)
Post-intervention	13	1.14 (0.29)	14	1.77 (0.28)	$p = .689$	$p = .421$
				Effect Size:	$\eta_p^{b} = 0.007$	$\eta_p^{b} = 0.026$
CRP[b]						
Pre-intervention	14	0.09 (0.27)	13	0.84 (0.28)	0.27 (1, 25)	1.55 (1, 25)
Post-intervention	14	0.00 (0.33)	13	1.07(0.34)	$p = .609$	$p = .225$
				Effect Size:	$\eta_p^{b} = 0.011$	$\eta_p^{b} = 0.058$

Notes.
[a] Outlier case dropped in order to meet normality assumption.
[b] Natural Log transformed, partial η^{b} explains the variance in the outcome explained by the effect after removing other effects (like a partial correlation coefficient). partial $\eta^{b} > .20$ is considered a large to very large effect size.

For the coloring sessions, participants chose a coloring page from a provided package and were left with markers, colored pencils, and a pencil sharpener. They were told that the researcher would be just outside the door or quietly sitting to the side without interacting and participants could choose to close the door or leave it open. Participants colored for 45 min and were alerted when there were 5 min left.

After either condition, the participants repeated the self-report measures and subsequently provided a second saliva sample. With the permission of the participants, the researchers took digital photographs of the art pieces. Participants were given the choice to take their art work, completed or not, with them. Following the sessions, researchers took field notes and recorded all the happenings, including verbalizations, themes, and observations. These were imported alongside the digital pictures into an encrypted Onedrive file server shared by the research team. The data were entered by one member of the research team into SPSS and cross checked by a second member prior to analysis.

2.4. Quantitative data analysis

Statistical analyses were performed using SPSS (version 24.0, Armonk, NY: IBM Corp.). To test the comparative effects of the two brief arts-based interventions (open art studio versus the coloring control) we conducted a 2×2 repeated measures factorial ANOVA (between-subjects condition: open studio art versus coloring; within-subjects condition: time/pre versus post-intervention). The main effect of time (ie, the within-subjects condition) was examined to show whether there were changes overall from pre to post intervention, regardless of condition. The interaction effect of condition by time was examined to show if the changes from pre-to post-intervention varied by condition. Assumptions of normality and homogeneity of variance of the model were determined by examining the histograms and Q-Q plots of the standardized residuals and Levene's test, respectively. Influential outliers were detected using plots of Cook's distance. One extreme outlier was detected for the anxiety, stress, positive, and negative affect outcomes and was removed from the distribution in order to meet the model normality assumptions. The biomarker distributions, cortisol, IL-6, and C-reactive protein (CRP), all displayed extreme positive skew. Natural log transformations were performed to aid with correcting this. To correct for family-wise error in the conduct of multiple tests, we utilized a Bonferroni adjustment for the 9 outcomes, which set the alpha at a conservative 0.006. Post hoc sensitivity analyses using repeated measures ANOVA were conducted to determine how experience level impacted the results of the primary aims.

2.5. Qualitative data analysis of artwork and narrative responses

The qualitative data, field notes and open-ended survey questions, were consolidated for each participant separately and imported into the software program Dedoose for data management and analysis. The data were analyzed according to Braun and Clark's (2012) thematic analysis approach, which includes the following six steps: (a) familiarize with the data, (b) generate initial codes, (c) search for themes, (d) review potential themes, (e) define and name themes, and (f) complete the final report. This thematic analysis was driven by a framework based on the literature and the hypotheses guiding the study, from which an a priori coding guide was established (Braun and Clarke, 2012). Additional codes were added following a thorough examination of the complete dataset. Two researchers independently coded the data and identified preliminary themes by clustering the codes based on similarities or overlap. The two researchers then compared and reviewed their preliminary themes, and separately reexamined the data to better define the themes and identify representative quotes. This was followed by further cross-checking and researcher triangulation to ensure credibility (Lincoln and Guba, 1985).

3. Results

3.1. Quantitative results

Caregivers in both interventions demonstrated improvements across all psychological outcomes. Effect sizes for the main effect of time (pre to post-intervention) ranged from large ($\eta_p^2 = 0.171$) for self-efficacy to very large ($\eta_p^2 = 0.464$) for positive affect (see estimated marginal means in Table 1). After the Bonferroni correction, however, the changes in self-efficacy ($p = .015$) and burnout ($p = .041$) did not reach the established adjusted p-value cut-off of 0.006. A time by condition interaction effect was tested to determine if there were group differences in pre-to -post-intervention changes; however, no differences in change between intervention types emerged (all $ps > .255$). On average, the coloring and open art studio conditions were equally effective in improving mood, anxiety, stress, caregiver burnout, self-efficacy, and creative agency for this sample of caregivers.

The main effect of time (pre to post-intervention) was also examined for change in salivary biomarkers, (cortisol, IL-6, and CRP) pre- and post-intervention. There was no evidence of change in any of the biomarkers we measured (time effect p's > 0.609); nor were there any group differences in change (time by condition interaction effect p's $> .225$). All effect sizes were minimal to small.

In order to determine whether the results were impacted by the participants' level of experience with artmaking (coded 1 to represent: *Some or Extensive*, and coded 0 to represent: *None or Limited*), we performed a sensitivity analysis. Since condition had no effect on the outcomes in the primary analyses, we replaced the between-groups factor (open art versus coloring) with the experience variable. No differences were found in the analyses with stress, anxiety, or positive affect outcomes. Experience did however impact the change in negative affect. Those without experience in artmaking actually demonstrated slightly higher negative affect on average after the intervention (a non-significant change) while those with experience in artmaking improved significantly (i.e., there was an experience by time interaction effect $\eta_p^2 = 0.155$; $p = .024$). In addition, experience had a small non-significant impact on the change in self-efficacy and creative agency ($p = .132$, $p = .180$, respectively). Again, individuals reporting experience in artmaking tended to benefit more than individuals with none. For burnout, once experience was added into the model, the effect of time was slightly reduced to a medium effect size and a statistically non-significant p-value ($\eta_p^2 = 0.140$; $p = .087$). Sensitivity analyses are not reported for the biomarker data given that the interventions made no evident changes in these variables in the primary analyses conducted.

3.2. Qualitative results

The qualitative analysis indicates that there were common themes across both conditions (open studio and coloring) as well as nuances of participant experiences that were unique to each condition. The common themes mirror many of the findings seen in the results of the six quantitative measures: *improved affect, decreased anxiety and stress, reduced caregiver burnout, improved self-efficacy,* and *improved creative agency* were in concurrence with qualitative findings. The qualitative data suggest that both coloring and open studio conditions improved affect in the participants. Feelings of pleasure and enjoyment were voiced throughout:

> *"It was really fun … I'm excited to go home and pull out paper and pastels and get to work." "Very enjoyable. Takes my mind off stress and allows creativity." "It was fun. It provided a release from my daily routine.*
>
> -Open Studio Condition

> *"Great! Relaxing & relieving to relay feelings in art. I used to do it all the time, haven't done much so that was refreshing." "This was fun – I used to do this sometimes, it's nice to get back into it." "It was really relaxing and fun. The time flew by and I'm glad I did this today."*
>
> -Coloring Condition

While many participants expressed feeling nervous initially, they used the art process, whether it was coloring or open studio art therapy, to relax and calm themselves down. This aligned with the findings that both conditions resulted in reduced anxiety and stress.

> *"It was relieving in a way – I was able to focus on pictures of things that I like and enjoy. That made me feel peaceful." "Relaxing; for 30 minutes, I was able to forget about everything and just focus on art." "Very calming and took all the environmental distractions away."*
>
> -Open Studio Condition

> *"There were several points in the beginning of the process that were stressful – 'what supplies would look good?' – 'what do I do?' – 'how do I make this perfect?' – but after realizing that those questions didn't matter – it was really relaxing and fun. The time flew by and I'm glad I did this today." "It was extremely relaxing. It helped pass the time and mostly gave me something to focus on other than the time and my surroundings."*
>
> -Coloring Condition

Taking time out of their busy schedules to engage in art was helping participants to focus on something other than their caregiving. This sentiment was voiced in both the coloring condition and art therapy session and aligns with the quantitative findings in reduced caregiver burnout.

> *"It was the first hour that I had in a long time where I did not have to talk or think about my husband's sickness and just be in the moment." "Thank you for not asking me to create a picture of my feeling. If I was going to paint my feelings, there would torn paper all over the floor."* "[Art making] helped me to get my mind off things for a while; I'm dealing with a lot of stress between work, school, and family."**
>
> -Open studio condition

> *"I was able to focus on coloring and not think of work or family life or the long list of things on my "to-do" list for today." I am always on the go*

and interacting with patients but this session helped me take a step back and organize my day."

-Coloring Condition

Over the course of the art making sessions, participants tried new things, took risks and made decisions. We noted a common sentiment of competence, self-efficacy, and creative agency, an individual's perception of his or her own ability to generate creative solutions. These findings mirror the quantitative findings of significant improvements in creative agency and self-efficacy:

"I feel more confident." "It was exciting to see what I was creating come to life." "I haven't used pastels in years, and I didn't know that oil pastels could be used with water! Really enjoyed experimenting with watercolor pastels and watercolor pencils (never knew they existed). Using familiar art tools in a new way energized me."

-Open studio condition

"A little intimidating at first, out of comfort zone … But then I felt determined to fill in the picture." "I thought of a 4-color theorem from mathematics. It's basically a theorem that says, with 4 colors any map can be colored without 2 of the same colors touching. I liked the problem-solving aspect of trying to color without having two of the same colors border each other."

-Coloring Condition

Aside from the themes concurring with the quantitative results, two additional themes emerged that were common to both conditions: *feeling a sense of flow,* and *personal and existential insights*. Participants further expressed a desire to continue to make art in the future.

Experiences of flow, an effortless and highly focused state (Csikszentmihalyi, 1996, p. 110), were described by participants in both conditions. In particular, participants expressed losing track of time while engaging in coloring or art making.

"I thought it would only take me 5 minutes to paint. It took a lot longer than I thought! I lost track of time while painting." "I was to forget about everything and just focus on art."

-Open Studio Condition

"I was so engrossed in my coloring." "Very relaxing; took my mind away."

-Coloring Condition

Many participants shared experiences of learning about new aspects of the self and existential insights through identification of thoughts, feelings, and personal qualities following art making or coloring. Furthermore, participants often reflected on the meanings of their artwork. Existential themes were frequently related to symbolism in the artwork in the open studio condition. Some participants in the coloring condition expressed meaning through specific colors and coloring sheet designs (mandala, geometric design, etc.)

*"A storm. Things can be gloomy, or things can be a disaster. Then some days it's sunny and we have great days together. A picture of our support system." "Gave me opportunity to reflect on both past and present life. Also looked to future." "I created a tree based on my fear of how we are destroying nature and our world." **

-Open Studio Condition

"I colored a picture with the slogan "today is going to awesome." It's a positive message for my day. The message 'spoke' to me. It felt good to spend time focusing on something creative and not work-related."

-Coloring Condition

Participants shared about finding meaning in both color selection and placement on the coloring sheet:

"My coloring sheet represents a fight between dark and light". "Colors represent different things; I'm glad used light, bright colors because dark colors are gloomy."* "There is beauty in everything, even in struggle. You just have to find it."*

The two conditions also drew responses that were unique to each. The themes that emerged from the studio condition were a *freedom of expression* and *beneficial guidance and support.* In contrast, participants frequently noted an *improved focus* in response to the coloring condition.

Participants shared a sense of freedom to express thoughts and feelings through art making during the open studio condition:

"I feel empowered by my choices and I found a sense of freedom while working that I have not experienced in some time… I also felt like I could express myself more freely." "Felt good and allowed me freedom to put some of my beliefs on paper."

The facilitation of open studio sessions by a trained art therapist was experienced as supportive, particularly for participants that were initially anxious to engage in art making.

"Well … I used the time to have a much-appreciated art lesson from (therapist researcher), so my 'work of art' is really little experiments in trying out new techniques. So much fun!" "I found it stressful in the beginning but with guidance I enjoyed the process … It was nice to have some help being creative."

Coloring was found to promote focus in several participants who also described it as a form of distraction from everyday worries.

"It was an exercise in focus and exploration. As I was looking at the coloring pattern, I found myself thinking almost exclusively about what was in front of me. It was a respite from the normal train of thoughts that occupy my mind"

(See Figs. 3-6).

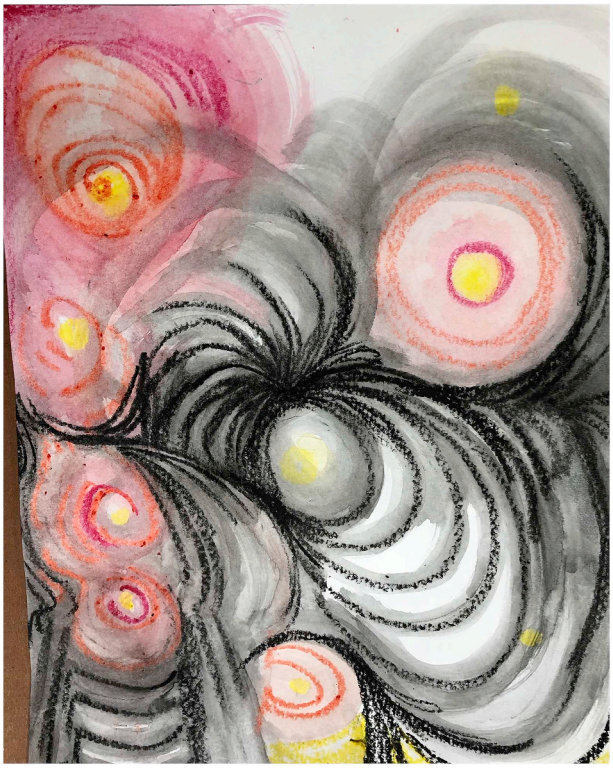

Fig. 3. Open studio drawing.

Fig. 4. Coloring sheet.

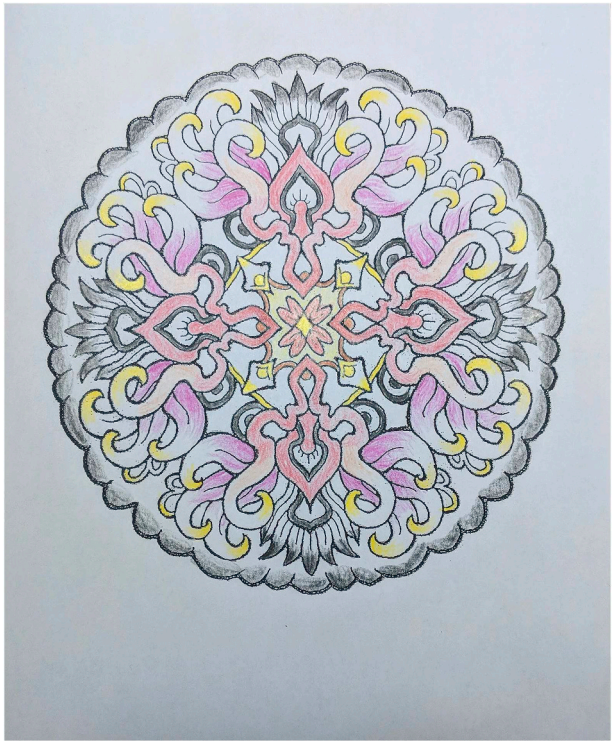

Fig. 5. Coloring sheet.

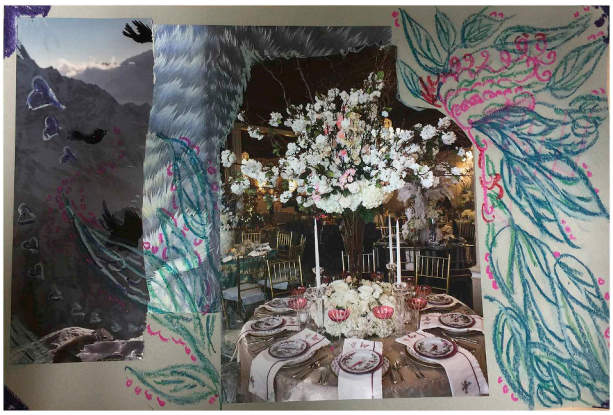

Fig. 6. Open studio mixed media artwork.

4. Discussion

In this study we examined the differences in outcomes between two visual expressive conditions (coloring and open studio art therapy) for caregivers of patients undergoing radiation oncology treatment. Caregivers in this exploratory study included both healthcare providers and family members providing care to the patient, all of whom face high levels of chronic stress although their specific emotional burdens differ due to the caregiving occurring in their personal or professional roles. The findings replicate many of the results from our previous studies with healthy adults (Kaimal et al., 2017) but also highlight some of the unique considerations for caregivers of patients with cancer. Unlike our previous studies in which coloring resulted in fewer positive effects for healthy adults, in this study we found that both visual expression conditions resulted in improved outcomes. It is of note that despite the small sample size both conditions resulted in significant improvement in symptoms of stress, anxiety, mood, and creative agency in a single 45-min intervention. This suggests that even brief visual arts interventions in a dedicated studio space could significantly enhance well-being for caregivers. It appears that in these chronically stressed populations, the quiet reflective time provided in the studio was a possible respite from the stresses of caregiving. Both arts approaches could be simulating aspects of mindfulness interventions in bringing the participants' focus onto the “present moment” in a space and activity separate from their caregiving worries and concerns. Art-making could therefore be seen as an effective distraction or self-care technique to shift caregivers’ attention away from their worries for sufficiently long to reduce their stress and change their affect. It might then be unsurprising for both groups to show a similar benefit due to the consistent length of time, space, and focus on creating artwork with their hands. In the absence of a dedicated space or the context of the study, the outcomes may have been different. For example, coloring sheets are often left out in the waiting areas but not seen to be used by the patients or caregivers.

Improvements to the participant's perception of their abilities to handle stressors can be quite useful for caregivers who will be returning to a stressful situation (note – though the improvements were not statistically significant for all outcomes after a conservative *p*-value adjustment for multiple comparisons, they were impressive in effect size). The changes in the Perceived Stress Scale and General Self-Efficacy Scale suggest that time away from the stressor successfully making art may have supported caregivers in feeling more capable or emotionally ready to handle the next stressor. Improved affect and decreased feelings of burnout may similarly improve patient care as caregivers who are feeling less distressed and in a more positive mood might be better equipped to be emotionally present and engaged in their interactions with the cancer patients. The qualitative descriptions suggest that the increased sense of agency paralleled a transformative process in the art-

making itself, from “an initial struggle to a later resolution” (Kaimal et al., 2016, p. 78).

The qualitative findings supported the quantitative results with participants describing improvements in affect, relaxation, sense of agency, self-efficacy and burnout. The qualitative findings furthermore highlighted some nuanced differences between the conditions that were not readily evident in the quantitative findings. For example, participants reported more personal meaning, freedom of expression and recognition of support from their experiences in the open studio conditions compared with the coloring conditions. In contrast, participants in the coloring condition reported being able to focus and concentrate more. Additionally, participants in both conditions experienced a highly focused state of flow. *Flow* (Csikszentmihalyi, 1996, p. 110) encompasses an enhanced state of focus that achieves a balance between the challenges and skills required for a task. Participants in both conditions responded to initial challenges in art making with creative solutions, improving self-efficacy. This indicates the potential benefit of application of either of these approaches depending on individual need, paralleling the overlapping but distinct aims reported by art therapists and artists-in-healthcare (Van Lith and Spooner, 2018). Having a dedicated studio space in a radiation oncology unit is recommended as it can provide a convenient space away from caregiving demands, and be arranged with materials on hand and artwork on the walls, which itself provides inspiration and has been found to be a pleasant distraction and support relaxation and positive emotions (Fang et al., 2012).

Lastly, unlike in previous studies where we found no impact of prior experience (Kaimal et al., 2016), here we found that a few outcomes (negative affect, creative agency and self-efficacy) tended to be slightly better for participants with some experience with artmaking. Note that we were not referring to perceived skills, only whether they had any prior experience. The implication here could be that longer term and additional sessions of art therapy based interventions could result cumulatively in better outcomes. For caregivers under chronic stress, the prior experience might have brought a level of ease and confidence to participation which resulted in different outcomes compared to relatively healthier adults (Kaimal et al., 2016) where prior experience did not impact results. It may also be the case that a longer-term intervention would result in a greater distinction between the two approaches as repeated sessions would not only build experience with artmaking but also allow participants to build rapport with the art therapist. Increased rapport may make participants in open-studio art therapy more willing to share and lead to deeper and more meaningful and lasting personal and existential insights along with more accurate reflection by the art therapist as the therapist becomes more familiar with the participant. This same process might not be expected in the self-directed coloring condition, such that the level of insight and psychosocial growth would not be expected to increase in the same way although coloring could continue to support improved affect, self-efficacy, creative agency, and decreased stress and burnout immediately after each session.

There are many limitations with this study including a small sample size and, within that, a smaller proportion of family caregivers compared to healthcare providers. This is an ongoing challenge in the field since family caregivers are often focused on the patient and unavailable and unwilling to take time for themselves (Walsh et al., 2007) and professionals may have long hours and feel pressured to keep working and not admit to their own needs (Tjasink and Soosaipillai, 2019). In a study of caregiver recruitment, Morrison et al. (2014) spent an average over $160 per person to recruit caregivers into a study. While combining family and professional caregivers into one group in our study increased the overall sample size, it must be noted that the two types of caregivers have very different emotional burdens and this may have hidden important distinctions between the groups. Future studies should investigate the distinct needs and impacts of arts-based interventions on each of these two groups.

This study was further limited by the lack of a no-art control condition. Coloring was initially conceived of as an active control condition for open studio art therapy, however given that the caregivers responded to both arts-based interventions, the lack of a no art control group leaves open the possibility that participants responded more favorably after the intervention simply due to receiving attention from the researchers. In addition, the findings reported here are based on a brief intervention and the longer term sustained impact of these short-term improvements in outcomes is not known. The qualitative theme of personal and existential insights was not reflected in the quantitative findings because there was no quantitative instrument that captured meaning making or spiritual well-being. One of the recommendations for future research is thus to include such a measure. For example, the Meaning in Life Questionnaire (Steger et al., 2006) may be well suited for caregivers.

The salivary biomarker data suffered from an even smaller sample size due to problems with the data collection for several of the participants who did not generate enough saliva to enable analysis; thus, little could be determined from these results. Further studies with a larger sample are necessary to determine if change might occur in caregiver's biomarkers after art therapy as we had observed in a general adult population (Kaimal et al., 2016). Some participants had particular difficulty producing sufficient saliva prior to the session, potentially related to high initial levels of stress as stress can decrease saliva production (Slavish et al., 2015). Moreover there are some debates around the use of saliva as a source of reliable data on inflammatory markers as salivary biomarkers do not tend to correlate with or respond in the same time frame as blood serum levels, making this more difficult to interpret than more commonly used blood serum levels (Rohleder, 2019; Slavish et al., 2015). Differences in salivary flow-rate can itself change concentrations of biomarkers in the saliva (Slavish et al., 2015), potentially complicating the interpretation of the biomarkers in this study given the number of participants with difficulties with saliva production or changes in the flow rate after the session. While the effects sizes on the self-report measures are promising in that they were medium to large in magnitude, replication is needed given the limited number of study participants leading to imprecise estimates. As an exploratory study, this study examined a large number of outcomes to better understand the relevant outcomes for this population, however further studies may benefit from a focus on a smaller number of outcomes for statistical analyses.

5. Conclusions

This exploratory study examined outcomes of two visual expressive conditions in a dedicated studio space in a radiation oncology unit in a large urban hospital. The findings indicate that even a brief single session intervention could result in significant improvements in measures of affect, anxiety, stress, burnout self-efficacy and creative agency, although this should be replicated in a larger study with further investigation into the differences between family and professional caregivers due to their distinct emotional burdens. Participants with prior artmaking experience (not skill) were found, generally, to benefit more indicating potentially improved outcomes with sustained practice and longer interventions. Further research is needed to determine the long-term outcomes and apt dosage to support the health and well-being of caregivers under conditions of chronic stress.

Declarations of interest

None declared.

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