Child Psychiatry & Human Development
https://doi.org/10.1007/s10578-024-01766-3

RESEARCH

The Impact of a Creativity Camp Intervention on Depression and Well-Being in Adolescents

Kathryn R. Cullen[1,2] · Michaelle E. DiMaggio-Potter[1,2,10] · Bonnie Klimes-Dougan[2,3] · Gail A. Bernstein[1,2] · Wilma Koutstaal[3] · Kristina Reigstad[1,2] · Laura E. Padilla[1,2,5] · Bryon A. Mueller[1] · Peng Wu[4] · David Schneck[2] · Eyerusalem Abebaw[1,2,5] · Mark B. Fiecas[2,6] · Abimbola Asojo[7] · Angie Mejia[2,11] · Boris Oicherman[9] · Yuko Taniguchi[8]

Accepted: 23 September 2024

Abstract

Depression is a serious public health problem that often emerges during adolescence. Many adolescents do not respond to standard treatments, necessitating the development of novel interventions. We conducted a preliminary study to assess the impact of a novel creative arts intervention on depression and well-being in adolescents. In this quasi-experimental study, 69 adolescents 12–17 years completed an 8-day "Creativity Camp" intervention encompassing multiple creative activities. Self-report questionnaires to measure depression, anxiety, and well-being were administered at five time points to allow examination of change across multiple temporal segments: the 2 weeks before the intervention, the 2 weeks during the intervention, the 2 weeks after the intervention, and the 6 months after the intervention. Adolescents were assigned to one of two groups to compare changes observed during the 2 week before-intervention period (Group A) to the changes observed during the intervention period (pre-post intervention) (Group B). According to both parent and child reports, pre-to-post-intervention, mean adolescent depressive symptoms significantly decreased, and these changes were sustained 2 weeks after the intervention and (according to parents) at the 6-month follow-up. There was preliminary evidence for improved well-being at post-intervention. Comparison of Group A's changes during the before-intervention period to Group B's changes pre-post intervention was significant for parent-reported depression. Preliminary evidence suggests that the Creativity Camp intervention may positively impact adolescent depression and well-being. This evidence highlights the importance of investigating and implementing treatment approaches focusing on creative arts for adolescents with depression.

Keywords Depression · Creativity · Adolescence · Treatment interventions · Arts in Health

✉ Kathryn R. Cullen
rega0026@umn.edu

[1] Department of Psychiatry and Behavioral Sciences, Medical School, University of Minnesota (UMN), Minneapolis, USA

[2] Masonic Institute for the Developing Brain, UMN, 2025 East River Parkway, Minneapolis, MN 55414, USA

[3] Department of Psychology, College of Liberal Arts, UMN, Minneapolis, USA

[4] St. Olaf College, Northfield, Minnesota, USA

[5] Department of Neuroscience, Medical School, UMN, Minneapolis, USA

[6] Division of Biostatistics and Health Data Science, School of Public Health, UMN, Minneapolis, USA

[7] School of Architecture and Planning, Morgan State University, Baltimore, USA

[8] Center for Learning Innovation, UMN–Rochester, Rochester, Minnesota, USA

[9] Hybrid Arts, Cleveland, United States

[10] Department of Psychology, University of Michigan, Ann Arbor, Michigan, United States

[11] Research in Action, Minneapolis, Minnesota, United States

Published online: 16 October 2024

Introduction

Adolescent depression is a serious and growing public health problem. While evidence-based treatments such as antidepressant medications and cognitive-behavioral therapy are helpful for some adolescents, many either do not respond [1], relapse [2], or demonstrate poor compliance to treatment [3]. Standard treatments focus on alleviating symptoms rather than promoting strengths, such as flexibility and resilience in facing life's challenges [4]. Adolescents with depression often develop increasingly inflexible, narrow, negative, and "stuck" ways of feeling and views of themselves and the world [5]. Novel strategies are needed to break through these patterns, to inspire adolescents and facilitate more growth-oriented modes of thinking and feeling.

A growing body of literature supports the idea that engaging in the arts—which includes both the creation of art by the individual and participating / interacting with art created by another person—can have positive effects on health and well-being [6, 7]. Prior work has suggested that infusing arts activities into standard mental health care [8, 9] and education settings [10] provide an opportunity for youth to see new aspects of themselves, build a sense of interpersonal connection, and promote resilience. In particular, youth have advocated for more arts-based approaches in mental health treatment to promote healing and growth [11].

To better understand the impact of engaging in creative activities on mental health and well-being for adolescents with depression, we designed Creativity Camp, a 2-week summer day-camp program, as a potential tool to improve depression and promote well-being in youth in a non-medical setting. The curriculum was designed to break through "stuck" patterns of depression symptoms—including low mood, anhedonia, rigid thinking, negative self-views and isolation—by creating a fun and enjoyable experience that introduces adolescents to novel and varied activities and promotes deep creative engagement through self-reflection and discovery in a welcoming group setting. Requiring no prior arts experience, the curriculum aimed to facilitate authentic and meaningful expression. Since individuals vary in how they respond to different types of creative activities, and to increase the chances of engaging all adolescent participants, the multi-pronged curriculum integrated varying creative activities. Key components of curriculum activities included that they: (1) introduced a novel concept which feels new, surprising, and fresh to the participants; (2) fostered a process of self-inquiry and authentic self-expression; (3) contained opportunities for participants to be open to new ideas while also allowing discovery and practice of skills and strengths they already possessed; (4) included prompts designed to invoke curiosity and wonder, inviting participants to explore meaningful questions; (5) encouraged participants to bypass self-judgment, focusing on what feels true to them; (6) encouraged participants to be bold and fiercely go in a direction they haven't gone before; (7) required play by providing opportunities that inspire participants to explore; (8) required participants to use their imagination; (9) included the opportunity for participants to share their creations and explain their meaning to others; and (10) ensured that at least some of the process was enjoyable and fun.

As opposed to art therapy, which is provided to patients by certified art therapists in clinical settings, Creativity Camp was delivered by professional artists in a non-medical setting (a summer camp format). This kind of approach has several advantages. First, by shifting the focus from symptom relief to learning and developing as an artist, Creativity Camp's growth-oriented approach may have appeal for teens who are resistant to traditional therapeutic offerings. Second, professional artists provided inspiration by sharing their own journey as an artist, using their expertise to provide hands-on guidance and encouraging teens to elaborate and stretch their ideas. Third, the summer camp format provided a space for fun and learning during the school-free months.

Using a quasi-experimental design, we evaluated the impact of Creativity Camp on mental health and well-being in adolescents with depression symptoms. All hypotheses were pre-registered in the Center for Open Science (https://osf.io/ecwrb). We predicted that participating in Creativity Camp would be associated with (1) a decrease in symptoms of depression, and (2) increases in measures of well-being. We predicted that these patterns would be evident when comparing the entire group's measures taken directly after the intervention to those taken directly before the intervention, and when comparing change observed pre-to-post intervention in half the sample to the change observed during the 2 weeks before the intervention in the other half (e.g., in an active versus waitlist comparison.)

Method

Overview and Experimental Design

We invited adolescents with depression symptoms to enroll in a series of cohorts of a 2-week Creativity Camp intervention in the summers of 2022 and 2023. The University of Minnesota Institutional Review Board approved the study. The study design is shown in Fig. 1. All adolescents enrolled in the study were invited to participate in the intervention, and analyses compared changes across several time

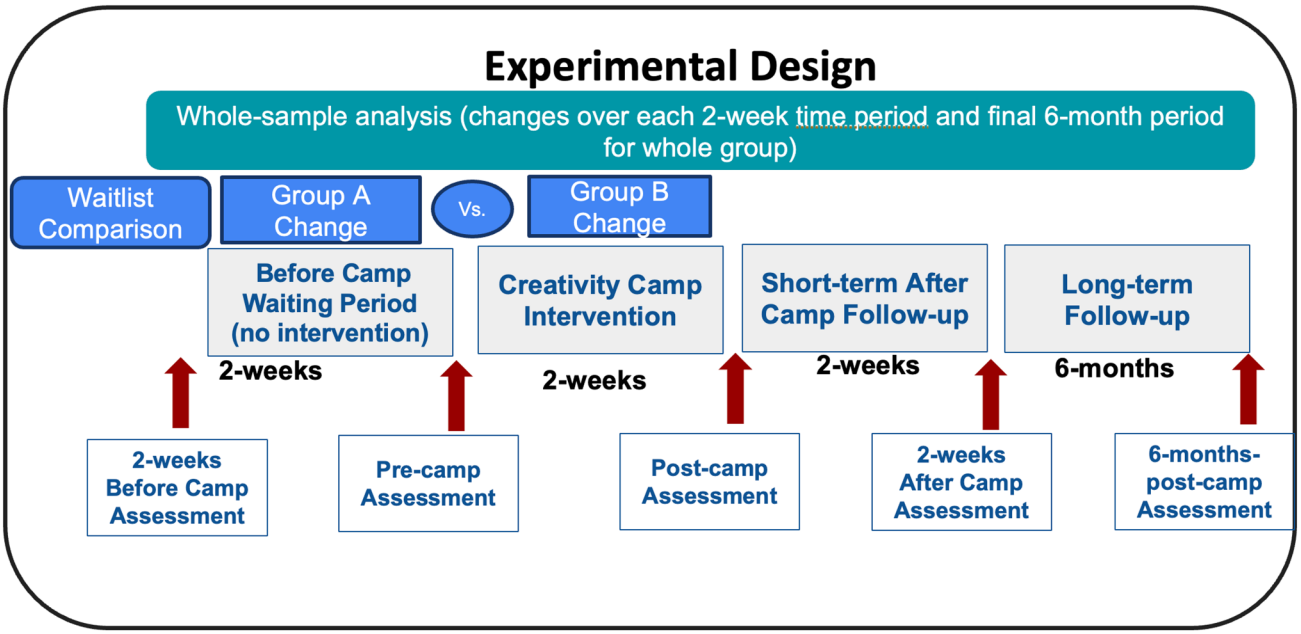

Fig. 1 The study design is shown, including the timing of assessments. In 2022, only Group A completed the 2-weeks-pre-intervention assessment, and only group B completed the 2-weeks-post-intervention assessment. In 2023, all participants completed all assessments.

segments: (1) the 2 weeks before the intervention, (2) before and after the 2-week intervention; (3) the 2 weeks after the intervention, and (4) the 6 months after the intervention. Furthermore, to allow a "waitlist versus active treatment" comparison in our analyses, participants were randomly assigned (1:1 allocation) to either Group A, for whom the "waitlist comparison" analyses would focus on changes in the 2 weeks before the intervention, or to Group B, for whom these analyses would focus on pre-to-post-intervention changes. The protocol in summer 2022 involved more expansive assessments, including brain imaging and cognitive testing (which are not reported on here); to reduce participant burden, for that summer only, adolescents were only expected to complete either the 2-weeks-pre-intervention visit or the 2-weeks-post-intervention visit. However, if a participant was assigned to a group that did not fit with their schedule (e.g., family vacations or other obligations interfered with completing the assigned assessments for that group), we allowed group switching. The Summer 2023 protocol had fewer assessments (e.g. no brain imaging), so all participants were expected to complete all four visits, and group switching did not occur. Since we could not adhere to randomization in all cases, the study design can most aptly be described as quasi-experimental.

Study Population

We recruited adolescents with current depression symptoms by connecting with community schools and community centers, posting flyers, distributing postcards to clinicians, and posting on social media. Inclusion criteria were age 12–17 years and depression symptom severity as measured by the Parent version of the Child Depression Inventory-2 (CDI 2) score ≥ 12 at the time of screening. Exclusion criteria were: history of a neurodevelopmental disorder such as intellectual disability or moderate/severe autism, as indicated by parent report; a primary psychotic disorder; a current substance use disorder; significant medical conditions that would interfere with participating in study activities; current active suicidal ideation and inability to agree to an appropriate safety plan; and (2022 only) magnetic resonance imaging (MRI) contraindications (e.g., claustrophobia, braces, pregnancy) and/or a history of significant neurological conditions that might confound MRI analyses.

Intervention

We implemented the 8-day Creativity Camp intervention for six summer cohorts (7–14 participants each). Rather than seeking to develop mastery in a particular art form, the objective of the Creativity Camp was to help adolescents tap into their creative potential. The curriculum consisted of various reflective, imaginative, and exploratory activities along the theme of "The World Inside You," (see Supplementary Materials, Figure S1 and Table S3), inviting the participants to "travel" to their inner and outer worlds, always taking a new direction. On this journey, adolescents

used their own stories to extract themes and create art, discovering their unique traits, interests, and imaginations along the way. The curriculum introduced topics with a creative twist, invoking a surprise that sparks both creative thinking and enjoyment.

A key aspect of Creativity Camp is that it was held in a non-clinical setting and implemented by non-medical leads. Professional artists served to inspire teenagers and encouraged them to elaborate and stretch their creative ideas. These artist leads met participants where they were, allowing their own pace while also inviting them to explore new directions, treating the participants as fellow artists with the understanding that authentic expression is a vulnerable and courageous act. Artist-leads were supported by research staff and undergraduate volunteers who served as near-peer mentors. Together, the team of instructors encouraged participants to tap into their imagination, to think deeper, and to set their judgments aside. Instructors worked toward facilitating a space that would feel welcoming, encouraging the youth to join in and to feel safe and comfortable enough to allow free expression. During open studio time, team members individually engaged teens in creative conversations to help them bypass negativity, judgment, and doubts. Additional details regarding the approach taken by program leads are provided in Supplementary Materials Table S6.

The group format of Creativity Camp was selected because group settings can provide adolescents with opportunities for both social connection and learning. In the program, adolescents listened to their peers' ideas as they discuss each other's creations, what they learned through their efforts, and what their next steps might be. Exposure to such ideas – especially after generating one's own – can stimulate new ways of thinking and looking at things from alternative perspectives.

Clinical Assessments

A complete summary of all study measures is provided in Supplementary Materials (Tables S1 and S2). At the first visit, after obtaining informed consent from the parent or guardian and assent from the adolescent, a diagnostic assessment was conducted using the Mini International Neuropsychiatric Interview (MINI-KID) [12] with the adolescent. Parents and adolescents provided demographic information. At all following visits (2 weeks before the intervention, pre-intervention, post-intervention, 2 weeks after the intervention, and 6 months after the intervention), the self-report measures were obtained to assess mental health and well-being. With respect to mental health symptoms, while adolescents with depression symptoms were the target population, and addressing depression symptom severity was the primary goal of the study, we also assessed anxiety symptoms which are known to commonly co-occur with depression symptoms in adolescents [13]. The self-report measures of focus in this manuscript are as follows:

1. Depression symptoms were assessed using the parent and child versions of the CDI 2 (Kovacs, 2015). The Child CDI 2 is a 28-item measure for youth ages 7—17. For each item, participants selected one of three choices that described their symptoms over the past 2 weeks. Responses were: 0 (no symptoms), 1 (mild or probable symptoms), or 2 (definite symptoms). Prior research has demonstrated that the Child CDI 2 has high internal reliability (Cronbach's alpha = 0.91), high short-term test–retest reliability (coefficient = 0.89), and good construct and discriminant validity (Kovacs, 2015). The 17-item Parent CDI 2, has four choices per item, ranging from 0 (not at all) to 3 (much or most of the time). The Parent CDI 2 has good internal consistency and construct validity, with a moderate positive correlation between Child and Parent scales, suggesting good convergent validity [14].
2. Anxiety symptoms were evaluated using the child-report version of the Screen for Child Anxiety Related Disorders (SCARED) [15], a 41-item inventory rated on a 3-point Likert-type scale that has good internal consistency, test–retest reliability, and discriminant validity.
3. Wellbeing was assessed using three self-report measures:
    1. The Zest for Life Scale (ZLS) [16, 17] contains 12 items,it measures engagement, enthusiasm, and positive outlook on life in the last week; has high internal consistency; and demonstrates concurrent validity.
    2. In the 8-item Flourishing Scale [18], which has been shown to have high convergent validity with similar scales, participants rate on a 1–7 scale their agreement with statements regarding perceptions of their life's meaning and purpose, view of self and how they fit into the world.
    3. The Satisfaction with Life Scale [19] assesses overall life satisfaction and has high temporal reliability, high internal consistency, and moderate to high convergent validity.
4. The Social Connectedness Scale—Revised (SCS) is a 20-item measure that assesses the degree to which adolescents ages 14–18 years feel connected to others [20]. Since this measure was added to the protocol for the 2023 cohort, we present the preliminary results in Supplementary Materials.

Statistical Analysis

We first conducted paired t-tests to measure change over time for each outcome during the 2 weeks before the intervention, pre-post intervention, and during the 2 weeks after the intervention. To conduct an "active treatment versus waitlist control" test, we implemented linear mixed models with restricted maximum likelihood estimation for each clinical outcome to compare the change over time during the 2-week before intervention waiting period versus change from pre- to post-intervention. For each of these models, the second assessment of the outcome served as the dependent variable in the model and assigned group (A versus B) as the main predictor of interest. We adjusted these models for pre-intervention measurement of the outcome and age and sex at birth and included a random intercept to adjust for the year in which adolescents participated in the study. Finally, to capture phases of growth or decay across all four time periods, we fit piecewise growth models for each outcome of interest, setting knots at the pre-intervention assessment and the post-intervention assessment to characterize three potential trajectories for each outcome: 2 weeks before the intervention to pre-intervention; pre-to post-intervention; and post-intervention to 6 months after the intervention). Piecewise growth models leverage the longitudinal structure of our data to capture the effects of the intervention across time. These models were adjusted for age, sex, and adolescent's first CDI 2 score and included both a random intercept for participant ID and (to account for possible shifts from one summer to the next), the year of the study.

Results

Participants

Table 1 provides the participants' demographic and clinical characteristics, and Fig. 2 provides a consort diagram showing the study activities they completed. Overall, we observed high retention rates in this study. In the summer of 2022, 43 adolescents were enrolled, and 39 completed the intervention. Three participants withdrew prior to and one during the intervention. In 2023, 34 adolescents enrolled, 3 withdrew prior to and one during the intervention. Attendance was 95.7% in 2022, 95% in 2023.

Table 1 Sample Characteristics (N = 77)

Characteristic	*n* (%)
Age, mean (SD)	15.1 years (1.65)
Race/ethnicity	
African american/black	7 (9.1)
Asian	4 (5.2)
Native american	1 (1.3)
Multiracial	10 (13.0)
Non-white & hispanic/latinx	1 (1.3)
White & hispanic/latinx	5 (6.5)
White & non-hispanic/latinx	49 (63.6)
Sex at birth	
Female	60 (77.9)
Male	15 (19.5)
Prefer not to say	2 (2.6)
Gender identity	
Transgender/nonbinary	22 (28.6)
Cisgender woman	34 (44.2)
Cisgender man	15 (19.5)
Other	6 (7.8)
Mental health diagnoses	
At least one mental health diagnosis	72 (93.5)
Current major depressive episode	43 (55.8)
Major depressive disorder	67 (87)
Bipolar disorder I	6 (7.8)
Bipolar disorder II	2 (2.6)
Other specified bipolar disorder	1 (1.3)
Any anxiety disorder	56 (72.7)
Generalized anxiety disorder	32 (41.6)
Specific phobia	16 (20.8)
Social anxiety disorder	27 (35.1)
Panic disorder	17 (22.1)
Separation anxiety disorder	12 (15.6)
Agoraphobia	19 (24.7)
Unspecified anxiety disorder	1 (1.3)
Posttraumatic stress disorder	10 (13.0)
Attention deficit hyperactivity disorder	10 (13.0)
Eating and feeding disorders	11 (14.3)
Tourette's/motor/phonic tic disorder	11 (14.3)
Obsessive compulsive disorder	7 (9.1)

Measures of Depression, Anxiety and Wellbeing

Descriptive results (*N*, mean, standard deviation, and Cronbach's alpha values) for each of the self-report measures at each time point are presented in Supplementary Materials, Table S7. For each of the outcomes of interest, Table 2 shows the results of paired t-tests for each time interval; Table 3 shows the results of active (Group B change during the intervention) versus waitlist control (Group A change in the 2 weeks before the intervention) comparisons, hereafter called "active versus waitlist comparison"; and Table 4 shows the results of the piecewise growth models. Supplementary Materials, Figures S2-S7 show plots of changes over time for each clinical outcome,

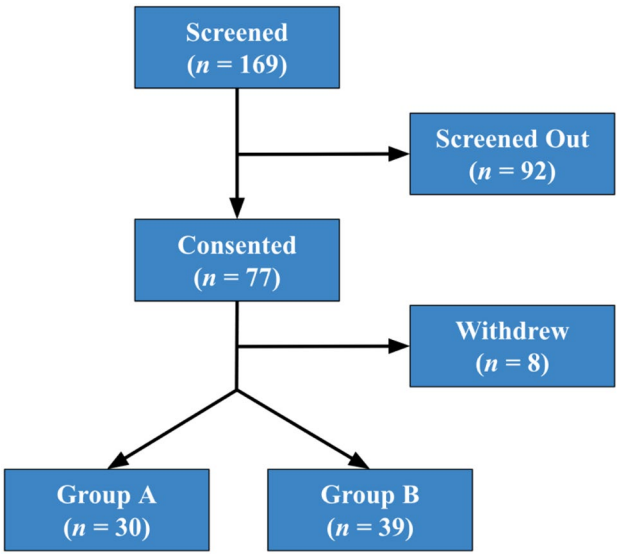

Fig. 2 Consort Diagram. The number of participants who completed each stage of the study is shown

both for the active versus waitlist comparisons and the pre-post (whole-group) comparisons.

Change in Depression Severity Over Time

As shown in Table 2, according to the Parent CDI 2, for the whole group, depression severity significantly decreased from pre-to-post intervention. Change during the 2 weeks before the intervention (the "waitlist" period), was not significant. As shown in Table 3, the active versus waitlist comparison was significant after adjusting for age, sex, and baseline Child CDI 2. No significant change occurred during the 2 weeks following the intervention, suggesting sustained short-term benefits (Table 2). The results of the piecewise growth models confirmed the prior results: there was a significant decrease in parent-reported CDI 2 total score from pre- to post-intervention after adjusting for age, sex, and baseline CDI 2. The model also showed no significant increase in depression scores between post-intervention and the 6-month follow-up, suggesting that improvements were sustained over that time.

As shown in Table 2, according to the Child CDI 2, we observed significant decreases in depression from pre-to-post intervention. However, the comparison between active and waitlist was not significant (Table 3). Child CDI 2 scores did not change significantly from post-intervention to 2 weeks after the intervention, suggesting that improvements

Table 2 Paired T-tests for three different 2-week time periods**.** We present results from three separate paired t-tests per clinical outcome, probing changes across three different 2-week epochs: pre-post intervention; the 2 weeks before the start of the intervention; and the 2 weeks after the intervention. For depression and anxiety (top three sections), a negative value for change (Mean of Differences column) signifies a reduction in symptoms, or clinical improvement. For the well-being measures (bottom three sections), a positive value for change signifies an improvement in well-being

Clinical outcome	2-week period	Mean of differences	95% CI for the difference	Test statistic t(df)	p value	Cohen's d
Parent CDI	Pre-post intervention	**− 4.82**	**(− 3.37, − 6.28)**	**− 6.60(67)**	**< 0.0001**	**− 0.80**
	Before intervention	− 0.87	(− 2.40, 0.66)	− 1.14(46)	0.25	− 0.17
	After intervention	− 0.25	(− 1.45, 0.97)	− 0.41(47)	0.68	− 0.06
Child CDI	Pre-post intervention	**− 3.54**	**(− 2.21, -4.86)**	**− 5.32(68)**	**< 0.0001**	**− 0.64**
	Before intervention	**− 1.12**	**(− 2.03, 0.22)**	**− 2.5(46)**	**0.02**	**− 0.36**
	After intervention	1.13	(− 0.26, 2.51)	1.6(47)	0.33	0.16
SCARED	Pre-post intervention	− 1.91	(− 3.87, 0.05)	− 1.95(68)	0.06	− 0.23
	Before intervention	− 1.57	(− 4.26, 1.11)	− 1.18(46)	0.24	− 0.17
	After intervention	− 1.19	(− 3.58, 1.21)	− 0.99(47)	0.32	− 0.14
Flourishing	Pre-post intervention	**1.75**	**(0.72, 2.79)**	**3.38(68)**	**0.001**	**0.41**
	Before intervention	**1.40**	(0.10, 2.71)	**2.16(46)**	**0.04**	**0.32**
	After intervention	− 0.25	(− 1.58, 1.08)	− 0.38(47)	0.71	− 0.05
Zest for Life	Pre-post intervention	**5.35**	**(2.64, 8.06)**	**3.94(68)**	**0.0002**	**0.47**
	Before intervention	1.87	(− 1.13, 4.88)	1.25(46)	0.21	0.18
	After intervention	− 0.69	(− 4.23, 2.86)	− 0.39(47)	0.70	− 0.06
SWLS	Pre-post intervention	0.88	(− 1.96, 0.19)	1.64(68)	0.11	0.20
	Before intervention	**1.51**	**(0.33, 2.70)**	**2.57(46)**	**0.01**	**0.37**
	After intervention	− 0.54	(− 1.90, 0.81)	− 0.60(47)	0.56	− 0.12

CDI children's depression inventory, *SCARED* screen for child anxiety related disorders, *SWLS* satisfaction with life scale

Significant findings are bolded

Table 3 Active versus control comparison. We present the linear regression coefficient for the group difference in each outcome comparing the active effect of Creativity Camp in Group B to the waitlist period in Group A. The regression coefficients shown are adjusted for age, sex at birth, and the baseline value for the outcome of interest

Outcome	Group (B vs A) parameter estimate (adjusted)	95% CI	p value
Parent-report CDI	**− 4.33**	**(− 6.72, − 1.91)**	**0.001**
Child-report CDI	− 1.70	(− 3.94, 0.54)	0.16
SCARED	0.38	(− 3.98, 4.75)	0.87
Flourishing	0.07	(− 2.09, 2.23)	0.95
Zest for life	4.22	(− 0.93, 9.37)	0.13
Satisfaction	− 0.95	(− 2.93, 1.00)	0.36

Significant findings are bolded

observed at post-intervention were sustained in the short term. However, while they did not return to pre-intervention levels, there was evidence for a significant increase in depression between post-intervention and the 6-month follow-up according to adolescents, suggesting that improvements were not fully sustained in the long term. The piecewise growth models confirmed a significant decrease in Child CDI 2 from pre- to post-intervention. The trajectories for the Parent and Child CDI 2 outcomes can be seen in Fig. 3.

Change in Anxiety Over Time

As shown in Table 2 and Table 4, there were no significant changes in anxiety as measured by the SCARED in any of the time periods that were tested, and the active versus waitlist comparison was also not significant (Table 3). These differing patterns for depression versus anxiety were observed even though, as expected, the adolescents' CDI 2 and SCARED scores strongly correlated both at pre-intervention ($r = 0.77$, $p < 0.0001$) and at post-intervention ($r = 0.62$, $p < 0.0001$).

Change in Well-Being Over Time

Whole-sample comparisons from pre-to-post intervention revealed a significant increase in Flourishing Scale scores after the intervention (Table 2). However, the comparison between active and waitlist was not significant (Table 3). Similar results were found for Zest for Life, but there was no significant change from pre- to post-intervention for Satisfaction with Life. The piecewise growth model showed that, though the direction and the magnitude of the changes were similar to those observed in the t-tests, the trajectories for the pre-post intervention were not significant for these three measures of well-being after accounting for age, sex at birth, and baseline Child CDI 2 (Table 4). The short-term follow-up results showed small but non-significant decreases

Table 4 Results from piecewise growth models. Adjusted results of the piecewise growth models for the trajectories of the three periods of interest. The parameter estimates characterize the change in the outcome, adjusted for age, sex at birth, and baseline CDI, over the specified time interval

Outcome	Time interval	Parameter estimate	95% CI	p value
Parent-report CDI	2 weeks before the intervention to pre-intervention	− 0.53	(− 2.09, 1.05)	0.51
	Pre-post intervention	**− 5.04**	**(− 6.41, − 3.68)**	**< 0.0001**
	Post-intervention to 6 months post intervention	0.31	(− 0.40, 1.03)	0.39
Child-Report CDI	2 weeks before the intervention to pre-intervention	− 0.82	(− 2.34, 0.71)	0.30
	Pre-post intervention	**− 3.34**	**(− 4.67, − 2.01)**	**< 0.0001**
	Post-intervention to 6 months post intervention	**0.76**	**(0.06, 1.47)**	**0.03**
SCARED	2 weeks before the intervention to pre-intervention	− 1.70	(− 4.20, 0.79)	0.19
	Pre-post intervention	− 1.66	(− 3.82, 0.50)	0.13
	Post-intervention to 6 months post intervention	− 0.36	(− 1.50, 0.78)	0.54
Flourishing	2 weeks before the intervention to pre-intervention	1.14	(− 0.40, 2.67)	0.15
	Pre-post intervention	**1.54**	**(0.21, 2.87)**	**0.02**
	Post-intervention to 6 months post intervention	0.04	(− 0.66, 0.74)	0.92
Zest for life	2 weeks before the intervention to pre-intervention	1.81	(− 1.90, 5.55)	0.34
	Pre-post intervention	**5.42**	**(2.19, 8.65)**	**0.001**
	Post-intervention to 6 months post intervention	− 0.32	(− 2.02, 1.38)	0.71
Satisfaction with life	2 weeks before the intervention to pre-intervention	**1.44**	**(0.11, 2.77)**	**0.04**
	Pre-post intervention	0.78	(− 0.37, 1.94)	0.19
	Post-intervention to 6 months post intervention	0.12	(− 0.49, 0.73)	0.70

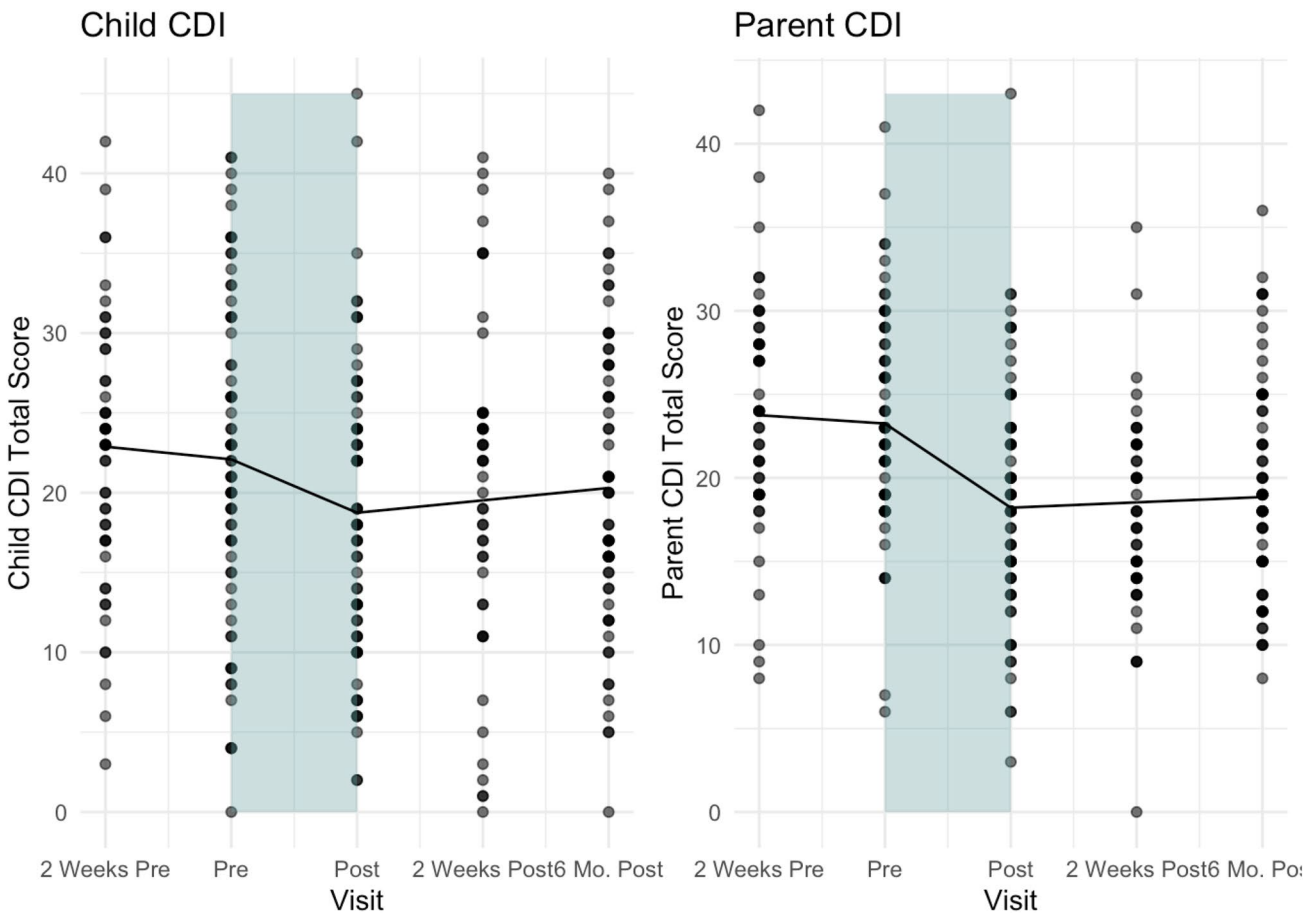

Fig. 3 Depression symptom trajectories. Here we present a visualization of three trajectories for Parent and Child CDI 2 scores: the change shown by Group A in the 2 weeks before the intervention; the change shown by all participants from pre- to post-intervention (highlighted); and the change for all participants from post-intervention to the 6 months follow-up. (While the 2-week-post-intervention measures are shown for Group B here, this trajectory is not highlighted in the graph.) Darker points on the plots signify higher concentrations of that particular outcome score. The slopes associated with the change from pre- to post-intervention (highlighted) are significant for both Parent and Child CDI scores

in well-being after 2 weeks (see Table 2) or after 6 months (Table 4).

Change in Social Connectedness Over Time

Preliminary results from the 2023 subsample are reported in Supplementary Materials (p. 17).

Discussion

In this study, we examined the potential impact of Creativity Camp, a novel creative arts intervention, on mental health and well-being in adolescents with depression symptoms. Key strengths of the study include a design that allowed for comparing the effects of the intervention versus a waitlist control; the growth-oriented nature of the intervention, focuses on fostering creative self-exploration; the multi-pronged curriculum encompassing a variety of arts activities, potentially enhancing engagement (evidenced by a low level of attrition); the multiple informants of depression symptoms; and the assessment of both clinical symptoms and well-being, allowing for a holistic understanding of the impact on the adolescent. In line with our pre-registered hypotheses, we report evidence of clinical improvement in adolescent-reported depression (as shown in pre-to-post intervention depressive symptom decreases) and even stronger evidence of clinical improvement from parent reports (shown not only in pre-to-post intervention changes, but also relative to the before-intervention wait-period). Additionally, also in line with our pre-registered hypotheses, we observed that adolescents improved on some measures of well-being at post-intervention, with preliminary evidence that these effects were persistent at the 2-week and 6-month follow-ups.

The study results suggest that Creativity Camp may be useful for mitigating depression in adolescents. In line with our hypotheses, we found preliminary evidence suggesting that depression symptoms improved from pre- to post-intervention according to both child and parent reports. The findings were strongest for the parent reports, with an effect size (0.80) similar to or greater than those reported in studies of standard treatments such as fluoxetine and cognitive-behavioral therapy [1, 21], and importantly, significant in the active versus waitlist comparison, providing an important preliminary indication of the efficacy of Creativity Camp. Using both parent and youth perspectives can provide meaningful and complementary information about the child [22, 23]. While youth can report most directly on their own internal experience, parents are better observers of their child's behavior. Conceivably, the stronger results from parent reports may suggest that the aspects of depression that were most sensitive to change in response to Creativity Camp were observable to parents (e.g., changes in behavior rather than in internal feelings), whereas the unobservable aspects of depression experienced by the adolescents improved to a lesser extent. It may be that a longer intervention, and/or a larger sample, would be required to show a significant effect in the waitlist versus intervention comparison from the adolescents' perspectives.

There was also some evidence for lasting effects for both adolescent-reported and parent-reported depression at the 2-week follow-up, and further sustained benefit according to parent (but not adolescent) reports at 6 months. The fact that adolescent-reported depression symptoms worsened again at 6 months might be expected given that depression is often a recurring illness in adolescents [2, 24–26]. This finding further underscores the importance of investigating the utility of longer-term intervention.

When considering the change in well-being from pre- to post-intervention for the whole sample, both the Flourishing Scale and Zest for Life (but not Satisfaction with Life) showed a significant change indicating improved well-being. However, none of these changes were significant in the waitlist control comparison. Similar to the findings with depression, and in line with hypotheses, we found preliminary evidence suggesting that post-intervention increases in Flourishing and Zest for Life persisted at 2 weeks and 6 months. The increases at post-intervention noted in the Flourishing Scale are in line with some past research examining the impact of arts engagement on well-being. One study showed significantly improved Flourishing Scale scores after a 2-month group arts intervention (painting and drawing with an art instructor) on well-being in 14 young female Yezidi trauma survivors [27]. Another study showed increases in Flourishing Scale scores after a photography intervention in 18 pediatric palliative caregivers [28]. Lack of significant changes at post-intervention on Satisfaction With Life may suggest that this measure (e.g., agreement with the statements, "The conditions of my life are excellent" and "So far I have gotten the important things I want in life") is less sensitive to changes on shorter time scales such as 2 weeks. One prior study examining the impact of an arts tour intervention for older adults which had a larger sample (N = 155) and longer duration (3 months) found significant increases in Satisfaction with Life after the intervention, suggesting this measure may still be useful to include in future studies of arts interventions (especially those of longer duration) for well-being.

Our findings add to an emerging body of knowledge on the positive impact of arts-based interventions on mental health and well-being [6, 7]. A recent call to action highlighted the potential value of arts-based interventions to address the global youth mental health crisis [29]. A recent systematic review of art therapy studies in youth mental health noted the small number of randomized controlled trials and lack of replication studies, and reported that the extant literature has provided the strongest evidence for the benefit for youth who have experienced trauma [30]. Initial findings from small studies testing other kinds of novel arts-based interventions suggest the potential to facilitate empowerment and social support [31] and to exert positive changes in identity development [32]. Controlled studies investigating music- and dance-based interventions in youth have demonstrated reductions in internalizing symptoms, including depression, anxiety, and indices of stress, compared to control conditions [33–35]. Additional research has demonstrated the benefit of arts interventions for reducing depression and stress in special populations such as children with cancer [27] and epilepsy [36]. Arts-based approaches may have the potential to overcome barriers to treatment such as negative biases about mental health care delivery [37].

We did not detect significant changes in anxiety symptoms related to Creativity Camp. Notably, the activities in this intervention were not specifically designed to include treatment elements that are effective for treating anxiety (e.g., exposure, cognitive restructuring, somatic management). While, participating in the intervention did require interacting with peers, which is routinely avoided by teens who experience social anxiety, perhaps this exposure was not enough to significantly reduce anxiety levels. Notably, the goal of this intervention was to target depressive symptoms; future work may consider how to tailor creative arts interventions to address anxiety symptoms more effectively.

Understanding the mechanisms underlying how arts engagement can benefit mental health has been identified as a research priority [38]. A recent framework for understanding "active ingredients" for arts-in-health interventions identified three categories for the elements underlying clinical response: *Project* (the art activity itself),

People (how people interact and who is involved in these interactions), and *Context* (setting, things, surroundings) [39]. Following this framework, Creativity Camp's active ingredients may include the following. *(1) Project.* Activities were designed to spark inspiration, facilitate self-inquiry, and invite new ways of thinking. This strategy may promote flexible thinking, which could be critical for shifting out of persistently negative thoughts and feelings. Furthermore, the simple act of "showing up" every day demonstrated by most participants represents behavioral activation, a known active ingredient in other treatments of depression [40, 41]. *(2) People.* Working directly with professional artists, research staff, near-peer mentors, and other teens could be inspirational for participants. Preliminary data from a subsample of this study showing an increase in social connectedness after the intervention (see Supplementary Materials) supports this idea. Furthermore, the instructor approach (focusing on authentic expression rather than following rules; see Supplementary Materials, Table S6) afforded more freedom than typical adolescent settings (e.g., school). *(3) Context.* Even though it was not a typical "therapy" context, adolescents knew that others in the program were also experiencing depression, possibly contributing to a feeling of safety. The program occurred in a large room with natural light, allowing free movement and access to the outdoors; activities involving nature were woven into the curriculum. Future research investigating these potential active ingredients to understand mechanisms of therapeutic effects will be important to guide treatment optimization.

Several study limitations should be considered. First, randomized assignments to Group A versus Group B were not strictly maintained in the Summer 2022 cohorts. In 2022, when adolescents were only expected to complete three visits due to the additional participant burden of the 2022 protocol, which included neuroimaging, we occasionally needed to reassign participants to a different group after randomization to accommodate family summer schedules. Thus, while this reassignment process in 2022 had some inherent randomness (e.g., family vacations and other commitments were spread randomly across the summer), it may have inadvertently introduced unseen bias, limiting causal attributions. A second issue was that since in the Summer 2022 cohorts, when we only expected participants to complete either the 2-week-before intervention or the 2-week-after intervention follow-up visit, we had limited power for the tests evaluating change during those time periods. Third, since we did not have an active control group, future work is needed to confirm that changes related to the intervention are not related to non-specific factors such as receiving attention, spending with the research team, or cohort effects. Fourth, the timing of the intervention during summer break coincides with a time that is typically notable for reduced stress for adolescents. Thus, it is possible that assessments during the summer are more likely to show "clinical improvement" because of being on summer break. This concern is mitigated in part because most of the baseline assessments were also conducted during summer break. Some of the benefits were maintained at 6 months, suggesting that even when school resumed, there may be some steeling effects that allow adolescents to be resilient to school-related stressors. For these reasons, adapting this intervention for the school year could be important. Fifth, our study inclusion criteria relied on parent-reported depression symptom levels. While most (87%) of the sample had a diagnosis of major depression, only 56% met criteria for a current episode of major depression. Therefore, future work may benefit from testing the extent to which this intervention is effective for adolescents with more severe forms of depression. Finally, our initial program development efforts did not include fidelity assessments of the curriculum delivery across six different cohorts spanning 2 years. This will be an important aspect to include in future work.

In conclusion, we report preliminary evidence that a 2-week Creativity Camp intervention has a positive impact on adolescents with depression, both alleviating depression symptoms and promoting well-being. Future research is needed to confirm these findings to facilitate the expansion of evidence-based approaches to the treatment of adolescent depression.

Summary

Depression is a serious public health problem that often emerges during the adolescent period. Novel interventions are needed to broaden the available treatment options for this condition in teenagers. This study examined the impact of "Creativity Camp", a novel 8-day creative arts intervention, on depression and well-being in adolescents. Results provided preliminary evidence that the Creativity Camp intervention had a positive impact on both depression (showing a decrease) and well-being (showing an increase) in 69 adolescents 12–17 years. This evidence highlights the importance of investigating and implementing treatment approaches focusing on creative arts for adolescents with depression.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10578-024-01766-3.

Acknowledgements The authors would like to express our deep appreciation to the adolescents and families who participated in the Creativity Camp study. We also gratefully thank the many students who volunteered to support the study, the Weisman Art Museum and the

University of Minnesota Urban Research and Outreach-Engagement Center (UROC) for their generous support of our project.

Author Contributions K.C. led the study design, oversaw the implementation of the protocol, oversaw analysis of the data and the interpretation of the study results, drafted and edited the manuscript. Y.T. designed the intervention, co-designed the study and edited the manuscript. P.W. contributed to designing aspects of the curriculum, delivered the curriculum, and edited the manuscript. B.K.D., W.K., B.O., Y.T., B.M., M.F., A.M. and A.A. co-designed the study, oversaw key elements of the study implementation, contributed to interpreting results and co-edited the manuscript. M.D. coordinated the study, played a key role in data analysis and contributed significantly to both drafting and editing the manuscript. G.B., B.K.D. and K.R. provided clinical supervision throughout the study, contributed to interpreting study results, and edited the paper. E.A. and D.S. contributed to data analysis, drafting sections of the manuscript and editing the manuscript.

Funding Office of the Vice President for Research, University of Minnesota, Minnesota Futures, Minnesota Futures, Minnesota Futures, Minnesota Futures, Minnesota Futures, Minnesota Futures, Minnesota Futures, Minnesota Futures, Minnesota Futures, Minnesota Futures, Minnesota Futures, NIH, R25 DA057802, R25 DA057802

Data Availability The data generated and analysed during the current study is not publicly available.

Declarations

Conflict of interest The authors declare no competing interests.

References

1. March J, Silva S, Petrycki S, Curry J, Wells K, Fairbank J, Burns B, Domino M, McNulty S, Vitiello B, Severe J (2004) Fluoxetine, cognitive-behavioral therapy, and their combination for adolescents with depression: Treatment for Adolescents With Depression Study (TADS) randomized controlled trial. JAMA: J Am Med Assoc 292(7):807–820. https://doi.org/10.1001/jama.292.7.807
2. Curry J, Silva S, Rohde P, Ginsburg G, Kratochvil C, Simons A, Kirchner J, May D, Kennard B, Mayes T, Feeny N, Albano AM, Lavanier S, Reinecke M, Jacobs R, Becker-Weidman E, Weller E, Emslie G, Walkup J, March J (2011) Recovery and recurrence following treatment for adolescent major depression. Archves Gen Psychiatry 68(3):263–269
3. Häge A, Weymann L, Bliznak L, Märker V, Mechler K, Dittmann RW (2018) Non-adherence to psychotropic medication among adolescents—a systematic review of the literature. Zeitschrift Fur Kinder- Und Jugendpsychiatrie Und Psychother 46(1):69–78
4. Østergaard T, Lundgren T, Zettle RD, Landrø NI, Haaland VØ (2020) Psychological flexibility in depression relapse prevention: processes of change and positive mental health in group-based ACT for residual symptoms. Front Psychol 11:528
5. Micco JA, Henin A, Hirshfeld-Becker DR (2014) Efficacy of interpretation bias modification in depressed adolescents and young adults. Cogn Ther Res 38(2):89–102
6. Fancourt, D., & Finn, S. (2019). *What is the evidence on the role of the arts in improving health and well-being? A scoping review*. World Health Organization. Regional Office for Europe. https://apps.who.int/iris/handle/10665/329834
7. Pesata V, Colverson A, Sonke J, Morgan-Daniel J, Schaefer N, Sams K, Carrion FM-E, Hanson S (2021) Engaging the arts for wellbeing in the United States of America: a scoping review. Front Psychol 12:791773
8. Thwaite P, Bennett DL, Pynor H, Zigmond H (2003) Art and "the language of well-being" in adolescent health care. Ann Acad Med Singap 32(1):71–77
9. Zarobe L, Bungay H (2017) The role of arts activities in developing resilience and mental wellbeing in children and young people a rapid review of the literature. Perspect Public Health 137(6):337–347
10. Gaiha SM, Salisbury TT, Usmani S, Koschorke M, Raman U, Petticrew M (2021) Effectiveness of arts interventions to reduce mental-health-related stigma among youth: a systematic review and meta-analysis. BMC Psychiatry 21(1):364
11. Kennedy H, Marley M, Torres K, Edelblute A, Novins D (2020) "Be creative and you will reach more people": youth's experiences participating in an arts-based social action group aimed at mental health stigma reduction. Arts Health 12(1):23–37
12. Sheehan DV, Sheehan KH, Shytle RD, Janavs J, Bannon Y, Rogers JE, Milo KM, Stock SL, Wilkinson B (2010) Reliability and validity of the Mini International Neuropsychiatric interview for children and adolescents (MINI-KID). J Clin Psychiatry 71(3):313–326
13. Garber J, Weersing VR (2010) Comorbidity of anxiety and depression in youth: implications for treatment and prevention. Clin Psychol: Publ Div Clin Psychol Am Psychol Assoc 17(4):293–306
14. Bae Y (2012) Test review: children's depression inventory 2 (CDI 2). J Psychoeduc Assess 30(3):304–308
15. Birmaher B, Khetarpal S, Brent D, Cully M, Balach L, Kaufman J, Neer SM (1997) The Screen for Child Anxiety Related Emotional Disorders (SCARED): scale construction and psychometric characteristics. J Am Acad Child Adolesc Psychiatry 36(4):545–553
16. Harrison DP, Stritzke WGK, Fay N, Hudaib A-R (2018) Suicide risk assessment: trust an implicit probe or listen to the patient? Psychol Assess 30(10):1317–1329
17. Linehan MM, Goodstein JL, Nielsen SL, Chiles JA (1983) Reasons for staying alive when you are thinking of killing yourself: the reasons for living inventory. J Consult Clin Psychol 51(2):276–286
18. Diener E, Wirtz D, Tov W (2010) New measures of well-being: flourishing and positive and negative feelings. Soc Indic Res 39:247–266
19. Diener E, Emmons RA, Larsen RJ, Griffin S (1985) The satisfaction with life scale. J Pers Assess 49(1):71–75
20. Lee RM, Draper M, Lee S (2001) Social connectedness, dysfunctional interpersonal behaviors, and psychological distress: testing a mediator model. J Couns Psychol 48(3):310–318
21. Stikkelbroek Y, Vink G, Nauta MH, Bottelier MA, Vet LJJ, Lont CM, van Baar AL, Bodden DHM (2020) Effectiveness and moderators of individual cognitive behavioral therapy versus treatment

as usual in clinically depressed adolescents: a randomized controlled trial. Sci Rep 10(1):14815
22. Aebi M, Kuhn C, Banaschewski T, Grimmer Y, Poustka L, Steinhausen H-C, Goodman R (2017) The contribution of parent and youth information to identify mental health disorders or problems in adolescents. Child Adolesc Psychiatry Ment Health 11:23
23. Kazdin AE, French NH, Unis AS, Esveldt-Dawson K (1983) Assessment of childhood depression: correspondence of child and parent ratings. J Am Acad Child Psychiatr 22(2):157–164
24. Emslie GJ, Rush AJ, Weinberg WA, Gullion CM, Rintelmann J, Hughes CW (1997) Recurrence of major depressive disorder in hospitalized children and adolescents. J Am Acad Child Adolesc Psychiatry 36(6):785–792
25. Kovacs M (1996) Presentation and course of major depressive disorder during childhood and later years of the life span. J Am Acad Child Adolesc Psychiatry 35(6):705–715
26. Lewinsohn PM, Rohde P, Klein DN, Seeley JR (1999) Natural course of adolescent major depressive disorder: I. Continuity into young adulthood. J Am Acad Child Adolesc Psychiatry 38(1):56–63
27. Abdulah DM, Abdulla BMO (2018) Effectiveness of group art therapy on quality of life in paediatric patients with cancer: a randomized controlled trial. Complement Ther Med 41:180–185
28. Levy K, Grant PC, Depner RM, Tenzek KE, Beaupin LK, Pailler ME, Brewer-Spritzer E (2020) The photographs of meaning program for pediatric palliative caregivers and its impact on meaning, well-being, and perceived social support. Palliat Med Rep 1(1):84–91
29. Golden TL, Ordway RW, Magsamen S, Mohanty A, Chen Y, Ng TWC (2024) Supporting youth mental health with arts-based strategies: a global perspective. BMC Med 22(1):7
30. Braito I, Rudd T, Buyuktaskin D, Ahmed M, Glancy C, Mulligan A (2022) Review: systematic review of effectiveness of art psychotherapy in children with mental health disorders. Ir J Med Sci 191(3):1369–1383
31. Gittings L, Medley S, Logie CH, Ralayo N, Cluver L, Petersen N, Chen-Charles J, Toska E (2022) Art-based reflections from 12 years of adolescent health and development-related research in South Africa. Health Promot Int 37(2):83–96. https://doi.org/10.1093/heapro/daac020
32. Kelemen LJ, Shamri-Zeevi L (2022) Art therapy open studio and teen identity development: helping adolescents recover from mental health conditions. Children 9(7):1029. https://doi.org/10.3390/children9071029
33. Albornoz Y (2011) The effects of group improvisational music therapy on depression in adolescents and adults with substance abuse: a randomized controlled trial. Nord J Music Ther 20(3):208–224
34. Geipel J, Koenig J, Hillecke TK, Resch F, Kaess M (2018) Music-based interventions to reduce internalizing symptoms in children and adolescents: a meta-analysis. J Affect Disord 225:647–656
35. Jeong Y-J, Hong S-C, Lee MS, Park M-C, Kim Y-K, Suh C-M (2005) Dance movement therapy improves emotional responses and modulates neurohormones in adolescents with mild depression. Int J Neurosci 115(12):1711–1720
36. Stafstrom CE (2019) Using artwork to understand and address the psychosocial challenges facing children and adolescents with epilepsy. Epilepsy Behav: E&B 101(Pt A):106572
37. Meredith LS, Stein BD, Paddock SM, Jaycox LH, Quinn VP, Chandra A, Burnam A (2009) Perceived barriers to treatment for adolescent depression. Med Care 47(6):677–685
38. de Witte M, Orkibi H, Zarate R, Karkou V, Sajnani N, Malhotra B, Ho RTH, Kaimal G, Baker FA, Koch SC (2021) From therapeutic factors to mechanisms of change in the creative arts therapies: a scoping review. Front Psychol 12:678397
39. Warran K, Burton A, Fancourt D (2022) What are the active ingredients of "arts in health" activities? Development of the INgredients iN ArTs in hEalth (INNATE) framework. Wellcome Open Res 7:10
40. Dimidjian S, Hollon SD, Dobson KS, Schmaling KB, Kohlenberg RJ, Addis ME, Gallop R, McGlinchey JB, Markley DK, Gollan JK, Atkins DC, Dunner DL, Jacobson NS (2006) Randomized trial of behavioral activation, cognitive therapy, and antidepressant medication in the acute treatment of adults with major depression. J Consult Clin Psychol 74(4):658–670
41. Fernández-Rodríguez C, Coto-Lesmes R, Martínez-Loredo V, González-Fernández S, Cuesta M (2023) Is activation the active ingredient of transdiagnostic therapies? A randomized clinical trial of behavioral activation, acceptance and commitment therapy, and transdiagnostic cognitive-behavioral therapy for emotional disorders. Behav Modif 47(1):3–45
42. Barnett AG, van der Pols JC, Dobson AJ (2005) Regression to the mean: what it is and how to deal with it. Int J Epidemiol 34(1):215–220
43. Kovacs M (2015) Children's depression inventory (CDI and CDI 2). In: Cautin RL, Lilienfeld SO (eds) The encyclopedia of clinical psychology. Hoboken, Wiley