

Supplementary Materials

Table S1. Timeline of quantitative and qualitative assessments for Groups A and B - Summer 2022

Measure (anticipated time in minutes)	Screen	Initial Visit	Two Weeks Before Camp	Pre-Camp	During Camp	Post-Camp	Two Weeks After Camp	6 Months After Camp
Clinical Assessments								
Diagnostic Interview (MINI; 60)		Both						
Phen-X Demographics (parent: 5; teen: 2)		Both						
Treatment History Form (parent: 2)		Both						Both
WASI-2 Matrix Reasoning (5)				Both				
Every Day Discrimination Scale (2)		Both						Both
Sense of Community Belonging (1)		Both				Both		Both
Parent CDI 2 (2)	Both		Group A	Both		Both	Group B	Both
Child CDI 2 (5)			Group A	Both		Both	Group B	Both
SCARED (3)			Group A	Both		Both	Group B	Both
Flourishing Scale (3)			Group A	Both		Both	Group B	Both
Zest for Life (3)			Group A	Both		Both	Group B	Both
Satisfaction w/ Life (1)			Group A	Both		Both	Group B	Both
ISAS (5)								Both
Creativity and Flexibility Assessments								
Daily Creativity (1)			Group A	Both		Both	Group B	Both
CDQ-R (5)			Group A	Both		Both	Group B	Both
Openness to Experience (3)			Group A	Both		Both	Group B	Both
Torrance Suppose (8)			Group A	Both		Both	Group B	Both
AUT+ (10)			Group A	Both		Both	Group B	Both
FIQ (2)			Group A	Both		Both	Group B	Both

D-KEFS Verbal Fluency (10)			Group A	Both		Both	Group B	Both
Action Fluency (1)			Group A	Both		Both	Group B	Both
fMRI + Post-Scan Reflections (10)			Group A	Both		Both	Group B	
Qualitative Assessments								
Self-Portrait/Timeline Interviews (30)					Both			Both
Behavioral Observations (field notes; takes place during camp hours)					Both			

Table S2. Timeline of quantitative and qualitative assessments for all participants - Summer 2023

Measure (anticipated time in minutes)	Screen	Initial Visit	Two Weeks Before Camp	Pre-Camp	During Camp	Post-Camp	Two Weeks After Camp	6 Months After Camp
Clinical Assessments								
Diagnostic Interview (MINI; 60)		X						
Phen-X Demographics (parent: 5; teen: 2)		X						
Treatment History Form (parent: 2)		X						X
Every Day Discrimination Scale (2)		X						X
Sense of Community Belonging (1)		X				X		X
Parent CDI 2 (2)	X		X	X		X	X	X
Child CDI 2 (5)			X	X		X	X	X
SCARED (3)			X	X		X	X	X
Flourishing Scale (3)			X	X		X	X	X
Zest for Life (3)			X	X		X	X	X
Satisfaction w/ Life (1)			X	X		X	X	X
ISAS (5)		X	X	X		X	X	X
Revised Social Connectedness Scale (2)		X	X	X		X	X	X
Creativity and Flexibility Assessments								
Daily Creativity (1)			X	X		X	X	X
CDQ-R (5)			X	X		X	X	X
Openness to Experience (3)			X	X		X	X	X
FIQ (2)			X	X		X	X	X
Qualitative Assessments								
Self-Portrait/Timeline Interviews (30)					Day 8			X
Behavioral Observations (field notes; takes place during camp hours)					Every day			

Figure S1. “The World Inside You” is a poem written by co-author Yuko Taniguchi specifically for this program. “The World Inside You” is the theme of the Creativity Camp curriculum, and the image below, designed by co-author and professional artist Peng Wu, using elements from the paintings of Suyao Tian, was used in promotional materials for the study.



Watercolor artwork by Suyao Tian. Poem by Yuko Taniguchi. Composition by Peng Wu.

Table S3. The Creativity Camp Curriculum: The World Inside You. One key aspect of this curriculum is that it aims to instill the sensation that the participants are going in a direction that they have not gone before. The curriculum is designed to have the participants connect to the topics in new ways that they had not considered previously by introducing the topics with a creative twist. While participants may have their own understanding of the topics, or they may be familiar with the medium of the art project, they likely have not explored and expanded their perspectives through the specific contexts introduced in the curriculum. A second key aspect of the curriculum is that it is structured to support self-inquiry. The theme of each session intends to explore the relationship between a specific topic and the self, “me,” referring to the participants. The curriculum encourages participants to gain a new relationship between themselves and each topic, which is revealed through their creative work. The table below describes each of the sessions’ themes and activities. There were some changes to the specific activities between 2022 and 2023; these are noted below.

Day	Theme	Medium options	Questions to be explored & the overview of activities
1	Multitude & me	Poetry and Collage	What makes me, me? Based on a poem, “Begin With Pieces,” by co-investigator Taniguchi, participants engage in creative writing to explore who they are. Through a series of prompts which instill holistic reflection of the whole person, they extract what they love, what follows them, and where in their body they hold darkness, participants. These prompts connect to the participants’ key concepts that represent their lived experiences. Based on these themes they identified, they decorate 12 pieces of a wooden jigsaw puzzle with mixed media to create an abstract self-portrait. This creative process aims to have the participants recognize the multitude of the self and the beauty of various experiences being represented visually.
2	Chaos & me	Clay, drawing, and dance	How does chaos feel inside our minds and bodies? Participants pay attention to their internal system: heart and brain. They recognize the music inside us created by our heart that tirelessly beats and our mind with the ability to imagine. Through listening to their own heartbeats and reflecting on how they imagine, they contemplate how both our hearts and our minds help us to work through chaos instead of being swallowed by it. Participants are invited to capture their internal system through abstract line drawing (2022) and clay (2023). Then they are invited to physically experience chaos collectively through contra dance. The aim of this session is to

			reconsider and redefine chaos, which may be stressful, yet is an opportunity to tap into our bodies and skills to creatively navigate.
3	Nature & me	Letter to the river and nature walk	What if nature isn't a place to visit but a space we absorb inside us? What is my connection to the sky, the sun, and the river? In this session, we explore our connection to nature creatively by first composing a letter of gratitude to the Mississippi river on compostable paper that responds to the question, What do you want the river to know? Participants journey to the river together to send their letters, and on this journey, they explore the surrounding natural world, and collect natural materials to be used in a subsequent activity (in 2022, the Community Forest activity in Session 4; in 2023, the Safe Space activity in Session 5). Participants engage in thinking creatively about breathing in and taking in the warmth of the sun as they imagine that nature and its power can stay with them.
4	Community and me	Collaborative art project	What gets created when we collaborate with others in our community? Following up on the previous nature session, participants are invited to consider questions at the macro level like what larger spaces, such as the forest, the sky, and the broader universe look like. Then they are guided to shift their perspectives to the micro level by noticing what is in each space. 2022: Community Forest. Through a multimedia collage of community forest creation, participants explore what exactly is included in a forest including nature's communication system of mycorrhizal networks. Participants are invited to use origami and their collections from the previous session's nature to collaboratively create a one-of-a-kind, unique community forest. 2023: Universe. Participants are guided to paint the universe with their own unique versions of the night sky. Then, their macro view is shifted to ponder the micro level prompt: "What is missing from our universe? What are the things you wish you could see/have?" Each participant paints an individual canvas, which are all later joined together, to create a

			community mural that fills in the world's missing pieces through art. Overall, this session aims for the participants to shift their perspectives from larger concepts to details to notice their environment and explore the collaborative creative process to discover and witness what gets created when many ideas are combined.
5	Space & me	Graphic design, 3D printing and mixed media collage	How do different environments influence us? When and where do we feel comfortable? From designing one of a kind chairs that represent their creativity and comfort (2022) to creating a safe space mixed media sculpture (2023), this session aims for the participants to become aware of key designs that are connected to comfort, safety, and wellbeing and express it through artwork. 2022: Designing comfort. Participants explore various types of space and designs in the built environment all over the world to collect their responses to each space. In addition to paying attention to technical details like size, shape, and color of the furniture and design of each space, they also collect how they feel about each space. Then they are invited to design an external object that represents comfort and safety, which is then 3D printed. 2023: Safe Space collage. Participants are invited to use their collections from the nature walk to incorporate them into their safe space mixed media collage sculpture.
6 and 7	The World Inside and Me	Clay or abstract painting	What does the inside of your mind look like? What ideas, stories, thoughts, and emotions are inside you? What color are they? And how do they move? Participants are invited to make their internal mind into a concrete physical object. 2022: Clay boxes. Participants are invited to create a black clay box with a lid with instructions to keep the external surface plain, in which they can place a 3D print of their brain (created from the neuroimaging data that was collected in 2022 only).

			But inside the box, they are encouraged to “make their imagination visible”, showing the various imaginations they hold inside them through their artwork. 2023: Abstract painting. What are you most passionate about? What does the inside of your mind look like? What ideas, stories, thoughts, and emotions are inside you? What color are they? And how do they move? Participants are invited to “go big and be bold” through abstract painting to express their inner selves and passions through colors on a large canvas with instructions to keep the expression abstract, avoiding concrete figures. Overall, this session challenges participants to consider their imagination as if it is another world inside and communicate their vision with an external audience.
8	Reflection and Sharing	Artist Interview	What have you discovered thus far? What do you notice from everything that you have created during this camp? How will you carry your creative self into the future? In this session, participants reflect on what they have created. They are invited to learn from their own creations and share what they have learned about their own creativity.

Table S4. Schedule Structure - Summer 2022

12PM-12:45PM	Campers arrive Lunch
12:45-1:15 PM	Creativity warm-up exercises
1:15-2:30 PM	First round of creative arts activities
2:30-2:45 PM	Snack & break
2:45-4PM	Second round of activities & wrap up
4-4:15PM	Campers are picked up to return home

Table S5. Schedule Structure - Summer 2023

10AM-10:45PM	Campers arrive at MIDB or UROC Art exercises introducing theme of the day
10:45-12:00	First round of creative arts activities
12:00-12:45	Lunch
12:45-2PM	Second round of activities & wrap up
2:00-2:15	Campers are picked up to return home

Table S6. Approach taken by Creativity Camp Program Leads. Creativity Camp sessions were led by a team of professional artists, research staff and undergraduate student volunteers. This table describes the approach taken in leading the sessions.

Element	Description
Flow of the class	Every class has a different speed and flow; facilitators appreciate the group's dynamic and set the tempo that feels right for everyone, most of the time. Every class has a different speed and flow; facilitators appreciate the group's dynamic and set the tempo that feels right for everyone, most of the time.
Adaptability	Instructors recognize that the best laid plans do not always work, and sometimes the situation calls for improvisation. There needs to be preparation for each class, and there also needs to be a readiness to shift the plan.
Noticing and attunement	Instructors must be attuned to notice subtle needs that adolescents express, and flexibly respond. Instructors need to have a sense of when to step in, when to step out.
Curiosity	Instructors need to be intensely curious— they want to be a detective to figure out how each young person could be supported.
Respect and validation	Instructors meet and validate students wherever they are. At-risk youth can often feel rejected by the world, and they expect to experience reprimand from adults. When this doesn't happen, they are surprised, which creates an opening.

Table S7: Cronbach's Alpha Values for all Outcome Measures

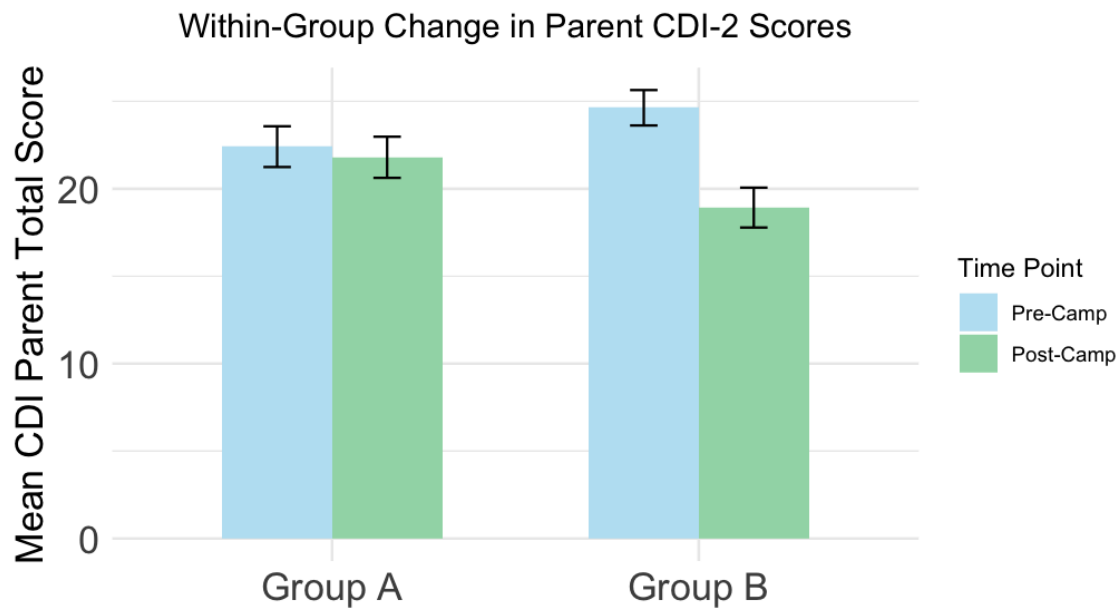
Measure	N, Mean, SD, Cronbach's Alpha Values				
	2 weeks before camp	Pre-camp	Post-camp	2 weeks after camp	6 months after camp
CDI 2 Child Report	45, 22.09, 8.6, 0.87	69, 22.26, 10.1, 0.91	69, 18.72, 9.2, 0.90	48, 20.48, 10.6, 0.92	66, 20.47, 9.1, 0.89
CDI 2 Parent Report	45, 23.80, 7.2, 0.82	68, 23.38, 6.5, 0.79	69, 18.48, 7.1, 0.84	48, 17.48, 5.9, 0.78	66, 19.30, 6.4, 0.80
Flourishing Scale	45, 35.42, 7.8, 0.79	69, 36.65, 8.6, 0.85	69, 38.41, 8.5, 0.87	48, 37.69, 8.1, 0.85	66, 38.26, 8.1, 0.85
Zest for Life	45, 42.89, 17.4, 0.89	69, 45.91, 19.2, 0.93	69, 51.26, 18.3, 0.92	48, 50.17, 21.1, 0.94	66, 50.39, 18.7, 0.92
Satisfaction with Life	45, 18.18, 7.2, 0.88	69, 19.65, 7.7, 0.91	69, 20.54, 7.0, 0.86	48, 19.88, 7.6, 0.87	66, 20.79, 6.8, 0.86
SCARED	45, 41.42, 17.4, 0.95	69, 40.94, 16.2, 0.94	69, 39.03, 16.2, 0.94	48, 39.92, 17.4, 0.95	66, 38.79, 16.1, 0.94
Social Connectedness (Only Summer 2023)	27, 71.26, 14.8, 0.87	30, 69.57, 15.6, 0.90	30, 75.97, 15.4, 0.92	29, 73.00, 14.7, 0.90	29, 72.55, 17.4, 0.94

CDI = Child Depression Inventory; SCARED = Screen for Child Anxiety Related Disorders.

Note: The *N*s for the 2 weeks before camp and 2 weeks after camp timepoint are smaller because in Summer 2022, participants were only required to attend one of these visits, depending on the group (A or B) assignment. (In Summer 2023, all participants completed visits at all time points.) The data provided in this table are from all participants at each time point (regardless of group assignment.)

Figure S2. Change in Parent CDI-2 scores over time.

S2A. Changes during the “waitlist” 2 weeks before camp (Group A, left) are contrasted with pre-post camp changes for Group B.



S2B. Pre-post camp changes are shown for the whole group.

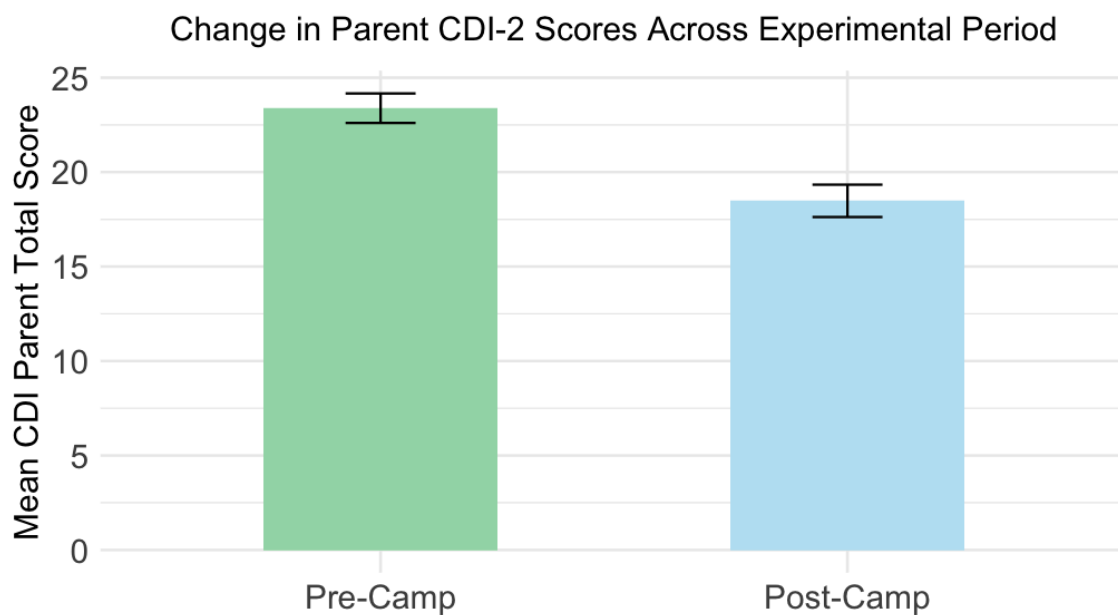


Figure S3. Change in Child CDI-2 scores over time.

Figure S3A. Changes during the “waitlist” 2 weeks before camp (Group A, left) are contrasted with pre-post camp changes for group B.

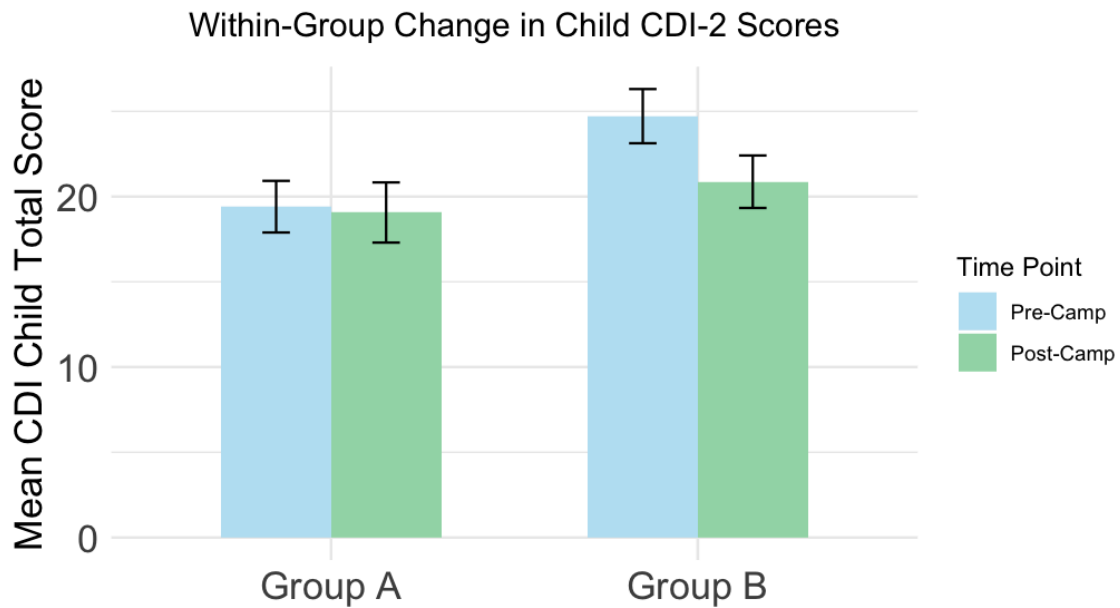


Figure S3B. Pre-post camp changes are shown for the whole group.

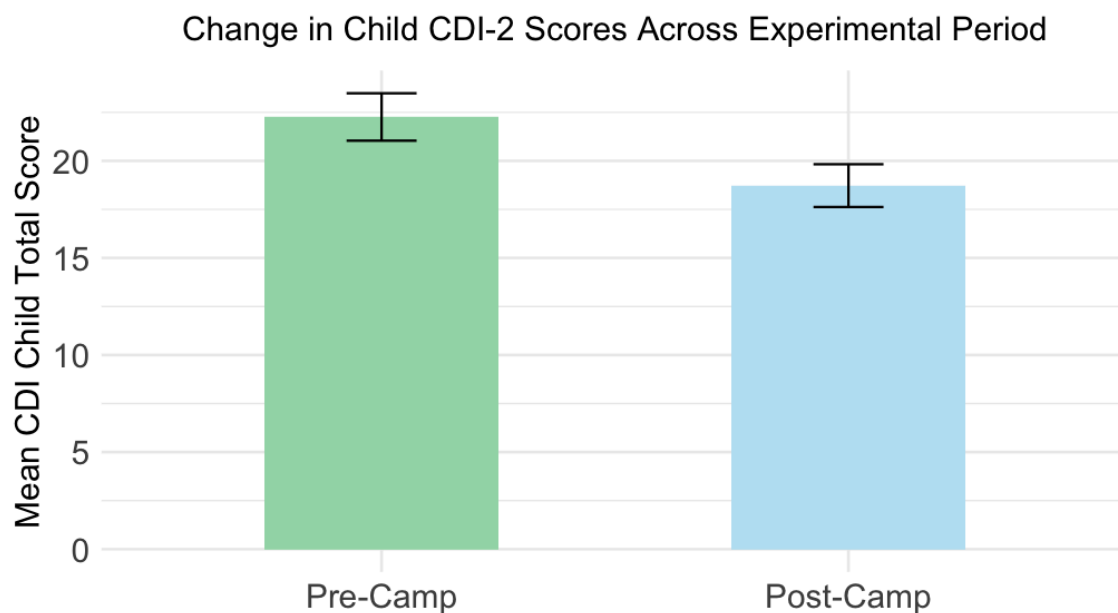


Figure S4. Change in SCARED scores over time.

Figure S4A. Changes during the “waitlist” 2 weeks before camp (Group A, left) are contrasted with pre-post camp changes for group B.

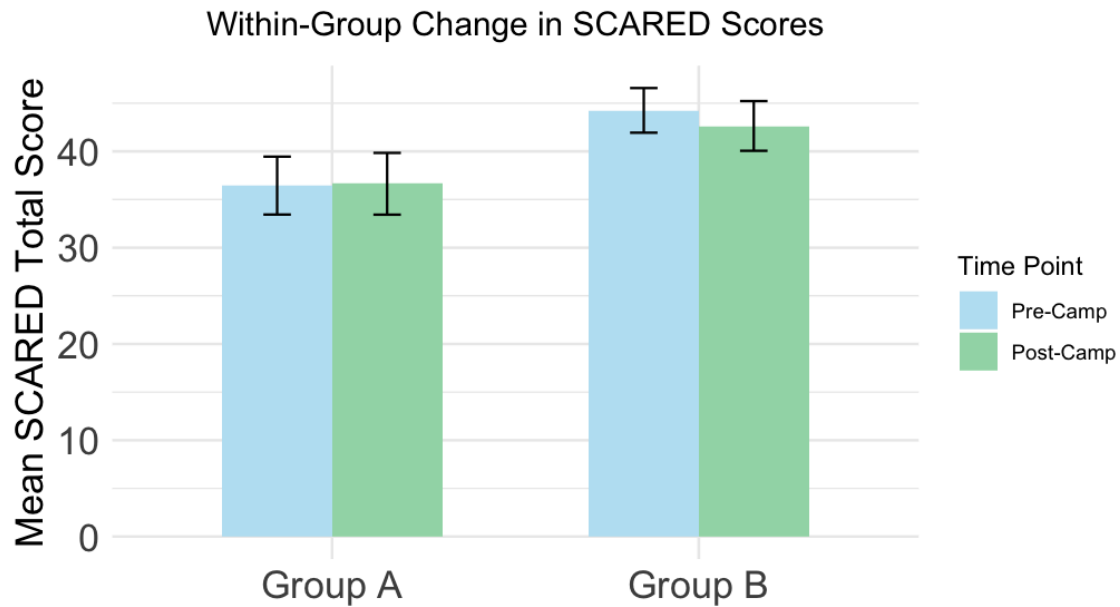


Figure S4B. Pre-post camp changes are shown for the whole group.

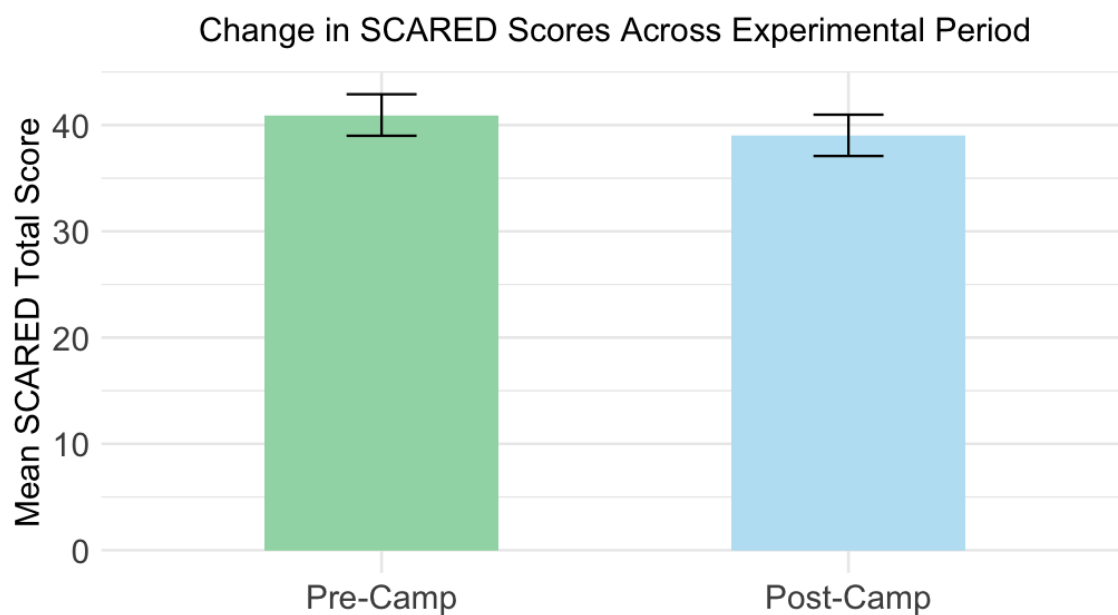


Figure S5. Change in Flourishing scores over time.

Figure S5A. Changes during the “waitlist” 2 weeks before camp (Group A, left) are contrasted with pre-post camp changes for group B.

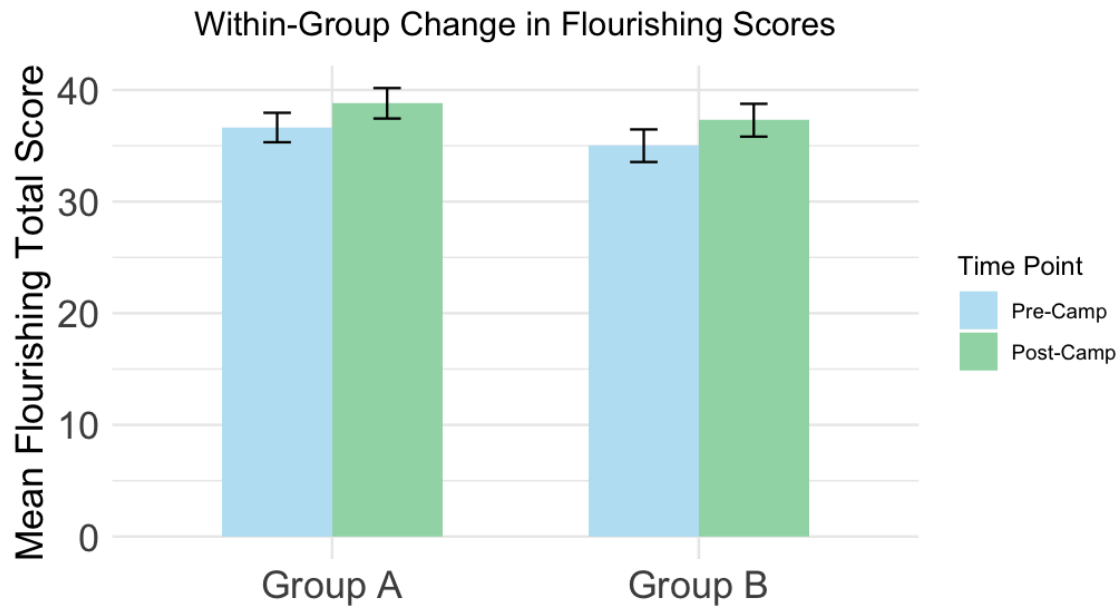


Figure S5B. Pre-post camp changes are shown for the whole group.

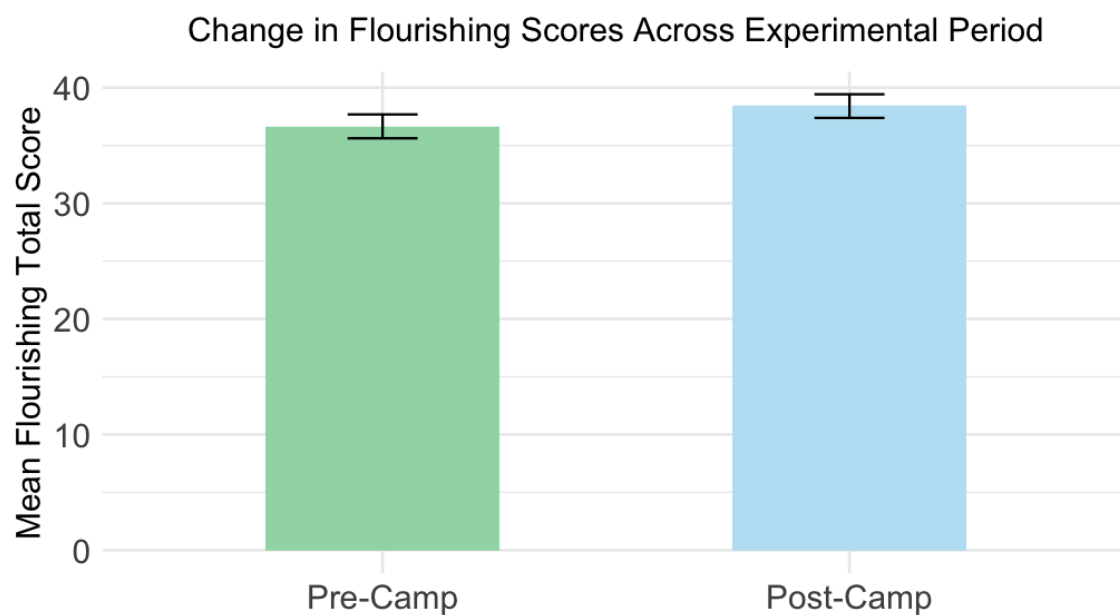


Figure S6. Change in Zest for Life scores over time.

Figure S6A. Changes during the “waitlist” 2 weeks before camp (Group A, left) are contrasted with pre-post camp changes for group B.

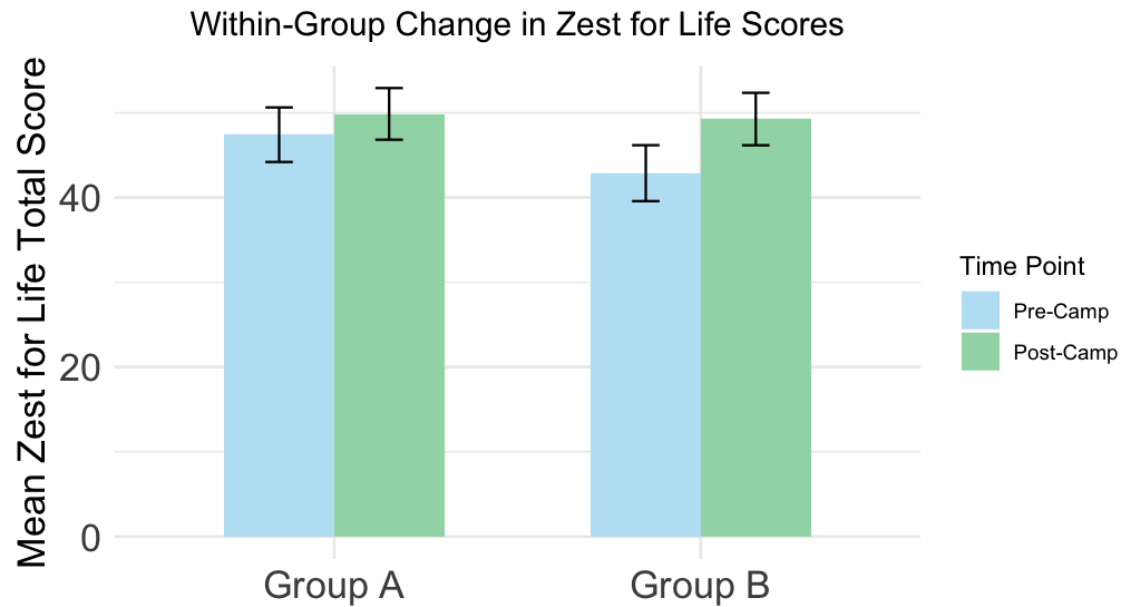


Figure S6B. Pre-post camp changes are shown for the whole group.

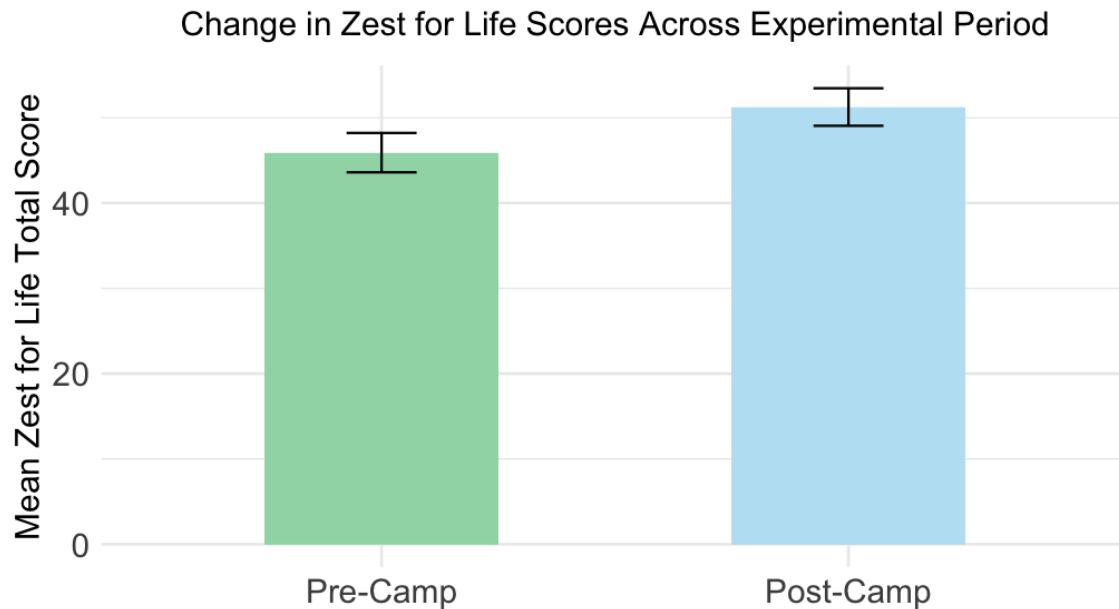


Figure S7. Change in Satisfaction with Life scores over time.

Figure S7A. Changes during the “waitlist” 2 weeks before camp (Group A, left) are contrasted with pre-post camp changes for group B.

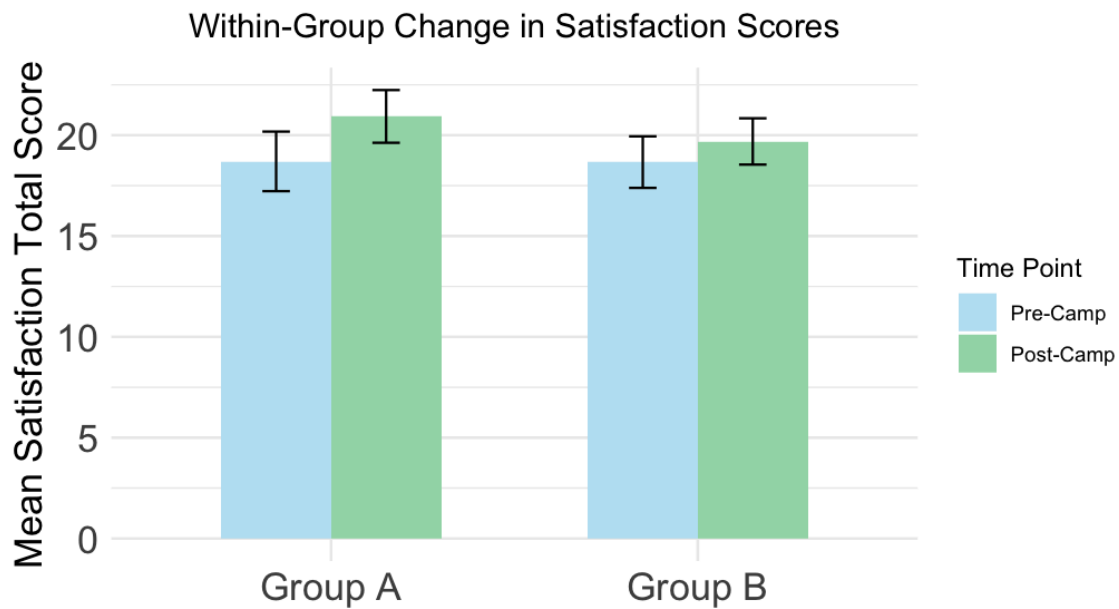
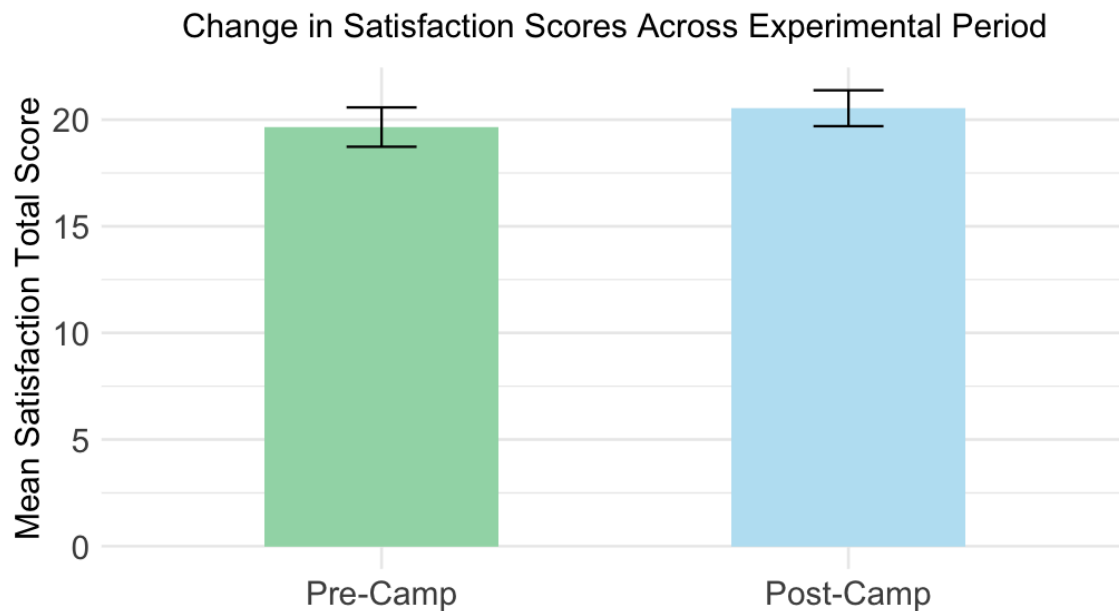


Figure S7B. Pre-post camp changes are shown for the whole group.



Social Connectedness Scale (SCS) results.

Since the SCS was only collected in 2023, these results are considered preliminary. For the 2023 subsample, as shown in Table S6, SCS scores did not change significantly during the before-camp waiting period, significantly increased pre- to post-intervention and then decreased again during the two-week follow-up period. The active versus waitlist comparison was not significant (Group B vs. Group A parameter estimate -3.64, confidence interval [-8.90, 1.62], $p = 0.17$), but piecewise models also indicated a significant increase in SCS scores pre- to post-camp (parameter estimate 5.01, confidence interval [1.45, 8.54], $p = 0.007$). Exploratory post-hoc correlation tests to measure the relationship between connectedness and mental health symptoms suggested that increases over time in SCS scores correlated with decreases over time in scores for child-reported CDI ($r = -0.17$, $p = 0.40$), parent-reported CDI ($r = -.27$, $p = 0.17$), and SCARED ($r = -0.31$, $p = 0.12$). Although not significant, the direction of this relationship suggests that future research (with larger sample sizes) should investigate social connection as a potential “key ingredient” of Creativity Camp’s positive effects.

Table S8: Paired T-tests for three different two-week time periods. We present the results of the three separate paired t-tests, probing changes across three different 2-week epochs: the pre-post camp changes observed in the full cohort; the changes during the 2 weeks before the start of camp; and the changes in the two weeks after camp. A positive value for change signifies an increase in feelings of connectedness. Significant findings are bolded.

Clinical Outcome	2-week period	Mean of Differences	95% CI for the Difference	Test Statistic t(df)	p Value	Cohen’s d
SCS (Only summer 2023)	Pre-post camp	6.40	(-10.14, -2.66)	-3.50(29)	0.002	0.64
	Before camp	-0.51	(-2.89, 1.86)	-0.44(28)	0.66	0.08
	After camp	-2.79	(-5.40, -0.18)	-2.19(28)	0.03	-0.40

SCS = Social Connectedness Scale