Searching for the science behind art therapy

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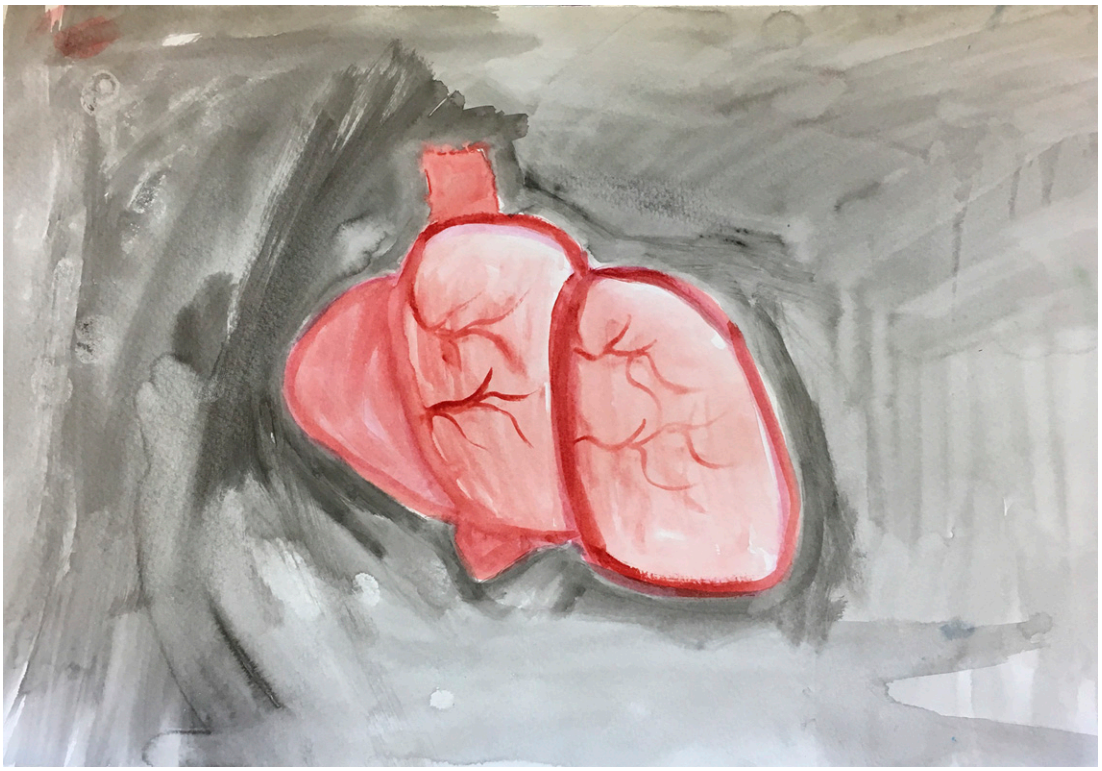
John sat hunched over, ears red, cursing the paint under his breath. A war veteran not an artist, John (not his real name) hadn't painted with water colors before. But he and seven other combat veterans of the Afghanistan and Iraq wars weren't trying to master a new artistic medium. They were all seeking relief from posttraumatic stress disorder (PTSD) through a form of psychotherapy called art therapy.

Art therapy helps people "tap into aspects of the self and the psyche that aren't always accessible," says Juliet King, an associate professor of art therapy at George Washington University. Typically masters-trained and board-certified, art therapists prompt patients to create with clay, paints, and other visual arts media. They talk with patients about the artwork and the patients' experiences. Their aim is to ease the symptoms of a wide range of mental health challenges—from eating disorders and anxiety to Alzheimer's disease and depression.

The efforts of King and others make one thing clear: Art therapy often appears to work. The question is why. Why might creating abstract art from papier-mâché and pastel help access, explicate, and even soothe the pain of a traumatic experience or condition? Despite efforts by scientists and art therapists, scientific answers remain elusive. The effects of art therapy, an inherently subjective activity, are difficult to test.



Art therapists use a range of visual media to help patients verbalize and address the pain of traumatic experiences. This watercolor painting of a heart without arteries captured one combat veteran's state of mind, helping him grapple with feelings of being disconnected. Image credit: "John" (artist) and Juliet King (Indiana University School of Medicine, Indianapolis).

Military service members at NICoE at Walter Reed National Military Medical Center use masks to express the hidden wounds of war. Image credit: the National Intrepid Center of Excellence.

But King and others are starting to build bridges between art therapy and neuroscience in the hopes of gaining new insight into the approach. If successful, their findings could lend further credibility to the field and possibly even help tune the art therapist's toolkit to more specific targets in the brain.

Losing Control, Gaining Insight

John's frustration didn't go unnoticed by the group, recalls King, who co-led this 8-week program at a Midwest VA Medical Center in 2014. When King asked him if he was OK, he smiled and said he was fine. Another group member said, "Really?" and John confessed that the watercolor was "hard to control." King said that it wasn't just him—people often find watercolor paints difficult to manipulate on the page. "This is what I do all the time," she recalls him saying after some thought. "Things aren't OK, and I say that they are."

King points to John's case as an example of how art therapy works. "He didn't seem to think much about what he was making. He just recognized that he couldn't control it," she says. "Then he could talk about it, and with the help of the group and the therapist, he could dialogue about himself in response to the work." The general aim: expose and then treat emotional wounds.

Another approach does so by asking patients, often those with PTSD, to craft papier-mâché masks that stare back at them—frequently with harrowing expressions. Instilling fears and emotions onto a face helps them explore a complex mix of feelings. "Something about the mask itself encompasses identity," says art therapist Melissa Walker of the National Intrepid Center of Excellence (NICoE) at Walter Reed National Military Medical Center in Bethesda, MD. Walker notes that the masks may allow service members to "visually express the invisible wounds of war and the effects their injuries have had on their identities." According to Christianne Strang, president of the American Art Therapy Association, the masks may help "directly express the dichotomy between one's internal experience and what one shows to the world." It may be, she adds, that the experiences of a soldier, or any trauma survivor, are so extreme, that there's an exceptionally strong divide between "the internal and what must be projected externally in order to function in society."

The Need for Proof

But whether masks or abstract watercolors, proving how and why art therapy approaches are effective is a complex endeavor. Despite decades of success stories, scientific evidence that art therapy works is hard to come by. And explanations for exactly what happens in the minds of patients are even more elusive.

Art therapy arose in the United States and Europe in the 1940s. Some of the earliest practitioners treated World War II veterans experiencing "shell shock." The Museum of Modern Art in New York City, for example, offered classes for veterans interested in exploring a variety of artistic media with therapists, from drawing and painting to metalwork and sculpture (1). Today, art therapy has its own master's level training program and relies on a unique set of tenets and practices.

One core tenet, though not yet scientifically proven, is that different art media activate different brain regions. "Less resistive media like water color or clay [are] going to tap into more emotional centers," explains King. "More resistive media—pencils, rulers, building something 3D—[are] going to utilize more cognitive processes."

Another tenet, also not yet scientifically proven, is that a patient's work often contains symbolic meanings, and these reflect memories and emotions that are difficult to access with words alone. One of John's watercolor paintings, for example, depicted a heart without arteries. "My heart doesn't have them," King recalls John explaining to the group. "I'm completely disconnected." Creating art may even help patients regain a sense of self-worth. "I really didn't think I could do anything to contribute to society anymore," recalls Harry Wingfield, who attended art therapy sessions with Strang after being diagnosed with AIDS in the early 1990s. Wingfield credits art therapy with giving him the confidence to start a new job once his health improved. One of his pieces ultimately became an AIDS quilt panel in remembrance of his best friend.

Case studies do seem to suggest the treatments are effective. A 2014 review of 16 case studies and small experiments exploring art therapy as a treatment for dementias found evidence suggesting that art therapy may ease neuropsychiatric symptoms, raise self-esteem, and improve social behavior (2). But this evidence didn't offer definitive proof. "There weren't enough studies to make a claim, and what there were,

were relatively small and anecdotal," says review author and neuroscientist Anjan Chatterjee of the University of Pennsylvania.

More scientific evidence could expand the reach of art therapy. "To have the science support what we observe as beneficial," says King, "will help us to have a seat at the table in terms of larger collaborative efforts to treat disease and ameliorate pain."

"If we understand how it works, it can make the treatment itself more effective," says Strang, who is also a behavioral neuroscientist at the University of Alabama at Birmingham. She notes, for example, that art therapists could further fine-tune which art supplies to offer which patients if they knew how each artistic medium triggered specific emotional or cognitive centers in the brain.

History suggests that more scientific rigor is not an impossible task. Years ago, psychotherapy faced similar arguments casting doubt on the feasibility of rigorous clinical trials because treatments were personal, variable, and depended on the therapist, notes Myrna Weissman, chief of clinical and genetic epidemiology at Columbia University's New York State Psychiatric Institute. "There is no reason why the efficacy of art therapy could not be tested just like psychotherapy," she says. According to Wen Chen of NIH's National Center for Complementary and Integrative Health (NCCIH), the study of psychotherapy advanced once the relevant variables were standardized. Chen sees great potential if the art therapy community can engage more sensory, motor, and cognitive neuroscientists in "conceptualizing and hypothesizing the underlying mechanisms."

A Catch-22

But enlisting more neuroscientists hasn't been easy. "We are in a catch-22 situation that is making the research difficult to even start," says Chen. As branch chief of NCCIH's basic and mechanistic research programs, Chen says she'd like to fund more art therapy studies.

The challenge: art therapy engages many different parts of the brain. And it's hard to define a cogent study that can pinpoint with any certainty whether it's the visual, cognitive, or motor component that really matters, says Chen. A study that could disentangle all of these pieces and their interactions would require many controls. "It's too complex to study in a pilot way," Chen explains, "and because you don't have a pilot study, you don't have a very good foundation to do a larger study."

The relative importance of the relationship with the therapist is also difficult to test and control for. All therapists are different, as are their relationships with patients. Some patients, for example, frequently engage with the art therapist while crafting their pieces whereas others rarely speak. "It's very difficult to create larger empirical studies with control groups based on the nature of what this work is," says King. "Art making and the creative process tend to be very subjective and personal."

Bridging Fields

Despite these challenges, some recent work has shown promise—although sample sizes remain small. In a 2014 study, Girija Kaimal of Drexel University, an art therapist who also holds a doctorate in human development and psychology, investigated the effect of a single 45-minute art therapy session on stress in 39 healthy adults (3). She and her team sampled the saliva of participants before and after the session to test levels of cortisol, a stress-related hormone. For about 75% of participants, cortisol levels went down immediately after art therapy.

In a 2010 study, researchers at National Jewish Health in Denver tested the effect of seven weekly art therapy sessions on children with asthma (4). Although asthma is a physical condition, the stress of living with it can also have an effect on children's mental health. A randomized controlled study of 22 children found that those who received art therapy showed greater improvement on tests that quantify anxiety levels and quality of life, even 6 months after treatment.

King, who holds an adjunct associate professorship in Indiana University School of Medicine's neurology department, is also beginning to explore not whether art therapy works but how. In 2017, she organized an international symposium that brought neuroscientists, including Chatterjee, into conversation with art therapists. The aim was to develop a roadmap for probing the neural underpinnings of art therapy. One of the major themes was how neuroscience technologies could illuminate the ways in which art therapy changes the brain.

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—Juliet King

In a 2017 pilot study, King worked with her Indiana University team to explore whether different patterns of brain activity occur when people engage in art making versus rote motor tasks (5). They took EEG readings of 10 healthy participants before and after they worked with chalk pastels and then before and after repeatedly tossing a coin and then rotating a pencil. Art making enhanced brain waves across both hemispheres more than the rote motor tasks.

In another recent pilot study, Kaimal and colleagues studied 26 subjects using functional near-infrared spectroscopy (fNIRS) to explore how coloring, doodling, and drawing affect brain activity. fNIRS uses infrared light to track blood flow in the cerebral cortex. "By tracking blood flow, we assume that that part of the cortex is being activated," explains Kaimal. Like EEG, the fNIRS neuroimaging tool can log brain

activity while a participant is in the act of art making, as opposed to being immobilized in an fMRI machine. The team found that all three creative acts increased blood flow in the medial prefrontal cortex, part of a reward circuit in the brain (6).

Facing Your Fears

In the case of the masks, Walker and her team found that service members with higher PTSD scores were more likely to depict psychological injury and trauma whereas those with lower PTSD scores were more likely to depict themes that suggested a sense of community, such as patriotic images. In collaboration with NICoE's neuroimaging department, they conducted a pilot study using fMRI to study brain activity in 10 service members with chronic mild traumatic brain injuries (7).

Service members who had depicted injury and trauma in their masks had less activity in a neural network known as the task-free default mode network, which tends to be active during periods of low stimulation—hence, suggesting that their minds were less at ease when at rest. And the patients' thalamus, which processes information and is known to get overwhelmed after trauma, had less connectivity with other brain regions.

But fMRI required that the participants remain immobile. Hence, Walker captured brain activity at a single time point in the week after service members made masks. In the future, she and her team would like to use more mobile neuroimaging techniques that would allow them to observe the brain before, during, and after mask making. "We are interested in the moment when a service member begins to psychotherapeutically process the meaning of his or her mask with the art therapist," says Walker, who believes that the keys to healing entail not only the self-exploration during art making but the relationship with the therapist that allows service members to open up and discuss their experiences.

For now, King has no scientific proof that John's watercolor session helped. But she did witness a change. When John started the session, he was hunched over. When he finished, he sat tall. "He learned how to use less paint and to create something that had a specific form," says King, who plans to pursue a PhD in translational health sciences so that neuroscience better informs her art therapy. "For a person who is grappling with avoidance and numbing and nightmares and all of the other agitations—the symptoms that go along with posttraumatic stress—to be able to control something at your own volition in an easy, calm, supportive way, is huge."

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