

# THE ARTS AND AGING

## BUILDING THE SCIENCE



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Summary of a National Academies Workshop,  
“Research Gaps and Opportunities for Exploring the Relationship  
of the Arts to Health and Well-Being in Older Adults”



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# LIST OF ACRONYMS

<b>AD</b>	Alzheimer's disease
<b>ADCS</b>	Alzheimer's Disease Cooperative Study
<b>ARTZ</b>	Artists for Alzheimer's
<b>cABR</b>	auditory brainstem response to complex sounds
<b>CBA</b>	cost-benefit analysis
<b>CE</b>	cost-effectiveness
<b>EBD</b>	evidence-based design
<b>FDA</b>	U.S. Food and Drug Administration
<b>fMRI</b>	functional magnetic resonance imaging
<b>GAP</b>	Group Art Program
<b>HHS</b>	U.S. Department of Health and Human Services
<b>HRQL</b>	health-related quality of life
<b>IQ</b>	intelligence quotient
<b>LTC</b>	long-term care
<b>MoMA</b>	Museum of Modern Art
<b>NAS</b>	National Academy of Sciences
<b>NCCAM</b>	National Center for Complementary and Alternative Medicine
<b>NEA</b>	National Endowment for the Arts
<b>NIA</b>	National Institute on Aging
<b>NIH</b>	National Institutes of Health
<b>OBSSR</b>	Office of Behavioral and Social Sciences Research
<b>PA</b>	physical activity
<b>PCORI</b>	Patient-Centered Outcomes Research Institute
<b>PD</b>	Parkinson's disease
<b>QALY</b>	Quality Adjusted Life Year
<b>RCT</b>	randomized controlled trial
<b>SOC</b>	Selective Optimization with Compensation
<b>UCLA</b>	University of California, Los Angeles
<b>WHO</b>	World Health Organization
<b>WTP</b>	Willingness to Pay

# EXECUTIVE SUMMARY

**R**ecent and ongoing research suggests exciting possibilities for the therapeutic use of art to improve the health and well-being of older adults. As this population grows in number and as a proportion of all Americans, it will experience dramatic increases in the number of people with aging-related health conditions, including cognitive decline and dementia. Given the arts' potential to treat, prevent, or ameliorate those conditions, additional research is needed to clarify the relationship between the arts and the health and well-being of older adults.

As part of a Federal Interagency Task Force on the Arts and Human Development ([www.nea.gov/news/news11/Task-Force-Announcement.html](http://www.nea.gov/news/news11/Task-Force-Announcement.html)), the National Endowment for the Arts (NEA) and three units within the National Institutes of Health (NIH)—the National Institute on Aging (NIA), the Office of Behavioral and Social Sciences Research (OBSSR), and the National Center for Complementary and Alternative Medicine (NCCAM)—joined in requesting the National Academy of Sciences (NAS) to convene a public workshop around this research need. The NAS workshop subsequently aimed to identify research gaps and opportunities to foster greater investment in promising arts-related research that can seed interventions to improve quality of life for older adults.

So far, participation in arts interventions has been linked with improving cognitive function and

memory, general self-esteem and well-being, as well as reducing stress and other common symptoms of dementia, such as aggression, agitation, and apathy. Some interventions promote social interaction, which has multiple psychosocial benefits.

Music is the most common participatory art studied, but theater, dance, and creative writing also hold promise as effective health interventions for older people. Lifelong music training is associated with many effects among older people, including improved memory and hearing. However, people who began singing or other music activities when older also derived benefits in many areas, as did older people who took acting classes or participated in creative writing programs for the first time.

Design and visual arts play an important role in the well-being and quality of life for older people. The design of residential buildings for older people can affect the amount and quality of social interaction, physical activity, cognitive stimulation, and emotional well-being of residents. The landscaping, traffic flow, building materials, and design of activity hubs all contribute to the success or failure of a residential facility as a thriving community.

In addition, the increasing use of universal design can help older people participate more fully in normal activities. Universal design embraces the integration of “places, things, information, and communication” to expand accessibility to the widest spectrum of users in the widest range of situations.

Visual arts have been used in healthcare for centuries and are now a staple in hospitals, assisted living facilities, and long-term care facilities. But more research is needed to understand the situations in which different art forms are most suitable. For example, dementia patients might be affected negatively by art that might prove relaxing to others.

Although arts interventions show promise, most studies documenting these beneficial effects do not meet the rigorous standards of scientific research and few include a cost-benefit analysis (CBA)—necessary elements for securing funding for future programs and research. Further, arts interventions are less likely to be adopted in the wider community unless they can demonstrate effectiveness and cost-advantage.

There was broad agreement among the workshop participants about the need for more rigorous research as well as the need for new or alternative research designs and measurements that are more appropriate for the multimodal aspects of arts interventions.

## COMMON DEFICIENCIES IN THE RESEARCH

The assessments of existing research by the workshop presenters identified a number of common deficiencies, including:

- Samples are too small, nonrandom, and poorly defined.
- The studies lack an adequate control group.
- The arts interventions are not well defined or documented, especially with regard to the frequency and intensity of the activity (the dose). Accordingly, they cannot be easily replicated.

- The health outcomes are not adequately measured by common tools and are not consistent across studies.
- The statistical methodology is weak, especially given subject attrition or missing data, yet conclusions are often over-stated.
- There are few studies that employ CBA.

## OPPORTUNITIES FOR MOVING FORWARD

In addition to addressing the shortcomings listed above, the workshop participants had a number of common recommendations, including:

- Develop better theoretical models to inform the research agenda.
- Identify research designs and measurement tools more appropriate for multimodal arts interventions.
- Develop replicable, rigorous research designs that accommodate multiple levels of analysis.
- Diversify study populations in terms of ethnicity, socioeconomic status, residence, and health status, including cognitive ability.
- Study aging effects across the lifespan.
- Encourage more interdisciplinary cooperation—for example, among designers, scientists, statisticians, and arts researchers—to generate more ideas.
- Combine interventions—for example, exercise and arts—or integrate various arts interventions for a greater impact.
- Develop tool kits for implementing arts interventions.

# BACKGROUND

In March 2011, the National Endowment for the Arts (NEA) and the U.S. Department of Health and Human Services (HHS) hosted a first-of-its-kind event to showcase and discuss recent research on the arts and human development, with the ultimate goal of finding ways to engage the arts to improve people's lives. The one-day forum examined the relationship between the arts and positive health and educational outcomes at various segments of the lifespan and encouraged the formation of a long-term federal partnership to promote research and evidence-sharing nationwide. It also pointed to the need for a systematic literature review and gap analysis to identify priority areas for further research.<sup>1</sup>

Building on these promising initial efforts, members of a federal taskforce including the NEA and three units of the National Institutes of Health (NIH)—the National Institute on Aging (NIA), the Office of Behavioral and Social Sciences Research (OBSSR), and the National Center for Complementary and Alternative Medicine (NCCAM)—requested that the National Academies (through its Committee on National Statistics) convene a public workshop to explore ways to strengthen research on the relationship of the arts

and aging. The workshop was held September 14, 2012, in Washington, DC. The decision to focus on older Americans—and to identify research gaps and opportunities—is based on a growing interest in novel intervention approaches for improving the health and quality of life for this growing population.

In his opening remarks, David Reuben, a geriatrician, researcher, and educator based at the University of California, Los Angeles (UCLA), and chair of the workshop, described four of his patients—all artists or performers—who remain highly engaged and productive well into their 80s and 90s. Were these patients just exceptional individuals, Reuben asked, or did their lifetime involvement in the arts help them avoid the cognitive decline and other aspects of aging that so often erode our health and quality of life? To answer these questions, and rely less heavily on anecdote, more evidence is needed. Specifically, is there a body of scientific evidence that demonstrates the role of creativity in the arts in maintaining health? Can greater involvement in the arts by older people reduce the use of medicines that can have serious side effects?

Participants from multiple disciplinary viewpoints, including auditory and cognitive neuroscience, geriatrics, social work, psychology, epidemiology, theatre arts, music, architecture, cost-effectiveness and economics, and health services research, attended the September 2012 public workshop to explore topics related to these types of

<sup>1</sup> *The Arts and Human Development: Framing a National Research Agenda for the Arts, Lifelong Learning and Individual Well-Being* (2011), available at [www.arts.gov/research/TaskForce/Arts-and-Human-Development.html](http://www.arts.gov/research/TaskForce/Arts-and-Human-Development.html).



questions. (See Appendix 1 for list of participants.) They sought to better understand in particular:

- The relationship of arts programs and interventions to psychological well-being, cognitive, sensory, and motor skills function in older adults, and the underlying neural processes;
- Benefits and weaknesses of arts therapies compared with other behavioral and/or drug interventions for older adults with declining cognitive, sensory, or motor function;
- Cost-effectiveness analysis of such programs compared with other healthcare interventions for this population; and
- The relationship of aesthetics and design factors to health and quality-of-life-related outcomes of older adults in long-term care and assisted living facilities.

Five papers were commissioned for presentation at the workshop to foster concrete discussion about research gaps and opportunities for exploring the relationship of arts participation to physical health and psychological well-being in older adults (Appendix 2). These papers are being prepared for publication and are not summarized here. As a collection, the papers and presentations enriched the workshop discussion about the challenges of building research capacity. They offer guidance for the design of future studies and research.

Representatives of federal funding agencies that co-sponsored the workshop considered it important for advancing their vital interests in enhancing health for older Americans on multiple levels, including developing effective health interventions, creating new strategies to enhance social involvement and support among older adults, and increasing the awareness and promoting the adoption of effective health interventions. Marie A. Bernard, deputy director of the NIA, emphasized the types of research of particular interest to the NIA, including:

- Incorporating arts activities in interventions to remediate or delay age-related cognitive decline or sensorimotor impairments;
- Examining the potential of specific arts activities and interventions to enhance quality of life in older adults in different residential settings and with different health statuses;
- Examining the potential of arts interventions to support healthy communities and encourage social engagement across generations; and
- Understanding the potential impact of the arts on other health outcomes.

Rocco Landesman, then-chairman of the NEA, described the NEA's efforts to persuade federal agencies to promote the importance of the arts in other sectors and its continued efforts to generate greater support for and acknowledgement of the arts. Sunil Iyengar, director of the NEA's Office of Research & Analysis, urged the organizers, speakers, and participants to consider three overarching issues:

- Are there theoretical models that explain how participation in the arts affects the health and well-being of older Americans?
- How can we best measure the effect of arts participation on elder health, given the complex web of variables at work? In particular, are there innovative study designs that could be used in lieu of Randomized Controlled Trials (RCTs)?
- How can we build research capacity in this area? Can we nurture a cadre of researchers who can take this research to the next level and who can attract the support of potential funders?

The remainder of this report highlights dominant themes expressed at the workshop and identifies deficiencies in current research and opportunities for moving forward. The workshop agenda is included as Appendix 3.

# RESEARCH AND THE ARTS— BRIDGING THE GULF

Involvement with the arts can affect people on many physical, cognitive, and emotional levels, creating effects that are difficult to capture using standard research designs. Cultural differences between artists and researchers also can make it hard to produce what the scientific research community would describe as scientifically rigorous research. Noice, Noice, and Kramer (2012) have reported that their search of the literature “reveals a paucity of research on the effects of arts participation and physical, cognitive, and psychological well-being, possibly because artists tend to have a mindset that resists quantification and researchers are generally uncomfortable with vagaries.”<sup>2</sup> As Tony Noice mentioned, artists are more likely to say, “Let’s do something and see what happens.”

Wider use of effective therapeutic arts programs could enhance the health and well-being of older Americans. The scientific community expects scientific evidence not only to demonstrate that interventions are effective but also to provide basic information about the frequency and intensity required (dose), the duration of an effect, and whether the arts intervention works at least as well as other health interventions.

<sup>2</sup> Noice T., Noice H., and Kramer A. 2012. “Participatory Arts for Older Adults: Benefits and Challenges.” Paper prepared for the Workshop on Research Gaps and Opportunities for Exploring the Relationship of the Arts to Health and Well-Being in Older Adults, National Academy of Sciences, Washington, DC, September 14, p.3.

The assessments of existing research by the workshop presenters identified a number of common deficiencies in arts intervention research, including:

- Poorly defined, nonrandom, and small samples.
- Inadequate control group.
- Poorly defined or inadequately documented arts interventions, especially with regard to the frequency and intensity of the activity (the dose), making findings difficult to replicate.
- Inconsistent health outcomes across studies and lack of common tools for measurement.
- Weak statistical methodology, especially given attrition or missing data, and overstated conclusions.

## PARTICIPATORY ARTS FOR OLDER ADULTS

Workshop participants Tony and Helga Noice explored the relationship between participatory arts and the cognitive/physical health and psychological well-being of older adults. They presented some compelling studies showing how older participants benefited from a variety of arts (dance, music, pottery, visual arts, and expressive writing).

Tony Noice, a professional actor and educator, demonstrated how acting classes he conducts with older participants compel cognitive, emotional, and physical action. Acting also engenders strong social

support, a valuable asset for older people.

To quantify how acting affects older people, the Noices randomly assigned 122 eligible volunteers from retirement homes to an acting, singing, or waiting-list control group. After a four-week intensive course, the actors improved significantly on seven of eight cognitive measures, more than the singers or control group. Both the actors and singers improved on self-reports of personal growth, as measured by a standard quality of life measure. The control group did not show the same improvement.<sup>3</sup>

A theater training program now in progress has added neuroimaging [fMRI] to capture possible changes in brain function related to active participation in theater. Kramer described how neuroimaging has been used to augment cognitive and psychosocial measures and to reveal changes in brain function in diverse interventions, including exercise as well as volunteer activity.

Kramer reported that he is working on an NIA-supported study contrasting ballroom dancing with walking, toning, strengthening, and stretching on multiple psychosocial, behavioral, and neuroimaging measures previously used in walking studies. Dance is truly multimodal, which can complicate evaluating its effects using standard research designs. Responding to questions from the audience, Tony Noice emphasized the benefits of the multimodal aspect of acting: It involves the mind, body, and emotions. Unlike playing an instrument, acting does not require previous training, or even initial interest. Participants in 15 years of his acting classes improved on the outcomes tested even though they were randomly assigned to the acting versus singing class.

<sup>3</sup> Study participants were screened using the Pfeiffer Short Portable Mental Status Questionnaire to ensure they had intact intellectual functioning. The eight cognitive measures were: Word List Memory, Word List Delayed Recall, Category Fluency, Digit Span Forward, Digit Span Backward, East Boston Memory Test, East Boston Memory Test delayed, Means-End Problem Solving. In addition, one Quality of Life Scale was administered: Self Reported Personal Growth.

## MUSIC, HEARING, AND MEMORY

Nina Kraus presented research on music training and aging. One of the most common complaints of an older adult, Kraus noted, is understanding speech when there is background noise. Another common problem is the decline of auditory working memory with age. The evidence is resounding that, across the life span, musical training and participation can be a remedy for both problems, as demonstrated by standardized tests of hearing in noise and of working memory.

How does music training help? With regard to hearing, Kraus noted that musicians are good at extracting relevant information from a complex soundscape and that this ability translates to a greater facility with hearing speech in noise in older ages, even as hearing declines.

Music performance requires memory. To learn, read, and perform music, musicians must memorize sound and visual patterns; memorize auditory-motor sequences; tune an instrument; and improvise—all activities that exercise memory.

To better understand how music training affects cognitive activity, Kraus and her colleagues examined brain activity in older people with and without music training. They were interested in the slowing of neural activity that occurs with aging. This slowing is associated with decreased inhibition, broader neural tuning, longer neural recovery, and an increase in neural background noise. Kraus and colleagues applied a biological approach called auditory brainstem response to complex sounds (cABR), which uses a few scalp electrodes to capture the electrical activity of neurons in the brain under specific situations. The neural responses to sound come largely from the midbrain, the site of convergence of information coming from the ear and involving emotional areas: executive function, attention, and memory. The midbrain plays a critical role in auditory learning. Kraus and her colleagues examined feedback to the auditory system from brain regions responsible for executive function.

The cABR technique is an effective and powerful way to study brain activity related to communication/sound, as well as how the brain is changed by experience—for example, musical training. Kraus envisions cABR’s adaptation from laboratory use to a much wider use in the field—in retirement homes, for example, using a headband and iPad. The cABR research demonstrated the effect of aging on timing, harmonics magnitude, synchrony (phaselocking), consistency, and neural noise.

Kraus cited the common difficulty of distinguishing “bill” from “pill,” among older people. The initial letter—a rapid, complex sound—is the source of the difficulty in understanding. The cABR results showed that response neurons react more slowly among older subjects, which means that it takes slightly longer for older people to understand the sound they have just heard. The finding is consistent with those from animal studies. The nervous system does not slow for all sounds, but does for hard, complex sounds. Kraus and her colleagues also found less consistency in the neural response to the repetition of the same sound in an older than in a younger brain.

The nervous system is good at accurately responding to the sound frequencies that make up music and speech, but this capacity diminishes as people age. In addition, the perception of background noise increases with aging. These two factors may conspire to make hearing more difficult as we age.

Kraus’ research with cABR shows that musicians weather these aging effects better than nonmusicians. She found that musicians’ brains are quicker to respond to sounds and that older musicians can distinguish sounds more consistently and understand speech in background noise better than older nonmusicians.<sup>4</sup> Her findings suggest that a lifetime of making music promotes improved hearing in noise, auditory memory, and biological processing

of sound. Participation also enhances communication skills, cognitive function, and physical health.

## Research Gaps and Questions

Kraus noted that, while this research suggests numerous benefits from participation in music, the frequency or intensity of participation required to gain these benefits remains uncertain. There are many potential research questions: Do the beneficial effects dissipate if people abandon their music or significantly reduce their practice time? If so, how long does this process take? Can they regain the benefits in their older ages if they return to music? Do people who take up music for the first time at older ages also reap benefits?

Kraus sees clues to the answers to these questions in two avenues of research: short-term music training among children and software-based training with older adults. Her research shows that children receiving music training improved their reading and verbal IQ more than those receiving art training, or with neither type of training. Kraus asserted that this corroborates other research showing a particularly strong cognitive benefit for music, suggesting that music might operate differently than other participatory arts.

Research with older adults has demonstrated that software-based training can mimic the cognitive benefits of music training. A current study of an auditory- and memory-based brain fitness program put out by Posit Science found that hearing in noise improved after an intensive training program.<sup>5</sup> Kraus also found gains in the auditory working memory of study participants, compared with a control group. She sees these findings as consistent with evidence that the older nervous system is malleable and capable of positive changes.

In response to questions from the audience, Kraus stressed the fact that her research involves people who are actively playing an instrument.

<sup>4</sup> In this study, active musicians practiced 20 minutes a day, three times a week.

<sup>5</sup> The participants trained on the software 40 minutes a day, five days a week for two months.

Most of her data pertain to instrumentalists and the instrument used does make a difference. The nervous system responds to the sound of the specific instrument played. cABR results showed that brain responses were greater for people playing the bassoon than those playing piano, for example. And interestingly, the nervous system of trained musicians responds to these aspects of sound whether they are awake or asleep.

Kraus has a current study comparing vocalists and drummers, which presents challenges when constructing a control group because singers cannot practice as many hours as people who play other instruments. Yet, singing involves the entire body, so it is more intense in some ways. How much people practice—whether they play alone or in ensembles—all make a difference and warrant additional research.

## MUSICAL TRAINING AND BRAIN FUNCTION

Gottfried Schlaug, who is both a neuroscientist and organist, also presented information about the relationship between musical training and brain function. He was drawn to the topic because of a personal interest in the neuroscience of perfect pitch.

Schlaug compared the brain activity of people who are active musicians with passive listeners. Musicians, he said, are auditory-motor athletes. Their brains have a significantly larger corpus collosum than nonmusicians, particularly the interior two-thirds of that region. He found variations according to the intensity of musical training and by the type of instrument, presumably reflecting the different motor and auditory skills required. He and colleagues studied the 3D configuration of the precentral gyrus—site of the primary motor cortex—among string players and keyboard players. String players had a more elaborate right motor cortex controlling the left hand, while the keyboard player had a more elaborate motor cortex on both sides of the brain.

He presented video evidence of the therapeutic use of music with people recovering from a brain injury. A stroke victim who could not say “I am thirsty” in comprehensible speech could sing the same words with perfect clarity. Schlaug described how repeated training could enable some patients to regain the ability to speak the words.

Music also enhances movement in people with Parkinson’s disease (PD). Schlaug showed a video depicting how the gait and flexibility of a PD patient dramatically improved when music was played. Similarly, Noice, Noice, and Kramer (2012) reported that PD patients showed dramatic improvement in flexibility and movement after participating in ballroom dancing classes. Researchers do not understand why an impaired brain can react so strongly to music. The evidence shows that music can have remarkable therapeutic effects in some instances.

## ADDRESSING COGNITIVE DECLINE AND DEMENTIA WITH THE ARTS

The number of Americans with Alzheimer’s disease (AD) will more than double between 2010 and 2050, from 5.1 million to 13.2 million. The direct cost of their care will soar from \$172 billion to \$1.1 trillion over that period.<sup>6</sup> There are no pharmaceuticals currently available that halt the disease, just five FDA-approved drugs that temporarily improve symptoms. But finding ways to delay the debilitating effects of AD would significantly reduce the costs of care.<sup>7</sup> This makes the therapeutic use of arts for older

<sup>6</sup> See Figure 4 and page 48 in Alzheimer’s Association, 2012 Alzheimer’s Disease Facts and Figures. *Alzheimer’s and Dementia: The Journal of the Alzheimer’s Association*. March 2012; 8:131-168 and Alzheimer’s Association, 2010 Alzheimer’s Disease Facts and Figures, both available at [www.alz.org](http://www.alz.org).

<sup>7</sup> The 2012 Alzheimer’s Disease Facts and Figures noted: Because of the increased cost and loss of independence associated with placement in a nursing home, strategies to prevent or delay nursing home placement are desirable. It has been estimated that delaying long-term care by one month for each person in the United States age 65 or older could save \$60 billion each year.



dementia patients an important issue for research from a public health perspective.

Anne Basting and Kate de Medeiros assessed the body of scientific evidence related to arts and other types of interventions on cognitive decline, neuropsychiatric symptoms—such as agitation or night wandering—and quality of life in people with dementia.

Basting and de Medeiros examined systematic reviews of research for three types of interventions: pharmacological, nonpharmacological (excluding the arts), and arts programs. There were nearly 2,900 studies published on these topics since 2000, but few arts intervention studies were included in systematic reviews, often because they did not meet reviewers' basic criteria of a randomized design and adequate controls. As stated by other workshop presenters, arts interventions are difficult to study in an RCT, which is considered the gold standard for clinical trials designed to test an intervention's efficacy or effectiveness. Arts interventions involve multiple elements that can influence behavior, including social interaction, personal interests, and the quality of instruction or delivery mechanism.

De Medeiros also pointed out that tests generally used in RCTs involving cognition and behavior were developed for pharmacological studies and targeted for the length of time necessary for a drug to take effect. Such tests do not capture the immediate impact of an arts intervention on mood or apathy. Further, some common tests, such as the Neuropsychiatric Inventory, measure behavior such as delusions and hallucinations, which are unlikely to be affected by an arts intervention. This makes it difficult to compare results between arts interventions and pharmacological interventions.

Given the problems fitting arts intervention studies into the standard RCT design, Basting and de Medeiros expanded their assessment to include integrative reviews of studies, which consider more qualitative aspects of research. Because pharmacological interventions were well covered in

the systematic reviews, the authors excluded them from the integrative reviews.

Basting and de Medeiros' assessment of pharmacological interventions found that the drug Donepezil showed most promise for slowing cognitive decline, especially when combined with cognitive stimulation. But this and the other drugs studied have significant side effects, which can outweigh their therapeutic benefits for patients with AD. They noted that just five drugs are approved by the Food and Drug Administration (FDA) for use in AD patients. All show limited effectiveness and negative side effects.

Nonpharmacological interventions reviewed include behavior management and modification, cognitive stimulation (through discussion or activities), changing the physical environment—e.g., removing mirrors or disguising doorways—emotion-oriented care, and simulated presence—e.g., through videos of family members.<sup>8</sup>

The arts interventions included in the systematic or integrative reviews primarily involved music, which might range from passive listening to music (to calm patients) or active drum circle participation. The studies did not address cognitive decline but several reported improved neuropsychiatric symptoms, such as reduced aggressive or agitated behavior. Several music interventions improved patients' reported quality of life, as did some studies of interventions involving drama and participatory art-making.

In general, the reviews found promising results from nonpharmacological interventions, but the studies were faulted for their weak study designs. The samples tended to be quite small (117 patients or fewer) and the measured outcomes were not comparable across studies.

The studies tested for different types of outcomes, but the results overall showed some

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<sup>8</sup> Other interventions included reality orientation, reminiscence, sensory stimulation, validation therapy, and TAP (Tailored Activity Program).

benefit to cognition. Several interventions did affect neuropsychiatric symptoms—reducing agitation or night wandering, for example—but recorded little or no discernible effect on quality of life.

Because arts-based interventions are multimodal, multilevel, and may produce subtle changes, they are difficult to evaluate as RCTs. Many measurement tools currently being used cannot capture the true or full impact of multimodal interventions. Basting and de Medeiros recommended identifying and developing alternative approaches to arts intervention research. Rather than focusing on a preferred intervention, such as music, dance, or theater, they suggested that researchers use an integrative approach that combines these activities and builds in improvisation, expanding the multimodal aspect of participatory arts.

They further recommended searching for the mechanisms that lead to cognitive or other changes to understand how an intervention might affect cognition and behavior: What senses are engaged and how? Is the intervention participatory? Does it facilitate cognitive function or social interaction? They underscored the need for more details about an intervention to identify those mechanisms and to select appropriate measurement tools. Such information will clarify who can provide the program (caregivers or trained professionals) and enrich conversations between therapists and artists. Also, researchers need to develop interventions tailored for an individual situation.

Finding appropriate tools for evaluating arts interventions is crucial. De Medeiros said the first step would be to determine which behaviors or functions (e.g., apathy, irritability, social connectedness, appetite) would be positively affected by arts-based interventions and over what time period (e.g., one hour, one day, one week, etc., after the intervention). She said that tests that can capture immediate and long-term responses make the most sense for evaluating an arts-based intervention.

The Observed Emotion Rating Scale is one option.<sup>9</sup> Although an extremely brief scale, it provides a way to record the appearance of pleasure, anger, anxiety, sadness, or general alertness in five-minute intervals. Other possible tests include monitoring change in food consumption, the Apathy Evaluation Scale, and a more detailed version of the Neuropsychiatric Inventory.

Basting and de Medeiros suggested that researchers and artists would do well, moreover, to focus on the impact of interventions beyond the individual. Artistic products can create social capital for persons with dementia by fostering closer connections among patients, care partners, friends, and family.

In response to audience questions, Basting described the wider impact of the TimeSlips program, which involves improvisational storytelling with dementia patients. The TimeSlips program encourages people with dementia to express themselves through group-generated stories, and failing memories did not deter their creative storytelling. After ten weeks in the program, participants in long-term care facilities with the TimeSlips program were more engaged and alert. The program can be administered by trained nursing home staff; one of the surprising benefits has been improved relationships among the staff and residents. Staff in TimeSlips facilities reported more frequent staff-resident interactions and a more positive view of their patients than staff in the control facilities with no program.<sup>10</sup>

<sup>9</sup> Lawton, M., Van Haitsma, K., Klapper, J. 1999. Observed Emotion Rating Scale, available at [www.abramsoncenter.org/pri/documents/observedemotion.pdf](http://www.abramsoncenter.org/pri/documents/observedemotion.pdf).

<sup>10</sup> Fritsch, T., et al. 2009. "Impact of TimeSlips, a Creative Expression Intervention Program on Nursing Home Residents with Dementia and Their Caregivers." *The Gerontologist* 49(1): 117-127; Philips, L., S.A Reid-Arndt, and Y. Pak. 2010. "Effects of a Creative Expression Intervention on Emotion, Communications, and Quality of Life in Persons with Dementia," *Nursing Research* 59(6): 417-425. Summarized in *The Arts and Human Development: Framing a National Research Agenda for the Arts, Lifelong Learning and Individual Well-Being* (2011), available at [www.arts.gov/research/TaskForce/Arts-and-Human-Development.html](http://www.arts.gov/research/TaskForce/Arts-and-Human-Development.html).

She urged researchers to imagine interventions that can engage people outside congregate care settings. Most interventions involve people living in group settings, yet they are a small minority of the older population. With the coming wave of older people, a future challenge will be improving the lives of people residing in their own homes, often isolated from family and friends.

Basting called for exploring cost-effectiveness and side effects of arts-based interventions; supporting collaborations between researchers and arts-based practitioners; and conducting demonstrations with seasoned researchers to better understand mechanisms and to yield descriptions through fresh eyes.

## MUSIC THERAPY FOR DEMENTIA

Julene Johnson, a musician as well as a professor, presented evidence of the therapeutic use of music specifically to help dementia patients. Early studies focused on using music to help manage the behavior of people with severe dementia, such as reducing agitation or aggression, as well as increasing alertness. Numerous studies also have documented that AD patients retain music skills and music memory (a preserved memory of music) long after their other communication and cognitive skills diminish.

Johnson reviewed 24 studies that used music to manage dementia symptoms. The music interventions were varied and included listening to live or recorded music, participating in singing or playing instruments, music therapy, and combining music with movement. The participants generally were in severe stages of AD or other dementias and lived in assisted living settings. The samples were typically small, around 25 subjects; many were not randomized to treatment. The studies lasted six to eight weeks, with the intervention, or exposure, ranging from 30 to 60 minutes, two to three times per week.

Johnson reported that many of the studies found that music interventions reduced some negative

behaviors associated with dementia, including aggression, agitation, anxiety, depression, and wandering. A few found improvement in cognitive skills (specifically memory and language). But other studies found no change in behavior or found a change in behavior but not in cognitive skills.

These studies reported interesting and promising results but did not provide strong scientific evidence for efficacy of interventions because of design shortcomings. None included a CBA of the intervention. She quoted the conclusion of the Cochrane group review of ten studies as a summary of the situation: “There is no substantial evidence to support nor discourage the use of music therapy in the care of older people with dementia.” Further, “the methodological quality of these small, short-term studies was generally poor, as was the presentation of results.”<sup>11</sup>

Johnson looked at three additional studies and reached a similar conclusion. In general, the criticisms were similar to those identified by other researchers and summarized above: inadequate samples and methods, limited and inappropriate outcome measures, weak statistical methods, and inconclusive results.

In contrast, the studies of pharmacological agents Johnson reviewed were well-designed, international RCTs conforming to high research standards. Nevertheless, the results were disappointing, showing that neither Donepezil nor Memantine were effective for treating agitation in AD and that they had negative side effects. Furthermore, these drugs did not reduce burden on caregivers, which is a significant part of the cost of AD.

Johnson also reviewed the findings from studies of other nonpharmacological interventions with

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<sup>11</sup> Vink, A., Bruinsma, M., Scholten, R. 2011. “There Is No Substantial Evidence to Support nor Discourage the Use of Music Therapy in the Care of Older People with Dementia.” Cochrane Dementia and Cognitive Improvement Group. Published online and accessed at [summaries.cochrane.org/CD003477/there-is-no-substantial-evidence-to-support-nor-discourage-the-use-of-music-therapy-in-the-care-of-older-people-with-dementia](http://summaries.cochrane.org/CD003477/there-is-no-substantial-evidence-to-support-nor-discourage-the-use-of-music-therapy-in-the-care-of-older-people-with-dementia).

dementia patients.<sup>12</sup> These studies looked at such interventions as behavior management, family-based coping therapy, environmental management, hand massage, and physical activity. However, the studies tended to suffer from the same methodological problems as the music intervention programs.

## Music Interventions Appear Promising

Despite these limitations, Johnson's review of music interventions showed they may prove effective in some circumstances. At a minimum, several studies suggested that music helped improve behavioral symptoms. Music has the potential to improve the quality of life for both the person with dementia and caregivers. Music also has the potential to be cost-effective, imposes minimal risk, and is easily accessible, including for culturally diverse older adults and those with dementia.

Johnson presented several suggestions for improving the quality of research studies on music interventions:

- Encourage cross-talk between music and dementia researchers (interdisciplinary teams, including statisticians and methodologists).
- Consider using international clinical trials criteria or consult the Alzheimer's Disease Cooperative Study (ADCS), an academic research consortium that studies interventions for AD.

<sup>12</sup> For example: Cooper, C., et al. 2012. "Systematic Review of the Effectiveness of Non-Pharmacological Interventions to Improve Quality of Life of People with Dementia." *International Psychogeriatrics* 24(6): 856-70 (Jun); Gauthier, S., et al. 2010. "Effects of Donepezil on Activities of Daily Living: Integrated Analysis of Patient Data from Studies in Mild, Moderate and Severe Alzheimer's Disease." *International Psychogeriatrics* 22 (6): 973-983; Hulme, C., et al. 2010. "Non-Pharmacological Approaches for Dementia that Informal Carers Might Try or Access: A Systematic Review." *International Journal of Geriatric Psychiatry* 25 (7): 756-763; Livingston, G., et al. 2005. "Systematic Review of Psychological Approaches to the Management of Neuropsychiatric Symptoms of Dementia." *American Journal of Psychiatry* 162 (11): 1996-2021; Olazarán, J., et al. 2010. "Nonpharmacological Therapies in Alzheimer's Disease: A Systematic Review of Efficacy." *Dementia and Geriatric Cognitive Disorders* 30: 161-178.

- Include more ethnically and culturally diverse older adults.
- Develop better theoretical models to inform research agendas.
- Consider novel ways to capture the effects of music on older adults.
- Increase basic research about processing/experience of music of older adults.
- Consider intervention effects on both AD and non-AD dementias.
- Consider music interventions in early-stage dementia and possibly across the lifespan.

Most people will not develop dementia but may experience aging-related cognitive decline. They could also benefit from music interventions. (The importance of music through the lifespan is acknowledged with government support in Finland, for example.)

## COST-BENEFIT ANALYSIS

Emmet Keeler addressed the difficult but necessary exercise of conducting CBA of arts interventions.

In this country, which has the world's most expensive healthcare, it is always important to ask how much an intervention will cost and justify why money should be spent on it rather than some other intervention.

Arts interventions have many intangible benefits, which may accrue to caregivers or family members as well as the patient. This factor makes it harder to conduct CBAs, which requires numeric inputs into a table or scorecard of direct and indirect costs as well as the estimated medical costs offset by the intervention.

Keeler presented a primer on the various methods for weighing costs versus benefits of any health intervention. Researchers generally opt for a full CBA, the standard for assessing the impact of regulations on an industry. Cost-only analyses are useful in business but are not appropriate for

arts interventions because health interventions, whether arts programs or blood pressure screening, are meant to improve health, not just to save money. Another type of analysis—cost-effectiveness (CE) analysis—focuses on one effect or outcome and may be appropriate only for some arts interventions. They are not designed to capture multiple effects for the patient and possibly for others.

Although some benefits are very difficult to quantify, researchers need to place a dollar value for all effects to obtain the net value of the program. They must go through the same exercise with other options, such as the status quo or another intervention.

He noted that researchers need to pick measureable objectives, provide evidence that a program works, and show how it compares with the costs and benefits of other interventions. The steps included are:

- Specify exactly what is being “costed.”
- Choose which benefits and impacts to count.
- Predict costs and impacts and monetize them.
- Discount future dollars to present value.
- Calculate the net benefit and choose the programs with maximum net benefit.
- Conduct a sensitivity analysis of key assumptions and consider the impact if assumptions are changed.

The cost comprises the cost of each activity in the program, including set-up (training and planning, for example) and ongoing costs. Typically, research costs are excluded.

The downstream costs are often less certain, even though they may be substantial. In medical analyses they are modeled using disease history models: Suppose the arts program postpones entry into long-term care. This could delay major care costs, Keeler said, but quantifying that effect requires a number of assumptions.

The actual costs of supplies, rent, or workers

are another input. Labor costs are calculated by estimating the time required for each activity at average wages. The value of volunteers’ time poses a different question because there is an opportunity cost: What else could one be doing if retired? In a similar vein, should family caregiver time be entered as \$0 or an appropriate wage rate? People may like the feeling of helping their parents or spouse, but within limits. At some point, they may be willing to pay to regain some of their time.

The participants also could be doing something else with their time, and the program could also incur an opportunity cost for them. However, if the program is fun, then the participants’ time would be counted as a benefit and not a cost.

## Quality Adjusted Life Years (QALYs): Combining Dimensions of Health Benefits

Health programs aim to improve life expectancy and functioning, but the quality of life is also important. Feeling healthy or fit, comfortable and pain free—even “happy,” useful, and socially connected—all help define the quality of those extra years of life.

Keeler pointed out that a lot of health programs are not just aimed at extending life—indeed, people undergo mildly dangerous operations to improve functioning or gain symptomatic relief—thus a CBA needs to consider improvements in health and in the quality of life. QALYs range from 1 (excellent health) to zero (death), with various states of imperfect health in between. These values are determined by health-related quality of life (HRQL) weights applied to each year of life, i.e.,  $\text{QALYs} = \sum \text{years} \times \text{HRQL factor for those years}$ . One summary measure aggregates QALYs.<sup>13</sup>

<sup>13</sup> The adjustment ratio for quality of life given specific disabilities is determined using survey responses about the number of disability-years a person would be willing to forego for every year of disability-free life. For a stroke victim, the value is 0.7, meaning that people have said they would, on average, give up 14 of the next 20 years of life if they could avoid living with stroke disabilities.



## What Is the Dollar Value of Health?

According to economic theory, the value of something is what people are willing to pay for it (Willingness to Pay [WTP]). Health is an important outcome that is not purchased directly, so has no clear price. Researchers can estimate WTP values for health in two ways: 1) implicit choices, e.g., hazard premium wages for dangerous jobs; and 2) surveys that ask people what they would pay for specific goods. The literature on both these methods shows that people are willing to pay between \$1,000 and \$10,000 to reduce their risk of dying by 1/1000—for example by paying substantially more for a top surgeon to perform a risky operation. The value of an additional QALY ranges from \$50,000 to \$250,000.

### A Real-World CBA Example: Chorale Group

Keeler explained the basic principles of CBA with regard to arts interventions, described in a paper by Gene Cohen and colleagues. In the study, about 160 ambulatory older adults were assigned to a chorale group or their usual activity.<sup>14</sup> Participants in the professionally run weekly sessions reported better overall health (to 0.1 standard deviations), two fewer doctor's visits, and fewer over-the-counter medications and falls than the control group. In this example, Keeler assumes that 0.1 standard deviation in health is equivalent to a 0.01 increase in the scale of health quality of life adjustment that goes from 0 to 1 for excellent health. He did not assign a value to other activities.

#### Net Costs

Keeler assumed \$50,000 for the costs to manage the professional chorale group. He estimated a medical savings of \$250 for each of the 80

participants in the chorale group in avoided doctor visits, or \$20,000 total (80 x \$250). So the net cost is \$30,000 (\$50,000-\$20,000).

#### Net Benefit

Assuming WTP for each additional QALY is \$50,000, Keeler estimated that the increased health is worth \$500 for each participant (0.01 x \$50,000). He assumed the fun of singing is worth \$10 each week to each participant; 30 weeks of fun then adds up to \$300 of fun. The average total individual benefit is thus \$800, so the total net benefit for the program participants would be \$64,000 (80 x \$800).

The program has a net positive effect (\$64,000 > \$30,000), but by Keeler's rough calculation the program is not necessarily cost-saving as there is still a net cost of \$30,000.

## COSTS AND BENEFITS OF EVIDENCE-BASED PROGRAMS

Melissa Castora-Binkley and Tom Prohaska presented the issues involved in determining cost and cost-effectiveness when translating research in arts programs into evidence-based programs in a community. They examined existing models for assessing and implementing physical activity (PA) programs to improve the health and well-being of older adults, because, they said, research on the impact of the arts to health and well-being in older adults is similar to research on lifestyle and health practices such as exercise. PA and arts interventions share similar issues and barriers in determining cost, cost-effectiveness, and the public health impact of programs.

They outlined the basic questions to address before launching an intervention program:

1. What are the specific arts interventions and populations to be studied?
2. What are the health benefits of participating and the consequences of not participating?
3. What are the potential barriers to participation?

<sup>14</sup> Cohen, G.D., Perlstein, S., Chapline, J., Kelly, J., Firth, K.M., and Simmens, S. 2006. "The Impact of Professionally Conducted Cultural Programs on the Physical Health, Mental Health, and Social Functioning of Older Adults." *The Gerontologist* 46, no. 6: 726-734.

4. How can we develop successful interventions and the policies to promote them in older populations, while identifying the criteria on which to evaluate their success?

Prohaska maintained that the answers to all of these questions feed into the cost and cost-effectiveness of a program. In particular, it is important to capture measures of prevalence, incidence, antecedents, cost outcome, factors affecting the initiation and maintenance of a program, and finally, bringing a program up to scale.

Castora-Binkley's review of arts programs involving dance, chorale, theater, piano, and creative writing found a number of positive effects on general health. Specifically, these included lower medication use; fewer falls and better balance; improved cognition; decreased hostility, anxiety, and depression; and increased sense of mastery and of well-being.<sup>15</sup> Although researchers were good at describing the intervention, they were less diligent about documenting the dosage, such as time and intensity, and the studies needed more organizational structure. Castora-Binkley concluded that answers to the basic research questions are insufficient to provide a true CBA. Both researchers agreed that the efficacy of these programs needs to be established before the costs can be evaluated and the research translated to community-based programs.

Prohaska noted that while costs must be considered, it might be futile to try to operationally define costs at this time. Likewise, it is difficult to estimate the total benefits from a study. Another way of evaluating cost is by looking at the true value of what we have and the public health impact of what we have done. He described how arts programs operate within a broader ecological framework. Current research is oriented to the individual in a controlled or semi-controlled situation. Yet the

interpersonal, institutional, and community elements have a function and provide a setting in which these occur. These ecological factors contribute to the true costs. Understanding the interrelationship of factors—that elements have a function as well as a location—helps us estimate costs. He also noted that researchers do not need to isolate specific aspects if a program has multifaceted aspects.

He enumerated elements that define evidence-based wellness programs and health promotion programs. These programs:

- All include a therapeutic element (treatment) and a well-developed strategy for implementing the treatment (program delivery).
- May include healthy older adults as well as those with moderate to significant health conditions.
- Document the impact on meaningful health outcomes and related demographic, psychosocial, and environmental correlations that influence the behaviors.
- Include comprehensive, multifaceted interventions appropriate for older adults.
- Document evidence of a systematic review and an evidence-based program.

The translation of scientifically tested research findings to community-based health promotion programs is often slow, fragmented, and subject to speculation by the practitioner community. Programs have the greatest chance for success if their methods and goals are well defined and documented, include a CBA, and are adaptable for a variety of real-world situations.

Prohaska suggested using the RE-AIM framework to determine the overall public health impact of programs: *Reach, Effectiveness, Adoption, Implementation* (consistency and fidelity), and *Maintenance*.<sup>16</sup>

<sup>15</sup> Castora-Binkley, M., Noelker, L., Prohaska, T., and Satariano, W. 2010. "Impact of Arts Participation on Health Outcomes for Older Adults." *Journal of Aging, Humanities and the Arts* 4: 352-367.

<sup>16</sup> An explanation of and resources for those wanting to apply the RE-AIM framework can be found at: [www.re-aim.org](http://www.re-aim.org).

He also enumerated recommendations for reducing cost, determining cost-effectiveness, and enhancing overall impact, including focusing on essential elements, considering the contextual factors, and planning for dissemination. He urged researchers not to wait for results from gold standard evidence-based programs. He considered an important objective of this workshop should be to disseminate the findings already known. Finally, quoting researcher Larry Green (2008), he said, “If we want more evidence-based practices, we need more practice-based evidence.”

Prohaska expects a proliferation of new evidence-based programs as the field advances. However, he warned that there needs to be a corresponding effort to improve the quality, promote the flexibility, and enhance the public health impact of these programs.

## APPLYING COST-BENEFIT ANALYSIS

William Spector illustrated real-world issues associated with CBA with a theoretical example: a chamber music camp for older participants. It is important to determine who will benefit and who is likely to pay for the program. This is not always straightforward because some benefits are more public than private. He noted that the CBA is meant to determine the value to society in dollar terms, with benefits expressed in health effects and costs expressed in dollars. The costs and benefits do not always accrue to the same people.

Defining the context of the intervention is also important: Who is funding the program—public or private entities, or the participants themselves? Will it be possible to evaluate health effects in terms of reduced medical costs or fewer sick days?

### Defining the Intervention

As mentioned in other presentations, researchers need to document the intensity of the intervention. Referring to a hypothetical example he called the Group Art Program (GAP), a music performance

group, Spector discussed how researchers need to know intensity of practice, not just number of hours, because the greatest cognitive benefit comes when participants take on difficult tasks. Are members sight-reading music or practicing for a group performance? How difficult is the music? All components need to be documented so they can be replicated to the extent possible. Spector noted that musicians’ brains differ by how much they practice. Most professionals practice an average of about two hours a day, while an active amateur might average 30 minutes a day at most, he speculated.

Other aspects of the program can have important effects, such as whether a professional or amateur coach runs the practices, or whether practices are run by participants themselves, as is common with chamber music groups.

It also is important to ask what other aspects of the intervention are challenging the participants. In the hypothetical GAP music camp, older participants may have to work harder than young adults to keep track of music and practice schedules. The camp may provide physical challenges for some people who have mobility limitations or who are just starting or relearning an instrument. Each activity—rehearsal, group practice, and the physical requirement of playing different instruments—makes different demands on the brain.

### Identifying Benefits and Costs

Benefits of this intervention might include improved health and quality of life, greater job productivity, lower healthcare costs, enhanced social interactions, improved cognitive and motor skills, and potentially, anatomical brain changes. Benefits may differ depending on the task, the role of the team, and who is on the team. For example, ballroom dancing may be a greater cognitive challenge for a man because he leads the pair. Sight reading music might require less effort than perfecting new challenging music.

The costs of interventions must include all aspects of the program, including time for rehearsals and performances, marketing, space rental, and

travel. Researchers need to consider the depreciation of instruments as a potential cost. Spector suggested building in the cost of a facilitator and creating educational materials or a tool kit for staff and consumers. The costs also should be compared to those of other programs.

Spector concluded that, as with exercise programs, people will only reap the benefits if they are pushed to exert themselves, whether physically or mentally. In fact, in such a program, the worst players may get the most health benefit because the program may be more challenging relative to their initial skills. However, the requirements need to be reasonable for the skill levels of participants to avoid excessive frustration and to minimize program attrition.

# AESTHETICS AND DESIGN IN GROUP LIVING ARRANGEMENTS

Sandra Crewe moderated a session on the relationship of aesthetics and design factors to health and quality-of-life-related outcomes of older adults in long-term care and assisted living facilities. She noted that when older people move from their homes to an assisted living facility, they are giving up some independence, establishing relationships with a new support network, and adjusting to an unfamiliar environment, all of which can contribute to cognitive and emotional stress. As health and social care providers try to minimize the stress and ensure the new environment is stimulating, they need to understand how the person and his or her environment are linked. Crewe also mentioned that, as the older population becomes more diverse, cultural differences in the physical surroundings may need to be considered.

In his presentation, Victor Regnier emphasized the importance of making assisted living homes welcoming to family members of all ages. In his study of 300 assisted living homes in the United States and northern Europe, Regnier identified important design elements that encourage interaction and activity, while providing privacy and a residential feel.<sup>17</sup> The design should allow for a primary pathway with links to activity rooms, dining areas, and

seating areas for visitors as well as individual rooms. Windows, half-walls, or balconies can allow residents to preview rooms before they enter them, so they can decide whether they want to join the group or activity and avoid unnecessary anxiety about chance encounters.

Regnier favors building activity rooms that might appeal to a limited group, such as a recording or art studio, as well as all-purpose rooms that can accommodate a range of more popular activities. He noted that the design of staff offices is also important to the overall feel of a building. Some care facilities use floating desks or offices with Dutch doors to keep the staff more visually accessible to residents.

Dementia patients might benefit from additional specific design features. A symmetrical floor plan, for example, can be disorienting to older residents, and asymmetrical layouts, with distinctive landmarks, like a statue or wall decoration, can help orient residents. Many dementia patients function better when possessions are visible, and might for example benefit from having open closets, with wire baskets for storage. Dutch doors and windows that allow residents to see into other rooms also can be particularly helpful to orient these residents.

Lush landscaping and natural light in interior areas are among other design elements that contribute to the success of an assisted living facility. The décor can be tailored to the situation and the population group. Some residential homes have found that dementia patients react well when their

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<sup>17</sup> Regnier, V. 2002. *Design for Assisted Living: Guidelines for Housing the Physically and Mentally Frail*. (New York: John Wiley & Sons.)



own art is posted on hallways outside their rooms. Responding to a question from the audience about whether a design element that is beneficial to one person might be detrimental to another, Regnier recognized that designs need to be adaptable so residents can retain their sense of individuality. He also acknowledged the value of alternative models that accommodate the needs of older adults like the village movement or the service houses in Northern Europe, which have programs that serve older people living in the surrounding communities.

As Basting noted in a later session, residents seldom get the chance to design a space, so creative ways are needed to adapt the current environment to be more welcoming and appropriate for older residents. She has a documentary in progress about the Penelope Project, in which use of space in a residential home was reconceptualized.

## THEORETICAL BACKGROUND OF RESEARCH IN VISUAL ART

Kathy Hathorn, a pioneer in therapeutic health care art, described how visual art has been used in healthcare for more than 600 years, with early use often focusing on religious themes, such as heaven and hell. In the 1860s, Florence Nightingale addressed the importance of the hospital environment—especially fresh air and light—in her *Notes on Nursing*.<sup>18</sup> In recent decades, most hospitals and nursing homes have used art to create a pleasant environment. More recently art is being used therapeutically.

Hathorn reviewed some landmark studies that demonstrate the health benefits of visual art. She presented three theories that underlie research in visual art and health:

- Prospect and Refuge Theory: The ability to see and the ability to hide are key to our survival. This theory holds that modern man views art

from this perspective and is attracted to art that has broad vistas (representing prospects) with visible places for easy refuge, thus satisfying innate instincts for fight or flight.<sup>19</sup>

- Emotional Congruence Theory: Our emotional states bias our perception of environmental stimuli in ways that are congruent or match our feelings.<sup>20</sup>
- Biophilia Theory: Millions of years of evolution have left humans genetically prone to respond positively to nature settings that fostered well-being and survival for early humans.<sup>21</sup>

A seminal study of nine years of discharge data found that recovery from surgery was faster for hospital patients who stayed in a room with a view of a natural setting than for patients with a view of a brick wall. The hospital stay was shorter (7.96 days compared to 8.70 days), fewer strong analgesics were needed, and nursing staff wrote fewer notes for the patients who had rooms with the natural scene. This study, by Roger Ulrich, helped lay the foundation for evidence-based design (EBD).<sup>22</sup> Another noted study found that patients who viewed serene natural scenes before going into surgery had lower blood pressure—and less preoperative stress—than patients who viewed arousing pictures.

## Physical, Cognitive, and Emotional Issues Affect Perception of Art

Hathorn noted that aging is associated with physical changes that can affect how older people view art.

<sup>19</sup> Appleton, J. 1975. *The Experience of Landscape*. (London: John Wiley)

<sup>20</sup> Ulrich, R., and Gilpin, L. 2003. "Healing Arts: Nutrition for the Soul." In S. B. Frampton, L. Gilpin, & P. A. Charmel (Eds.), *Putting Patients First: Designing and Practicing Patient-centered Care* (pp. 117–146). (San Francisco, CA: John Wiley & Sons)

<sup>21</sup> Wilson, E., and Kellert, S. 1993. *The Biophilia Hypothesis*. (Washington, DC: Inland Press)

<sup>22</sup> Ulrich, R. 2004. "View Through a Window May Influence Recovery from Surgery." *Science* 224 (4647): 420–1.

<sup>18</sup> Nightingale, F. 1898. *Notes on Nursing: What It Is and What It Is Not* (New York: D. Appleton).

This determines what visual art is appropriate to display in different settings. With aging, significantly less light is available to the retina; depth perception is impaired. Older people often develop lens sclerosis and cataracts and they are more affected by glare and shadows.

Dementia and other cognitive impairments also affect how people perceive art. As the sense of time and place changes, the ability to recognize common objects may deteriorate. The emotional changes with dementia must be considered when selecting art for dementia patients. Hathorn relayed an example in which a picture of a natural landscape was calming for most people, but looked “empty” to AD patients, who asked where the people had gone.

## Impact of Visual Art and Design on the Elderly

Nearly one-half (43 percent) of hospitals surveyed in a recent study said they displayed visual art in the belief that it benefits patients and their families and contributes to a healing environment.<sup>23</sup> Extrapolating these findings, Hathorn estimated that more than 20,000 facilities for older Americans have visual art, affecting more than 960,000 residents. Hathorn noted that art can stimulate emotional function and can be an effective way to engage older viewers.

Museums worldwide have programs geared for older people, even dementia patients. The Artists for Alzheimer’s (ARTZ) program at New York’s Museum of Modern Art (MoMA) and other museums, for example, provides an opportunity for personal growth and insight and allows participants to access long-term memories.<sup>24</sup> Working with MoMA staff, Mary Mittleman and New York University School of Medicine researchers found that visual arts programs reduced depression, improved socializing,

and increased self-esteem among participants.<sup>25</sup>

A Swedish study also found social and cognitive benefits for patients who participated in an arts program.<sup>26</sup> A pilot study in five Midwestern nursing homes found that pictures and bird sounds improved the bathing experience for patients, reducing agitation and aggression.<sup>27</sup>

## Significance and Effectiveness of Expressive Arts Activities

Expressive arts activities help individuals relax, provide a sense of control, reduce depression and anxiety, encourage playfulness and a sense of humor, as well as improve cognition and self-esteem.<sup>28</sup> Hathorn noted that making art also can nurture spirituality and reduce boredom.

Art also can reflect the emotional and cognitive condition of the artist. Hathorn displayed a series of drawings by three artists with AD that clearly showed the effects of disease progression over time, with less detail, different colors, and more abstract forms, as the artists’ cognitive ability declined.

The effects of art and arts activities extend beyond the patients. Hathorn observed the growing recognition that displaying visual art and creating art in the workplace can reduce stress for the healthcare staff and can promote more compassionate, higher-quality care. Accordingly, some medical school curricula are incorporating an arts component.

Hathorn saw a need to learn more about participatory art programs and about viewing art in

<sup>23</sup> State of the Field Committee. 2009. *State of the Field Report: Arts in Healthcare 2009*. Washington, DC: Society for the Arts in Healthcare. Available at: [thesah.org/doc/reports/ArtsInHealthcare.pdf](http://thesah.org/doc/reports/ArtsInHealthcare.pdf).

<sup>24</sup> Artists for Alzheimer’s, available at [www.artistsforalzheimers.org/](http://www.artistsforalzheimers.org/)

<sup>25</sup> The New York University Evaluation of Meet Me at MoMA is available at: [www.moma.org/meetme/resources/index#evaluation](http://www.moma.org/meetme/resources/index#evaluation) (accessed November 6, 2012). See also: Jones, K. 2009. “Keeping Those with Alzheimer’s Engaged.” *The New York Times*. Arts section (March 12).

<sup>26</sup> Wikström, B. 2002. “Social Interaction Associated with Visual Art Discussions: A Controlled Intervention Study.” *Aging & Mental Health* 6 (1): 82-7 (February).

<sup>27</sup> Whall, A., Black, M., Groh, C., Yankou, D., Kupferschmid, B., and Foster, N. 1997. “The Effect of Natural Environments Upon Agitation and Aggression in Late Stage Dementia Patients.” *American Journal of Alzheimer’s Disease*, 12(5): 216-220.

<sup>28</sup> Cohen, G. 2000. *The Creative Age*. (New York: Avon Books Inc.)

an unstructured environment. The burning question, in her mind, is “What happens when the art does night duty? We simply have no idea.”

## **DESIGN FOR EVERYONE— INCLUDING OLDER ADULTS**

Valerie Fletcher expanded on the discussion of the health aspects of aesthetics and design, in particular, universal design that accommodates the mobility and cognitive realities of older people.

Fletcher outlined three broad categories of functional limitations: physical; sensorimotor; and brain-based, including cognitive functioning as well as mental health. She emphasized that variation in ability is normal and ordinary, and that most people will experience some limitations during their lives. Thus, universal design is not just about serving the disabled or older people, but serving everyone. Universal design embraces the design of “places, things, information, and communication” to expand accessibility to the widest spectrum of users in a wide range of situations.

Equitable use is the overarching and transcending principle of universal design. Use should be intuitive and require minimal physical effort. The best evaluations of successful design come from people at the edges of the spectrum of ability and age—those with the greatest limitations and oldest ages. These user experts fuel insight and inspiration and help generate theories, not just identify problems.

Support for creating enabling environments for people with disabilities, whatever their age, has gained ground in recent decades. Disability was redefined by the World Health Organization (WHO) in 2001 as a contextual variable. As such, specific physical, communication, and sociopolitical environments can present barriers for individuals depending on their physical or mental condition. Individuals may be disabled only in a given context.

The magnitude and speed of aging around the globe in coming decades adds a sense of urgency

for creating an environment more appropriate for older people. The percentage of older people living in community housing or long-term care increases sharply with age. Yet, the vast majority of older people will not live in assisted living facilities but in private homes within communities. This extends the need for universal design features well beyond institutional settings. Neither incremental strategies nor special solutions will be enough, Hathorn said, as the need is too great.

Universal design is a way of thinking about human diversity today and about the power of design. She maintained that design is a social art and that it influences the sense of confidence, comfort, and control.

# RESEARCH GAPS AND OPPORTUNITIES

In the final session of the workshop, three panelists were invited to provide insights about research needs in the field. They highlighted the strengths and weaknesses of current research and offered suggestions for new avenues and approaches going forward, including practical considerations for the implementation of evidence-based programs.

## RESEARCH DESIGNS THAT CAPTURE LONG-TERM EFFECTS OF ART ON THE AGING PROCESS

Margie Lachman emphasized the need for research across the lifespan. Research shows an association between art and cognitive performance, but can art slow the effects of aging? The research to date on lifetime effects of arts participation is not conclusive. Related factors, including education, cognitive stimulation, physical activity, and social engagement, may be the mechanisms for change.

Research into the linkages between arts and aging must be tailored to the goals and situation. Experimental study designs such as RCTs can vary conditions and control groups (alone versus in groups, participation versus observation, moderate physical activity versus light physical activity), or allow participants to choose their group or be assigned to one. Earlier in the workshop, it was noted that such designs should involve consistent measurement in pre- and post- tests.

Developmental and quasi-experimental designs

might be used to examine the long-term effects of art. They can be longitudinal, cross-sectional, or reversal designs. They can address such questions as “Does art affect the aging process? Is art better for older than younger adults?” The ABAB reversal design (which involves a baseline, treatment, reversal, and another treatment) can test whether an art treatment makes a difference and, if so, whether the effects dissipate when treatment is removed.

Another valuable research design is the daily diary and experience sampling. This occurs in a natural setting, in which participants might log their mood when they are doing art. Or, participation in arts might be tied to such measures as blood pressure or cortisol, as well as mood or perceived stress. This design allows multiple outcomes to be tracked, including physical health, mood, cognition and memory, social engagement, and longevity.

## Prospect and Promise of Art

Participation in the arts means learning something new, mastering a skill, and enjoyment. It can be a lifelong engagement with long-lasting cognitive benefits. Art can aid the adaptation of older people as they age, which has been described as Selective Optimization with Compensation (SOC).<sup>29</sup>

<sup>29</sup> Baltes, P., and Baltes, M. 1990. “Psychological Perspectives on Successful Aging: The Model of Selective Optimization with Compensation.” *Successful Aging: Perspectives from the Behavioral Sciences*, pages 1-34. (Cambridge, U.K.: Cambridge University Press).

Selection—focus of goals; Optimization—means to achieve goals; and Compensation—maintaining goals in the face of losses.

Lachman described the prospect and promise of art for aging populations as wide-ranging. They might encompass therapeutic uses with dementia and PD, enrich the general quality of life, drive new policies, and even create new marketing strategies for long-term care facilities.

## **INTERDISCIPLINARY TEAMS, INTEGRATED ARTS INTERVENTIONS, AND EASTERN APPROACHES**

Art Kramer agreed with the workshop participants about the need for interdisciplinary teams. He suggested that, in addition to cognitive scientists, biologists, and neurologists, teams should include public health experts and health economists.

Kramer also called for more enlightened architects, and offered an example—the Beckman Institute Building at the University of Illinois, which won a design award in 1989. The building design encourages interaction among researchers in different disciplines, which can generate new research ideas.

He also favored consideration of more animal models in parallel with human models, as well as new computational models. An audience member questioned whether animal models could be valid for research on the arts because art is a uniquely human domain. Kramer argued that we need our perceptual, cognitive, and motor facilities to engage in and appreciate art. He noted we can learn a great deal about these facilities from animal studies of brain function.

Kramer also pointed to lessons that can be learned from Eastern health practices and knowledge, although he acknowledged that these were hardly discussed in the workshop. He pointed researchers to the work on integrative mind-body training by Chinese researcher Yi-Yuan Tang and

psychologist Michael Posner.

Kramer also agreed with the call for a lifespan approach to the study of aging, to track the long-term effects of lifelong habits and activities, including exercise and arts participation. With few exceptions, when people stop the physical exercise, music training, or other arts activity, the benefits go away. It would be helpful to know more about how long benefits last.

He expressed interest in Kraus' research approach of matching the appropriate art intervention with targeted (often negative) aging-related changes. The right intervention might be able to enhance auditory and sensory function, recognition, and perhaps auditory recall. Researchers could map the relationship between desired changes or outcomes and art forms. Some outcome measures, such as brain imaging, are appropriate for the laboratory but difficult to apply in a community setting. Other measures are more portable, like diaries or writing projects, and even some computer-based measures. An increasing array of measures is downloadable from iTunes to iPads, phones, or computers.

Kramer echoed the concern of Johnson and others that the research should distinguish type of dementia, for example, the level of severity and whether or not it is AD. And researchers could learn much about the efficacy of interventions using more diverse populations and animal studies. He mentioned the work of Henriette van Praag at NIA, which draws on animal studies involving brain disorders.

Researchers also need to consider combining interventions to test whether such an approach might be more cost effective. An arts intervention combined with tai chi, for example, might yield even more benefits than either intervention alone. Animal studies show, for example, that socializing combined with exercise sometimes has additive, even multiplicative effects. Echoing several other participants, Kramer stated that total understanding about the underlying mechanism is not required



before implementing a program that has proved effective.

## **THEORIES, MECHANISMS, LEVELS OF ANALYSIS, AND REPLICABLE, RIGOROUS DESIGNS**

Becca Levy considered the research findings to be promising and thought the presenters had identified some outstanding examples of both quantitative and qualitative studies. She enumerated four opportunities to advance research in the arts to improve health and well-being in older adults:

### **1: Encourage Research to Build on Theories**

Levy suggested considering Simonton's model of creative careers. Using testable hypotheses, he has examined the phenomenon of changing creative outlets to match current abilities or limitations. Because of arthritis, for example, Grandma Moses switched from embroidery to painting at age 76 and found enormous success in her late-life pursuit.

Levy mentioned another theoretical framework: stereotype embodiment theory.<sup>30</sup> From a young age, individuals internalize self-fulfilling stereotypes, for example, that aging equals decline, and that older people are not productive or creative. Levy and colleagues found the risk of cardiovascular events was higher among older adults who had held negative stereotypes of aging in young adulthood.<sup>31</sup> Reversing this stereotype, such that older people are valued for their experience and creativity, could yield positive health benefits.

<sup>30</sup> Levy, B. 2009. "Stereotype Embodiment." *Current Directions in Psychological Science*. 18(6): 332-336.

<sup>31</sup> Levy, B., Zonderman, A.B., Slade, M.D. and Ferrucci, L. 2009. "Age Stereotypes Held Earlier in Life Predict Cardiovascular Events in Later Life." *Psychological Science* 20(3): 296-298.

### **2: Examine Ways to Make Arts Interventions Most Effective**

Future research could compare passive versus active art forms and try to measure the engagement level of participants. The issue of choice also can be tested: Do health effects differ if people choose their art form rather than be randomly assigned to a research or control group? The type of art also can be tested. In particular, is it more effective to use culture-specific arts or to introduce new art forms?

### **3: Develop Replicable, Rigorous Designs and Multiple Levels of Analysis**

Levy echoed the call for more rigorous research designs, and cited Kraus' study of understanding in noise as a good example of the type of research needed. In sum, Levy called for stronger statistical methods, including sampling, standardized outcomes, replicable methods, and adequate control groups.

### **4: Identify the Mechanism**

Levy noted that Schlaug's research on neurocognitive plasticity and Kraus' research on older musicians' brain function were good research examples. Another example is reminiscence, which may serve as a catalyst to personal growth for older adults. The author Henry Roth, for example, wrote six autobiographical novels between the ages of 73 and 89, breaking a 45-year writer's block. Roth said that writing allowed him to come to terms with past actions he regretted as he faced his own mortality.

Levy concluded by quoting Robert Butler, who said that baby boomers must overcome their denial of aging and advocate for new ways to prevent and manage AD. The arts can be mobilized as a key resource to give individuals purpose, which can improve health and longevity.

## FUNDING OPPORTUNITIES FOR FUTURE WORK

The issue of funding for arts intervention research was addressed by several representatives of the steering committee and sponsoring agencies.

Lisbeth Nielsen (NIA), Jonathan King (NIA), and William Elwood (OBSSR) mentioned existing NIH funding opportunities for multisensory research and for projects that link researchers and community organizations. Researchers can register with the NIH through [www.grants.gov](http://www.grants.gov), create a profile, search for funding opportunities of interest, and submit grant applications.

Sunil Iyengar (NEA) suggested that interested parties also monitor communications from the Federal Interagency Task Force to Promote Research on the Arts and Human Development ([www.arts.gov/research/TaskForce/task-force-members.html](http://www.arts.gov/research/TaskForce/task-force-members.html)) about future funding opportunity announcements. The task force intends to facilitate research in this area by matching funders with researchers.

Jolene Johnson mentioned the Patient-Centered Outcomes Research Institute (PCORI) as another potential funding source, which can be accessed at [www.pcori.org](http://www.pcori.org).

contributing to the work. He also said that reviewers of grant applications need to be prepared to acknowledge risks, and to perhaps fund bold new research ideas as well as proven approaches. He noted that “aging is a lot like life: complicated and messy. Don’t run away from the messy.”

## GOING FORWARD: PROMOTE CROSS-TALK AND TAKE RISKS

In his role as chairman of the workshop’s steering committee, David Reuben summarized the deficiencies of the existing research and the barriers to advancing the field. Technology, which was not addressed directly during the workshop, might provide crucial help in the implementation and evaluation of arts interventions. The workshop also only touched briefly on scaling-up and the fidelity of programs, which will need to be addressed, along with CBAs, if arts interventions are to be widely adopted.

He suggested that “cross-talk” among scientists and researchers might ease the shortage of experts

# APPENDIX 1: WORKSHOP PARTICIPANTS

## Steering Committee Members:

**David Reuben** (Chair), University of California, Los Angeles (UCLA)

**Sandra Edmonds Crewe**, Howard University

**Art Kramer**, University of Illinois

**Nina Kraus**, Northwestern University

**Becca Levy**, Yale School of Public Health

**Helga Noice**, Elmhurst College

## Workshop Sponsor Representatives:

**Marie A. Bernard**, National Institute on Aging (NIA), National Institutes of Health (NIH)

**Wen Chen**, NIA, NIH

**Constance Citro**, Committee on National Statistics, National Academy of Sciences (NAS)

**Emmeline Edwards**, National Center for Complementary and Alternative Medicine (NCCAM), NIH

**William Elwood**, Office of Behavioral and Social Sciences Research (OBSSR), NIH

**Sunil Iyengar**, National Endowment for the Arts (NEA)

**Nancy Kirkendall**, Committee on National Statistics, NAS

**Jonathan King**, NIA, NIH

**Rocco Landesman**, NEA

**Lisbeth Nielsen**, NIA, NIH

**Deborah Olster**, OBSSR, NIH

**Molly Wagster**, NIA, NIH

## Other Speakers / Authors:

**Anne Basting**, University of Wisconsin Milwaukee

**Melissa Castora-Binkley**, University of South Florida

**Kate de Medeiros**, Miami University

**Valerie Fletcher**, Institute for Human Centered Design

**Kathy Hathorn**, American Art Resources

**Julene Johnson**, University of California, San Francisco

**Emmett Keeler**, RAND and UCLA

**Margie Lachman**, Brandeis University

**Tony Noice**, Elmhurst College

**Alexandra Parbery-Clark**, Northwestern University

**Thomas Prohaska**, George Mason University

**Victor Regnier**, University of Southern California

**Gottfried Schlaug**, Beth Israel Deaconess Medical Center and Harvard Medical School

**William Spector**, Agency for Healthcare Research and Quality

## APPENDIX 2: COMMISSIONED PAPERS

Five papers were prepared for the workshop on "Research Gaps and Opportunities for Exploring the Relationship of the Arts to Health and Well-Being in Older Adults, National Academy of Sciences," Washington, DC, September 14, 2012:

De Medeiros K, and Basting A. **"Shall I Compare Thee to a Dose of Donepezil?": An Overview of Intervention Research in Dementia Care.**

Hathorn K. **The Role of Visual Art in Improving Quality-of-Life Related Outcomes for Older Adults.**

Kraus N, and Parbery-Clark A. **Music and Aging: Exercise for a Well-Tempered Mind.**

Noice T, Noice H, and Kramer A. **Participatory Arts for Older Adults: Benefits and Challenges.**

Prohaska TR and Castora-Brinkley M. **Cost and Cost-Effectiveness in the Translation from Randomized Controlled Trials to Community Evidence-Based Arts Programs.**

# APPENDIX 3: WORKSHOP AGENDA

National Academy of Sciences  
National Research Council  
Division of Behavioral and Social Sciences and Education  
Committee on National Statistics

## WORKSHOP ON RESEARCH GAPS AND OPPORTUNITIES FOR EXPLORING THE RELATIONSHIP OF THE ARTS TO HEALTH AND WELL- BEING IN OLDER ADULTS

September 14, 2012

500 Fifth St. NW (the Keck Building),  
Room 100  
Washington, D.C. 20001

This workshop is presented by the National Academy of Sciences, Committee on National Statistics, at the request of a consortium of the National Endowment for the Arts and three units within the National Institutes of Health: the National Institute on Aging, the Office of Behavioral and Social Sciences Research, and the National Center for Complementary & Alternative Medicine. The purpose of the workshop is to identify research gaps and opportunities for exploring the relationship of arts participation and creativity to physical health and psychological well-being in older adults. It will provide a critique of the field, including challenges in undertaking research capacity-building; and it will offer guidance for the design of future studies and research funding opportunities.

Primary speaker shown in **bold**

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8:30

### Introductions and Welcome

CHAIR: **David Reuben**, UCLA

8:35

### Welcome on Behalf of the National Academies

**Connie Citro**, Committee on National Statistics

8:45

### Intended Workshop Outcomes

**Marie A. Bernard**, National Institute on Aging,  
National Institutes of Health; **Rocco Landesman** and  
**Sunil Iyengar**, National Endowment for the Arts

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9:00

### The Relationship of Arts Programs and Interventions to Psychological Well-Being, Cognitive, Sensory, and Motor Skills Function in Older Adults, and the Underlying Neural Processes

MODERATOR: **Art Kramer**, University of Illinois at Urbana-  
Champaign

9:05

### Participatory Arts for Older Adults: Benefits and Challenges

**Tony Noice** and Helga Noice, Elmhurst College;  
and **Art Kramer**, University of Illinois at Urbana-  
Champaign

9:35

### Music and Aging: Exercise for a Well-Tempered Mind

**Nina Kraus** and Alexandra Parbery-Clark,  
Northwestern University



10:05

## Floor Discussion

10:20

Break

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10:30

### Comparative Benefits or Weaknesses of Arts Therapies over Other Behavioral and/or Pharmacological Interventions for Older Adults Experiencing Declines in Cognitive, Sensory, and/or Motor Ability

MODERATOR: **Becca Levy**, Yale University

10:35

#### “Shall I Compare Thee to a Dose of Donepezil?”: An Overview Intervention Research in Dementia Care

**Kate de Medeiros**, Miami University and Anne Basting, University of Wisconsin-Milwaukee

10:55

#### Music and the Brain in Health and Disease: What We Learned from Correlational, Longitudinal, and Stroke Recovery Studies

**Gottfried Schlaug**, Harvard University

11:15

#### Using Music to Manage Symptoms of Dementia: What Is the State of the Science?

**Julene Johnson**, University of California San Francisco

11:35

## Floor Discussion

12:00

Lunch

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1:00

### Cost-Benefit Analyses Associated with the Inclusion of Arts Programs and Interventions in Healthcare Delivery for Older Adults

MODERATOR: **David Reuben**, UCLA

1:05

#### A Primer on Cost Benefit Analysis

**Emmett Keeler**, RAND and UCLA

1:35

### Cost and Cost-Effectiveness in the Translation from Randomized Controlled Trials to Community Evidence-Based Arts Programs

**Thomas Prohaska**, George Mason University and  
**Melissa Castora-Binkley**, University of South Florida

1:50

#### Discussant:

**William Spector**, Agency for Healthcare Research and Quality

2:05

## Floor Discussion

2:20

Break

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2:30

### The Relationship of Aesthetics and Design Factors to Health and Quality-of-Life-Related Outcomes of Older Adults in Long-Term Care and Assisted Living Facilities

MODERATOR: **Sandra Crewe**, Howard University

2:35

#### How the Design of the Assisted Living and LTC Environment Impacts the Success of Arts Programs

**Victor Regnier**, University of Southern California, Los Angeles

3:00

#### The Role of Visual Art in Improving Quality-of-Life Related Outcomes for Older Adults

**Kathy Hathorn**, American Art Resources

3:25

#### Discussant:

**Valerie Fletcher**, Institute for Human Centered Design

3:40

## Floor Discussion

3:50

Break

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4:00

## **Research Gaps and Opportunities: A Summary**

Panelists will summarize the workshop and offer their own insights about research needs in the field, addressing specifically such themes as the state of evidence for causal links between arts programs and specific outcomes; appropriate research designs to improve the quality of such evidence; basic and translational research needs; and cost-benefit analyses and other practical considerations for the implementation of evidence-based programs.

MODERATOR: **David Reuben**, UCLA

4:05

**Margie Lachman**, Brandeis University

4:15

**Art Kramer**, University of Illinois at  
Urbana-Champaign

4:25

**Becca Levy**, Yale University

4:35

## **Floor discussion**

5:30

Adjourn

Summary of a National Academies Workshop,  
“Research Gaps and Opportunities for Exploring the Relationship  
of the Arts to Health and Well-Being in Older Adults,”  
September 14, 2012

