

Brain on Art Therapy-Understanding the Connections Between Facilitated Visual Self-expression, Health, and Well-Being

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1 Artistic Influences: Nature, Nurture, and Heritage

When I was a child, we lived in India and my mother, as was typical for her generation and upbringing, was a stay-at-home wife and mother. It was not her choice, but life circumstances precluded her from pursuing many professional dreams. Despite (or perhaps because of) these limitations, my mother found outlets for creative self-expression around the home. She often wrote little narrative notes and stashed them away in her jewelry case, embroidered pillow cases, sewed clothes, and knitted sweaters for my brothers and me. In addition to these pragmatic creations, she did one thing that has always stayed in my mind: She would take the tops of carrots that were being prepared for cooking and place them in a shallow bowl with just enough water to cover the tops. Slowly the carrot tops would sprout the most beautiful leafy structures, and these would grow to be a few inches tall: fine, bright green leaflets that brought a contrast to the orange carrot top and looked particularly stunning when filtered through the sunlight on the kitchen window sill. This art installation although aesthetically beautiful, served no practical purpose. It was simply an expression of creativity: an up cycling through creative re-creation of kitchen vegetable waste. These early exposures to creative acts taught me that art could be a part of everyday life, an outlet for self-expression, and that aesthetic beauty generated from the simplest of natural sources could bring joy.

I went on to learn many of the art forms practiced by my mother at home, and other traditional forms of expression including dance and art-making were a part of my life for as long as I can remember. When I was a child, I frequently missed school because of a series of illnesses, but my art-work was there in my stead. Working with crayons and

paper at that time was my way to communicate with adults around me. Art went on to play a dominant role in my life when I won recognition in art shows and design school. Art then took on a different role when I went on to get my master's degree in art therapy. It further expanded in scope from artistic practice and personal wellness to professional research as I got my doctorate and examined how art and visual story-telling narratives relate to all aspects of human development.

In my present work in the arts, health, human development, and well-being, I am intentionally trying to systematically understand what I might have implicitly sought and experienced in earlier years. The questions I explore include the following: Is art related to beauty and to that which gives us joy? Is beauty essential like food, drink, and social connection? Is it the pursuit of happiness manifested in different forms in all parts of the world? Could the desire for beauty, to be surrounded by elements of nature, be an innate force, a way to be? Is beauty essential for a good life? Do we instinctively create, seek, and replicate what is beautiful to us?

2 Receptive and Expressive Art-Making Experiences

The experience of art-making is ubiquitous in human society and can broadly be divided into two categories: (1) receptive experiences, such as those that involve viewing or experiencing art and (2) expressive experiences such as those that relate to creating or making an art product. But what is the purpose of either aspect? Why do we choose to view or make art? These questions remain largely unanswered and continue to intrigue researchers.

Several scholars have examined the purpose and role of art in the human life. Some evolutionary theorists [13] argue that art is simply a by-product of the human brain's expanded processing capacity, a spandrel that is created simply as a result of improved cortical abilities. This

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hypothesis is rejected by most scholars who argue that art has several specific roles in society. Dissanayake [9] has referred to arts engagement and art-making as a process of *making special* the everyday and the ordinary by commemorating special events, milestones, and landmarks in the life of an individual or community. Based on observations of traditional communities and viewing art from an anthropological perspective, she argued that art-making is part of human development and history and is not separate and distant, as we have considered the role of the modern artist as the individual expert with works placed in museums. In examining the historical context and role of art-making, Dutton [11] further argued that art-making is not a cultural artifact; rather, it is part of human evolution and a means to capture the imaginative qualities inherent in human functioning. He referred to art not as a technical concept confined to a cultural context but rather as a universal phenomenon of human evolution like language, tool making, and kinship systems. He defined a piece of art as having 12 essential qualities. These include (1) direct pleasure, (2) skill and virtuosity, (3) style, (4) novelty and creativity, (5) criticism, (6) representation, (7) special focus, (8) expressive individuality, (9) emotional saturation, (10) intellectual challenge, (11) art traditions and institutions, and (12) imaginative experience. He argued that the arts are different from activities like sports where there is typically no imaginative experience because the end result of a win or loss is what guides interest in the game. It can be argued though that this is not necessarily a valid critique because games and plays can also be demonstrative of imaginative variations within the core construct of a winning score or loss. Dutton [11] further asserted that art is embedded in a context but is not necessarily always reflective of that context; rather it is the creation of individuals or communities who happen to live in that moment. Recent scholarship in human development and education [16] suggests that working with the visual arts helps us develop a craft (learn to use and care for tools); engage and persist (to stay with a task and persevere to complete it); envision (imagine possibilities not yet seen); express (convey ideas nonverbally); observe (learn to see effectively); reflect (learn to think through with self and others); stretch and explore (learn from mistakes); and learn the artistic practice and professions.

Child developmental theorists like Viktor Lowenfeld have identified stages in artistic development similar to those in cognitive and psychosocial development. In examining millions of drawings, a fairly universal trend was found [28]. Children started with scribbling (up to 2–3 years of age), moved on to create simple images of faces with arms and legs coming out of the head (2–4 years), then added additional details of the neck and formed body parts (4–6 years), added the environment using baselines and skies (6–8 years), added scenes with people and places (age 8 onwards). Art

therapists have noted from clinical experience that many children move away from drawing around the age of puberty because they become increasingly critical of their artistic skills and choose not to continue drawing if they do not perceive themselves as being skilled in the visual arts.

3 Art-Making and the Predictive Brain

A common popular perception of the brain is that it is analogous to the computer: accepting and processing information received from the five senses. It is increasingly accepted now that the human brain is not analogous to the computer but is rather a prediction machine [5]. To maximize survival options, the brain is inherently wired to imagine possibilities for the future that enhance safety and resources and minimize risk and danger. We also know that the brain is wired to understand and create stories [12, 36], which is possibly a mechanism to problem solve, learn vicariously, and retain relevant lessons and information. Stories typically follow a chronological sequence where preceding events lead to culminating events and there is a resolution of meaning generated at the end. As human beings, we have an ongoing script for our own stories with new incidents adding to, refining, or defining our stories. Depending on our developmental history and life experiences, we might generate a story that aligns with our interaction with the world. For individuals who are facing stress and adversity, both acute and chronic, the story has the potential to share recovery and resilience or trap the individual in nonrestorative storytelling.

In brain imaging studies, investigators have demonstrated the activation of the prefrontal cortex during visual arts activities. For example, Chamberlain et al. [6] used magnetic resonance imaging (MRI) scans to study the brain regions associated with drawing skills and artistic training. Their findings suggested that being able to draw from observation was associated with an increase in gray matter density in the left anterior cerebellum and the right medial frontal gyrus in the prefrontal cortex. Schlegel et al. [32] showed that 3 months of art training resulted in changes in prefrontal white matter. In this study of youth who were art students, art-making was associated with plasticity in neural pathways, increases in creative cognition, and to mediate perceptuomotor integration. Bolwerk et al. [3] found a clear difference between producing art compared to viewing art. Visual art production was shown to improve the functional connectivity in several brain areas, particularly between the parietal and frontal cortices, as well as to cause psychological resistance to change [3]. Although these findings suggest that visual art production results in stronger brain connectivity than cognitive art evaluation or viewing art, evidence shows that even passive engagement in art affects the

prefrontal cortex [3]. For example, when a person is viewing art, a reward circuitry is engaged that activates the ventral striatum, including the nucleus accumbens, along with the interconnected medial prefrontal cortex (mPFC) and the orbitofrontal cortex and amygdala [26]. Using functional MRI technology, Lacey et al. [26] found that art imagery alone activated the reward circuitry whereas matched non-art images did not. Likewise, activation of the mPFC, along with the rest of the reward circuitry, occurred while the individual was viewing beautiful visual images or architectural spaces [7].

In addition, it is well established that the visual and aural systems are the most developed of our senses (more so than smell, taste, and touch) [11]. Visual processing has been estimated to take up tremendous resources, and is considered our dominant sense including a dedicated area of the brain (occipital lobe) and specialized cells and pathways that track and process visual information [31]. Visual systems are hypothesized to have become a dominant sense especially since human beings evolved to be upright and could see considerable distances. As a result, visual expression, processing, and data could be a tremendous source of information about human experiences and mental states. Dutton asserted that “the greatest works of art are not necessarily the most novel or unusual. They do tend to be somehow the most personal... a strong sense of individual personality (p. 247). To me, this statement illustrates the implications of authentic self-expression, which is what art therapy seeks to do: encourage creative self-expression that represents the authenticity of the individual in the visual representation of the artwork and encourages sharing and re-storying the personal narrative towards health through the facilitative therapeutic relationship.

4 Art-Making in the Context of Art Therapy

Art therapy as a field of study originated in the twentieth century, simultaneously in many parts of Europe and America in response to the needs of clinical populations who were not being served effectively with traditional approaches to medicine and education. Art therapy developed most powerfully with military service members affected by post-traumatic stress syndrome (formerly referred to as “shell shock”) and with children with developmental and behavioral challenges. Over the past several decades, art therapists have gone on to work with a range of populations including the elderly, those affected by adversity and violence, individuals facing discrimination and marginalization and relational, developmental, or psychosocial challenges.

The American Art Therapy Association defines art therapy as an integrative mental health and human services profession that enriches the lives of individuals, families,

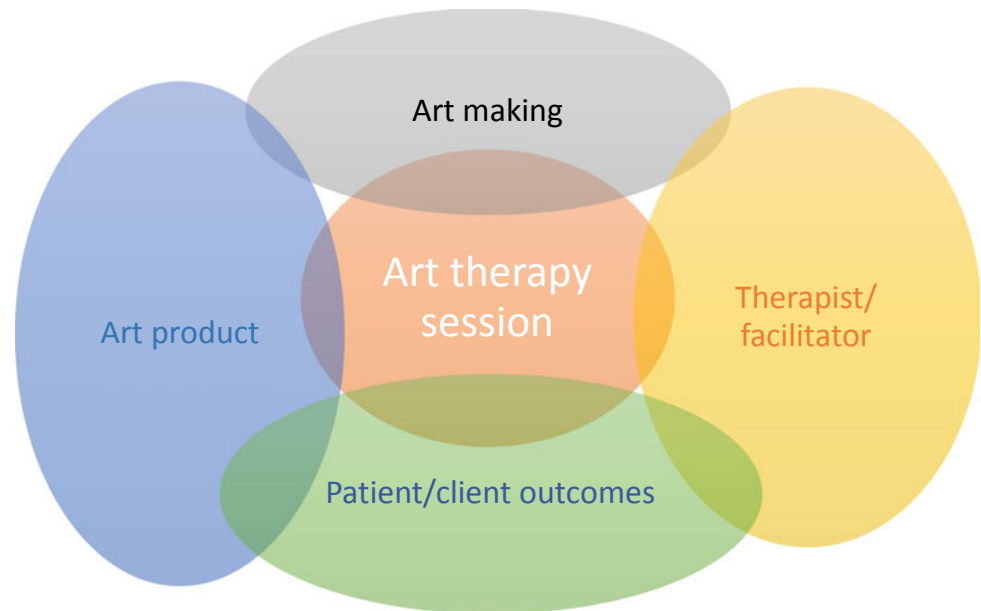
and communities through active art-making, creative processes, applied psychological theory, and human experience within a psychotherapeutic relationship [1]. Art therapists are masters-level trained clinicians who are proficient in art-making and in facilitating expression with a deep understanding of human psychology and psychopathology. There are now more than 6000 art therapists in the United States and 38 credentialed programs that prepare masters-level therapists. The majority of art therapists are clinicians, and the field now offers more than five doctoral programs to further deepen the research base in the field.

As such, we can argue that art therapy taps into the brain’s innate predictive and narrative capabilities by enabling individuals to imagine alternate and potentially adaptive and healthy personal narratives. An art therapy session can include groups or individuals and can be short term (on average 1–2 sessions) or longer term (spanning few weeks to several years). Art therapy treatment, depending on patient/client goals, can last a few weeks to several years.

Art therapists serve a range of populations including those with mental and physical illnesses, developmental challenges, and differential abilities and those who have experienced adversity and trauma. A typical art therapy session involves art-making, review of the art product, and verbal processing (as applicable and as the patient/client is able) with a masters-level trained art therapy clinician. The sessions can include individual clients/patients or a group. Figure 1 highlights the components of art therapy including the therapist, the patient/client, the art-making process, and the art product. The components are intentionally shown as intersecting to highlight the interlinking of all four aspects in a session.

Art therapists are often asked how they differ from artists in residence, art educators, or arts facilitators. A core difference lies in the focus on the expressive process and facilitation of the session in a way that supports the development of the individual. Art therapy is distinguished from therapeutic art-making, which can be facilitated by non-clinicians to promote overall health and well-being. Note that a core assumption in art therapy is that everyone is an artist, and art is defined as visual self-expression. Art-making does not judge the aesthetic qualities in the traditional sense; rather art-making is treated as a form of self-expression that allows for communication, learning, and awareness. Art therapists are attuned to the psychosocial needs of patients and clients in the sessions and have a specific skill in facilitating artistic expression that promotes individual strengths. Although patients/clients are not expected to have artistic skills, artistic/expressive knowledge is essential to art therapists’ clinical practice. This is one of the key differences between art therapists and artists/art educators who might be more focused on the artistry or quality of the artistic product. The art therapist typically is

Fig. 1 Components of art therapy



less concerned with the quality of the product than with the process and reflections on the process. The art therapy session is set up as a space that is nonjudgmental about the artistic product; it is a place to express oneself visually in order to learn about one's self and move towards adaptive choices and behaviors and reduced psychopathology in a safe space. The art therapist might work with the patients/clients in individual sessions or in groups based on treatment goals that might include interpersonal functioning, emotional regulation and awareness, physical functioning, or cognitive functioning (e.g., focus and memory). We know that when individuals go through disruptive abusive or traumatic experiences their ability to process sensory information effectively is hampered. We also know that the arts can evoke intense emotion and self-expression for highly stressed or psychologically vulnerable individuals; a lack of adequate support and facilitation can lead to harmful outcomes. Art therapists therefore work with individuals struggling with physical and psychological difficulties to imagine, explore, try out, and finally live out healthier and more adaptive lives.

A question then arises: Is art therapy only for individuals with mental illness conditions or can it be relevant to healthy or normal populations seeking options for well-being. Here I suggest a home-improvement analogy. Many things in the home, for example, can be fixed by the residents of that home; e.g., changing a lightbulb, cleaning and scrubbing dirty floors, drilling nails into walls. Some people might be skilled in doing things like replacing floors and painting walls. However, when we move into the realm of home improvement projects that require more experience and expertise, we are better off hiring an expert. For things like electrical work, roofing, and plumbing, unless we know

what we are skilled in, we might do more harm than good by trying to fix these things ourselves. Applying this analogy to art therapy, I argue that some human beings are resourceful, resilient, and capable of taking care of aspects of themselves that need healing and restoration. Most of us can respond effectively to the everyday challenges and adversities of living. However, when the challenges are overwhelming, a trained expert, a clinician, can help address the challenges and problems more effectively than we can by trying to diagnose the problem and fix it properly. Even for things that we might be able to do adequately, working with an expert gives us exposure to the ways in which even simple tasks can be accomplished with beauty, proficiency, and effectiveness. Thus by analogy, if you have artistic skills, practice them by all means, but note that an art therapist can offer you a perspective and facilitate development in a way that cannot be accomplished without the expertise that he or she brings to the situation.

5 What Makes Art Therapy Therapeutic?

The therapeutic power of creative expression in an art therapy session lies in the multidimensionality of the arts: the nonlinearity and timelessness that allow the process to hold several metaphors, associations and meaning concurrently. This creative expression and the unlocking of the imagination lead to a sense of agency and possibility that might previously not have been available to a patient/client. Each condition or cluster of symptoms might result in different mechanisms and pathways of change.

The pathways and mechanisms of change vary by individual, their clinical needs, and the context of care. For

example in the case of an individual struggling with feelings of incompetence and inefficacy, the process of art-making involves problem-solving and serves as a trial run for practicing the ability to gain mastery. Thus, for example, for individuals who have experienced trauma, verbal expression is often not an option [34, 35] since the verbal expressive part of the brain tends to be impacted [30]. Thus, being able to say the unsayable becomes really critical in such situations. In other cases with elderly individuals, social isolation might be an issue; thus the emphasis might be on social integration and expression through the art therapy process. Similarly, for an individual struggling with the ability to manage and contain emotional reactions and the process of effectively channeling these struggles through sublimating the emotions in the artwork (instead of harming self or others) in the art therapy session could be the therapeutic element. The therapeutic interaction and opportunity to create also offer opportunities to imagine new possibilities, learn new things about oneself, and experience the rewards of effort-based behaviors [27]. Effort-based reward systems are dopaminergic pathways that connect reward centers with human actions and choices to “make” and “do” things in their environment. Lambert [27] argued that humans evolved to be active and to make things, and just these acts can be ways to release dopamine in the brain and experience positive emotions.

To share an example, a patient came in recently for a session of art therapy as part of one of our research studies on arts and health. He had had surgery for a brain tumor that left him with limited control of his dominant hand. He would hold his right hand with his left hand at the beginning of the session to guide it. In his case, art therapy was a form of relaxation and social reconnection. Once he felt comfortable, relaxed, and safe, he also gained a sense of mastery and self-efficacy. At the end of the session, he was able to use his right without support and to write freely. I asked him if he noticed this change and why he thought it had occurred. His response was that he felt less anxious, he felt good, and he was relaxed at the end of the session; all of these factors helped him with his ability to write and to use his right hand. We could argue that this was the result of feeling comfortable in the session, which could occur in any therapeutic context. However, given that art therapy involves verbal interaction and some form of “making,” we might conjecture that multiple activities, processes, outcomes, and systems are at play in a session. The outcomes of individual sessions might be focused interpersonally whereas the outcomes in group art therapy sessions might result in more interpersonal and group transformations. In my workshops and presentations, I find often that group art-making breaks through the proverbial ice really quickly and catalyzes the activation of interpersonal interactions and socialization. The art product offers an externalized object for discussion and mutual

engagement as well as a rich resource for learning about each of the group members.

A question that is often asked of art therapists is which patients/clients are best served by the unique contributions of art therapy. The evidence from clinical practice indicates that art therapy is particularly suited for patients who have experienced trauma, identity struggles, physical and psychological stressors, and developmental challenges. Trauma can be overwhelming, which affects how it is integrated into long-term memory and in turn into the personal life story narrative. For individuals who struggle to articulate their lived experiences, challenges, and struggles, art therapy can help initiate expression that leads to reflection, articulation, and a better understanding of their experiences, which allows them to better integrate their experiences into a life narrative that feels empowering and manageable. For example, in working with pediatric oncology patients, Council [8] argued that art therapy promotes self-discovery and emotional and sensory integration that allow young people a safe arena in which to practice skills that can help them confront and transcend life’s challenges.

In my own clinical interactions, I remember a young woman who started the session feeling a deep sense of loss of hope and covered the page in black ink. She viewed the image for a while and then added cherry blossoms that were reminiscent of the time of the year. Through engaging in an authentic representation of her emotional state at the start of the session, she was also able to create a layer of new imagery that brought her to the physical present, contrasting the pink and white of the blossoms with her underlying darker state. Art therapy helps contain and externalize positive and negative emotions, thereby offering the patient or client an alternative visual perspective of his or her condition: breaking the cycle of rumination and providing hope for a possibly fulfilling future. See Fig. 2 for her artwork.

6 Brain-Based Research in Art Therapy: What Can We Track?

Several art therapists have developed frameworks for research in art therapy, including the expressive therapies continuum or ETC [17] and the CREATE mode [14]. The theoretical concept of the Expressive Therapies Continuum (ETC), proposed by Kagin and Lusebrink [17], incorporated the approaches to art therapy of several American art therapy pioneers. The ETC comprises three stepwise levels—kinesthetic/sensory, perceptual/affective, and cognitive/symbolic—interconnected by the creative level. The stepwise three-tiered structure of the ETC incorporates concepts from cognitive psychology and art education, namely, perception and imagery, visual information processing, stages of graphic development, and different expressive styles. It



Fig. 2 Artwork illuminating the process of shift in affect through the course of a session

has been hypothesized that the three levels of the ETC reflect three different areas of the brain in processing visual information [4, 29].

A more recent framework in art therapy is the CREATE framework, which demonstrates how the Art Therapy Relational Neuroscience (ATR-N) approach can support resilience in human beings [15]. The framework comprises of six principles included in the acronym CREATE, namely, Creative Embodiment, Relational Resonating, Expressive Communicating, Adaptive Responding, Transformative Integrating, and Empathizing and Compassion [14]. The framework integrates current knowledge of neurobiology with principles of art therapy that emphasize relational development through creative expression and embodiment. The CREATE framework is more grounded in neuroscience compared with the ETC; however, these are both theoretical frameworks developed from clinical experiences and from art therapists' knowledge of neuroscience but have not been empirically tested. Empirical research has been limited to a few empirical studies that have examined outcomes related to artistic skill, drawing tasks, and responses to clay manipulation.

Some findings to date with quantitative electroencephalography (qEEG) indicate that different art media result in different levels of brain activity and that these differences

are also associated with whether or not an individual is an artist. Belkofer et al. [2] investigated the differences in patterns of brain activity among artists and non-artists during the process of drawing. Results indicated that there was more activity in the left hemisphere of the brains of artists, whereas more activity was reflected in the frontal lobe of non-artists. This result may have been based on the fact that drawing was a new task for them and that stimulation in this area of the brain is a sign of learning. There was an increased presence of alpha waves for both the artists and the non-artists, indicating potentially relaxed creative opportunities generated by drawing tasks. Similarly, in a quantitative electroencephalographic comparison of working with clay and drawing, activation was noted in regions of memory processes, meditative states, and spatiotemporal processing [25]. King et al. [19] found that art-making resulted in overall increased EEG power compared with a rote motor task, highlighting that there are differences in brain activation in creative versus a pure sensorimotor-based activity.

Art therapy researchers have also focused on the relationship between art and mood states. For instance, art-making has been found to reduce cortisol levels [23, 22] as well as improve mood and self-efficacy [21]. Kaimal et al. [18] examined the outcomes of three different drawing tasks on reward perception as measured using functional near infrared spectroscopy, a technique that examines blood flow using infrared light and that can detect blood flow within up to 3 mm depth of the cortical surface. The underlying assumption in this study was that blood in the mPFC would indicate activation of a reward pathway in the brain. Participants were given three drawing tasks (coloring, doodling, and free drawing) spanning 3 min, each with intermittent rest periods of 2 min each. The findings indicate that the drawing tasks all activated the reward pathway of the brain compared with the no-activity rest conditions, with the doodling condition resulting in maximum activation. These findings are speculated to also mirror the theory of effort-based reward pathways [27] wherein making/creating are related to feelings of reward.

These studies highlight some preliminary work in examining the art-making aspect of art therapy. The relational component, the synchrony between the therapist and the patient/client, and the functional and structural changes that occur in the patient/client him- or herself remain to be better studied and understood. Research on interactional, existential, developmental, neuroscientific and creative processes remains limited because of the incomplete understanding of the processes involved and the complexity involved in measuring these attributes.

Opportunities for future research: The time is optimal for research in art therapy given its increasing visibility and the fact that many funding agencies in the United States, including the National Institutes of Health, the Department

of Defense, and the National Endowment for the Arts have issued calls for proposals. Many of the calls are not related to whether art therapy is helpful; rather, the calls are for studies to identify the mechanisms that make it effective. The clinical anecdotes and impressions have been well documented as have initial observational and evaluation studies indicating positive outcomes of art therapy [18–20, 24]. Further research is needed to isolate and identify the short- and long-term functional and structural contributions of art therapy in brain functioning.

Two potentially valuable research areas to pursue are positive emotions and reward perception. A consistent finding in art therapy research has been that art therapy enables individuals to experience positive emotions, often in unexpected ways, including through possibly effort-based rewards pathways. Some of the hormones released by the neuroendocrine system that have been associated with positive emotions include serotonin, endorphin, oxytocin, and dopamine. Serotonin is associated with feeling valued and with self-esteem. Serotonin is the basis of a class of antidepressants and possibly affects self-esteem and perceptions of value. Art therapists work to facilitate this sense of belonging and an inter- and intrapersonal sense of self. Dopamine has been implicated in a range of functions including movement coordination, reward perception, and, most recently [33], in responses to threatening stimuli. Together, these data highlight how dopamine in the mPFC can selectively route sensory information to specific downstream circuits, representing a potential circuit mechanism for valence processing. Dopaminergic reward pathways are overridden by the release of dopamine related to a perceived threat, highlighting the brain's focus on survival and anticipation of potential threats. This process relates the function of dopamine in anticipatory rewards as well since anticipating danger is possibly a way to respond effectively to that threat. Art therapy sessions could help patients regulate this response by better understanding potential triggers in the modern social environment and offsetting the threat with appropriate health-promoting choices. Endorphins are the human body's natural pain-killers. They are released often when an individual cries or after intense physical activity. Participants in art therapy sessions often report feeling temporarily pain-free when they have been deeply engaged in a session.

Oxytocin is understood to be a hormone that encourages relational bonding, primarily in mothers and infants. However De Dreu et al. [10] found that oxytocin can promote bonding sometimes in adversarial contexts including among warriors or tribal groups at war with an adversary. The relational bonding supports survival by making the individuals with heightened oxytocin levels care for and support each other (in-group love) even if possibly hating or wanting to kill an enemy (out-group aggression). Storytelling has also been found to release oxytocin as the narrator and listener [36]

engage in an empathic mutuality that engages several parts of the brain. Art therapists help patients and clients create narratives with and through the art-making process, often helping generate verbalizations that might previously have been absent or inaccessible due to histories of trauma and adversity that are known to inhibit narrative production [36].

Challenges and roadblocks in the field: Art therapy evolved as a clinical profession, and much of the knowledge in the field resides within the clinical impressions of experienced clinicians. Given this clinical focus, the profession has predominantly focused on developing masters-level trained clinicians rather than a sound evidence-based research base. Research in art therapy has been constrained by limited funding resources and the capacity of researchers in the field [19]. Given that there are about 6000 credentialed art therapists in the United States and only a few hundred art therapists with doctoral level training, there is a real limitation in capacity to conduct comprehensive, systematic research studies that capture the unique mechanisms and outcomes of the profession. In addition, given the lack of funding in the past, research has tended to be small in scale and done by individual therapists often at their own expense. Thus sample sizes have been small and the majority of the studies have been case-based descriptive summaries. This situation has begun to change because of the increasing recognition and new funding opportunities that have emerged in the United States through the National Endowment for the Arts, the National Institutes of Health, and the Department of Defense. The funding agencies recognize that the creative arts therapies have been effective in alleviating patient symptoms, especially in cases of individuals with long-standing chronic symptoms [24] but understanding of the mechanisms of change and of the generalizable outcomes based on larger population-based studies is limited. As art therapy clinicians and researchers learn to work in collaborative interdisciplinary groups, the evidence base is beginning to expand beyond case studies and small outcome studies to large cohort-based observational studies and randomized controlled trials.

In addition to systemic challenges, a specific problem in art therapy and brain-based research has been the difficulty in capturing the complexity of the session, which includes the artwork, art-making, verbal and nonverbal interactions between the therapist and patient/client, and all the unseen psychological and physiological changes happening internally among the participants in a session. Current brain imaging technologies can focus only on elements of the interaction and/or outcome, not on the all the multiple components that in combination lead to an effective session. Mobile brain/body imaging technologies are best suited for art therapy research because they allow for measurements in natural environments [18, 20]. As these technologies for measuring the response of multiple individual and multilevel

changes in human responses develop, including physiological and psychological measures, we will be better positioned to assess the processes and outcomes of an art therapy intervention.

7 Conclusions

In returning to the questions raised at the beginning of this chapter, scholarship to date asserts that art-making is a complex venture with many dimensions and levels of meaning to the human mind. In many ways, our lived experiences of the joys and rewards of art-making are far ahead of our abilities to understand why and how Art therapy integrates the relational facilitative interaction to art-making and thus adds an additional layer of complexity to this experience. Art therapy as a profession has a long-standing clinical history and, based on the foundation of clinical insights, is well positioned to conduct more empirical studies on how an art therapist-facilitated session can impact human physiological and psychological functioning. Clinical impressions of session duration, format, and dosage are key to determining how art therapy sessions can impact human functioning for optimal health and well-being. Brain imaging technologies are now beginning to capture functional and structural changes in patients/clients as a result of art therapy sessions. As imaging technologies develop in capacity and sensitivity, we will be better able to capture the multidimensionality of art and its role in understanding the human experience.

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