Executive Summary

NeuroArts Blueprint

Advancing the Science of Arts, Health, and Wellbeing

HEALTH, MEDICINE & SOCIETY PROGRAM
aspen institute

JOHNS HOPKINS
SCHOOL of MEDICINE

international arts+mind LAB
THE CENTER FOR APPLIED NEUROAESTHETICS

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About the NeuroArts Blueprint Initiative

The *NeuroArts Blueprint: Advancing the Science of Arts, Health, and Wellbeing* initiative is breaking new ground at the crossroads of science, the arts, and technology. Its mission is to cultivate an ecosystem for neuroarts, defined here as the transdisciplinary and extradisciplinary study of how the arts and aesthetic experiences measurably change the body, brain, and behavior, and how this knowledge is translated into specific practices that advance health and wellbeing.

To realize its potential, neuroarts must become a fully recognized field of research and practice, with educational and training pathways, dedicated funding, supportive public sector and private sector policies, effective leadership, well-crafted communications strategies, and infrastructure capacity. The *Blueprint* initiative is designed to put all of that in place. A partnership between the Johns Hopkins International Arts + Mind Lab Center for Applied Neuroaesthetics and the Aspen Institute's Health, Medicine & Society Program, the initiative engages leaders across a wide range of disciplines, as well as people with lived experience. Together, they are helping to drive the paradigm shift necessary to fully integrate arts and aesthetic experiences into activities that will advance individual and collective health across the planet.

More details are available at this website.

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At the core of being human, the arts are a vibrant path to health, community, and possibility.

December 2021

We are delighted to release the *NeuroArts Blueprint: Advancing the Science of Arts, Health, and Wellbeing*. Here you will find a roadmap to the future, building on the rigorous research and innovative practices that are already elevating the arts as a health-promoting tool for individuals and communities.

Scientific studies over the last 20 years are confirming what artists have always known intuitively: the arts can help in preventing, managing, and recovering from physical and mental health challenges; building more equitable communities; and fostering wellbeing through multiple biological systems. But to realize the full potential of these connections, we must cultivate a neuroarts ecosystem that brings together a diverse set of researchers, arts practitioners, artists, technology pioneers, local advocates, educators, funders, policymakers, and other stakeholders. The *NeuroArts Blueprint* is the action plan to make that happen.

This report is the result of an ambitious partnership between our two institutions, and we are proud to have supported this effort. The International Arts + Mind Lab Center for Applied Neuroaesthetics at Johns Hopkins is a multidisciplinary translation research-to-practice initiative that brings together brain scientists and arts practitioners to accelerate the field of neuroaesthetics, with the goal of amplifying human potential through the arts and aesthetic experiences. The Aspen Institute has a long-standing commitment to using both science and art as tools for building a just and equitable society. The Institute's Health, Medicine & Society program has earned a stellar reputation for convening influential groups of thought leaders, decision-makers, and the informed public to consider 21st-century health challenges and identify practical solutions for addressing them.

Many collaborators must work together to bring a report like this to fruition, and we owe all of them our appreciation. In particular, thanks are due to the cochairs of the Advisory Council: the renowned soprano Renée Fleming; Eric Nestler, who directs the Friedman Brain Institute at the Icahn School of Medicine, Mt. Sinai Health Center; Mike Paseornek, producer and former president of Motion Picture Production at Lionsgate; and Anna Deavere Smith, actress extraordinaire. We are grateful to them, and to all of the Advisory Council members who have given so generously of their time and insights to build this neuroarts framework.

This *Blueprint* is, of course, only the beginning of a long and important journey. Driven forward with intention, and particularly with a commitment to engaging *all* communities in the development and application of the neuroarts field, we believe this journey will truly be transformative for humankind.

Ron Daniels
President, Johns Hopkins University

Dan Porterfield
President and Chief Executive Officer, The Aspen Institute

NeuroArts Blueprint
Advancing the Science of Arts, Health, and Wellbeing

December 2021

Welcome to the *NeuroArts Blueprint: Advancing the Science of Arts, Health, and Wellbeing*. We are so excited to be launching this action plan to strengthen, formalize, and propel the emerging field of neuroarts and connect stakeholders across a vast and disparate landscape into a cohesive ecosystem.

In this report, you will learn a great deal about what is already happening in neuroarts—the many ways in which the scientific evidence documenting the role of arts and aesthetic experiences is transforming health and wellbeing for individuals and communities. You will also learn why the many advances need to coalesce into a robust transdisciplinary—indeed, extradisciplinary—field. Too much of the work currently underway in neuroarts is fragmented, a significant impediment to realizing its full potential. The time has come to bring together all of the stakeholders to implement a systematic and comprehensive plan for moving forward.

Our thanks go to the many partners who have brought us to this moment. We are indebted to AARP, the Aspen Institute, the Civil Society Institute, the Dana Foundation, the Ford Foundation, and Johns Hopkins University, all of which provided early support for this work. We are also extremely fortunate to have so many supportive members on our Advisory Council; their insights have been indispensable in building a foundation for neuroarts.

Thanks as well to project directors Susan Magsamen, executive director of the International Arts + Mind Lab Center for Applied Neuroaesthetics at Johns Hopkins, and Ruth J. Katz, executive director of the Aspen Institute's Health, Medicine & Society program, who bring vision and determination to this initiative. Their small but mighty team—Andrea Camp, Karyn Feiden, Samuel Garrett, Raven Tucker, and Katya Wanzer—have worked tirelessly to advance this initiative.

This *Blueprint* includes the Executive Summary and a full report. The Executive Summary provides a rich overview of what is happening now in neuroarts; identifies diversity, equity, and inclusion as imperatives for cultivating the field; and offers core principles, findings, recommendations, and action steps on which to build. The full report follows, exploring all of that in much more detail. A separate Appendix includes four key research documents that helped to inform the *Blueprint*.

Thanks for taking a deep dive into this work and becoming part of the neuroarts ecosystem.

Renée Fleming | Eric Nestler | Mike Paseornek | Anna Deavere Smith

Cochairs of the NeuroArts Blueprint Advisory Council

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EXECUTIVE SUMMARY

NeuroArts Blueprint

Advancing the Science of Arts, Health, and Wellbeing

Overview

Scientific studies increasingly confirm what human beings across cultures and throughout time have long recognized: we are wired for art. The arts in all of their modalities can improve our physical and mental health; amplify our ability to prevent, manage, or recover from disease challenges; enhance brain development in children; build more equitable communities; and foster wellbeing through multiple biological systems.

Most of us do not need rigorous research to recognize that arts and aesthetic experiences allow us to feel better; our own life experiences tell us that engaging with art, either as maker or user, can help us thrive. Why, then, have we developed the *NeuroArts Blueprint: Advancing the Science of Arts, Health, and Wellbeing*, a broad-reaching initiative designed to showcase the scientific evidence that explains these phenomena?

The answer is that we have not developed the systems and strategies to use the extraordinary asset that is at our disposal to its fullest potential. We need a *Blueprint* to guide us through the vast body of knowledge that is accumulating across multiple disciplines, to identify collaborative opportunities to collect many kinds of evidence, and to employ these learnings in systematic and sustainable ways so that we can ease some of the most intractable problems that humanity faces. Consider the possibilities:

- What if music helps people recover from depression and improves memory in those with Alzheimer's disease?
- What if movement and dance reduce the symptoms of Parkinson's disease?
- What if virtual reality allows people with physical disabilities to become more mobile?
- What if watching a theatrical performance lessens the toll of chronic illness or reduces the anxiety of palliative care?
- What if drawing bolsters social and emotional wellbeing in a child?
- What if the visual arts are an effective treatment for posttraumatic stress disorder (PTSD) and traumatic brain injury?
- What if community arts activities can reduce isolation and increase wellbeing?

- What if creating art helps people with autism and other intellectual disabilities build social and occupational skills?
- What if the arts can relieve burnout in healthcare and frontline workers?
- What if play-acting provides a pathway for clinicians to recognize their unintentional racial biases and change practice?
- What if building design improves the mental health of those working inside?

In fact, science is proving that the arts and aesthetic experiences can do all of that and more. The *NeuroArts Blueprint* offers a roadmap for translating those findings into asset-based action.

The *Blueprint* is a partnership between the Johns Hopkins International Arts + Mind Lab: The Center for Applied Neuroaesthetics (IAM Lab) and the Aspen Institute's Health, Medicine & Society Program (HMS). To inform our work, we assembled a diverse 25-member Advisory Council; conducted in-depth literature reviews and analyses (NeuroArts Today: State of an Emerging Field); held eight stakeholder convenings to explore communications, policy, practice, research, and technology, including two with a global focus; commissioned and published an economic analysis (Alzheimer's Disease and Music Engagement Economic Impact Analysis) and a 300-person survey of neuroarts stakeholders (Findings from an Online Survey of Stakeholders); published a World Bank report that linked art to economic development (Human Capital and the Arts at the World Bank Group); and exchanged ideas with hundreds of other experts and stakeholders. See the Appendix for *NeuroArts Today*, the full economic analysis and survey reports, and the World Bank report (NeuroArts Blueprint Initiative 2021a).

This initiative conceives of neuroarts as an ever-evolving ecosystem with many interdependent strands woven into an inclusive community. To foster a collective intelligence, equity must be at the core of the nascent field—a nonnegotiable commitment to dedicating the tools and sharing the power of the arts with all populations and in every community across culture, racial and ethnic background, socioeconomic status, skill set, and more. Bold systemic changes will be needed to further the momentum for neuroarts, steps that must be taken with intention and a willingness to shake up the status quo. By insisting that stakeholders come together on a level playing field, the *Blueprint* recognizes that traditional hierarchies have too often downplayed the knowledge birthed from lived experience and that agents of change dwell not only in academic centers and policymaking circles but also in the communities where neuroarts is used in service to greater health.

Neuroarts is defined in this *Blueprint* as the transdisciplinary and extradisciplinary study of how the arts and aesthetic experiences measurably change the body, brain, and behavior and how this knowledge is translated into specific practices that advance health and wellbeing. As used here **aesthetic experiences** are the feelings, emotions, and perceptions that derive from any art modality.

The **neuroarts ecosystem** (also referred to as the **neuroarts field**) provides the robust framework in which stakeholders with diverse backgrounds, training, and experience can direct their collective power to improving the health and wellbeing of individuals and communities.

Diversity, equity, and inclusion are central to the development of neuroarts and must be woven into every recommendation and action step in this *Blueprint* to achieve success.

Drawing on input from around the globe, the *Blueprint* lays out a collaborative action plan to cultivate the field and ultimately to change the paradigm about how health and wellbeing are achieved. Full implementation of our core principles, findings, and recommendations, summarized below, is a strategic process. In the first five years, we will measure success by the extent to which we assemble the elements of an interdependent, fully operational ecosystem. The foundational elements include a defined community of stakeholders, an established theory of change, shared language, agreed-upon outcome measures, and a well-defined mission. Effective framing, messaging, and communications are also fundamental to coalescing the field.

As more transdisciplinary research flows through the pipeline and evidence-based pilot programs are scaled, the synergies between science and practice will inform an ever-more-solid ecosystem. Over time, the increased understanding and use of the arts and aesthetic experiences to drive health and wellbeing should evolve into a mature field. To become sustainable, neuroarts must align the incentives that foster institutional commitments—from governments, across global organizations, among scientific and arts bodies, and in academic, workplace, healthcare, and community settings. Other long-term imperatives include dedicated funding; educational and career pathways that produce a diverse, well-trained workforce; and public and private policies that accommodate structural change.

As we pursue the promise of neuroarts, this roadmap recognizes and honors the accomplishments of the leaders and pioneers—scientists, arts practitioners, artists, and community knowledge keepers—who are already deeply engaged in this space. We are guided by their knowledge, experience, wisdom, and accomplishments.

Now Is the Moment for NeuroArts

The evidence-based field of neuroarts is not only *transdisciplinary*, meaning that it brings differing disciplines together, but also *extradisciplinary*, bringing in knowledge keepers outside traditional disciplines, including the local people who know so much about the assets and challenges of their own communities. By drawing on team science, research-to-practice strategies, and breakthrough technologies, we can enrich our knowledge of the complex ways in which the arts and aesthetic experiences impact the brain and body. That, in turn, enables us to hone and scale promising clinical and community interventions that serve the needs articulated by those who will use them.

As robust, empirical evidence and innovative practice join forces, they become part of the neuroarts ecosystem, which ties together a network of transdisciplinary—and extradisciplinary—stakeholders. Their collective power can ease some of the most pressing health problems the planet faces and lay the foundation for wellness.

Today, we can study many of the physiological and psychological processes triggered by the arts and aesthetic experiences as never before. Noninvasive ways to see inside the body—including cutting-edge imaging systems, wearable biomarker sensors, and other advanced tools—provide the means to trace and measure our sensory and motor responses, opening up remarkable information-gathering pathways.

New data allow us to characterize the complex biological relationships among genes, the brain, and behavior, spawning still more innovation. As evidence accumulates, our capacity to translate that knowledge to clinical and community practice continues to grow. At the same time, ever-greater computational capacity allows large data sets to be analyzed, interventions tailored to individual biology, evaluative research conducted to assess impact, and effective approaches broadly disseminated.

Allied with the growing research base, an army of arts practitioners is drawing on an arsenal of modalities to advance health and wellbeing. Validated by

a combination of professional experiences and quantitative and qualitative evidence, practitioners are using arts interventions to improve mobility, memory, and speech; relieve pain and the after-effects of trauma; ease the course of chronic and degenerative diseases; enhance learning outcomes; build resilience; lessen the stigma associated with mental health disorders; and address other challenges that sometimes seem intractable (*Arts and Health* 2009–2021; See Me Scotland 2020; University of Florida Center for Arts in Medicine 2021; World Health Organization 2019).

Beyond their capacity to lessen the toll of discrete medical conditions, the arts are playing a somewhat less easily measured—but no less crucial—role in advancing wellbeing, fostering social cohesion, and forging the more equitable, resilient, and economically viable communities that can grow and sustain health (Biondo, Vakis, & Dalton 2020; Center for Active Design 2021; Center for Health Design 2021; Metris Arts Consulting 2021; National Assembly of State Arts Agencies 2017; Rose, Daniel, & Liu 2017; Sonke, Golden, Francois, Hand, et al. 2019). By showcasing and supporting coherent, culturally distinct communities, the arts provide ingredients that are vital for collective health.

Neuroarts offers health-generating, asset-based tools that build on the resourcefulness, determination, and innovation embedded in communities.

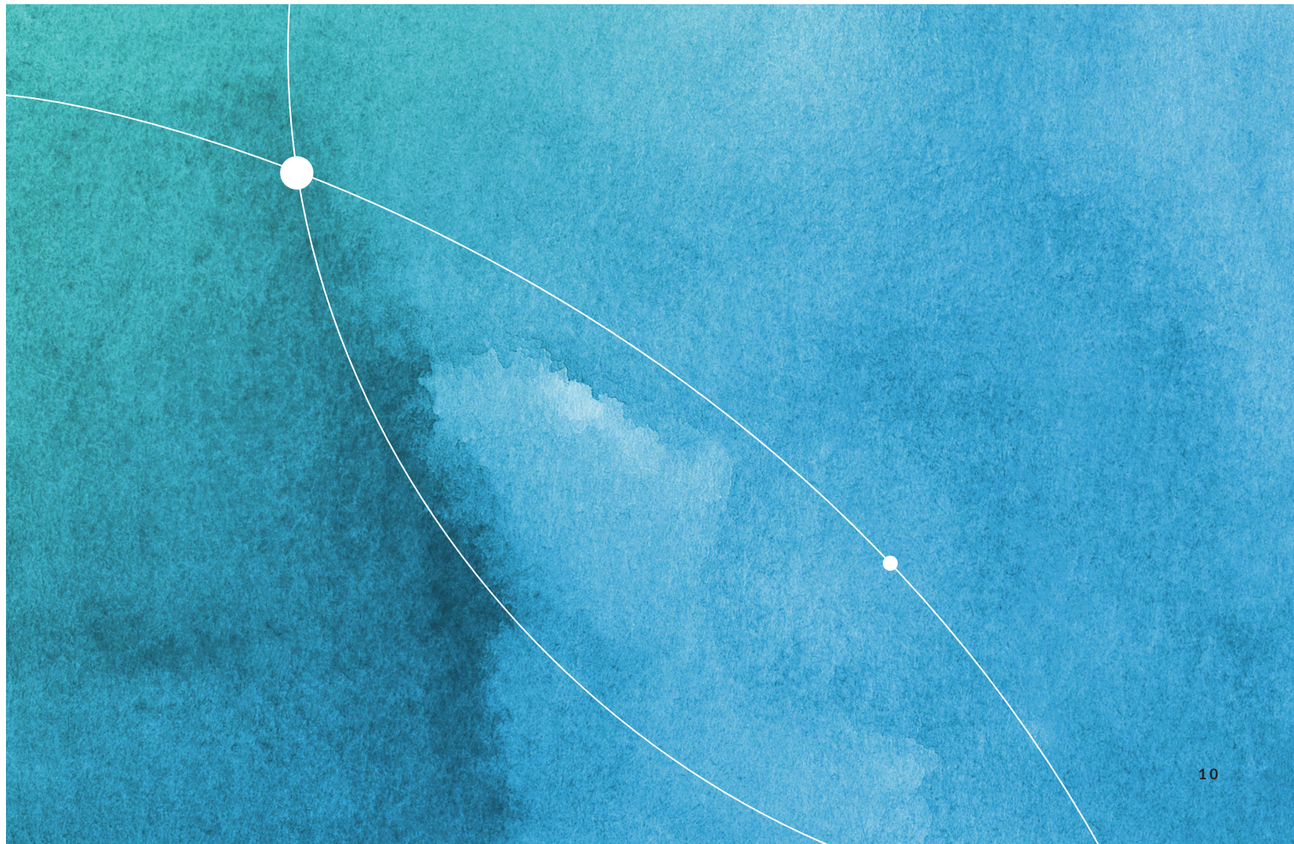
The arts have also demonstrated their capacity to enhance social, emotional, and cognitive learning and brain development in early childhood (Goldstein, Lerner, & Winner 2017; Menzer 2015). While the trajectory from engaging with the arts to enhancing early development to health and wellness that endures across the lifespan requires further study, bolstering biological systems at a young age could be a linchpin in the long-running pursuit of healthier populations.

Additionally, the economic analysis conducted by KPMG for this initiative suggests a compelling business case. A conservative analysis concluded that if 30 percent of the population with Alzheimer's disease has the opportunity for music engagement, it would contribute $830 million to GDP, sustain 7,784 jobs across the United States, generate $369 million in labor income, and produce $126 million in government tax revenues (KPMG 2021).

What is needed now is a structure that brings research and practice together, in service to health and wellbeing, with individuals and community members integral to the field development process. The opportunity is clear. A neuroarts ecosystem, with all of its interconnected components, provides the impetus for a much more rapid scale-up of what is already happening in scattered sites globally. We could then have a scientist studying the impact of a peer drama program on brain activity, a clinic partnering with a neighborhood hip-hop artist to bring music to the waiting room, an architect approaching workplace design with redoubled attention to what it takes for employees to thrive, a technology developer introducing its virtual reality platform to a trauma-afflicted community. . . .

When scientists and artists recognize one another as equal partners, each with something to share with the other, the multiplier effect advances individual and community health and wellbeing. The guiding principle is simple: science and the arts generate equally valid knowledge and learnings.

It will take a seismic culture change to create new norms. But with the right investments, full respect for the authority and insight embedded in diverse experiences and knowledge backgrounds, and a willingness to have new kinds of bold conversations, systems and structures can be overhauled and art and aesthetic experiences can assume their rightful place in driving health and wellbeing.



A Dynamic but Fragmented Field

A continuum of research—from basic scientific discovery to translational investigation to clinical and community application and evaluation—attests to the ferment of neuroarts activity. Practice activities are seemingly everywhere as well—in clinics and hospitals, community health centers and group care settings, community arts organizations and social service and advocacy agencies, workplaces, and public spaces (NeuroArts Blueprint Initiative 2021b).

In the United States, the National Institutes of Health and the National Endowment for the Arts are dedicating substantial federal resources to the intersection of the arts and health. State- and local-level activities are also emerging, and numerous professional associations and cultural institutions are involved, some exclusively focused on showcasing the links between the arts and health, others touching on neuroarts as part of a broader mandate.

Globally, Australia, Canada, Cuba, Finland, New Zealand, Sweden, and the United Kingdom are among the countries that have moved further, faster, to activate use of the arts and aesthetic experiences to support health and wellbeing. The World Health Organization (WHO) has ramped up its work in the field, establishing an Arts & Health Program in 2019, while the World Bank is supporting policies that draw the line from the arts to health to economic wellbeing (Biondo, Vakis, & Dalton 2020). Further momentum can be seen in training and education, where a growing number of courses, curricula, and degree programs are available.

Moreover, our survey of stakeholders reveals a constituency eager for neuroarts: across gender, age group, race and ethnicity, geography, and professional activity, researchers, arts practitioners, artists, and policymakers say they want to help cultivate the field. They also see the value of integrating neuroarts into numerous fields—among them, childhood development, mental health, education, community health, public health, complementary or integrative medicine, physical health, allied health, and community development (Lake Research Partners 2021).

But significant fragmentation diminishes the potential impact of neuroarts and undermines the capacity to sustain and scale success. There has not

yet been a dedicated effort to define the ecosystem, nurture an interactive network of stakeholders, or foster vigorous institutional commitments. Lacking opportunities to overlap in professional circles, scientists and arts practitioners remain unfamiliar with the idioms, priorities, and norms of one another's fields. Implicit biases have tended to assign greater worth to certain disciplines, experiences, and sources of knowledge over others, and the voices of community advocates and healthcare consumers are too often left out of the conversation altogether. Systemic issues related to power differentials, funding, and status across disciplines and sectors have yet to be fully confronted, which creates a barrier to sharing the stories and data needed to grow the knowledge base.

Cultivating the neuroarts ecosystem requires that we consider the influences of context, culture, and history on worldview; acknowledge and challenge biased assumptions; and craft broad, inclusive strategies.

Consistent terminology is another fundamental barrier. Along with *neuroarts*, many other terms are being used to describe the role of the arts in service to health, including *neuroaesthetics*, *empirical aesthetics*, *art therapy*, and *arts in health*, making it difficult to aggregate research findings. While many small-scale studies and potentially replicable exemplars provide promising insights, they lack broad influence because they are not widely shared. Published research too often remains within the confines of a single discipline, and lack of communication results in duplicative studies, prevents discovery from building on discovery, and limits generalizable conclusions. The absence of common reporting guidelines, an inflexible view of what constitutes rigor, a narrow understanding of the many ways of knowing, and inconsistent methodological approaches are further barriers.

Comparable fragmentation exists in practice, where a patchwork of arts-related activities is siloed by discipline. People working in creative arts therapy, arts in health, behavioral therapy, occupational and physical therapy, architecture, design, and elsewhere have few opportunities for cross-fertilization. These practitioners too often experiment and innovate alone, observing results that go unshared. While some of their work has been formally evaluated, much has not. Without systematic support or interest from the scientific community, their influence rarely matches their dedication, resulting in lost knowledge and fewer opportunities for scaling.

The same pattern impedes development of an infrastructure for neuroarts. The transdisciplinary and extradisciplinary educational and training opportunities that would expose students and early-career professionals to the broader neuroarts landscape, diversify the field, and bridge research to practice remain sparse. Supportive policies, including systematic public sector commitments and insurance reimbursement incentives, have yet to be put in place. Likewise, the business sector has not paid much attention to the arts as a tool to build a stronger, more innovative workforce.

Lack of robust funding opportunities is a potent barrier in all corners. The very nature of the field means that research activities do not fit readily within the mission of a single government agency, yet interagency cooperation can be difficult to secure. On the practice side, interventions are disproportionately dependent on philanthropic funders, which are typically nimbler than government funders, but also tend to be walled off from one another. And insurance coverage for arts-related health interventions is inconsistent and limited, especially in the United States.

All this fragmentation results in a degree of confusion and uncertainty. Many of the stakeholders simply don't know one another. They exchange ideas erratically and lack collaborative structures that would enable them to communicate, uncover common interests, share learnings and experience, and achieve mutual goals. Across the spectrum of neuroarts, they operate in separate academic, clinical, and community settings; read different journals; attend different conferences; and engage with very different allies.

A cohesive ecosystem is the solution to fragmentation, bringing professionals and knowledge keepers in every corner together so that the transdisciplinary and extradisciplinary fertilization critical to progress can occur at scale.

The Work Ahead

Elevating the transdisciplinary and extradisciplinary research and practice activities that are core components of a neuroarts ecosystem, and especially weaving them together, is a complex task. The strands are many, with much to do.

An equity imperative exists at every level—in opportunities to pursue relevant research and practices, in the value assigned to different art modalities, and in the populations that contribute to the growth of the field and have access to its benefits. This ecosystem must include a full constellation of voices—not only as players *invited* to the table but as part of the community *choosing* the table at which they sit, and then *setting* it. Diversity, equity, and inclusion are not merely catchphrases but rather are central assets that allows neuroarts to thrive.

The launch of a new field provides a rare opportunity to imbue equity in every phase of planning and implementation, ensuring that what is built meets the needs of all people from its inception.

A field as potentially transformative as neuroarts also demands:

- Research to grow the knowledge base, including learnings drawn from narratives and the experiences of those who engage with art.
- Strategies to implement and evaluate arts-based practices, pilot new ones, and scale those with proven benefits to individual and community health and wellbeing.
- Measures to attract and incentivize a diverse and inclusive cadre of professionals, including educational on-ramps, mentoring, resources for early-career investigators, promotional pathways, and appropriate compensation.
- Policy commitments aimed at elevating sustainable public sector and private sector investments and support.
- Adequate funding to advance knowledge and pay for arts-related services.
- Bold, effective leadership, from the community to academia to governance at every level; among scientists, practitioners, activists, patient advocates, and a host of other stakeholders; and within and across research and arts practice settings.
- Persuasive framing, messaging, and communications strategies that highlight the field's uniqueness, tailored to the many individuals and groups that have a stake in neuroarts.

The vision of a widely recognized and broadly influential neuroarts field will take many years to fully realize. As knowledge builds, we will learn more about what works, in which settings, at what dose, and for whom. Based on iterative agreements of what success looks like and how it can be achieved, measurable short-term wins and long-term milestones will support systematic, goal-oriented implementation. To build confidence and momentum, we also need to share more stories—the robust, revelatory narratives that capture the cultural frames and humanity of the people and communities who have long drawn on arts and aesthetic experiences as sources of strength, indeed as a form of medicine.

The *NeuroArts Blueprint* offers an actionable strategy for moving systematically along many parallel tracks to accomplish all of this. Five core principles, five core findings, and five core recommendations provide the framework for this vision.

Five Core Principles

Experiencing art is fundamental to being human, a common thread across cultures, racial and ethnic backgrounds, age groups, income levels, and skill sets. The arts offer a shared language, a means of elevating diverse voices, and a catalyst for action.

The arts, as expressed through many modalities, have demonstrable, evidence-based impacts on physiological and psychological health and wellbeing.

Science and technology make possible the ability to understand and measure the biological effects of the arts and aesthetic experiences on individuals and populations.

Neuroarts provides the connective tissue to bring together science, the arts, and technology as equal partners to advance health and wellbeing.

The benefits of the neuroarts field must be readily, consistently, and equitably accessible to all populations across the lifespan and in every community around the world.

Five Core Findings

The arts and aesthetic experiences impact human biology and behavior in ways that differ markedly from any other health intervention. Scientific studies demonstrate that many art modalities act on complex biological systems and mechanisms to generate physiological and psychological effects. As research applies increasingly sophisticated technological tools to learn more, practitioners are already using dynamic and targeted arts interventions to advance health and wellbeing.

Preliminary evidence suggests that the neuroarts field provides economic and social benefits. Metrics to determine the sum of the benefits, rather than just the contributions of individual components, can help capture the field's added value across sectors. Empirical research can document the potential for arts practices to reduce healthcare costs (by reducing demand for more costly clinical interventions), promote economic development, strengthen the social fabric, and advance wellbeing. The lived experiences of arts practitioners and the communities they serve are also crucial sources of rigorous evidence.

Neuroarts-related activities are everywhere, but they lack a cohesive structure. Although diverse stakeholders within and beyond traditional disciplines and sectors are vigorously engaged with various facets of neuroarts, no well-delineated ecosystem brings them together to coalesce the field. Neuroarts needs a broadly inclusive platform through which robust scientific evidence can emerge from silos, standards of practice can evolve and scale, and knowledge of many types can disperse in multidirectional fashion, allowing transdisciplinary and extradisciplinary collaborations to become the norm. Neuroarts also requires dedicated funding streams, supportive public sector and private sector policies, and targeted framing, messaging, and communications strategies.

Now is the moment to cultivate the neuroarts field. Scientists, practitioners, artists, knowledge keepers outside traditional disciplines, and institutions of all stripes are open to new paradigms and enthusiastic about the possibility of driving neuroarts forward. An inclusive set of stakeholders stands ready to accelerate transdisciplinary and extradisciplinary research, showcase practice exemplars, share knowledge and resources, and reach into new communities to strengthen the ecosystem. Public-private partnerships are already being developed, and there is broad interest from arts-related and cultural organizations, whether they have a health-related mission or not; from scientific associations, whether they have previously engaged with the arts or not; and from a diverse group of issue- or disease-focused advocacy organizations.

Leadership and community-based engagement are essential for neuroarts to progress. The complexity of the health challenges facing society can only be tackled by making space for all points of view. Top-down and bottom-up strategies are both needed to develop neuroarts leaders, champions, and advocates as effective communicators positioned to expand the constituencies committed to the field. At local, regional, national, and global levels, visionary leaders with far-reaching personal and professional networks can play central roles. We also need to nurture leadership capacity among early-career researchers and arts practitioners who see value in embracing the inherently complex nature of transdisciplinary and extradisciplinary work. Within public agencies, private organizations, and academic settings, leadership is key in gaining institutional commitments at the highest levels and engaging diverse stakeholders. Equally important are community leaders and others with grassroots connections and lived experience who have earned the trust of local constituencies.

Five Core Recommendations

Building on the principles and findings, the *NeuroArts Blueprint* offers the following core recommendations, each with action steps, to guide the process of developing a transdisciplinary and extradisciplinary ecosystem in which stakeholders align around common goals at the intersection of science, arts, technology, and health:

Strengthen the research foundation of neuroarts.

Honor and support the many arts practices that promote health and wellbeing.

Expand and enrich educational and career pathways.

Advocate for sustainable funding and promote effective policy.

Build capacity, leadership, and communications strategies.

Stewardship of the Implementation Process

This *Blueprint* does not pair each recommendation and action step with a responsible party, recognizing that many combinations of stakeholders and partners will engage as the neuroarts ecosystem evolves. Sometimes, they will work within their own fields, often they will interact across disciplines and sectors, and always they will pursue a collective vision, building on the many forward-thinking efforts already underway.

Academic and other institutions can create their own centers to further neuroarts while a central resource hub should serve as a global clearinghouse as disparate efforts move forward. As it provides momentum for an iterative process, the hub will connect the various institutional efforts, offer a global home for a vast arts and health research platform, foster a network of community-building connections, centralize convenings and resource development, promote scaling, and catalyze further action.

Three early implementation steps, overseen through this resource hub, offer stakeholders the framework in which to collaborate, drive toward common goals, and advance the core recommendations of this strategic plan over the next five years:

- Establish a cross-cutting Global NeuroArts Advisory Council to serve as a springboard for boundary-crossing conversations that develop consensus on next implementation steps, identify priorities, foster community, track progress, and support the evolution of the field.
- Develop asset maps to identify stakeholders and sectors that are integral to the neuroarts ecosystem, defining both the reach of the field and the boundaries around it.
- Broaden the knowledge base and implementation capacity with a commissioned series of white papers.

RECOMMENDATION

Strengthen the research foundation of neuroarts.

A synthesis of existing findings is the launching point for determining what we know, identifying gaps, and building on the evidence to learn more. Beyond the imperative of collecting, integrating, and sharing existing work, a rigorous quantitative and qualitative agenda will allow new scientific questions to be identified in the realms of basic, translational, clinical, and community-based study research. Defining the core elements of arts-based interventions and developing consistent study design and evaluation protocols will enable comparisons and allow each set of findings to inform others. This approach requires a consensus among stakeholders on terminology, reporting requirements, high-quality methodology, outcome measures, and platforms on which to exchange knowledge and scale success.

Importantly, the neuroarts community will need to stretch its thinking about what constitutes rigor, respecting the many ways of knowing that can help determine what works. While no simple formula exists for evaluating interventions that take aim at social determinants of health or perceptions of wellbeing, a number of validated tools merit closer looks.

Action Steps

- Establish and promote an interactive arts and health research platform for neuroarts, modeled on the vast PubMed search engine. A comprehensive, artificial intelligence (AI)–driven centralized repository and data management portal will enable intuitive searches and inquiries across a curated and dynamic landscape.
- Conduct comprehensive, in-depth systematic reviews and analyses of peer-reviewed research and published grey literature.
- Develop a prioritized basic, translational, clinical, and community-based research agenda designed to produce comparable findings that meet agreed-upon standards of rigor.
- Develop or expand translational models that bridge research and practice and offer implementation and scaling insights.
- Conduct a feasibility study for a model Neuroarts Mechanism Map that depicts the brain circuitry and neurotransmitter systems engaged through the arts and aesthetic experiences.

RECOMMENDATION

Honor and support the many arts practices that promote health and wellbeing.

To contribute their full potential to the growth of neuroarts, arts practitioners should be recognized and empowered as equal partners with scientists. They need opportunities to explore the biological underpinnings of their work, contribute to the growing body of evidence for the field, and share practices.

As well, the practitioner voice needs to be heard in conversations and convenings that explore taxonomy, articulate priorities for developing and testing interventions, consider the degree to which diverse arts practices can meet on common ground, and identify tools and techniques to adapt and scale effective interventions. When practitioners are embraced as codesigners of strategies, standards, and structures to advance the field, they gain the authority and visibility to inspire interest in their work and to pursue positive outcomes.

Broad-based input at all levels helps to elevate practices that resonate with diverse populations. Ensuring that their content is developed and implemented to meet the needs and goals identified by the individuals and communities they purport to serve requires intentionality, a commitment to inclusiveness, deep listening, and flexibility.

Action Steps

- Promote narrative changes that elevate the importance of arts practices as tools for health and wellbeing.
- Develop uniform strategies for collecting and analyzing outcome measures that guide practices aligned with neuroarts.
- Evaluate technologies that can be used to amplify and disseminate effective interventions.
- Identify and collaborate with institutional partners that can integrate arts practices into their health-related activities.
- Scale evidence-based practice.

RECOMMENDATION

Expand and enrich educational and career pathways.

Well-defined educational and training pathways, course and curriculum development, and strategies for career advancement encourage entry into the neuroarts field and help retain those already working there. The establishment of a new field provides a rare opportunity to prioritize equity throughout the educational pipeline, with particular attention to racial and gender equity.

To build capacity and expand scholarship and its translation, neuroarts education in some form should begin in early childhood, continue through secondary school, and offer well-defined on-ramps with undergraduate coursework and graduate-level degree programs. Although no single curriculum can ever serve an entire field, a package of synergistic courses and case studies can provide a shared grounding to link disciplines. The ultimate goal is to allow individuals to enter the field of neuroarts from almost anywhere.

In addition to traditional academic routes, new models that embrace multimodal delivery should be considered, including online courses and workshops, grand rounds, internships, and mentoring. Opportunities for collaborations and rewards, including scholarships and prizes targeted specifically at new and early-career investigators, can also widen interest. Deliberate educational boundary busting is called for to encourage cross-cutting collaborations within and across the various scientific and practice disciplines that intersect with neuroarts.

Action Steps

- Expand the content and availability of academic training at all educational levels, including opportunities to explore the biological influences of the arts.
- Build capacity and incentives that draw students into the neuroarts field and encourage early-career professionals to pursue relevant research or practice.
- Recognize and reward excellence, including through scholarships, awards, and grant funding.
- Expand community-based training to promote neuroarts in nontraditional settings.

RECOMMENDATION

Advocate for sustainable funding and promote effective policy.

As the neuroarts ecosystem evolves, dedicated and consistent funding and sound and innovative policies are essential to grow a broad-based transdisciplinary and extradisciplinary field. While individual champions will likely jumpstart engagement, it will ultimately take institutional commitments from a network of diverse public sector and private sector partners for neuroarts to flourish.

In the public sector, establishing positive economic and social impact is likely to have particularly strong appeal, whether by documenting systemwide cost savings or measurable effects on individual and community health and wellbeing. Globally, more information is needed about how nations are assigning public dollars, or blending public and private resources, to advance neuroarts. Evidence that engaging in arts activities can reduce demand for more costly healthcare could encourage insurers to provide coverage for arts-related interventions while other incentives can be identified to attract philanthropies and employers. Social impact investing, crowdsourcing, and other entrepreneurial opportunities are also potential entry points.

Action Steps

- Establish a funding source for pilot studies of arts-related health interventions with scaling potential to gather the empirical evidence that researchers need to compete for larger, multisite investigations.
- Build the economic case that investing in evidence-based arts practices can lower the downstream costs of health challenges.
- Develop an agile, multistep fundraising strategy for the field, beginning with assembling a comprehensive database of potential thought partners and funders.
- Deepen knowledge of global funding and policy frameworks.
- Identify and pursue strategic public sector and private sector policies that take neuroarts beyond the purview of individual champions and solidify its infrastructure.

RECOMMENDATION

Build capacity, leadership, and communications strategies.

The neuroarts ecosystem requires a solid infrastructure that allows stakeholders to convene, connect, and partner. Stewardship is essential to the *Blueprint*'s proposed implementation activities. The infrastructure includes a clearinghouse for information, aggregated data, research findings, case studies, and other resources; it also requires a center of gravity that draws together advocates, influencers, and champions; elevates voices that often go unheard; and fosters experimentation and innovation.

This developing field will need many kinds of leaders—early-career investigators and practitioners who think fluently across disciplines, dynamic institutions prepared to take center stage as momentum builds, and champions at every level and of every age. Comprehensive framing, messaging, and communications strategies using clear and accessible language are key. Rigorous data need to be presented, as do compelling stories that capture the vibrancy of neuroarts globally and the power of carefully implemented and evaluated interventions to achieve sought-after outcomes. More high-profile messengers, influencers, and local advocates can be recruited to spread the word and increase the field's reach.

Action Steps

- Build out the resource hub, established as an early implementation step, as an agent of convergence—the gravitational force that brings together the growing number of activities in the field of neuroarts and builds momentum for more.
- Encourage the establishment of institutional centers to foster rigorous research and training; facilitate knowledge sharing with practitioners, community and patient advocates, and other stakeholders; feed findings and experiences into the resource hub; and contribute to the growth of the field.
- Establish and deepen alliances with public and private organizations around the globe.
- Design strategies to build individual, community, and institutional leaders who can promote the field within their own science, arts, technology, health, and community networks.
- Conduct social science research to inform the ways in which neuroarts is framed and messaged and tell stories about promising practices and engaged communities.
- Develop and implement a comprehensive global communications plan.

Call to Action

The *NeuroArts Blueprint* offers a roadmap to the future, recognizing that implementing the Recommendations and Action Steps outlined here requires a multiyear initiative. As we move to coalesce neuroarts, it is again crucial to acknowledge the deep bench of stakeholders whose energy, creativity, and leadership have made it possible to cultivate the ecosystem.

More champions are crucial, helping to foster the momentum that allows partnerships to sprout, ideas to crystallize, and structures to be built—and to ensure that equity is front and center of decision-making from the outset. To become sustainable, these initial efforts must eventually generate incentives that are sufficiently aligned to foster institutional commitments—among scientific and arts bodies; in academic, workplace, healthcare, and community settings; from governments; and across global organizations.

The field will also need stewardship. In an identifiable home, resources can be aggregated and action catalyzed; basic, translational, clinical, and community-based research can work hand in hand with practitioners to grow and apply knowledge; and all stakeholders can have a voice in shaping future directions.

Together, scientists, arts practitioners, artists, educators, employers, funders, policymakers, healthcare advocates and consumers, and community leaders and activists can pursue a collective vision, grow knowledge and translate it into use, innovate and scale effective pilot programs, and dedicate the resources that allow all of that to endure. By recognizing themselves as part of an interdependent ecosystem—core members of a community dedicated to advancing neuroarts—every stakeholder can help position the field as a high priority. A shared identity and an effective framing, messaging, and communications strategy are central at every step.

Bringing the neuroarts field to full flower opens up extraordinary possibilities at an unprecedented time in history. “How do we take advantage of this moment of confluence to actually have it be a moment of transformation?” asked Maria Rosario Jackson, PhD, Institute professor at the Herberger Institute for Design and the Arts and Watts College of Public Service and Community Solutions, Arizona State University (Jackson 2020). With its strategy for establishing a well-defined, evidence-based, and inclusive neuroarts ecosystem, the *NeuroArts Blueprint* is intended to help answer this critical question.

> **An extraordinary opportunity is at hand—by fully integrating the arts into health-building activities that are accessible to all, we can foster individual health and wellbeing, strengthen our communities, and fulfill a human birthright.**

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Pg. 29: *Mind on Fire III*. Saggital view of the artist's brain. Drypoint etching on paper. Artwork by Elizabeth Jameson. Used with permission of Elizabeth Jameson.

NeuroArts Blueprint

Advancing the Science of Arts, Health, and Wellbeing