The National Academies

Workshop on Research Gaps and Opportunities for Exploring the Relationship of the Arts to Health and Well-Being in Older Adults

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Agenda Item: Introductions and Welcome

DR. REUBEN: Good morning. I am Dave Reuben. I am a geriatrician based at UCLA and I am delighted to be here. I am just thinking if I were not here, I would just be sleeping. Thank you. I think we have a very stimulating day. I am going to keep my remarks very brief right now.

But I would like to say that I am a geriatrician. A good bit of my life is spent taking care of old people. My youngest is in her late 60s and my oldest is almost 101. Most of my patients are in their 80s or older. I would just like to tell you about four of my patients very briefly. This should not take more than an hour or two.

The first is an 86-year-old man who is an architect and is kind of internationally renowned who is jet setting around the world and I cannot keep up with the guy because he is all over the place and still incredibly productive and thinking about the next big job.

The second is an 87-year-old patient of mine who was a television director and directed a lot of the sitcoms that I grew up with in the '50s and '60s. He is now writing plays and going to the Actors Workshop and places like that to get them to read and such like that. Actors' Gym is what he calls it.

The third is a woman who is 92 years old and she is about yea big. She has shrunk considerably. She is very interesting. She is an artist who has been active all of her life and she works in big sculptures. That is her big thing. Big sculptures. And she does these little mock ups and they have these fabricators that make them life size and bigger. And she is still working. Despite a number of hospitalizations recently, she is still working.

And the fourth is a 94-year-old man. I just went to his birthday party. He was a musician all of his life. He went to Curtis Institute in Philadelphia. And a classmate of his a couple of years ahead of him was Leonard Bernstein. And he still remembers when Leopold Stokowski asked him to come to New York and he said he did not want to leave Los Angeles. This guy is a very interesting fellow. He is a violinist. He became concertmaster for the Hollywood Bowl and played on just about every record that you grew up with. He worked with everybody from Frank Sinatra to Donna Summer. About a year and a half ago, he asked me if I would write some words for some music that he was writing. Here he is. He is 94 years old and he is still very active.

What is it about these four patients of mine? Are these just exceptional people? I would say as a geriatrician that all of my patients are exceptional. But

in fact, these are folks who are in very late years and are still quite active. The thing that they have in common is they are artists, they are really committed to their art, and they are very engaged at this point. These are anecdotes. This is not science.

And the question before us today is is there a science behind this or are we dealing with just exceptional people who defy the odds? Today we are going to really begin to look at what the evidence base is and what is missing. What more do we need to know? Is art the fountain of youth?

We were talking about this yesterday and reading over the papers. The one thing that is great about art and engagement in arts is there are virtually no side effects. It is really great. It is not like some of these medicines we give people. What is the potential for this and how can we exploit the potential to its benefit?

We have a wonderful group of people who are going to be speaking today. And hopefully we will be raising more questions than answering them. But the idea is how to go forward towards answering them so that when I am in my 80s and 90s, I know what is best to keep me young.

I am going to turn over the comments to Connie Citro who is here representing the Committee on National Statistics, the host of this conference. She will say a

few words about the National Academies' involvement.

Agenda Item: Welcome on Behalf of the National Academies

DR. CITRO: Thank you. I am delighted to be here to welcome you all at the National Academies' Keck Center to this workshop with this long, but very important title of Research Gaps and Opportunities for Exploring the Relationship of the Arts to Health and Well-Being in Older Adults.

You are going to be hearing from the National Institutes of Health and the National Endowment for the Arts. Several institutes and centers and offices in NIH came together with NEA to talk to the academy about putting on this event.

The Committee on National Statistics, which I direct, is a standing unit at the National Academy of Sciences. It was set up in 1972 when a presidential commission on federal statistics said we have the most decentralized statistical and also research operation in the world and this has many benefits. There are lots of innovations and innovative ideas that come from it. But it can make it sometimes difficult to coordinate efforts. Our committee was set up to be a body that could endeavor to help the statistical and research communities use state-of-the-art art methods and coordinate some of their

activities, and we try to do that to the best of our ability.

There are about 60 different units like this in the academy. They have names like the Food and Nutrition Board and the Army Research Science Board and Committee on Population. And they consist of usually a dozen to 15 volunteers, who serve pro bono, academics mostly, some people from industry, and some people from government who oversee a portfolio of work in a particular subject area.

Committee on National Statistics is a broad title and we do cover many topics ranging from under count in the decennial Census to improving the measures of our economy. We have a project right now funded by the National Institute on Aging, which is relevant to this workshop. It is about measuring subjective, or what a better term is, self-reported well-being. Such measures are gaining ground in many countries. The Office for National Statistics in the United Kingdom has such measures on its regular surveys and they are being used by the government as a way to monitor the state of the health of society in addition to the usual gross domestic product and so on.

There is a lot of research in back of this and some statistical activity, not actual questions in our official statistics, but things like the American Time Use Survey, which is a federal survey, which measures the time

that people devote to different activities. These are relevant, I think, to this workshop. The Time Use Survey and other studies are one way of seeing how many people are actually spending time on the arts as well as other activities. And some of the well-being measures are trying to capture well, when you were doing such and such, how were you feeling about it? We do have a portfolio that is relevant to this project.

But I am delighted that we were asked to do this particular workshop to get directly at what do we know, what do we need to know about how the arts relate to health and well-being in older adults.

Let me just say a word about the National Academy of Sciences itself under which our Committee on National Statistics and other units operate. The academy itself is a body, an honorary self-perpetuating, independent 501c3 nonprofit organization. Every year about 70 of the nation's top scientists are elected to membership.

The reason we have an advisory role to the government, which is actually quite unique in terms of other countries, is because there was a congressional charter signed in 1863 passed by Congress signed by President Abraham Lincoln. It said, all right, you eminent scientists, you go ahead and have this organization of eminent scientists. But we want you to provide, when

asked, advice to the government on matters of science and art. Those are the exact words. Now art actually referred more to technology, engineering kind of things, and one of the very first activities that this academy undertook was to figure out how to make a compass work in the ironclad war ship during the Civil War. They were successful in that.

One of their later projects recommended in the late 19th century that the US go over totally to a metric system and that of course has not been quite so successful.

In World War I, the need for the advice from the academies sort of mushroomed. It set up an operating arm, the National Research Council, under which my community and others operate and expanded the expertise that it would bring to bear from just beyond those people who were actually elected to this honorific society.

But I do want to say that also part of our charter is to provide our advice pro bono. And the people who have organized this workshop, chaired by David Reuben, are going to moderate the sessions. They have donated really an extensive amount of time working to put together what we think will be a very interesting and productive workshop that will help our sponsor agencies figure out where to go next.

I will end there except I do want to give a

thanks to Nancy Kirkendall who is sitting right there who is a senior program officer with CNSTAT. She is the staff member who has organized this. Agnes Gaskin, whom you saw when you came in and whom you will be seeing today, is shepherding you in terms of logistical arrangements and other CNSTAT staff are helping as well.

This is a public workshop. It is being transcribed. It is actually being videographed. NEA will release a summary report prepared by Rose Li and Associates. [CNSTAT will post a transcript of the workshop.] We ask that when you discuss things, and we ask all moderators to remind people go to the microphone, say your name so it is possible for those who are going to be reading the transcript and seeing the video to know who is talking about what.

Again, welcome. I look forward to a fantastic day. Thank you.

DR. REUBEN: Thank you. I would like to introduce my dear friend and colleague for many years Marie Bernard who is deputy director of the National Institute on Aging to give her perspective.

Agenda Item: Intended Workshop Outcomes

DR. BERNARD: Thank you David. I want to join David and Connie in welcoming you this morning. I represent the National Institutes of Health in particular

the National Institute on Aging, the Office of Behavioral and Social Sciences Research, and the National Center for Complementary and Alternative Medicine. We have collaborated in this endeavor and I, in particular, want to acknowledge our colleagues there. Dr. Deborah Olster, who is the deputy director of the Office of Behavioral and Social Sciences Research. Dr. Emmeline Edwards, who is the director of the Division of Extramural Activities and the National Center for Complementary and Alternative Medicine. And in particular, we are indebted to Dr. Lis Nielsen from the National Institute on Aging who has represented us very ably in this collaboration. I would also like to express thanks to all of the members of the steering committee and our NAS colleagues.

Today's meeting really is a culmination of almost a two-year process, which began with NEA forging a partnership with the Department of Health and Human Services to explore ways of strengthening arts research on human development. One of the first things that the multi-agency taskforce identified as a need was exploring through a systematic literature review and gap analysis those things that are necessary in priority areas for research.

In meetings between NIA and NEA initially and then the Office of Behavioral and Social Sciences Research, OBSSR, and National Center for Complementary and

Alternative Medicine, NCCAM (we like acronyms at NIH), we agree that a focused National Academies' led effort to review the literature would be very helpful as we move forward.

This meeting is going to focus on aging and life course development and how that intersects with the priorities for all three of these institutes and centers who are supporting this.

Success will depend upon achieving three objectives. First, to develop effective interventions to maintain health and function and prevent or reduce the burden of age-related diseases, disorders, and disabilities. The second objective is to understand and develop strategies to enhance societal roles in interpersonal support for older adults, reduce social isolation, and prevent elder abuse. And the third objective is to increase awareness and promote adoption of interventions to improve the health and quality of life of older adults. It is a mutual interest for all three of the institutes who have been involved in working with NEA and NAS on this endeavor.

A particular interest in research is research incorporating arts activities as components of interventions, to remediate or delay age-related cognitive decline, or sensory motor impairments. Examining the

potential of specific arts activities and interventions to enhance quality of life in older adults including those living in the community, those who are institutionalized, and those suffering from dementia or from critical illness at the end of life.

We are interested in examining the potential of arts interventions to support healthy communities and encourage social engagement across generations. And we are interested in understanding the potential of the arts to impact other biomedical health outcomes. This would include gaining a better understanding of the psychological, neurobiological, physiological, and behavioral pathways to which any salubrious health effects so the arts arise. We are very interested in the science.

We look forward to the discussions today to give us some actionable recommendations regarding ways in which we can build for the future. Again, thank you all very much.

DR. REUBEN: Thank you Marie. Next is Rocco Landesman. We are delighted to have him here. He is the director of the National Endowment for the Arts. He will say a few words about NEA's involvement.

DR. LANDESMAN: Thanks. I am here today not just as an old guy who cares about his health and well-being, although I do, I am here as the chairman of the National

Endowment for the Arts. As such, I have spent the last three years trying to embed the arts in every other federal agency. The cuckoo bird lays its eggs in other birds' nests. And I think of the arts as eggs that I am leaving around Washington, DC to be raised by others.

Health and Human Services Secretary Kathleen Sebelius was maybe the first cabinet secretary to accept an arts egg. She called in reinforcements to help with the rearing.

Today, I would like to especially thank the steering committee led by Dr. Dave Reuben as well as the NEA's fellow sponsors of this workshop in the commissioned papers. NIH's Office of Behavioral and Social Sciences Research, its National Center for Complementary and Alternative Medicine, and of course the National Academies and NIH's National Institute on Aging. Thank you again Marie and thanks also to people you have already thanked: Lis Nielsen, Deb Olster, and Emmeline Edwards, who all served as members of the NEA's Interagency Taskforce on the Arts and Human Development. I am very proud of this initiative indeed.

And thank you Connie Citro, Nancy Kirkendall and the staff of the Committee on National Statistics and the Division of Behavioral and Social Sciences and Education as well as Judy Salerno from the Institute of Medicine.

Finally, I also want to say that is great that Helga and Tony Noise are here. Their research was featured at the March 2011 convening that Secretary Sebelius and I co-convened and that led directly to today's workshop.

I have long believed that we need to be explicit about the connection between the arts and, for lack of a better phrase, the real world. The arts do not exist in vacuums. And their potency does not evaporate when you leave the performance hall or gallery. I know how art has worked on me over the years and I am eager to see our joint work go forward to quantify and analyze in exactly what ways.

Much of the work I am most excited about during my tenure has to do with the arts and human development. I am very proud of that brochure that is sitting over there on the table indeed. None of that would have been possible without the NEA secret weapon, our director of Research and Analysis, Sunil Iyengar. Let me turn things over to Sunil so we can hear from him and then get going on the important work we have ahead of us. Thank you so much.

DR. IYENGAR: Thank you very much Rocco. In the last few years, the National Endowment for the Arts has placed a heightened emphasis on evidence-based decision making through the Office of Research and Analysis, where I am fortunate to serve as director. Under the leadership of

the NEA chairman and senior deputy chairman and through the hard work and ingenuity of NEA staff, we have upped the level of responsibility and rigor that we take on as a federal agency whose mission is to advance artistic excellence, creativity, and innovation for the benefit of individuals and communities.

This mission coincides with the national moment, one with dramatic points of convergence when we as researchers, practitioners, and policymakers are increasingly seeing the arts appeal to a broad range of sectors as catalytic for their own goals. Part of that maybe the cuckoo nest effect, but it also seems to be organically happening.

You heard just now from Marie about arts-related research topics that align with the National Institute on Aging's core strategic objectives. Lately there has been the same type of recognition of the arts' potential role in achieving outcomes elsewhere in health and in education and economic and community development. As a result, there is more of a push to figure out what we know and how well we know it and to what extent the findings can be replicated.

One of the test beds we have for understanding the strength of these connections is the partnership you heard about that we forge with 14 other federal agencies and departments called the Interagency Taskforce on the

Arts and Human Development. It strives to consolidate research in evidence-based practices that demonstrate how the arts work in advancing health and well-being outcomes for individuals across the lifespan.

When we formed this group late last year, I went on a listening tour to meet with many of the taskforce members. What emerged from those conversations, as you heard from Marie, was a shared commitment by three members in particular: the National Institute on Aging, the NIH's Office of Behavioral and Social Sciences Research, and the NIH's National Center for Complementary and Alternative Medicine to focus on one particular segment of the lifespan, older Americans. To identify research gaps and opportunities that can drive future decisions about how these agencies and other funders invest in promising arts-related research, research that can seed interventions to improve quality of life for this growing population.

There was another reason to focus first on this age group and its attendant research questions and that has to do with substantial body of work already devoted to this topic partly represented by our speakers today. It has been more than six years since the late Dr. Gene Cohen published the final results of his creativity and aging study sponsored by the NEA and NIH. This was a landmark study of the arts potential impacts on older adults. But

in the public eye, it stands alone in solitary begging for companionship. We wanted to dig deeper and find that evidence and see how we could address limitations inherent in past research approaches.

I want to take just a minute or two to review the research questions before you and invite you to think about three additional crosscutting issues. As you can see from the agenda and as will grow apparent from today's presentations, we want your best thinking on what the state of evidence suggests for future research in questions such as the relationship of arts programs and interventions to psychological well-being, cognitive, sensory and motor skill function in older adults and the underlying neural processes, comparative benefits and weaknesses of arts therapies over other behavioral and/or drug interventions for older adults were experiencing declines in cognitive, sensory, or motor function. Cost effectiveness analysis of such programs in comparison with other health care 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.

And if that is not enough, I just want to say that in addition to these targeted questions I invite you to think as steering committee members, speakers and

general participants about three overarching issues. One, for each of the types of impacts we are addressing, have we sufficiently established a model for the mechanism of action by which arts' participation may have long-term effects on older Americans? What are those pathways and what are their implications for optimizing dosage, adherence to treatment, caregiver requirements, and clinical or nonclinical settings?

Two, an obvious shortcoming of much of the research in this field is a lack of large, randomized control trials to understand the unique contributions of the arts to these outcomes. The classic question is to what degree is the efficacy of arts' therapy attributable simply to the socialization that might have occurred with other types of behavioral interventions?

But before we get too fired up about RCTs, it behooves us to ask are there any innovative study designs or approaches that can be utilized in lieu of randomized control trials? Unlike clinical trials to test a pill or medical device, a study of an arts' intervention needs to account for a complex web of additional variables such as levels of prior exposure, the arts' activity, training, and qualifications of the provider, and self-reported responses to the therapy are all factors that might be better suited for another kind of study design, perhaps an observational

or a quasi-experimental model.

Three, this one is equally a challenge to us workshop sponsors and to funders not only sitting in this room and that is assuming that we can decide on some next steps for research in this exciting area and the kinds of research questions, approaches, and expertise we would invite. Then what kind of capacity building might be needed for such researchers? What strategies might be funded to raise the technical competency of the field across arts practitioners, therapists and the biomedical and behavioral research community to take this research to the next appropriate level?

I want to end by reminding you that ultimately this is what today's workshop is all about. Generating fresh ideas that can be acted upon by my fellow sponsors, the NEA, foundations, and other public and private funders who seek to improve our nation's understanding of the arts' potential in advancing health and well-being outcomes for older Americans. To that end, the NEA and its cosponsors will circulate a workshop report from today's deliberations within the next few months.

Let me close by thanking Ellen Grantham and the Office of Research and Analysis for helping to prepare this event for us today. And thank you all for coming.

DR. REUBEN: Thanks to each of you. We are doing

something that is very rare in my world. We are staying on time. I would like to move directly into the next session. Sunil has mentioned that the day is organized around five real issues. The first is the relationship of arts programs and intervention to psychological well-being, cognitive sensory and motor skill function in older adults and the underlying neural processes.

For this session, Art Kramer who is the director of the Beckman Institute for Advanced Science and Technology and the Swanlund Chair in Psychology and Neurosciences of the University of Illinois and a lifelong researcher in cognitive and brain plasticity across the lifespan is going to moderate. I spent dinner with Art last night and he is a very interesting guy. We talked about living in the caves. But any event, I am going to turn this over to Art and the other panelists.

Agenda Item: 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

DR. KRAMER: I will make my introduction to this panel brief. But I do find it interesting that this is an all Illinois panel. Each of our speakers is from Illinois either Northern -- well, I guess it is Northern and Central Illinois. As David said, this kickoff panel is focused on

the relationship of arts programs and interventions to psychosocial function, to behavioral or cognitive function, and there will even be more than a modicum of neural science here.

I really think of this symposium and the review that will take place -- Clint Eastwood has been in the news recently, I promise none of us will be talking to an empty chair, -- but I do think of it as the good, bad, and the ugly. The research in this field is quite interesting. There are some real gaps and that is what this workshop and symposium is about. Those are the kinds of things that will be discussed and reviewed both in this symposium and others.

Our speakers for today include the dynamic duo who are sitting in the front, Tony and Helga Noice. Tony is the professor of theater and Helga a professor of psychology at Elmhurst College, which is our Northern Illinois contributors up around Chicago. And they will be giving both a broad overview of the arts, cognition, and psychosocial function with a focus on theater and the work that they have done over the years.

Our next speaker will be Nina Kraus. Nina is a professor of neurobiology and physiology, also in Northern Illinois. Her focus will be mostly on music, both neuroscience and behavioral measures. We will start off

with a two 30-minute presentations and then follow with a 15-minute open discussion, which we invite all of you to participate in. Tony and Helga, the floor is yours.

Agenda Item: Participatory Arts for Older Adults: Benefits and Challenges

DR. TONY NOICE: Okay. Thank you very much. We are here to talk about participatory arts. That is not enjoying and viewing arts, but doing and making arts. That is the whole idea. I would love to disagree with my friend David Reuben about one thing. He said there are no side effects to the arts. Unfortunately, if you are talking about full-time professionals, there is a side effect. It is called poverty.

Our particular specialty is theater particularly acting and why acting is beneficial. It is multi-modal. It is cognitive, the thoughts that character thinks. It is emotional, the feelings of the character. It is physiological because thoughts and feelings inevitably lead to different body language, tones of voice, facial expression. And it is highly activating because everybody has to get up and do it in front of the others. There are no participants. Everybody is active. It is also novel, which is one of the hallmarks of effective interventions. Something that people have not done before. Few people are crazy enough to be actors. We have never had one in one of

our studies who had been an actor, not even an amateur actor. And it also engenders very strong social support inasmuch as everybody knows they are going to be up there doing the same thing in just a minute. They are all pulling for one another. It is a terrific thing to watch.

One of the criticisms that has been leveled -- and pardon me (coughs) --I am just getting over the first bout in my life of bronchitis. One of the criticisms that has been leveled with the reports we do is that they are wonderful for giving methodology, for giving statistics, tons of statistics, charts, and tables, but they do not really show you what we are actually doing. I am going to take the first eight or ten minutes to actually demonstrate what we do when we give this intervention.

The first thing -- and you have to help with this. You have to be an acting class because if you don't, this means nothing. Acting is not something you think about. It is something you do. Everybody here please listen for every sound you can hear in this room. Listen intently for every sound. Congratulations. You just passed the audition. You are now all actors because that is what actors do. Give an actor a script that calls for listening. He does not try to look and sound like he is listening. Only the world's worst actor is going to (cups hand to hear) -- he listens for real.

But unless the play happens to be taking place at the National Academy of Sciences, we also do it under imaginary circumstances. We will add the imaginary circumstances. What are we going to do? You are visiting a friend's house. He or she lives in a high rise, tenth floor with a noisy elevator. You always know when somebody is coming up and down. She says pardon me. I have to go down to the car for a minute. She leaves you. You hear that little beep from her computer in the corner meaning a message is coming in. You decide you are going to take a look. You decide to snoop. Ah, I did not know she knew her. And you are going through her email, but all the time you are listening for that elevator.

Remember, the circumstances are always imaginary. You are not crazy. You do not think you are Hamlet. You know who you are. But that is just in the imagination. But what the character is really doing, you do that for real. Now, everybody picture that. You are in that situation. You are in front of somebody's computer. Do not pretend. Do not pantomime. Just imagine that, but really listen for the sound of a noisy elevator out there meaning your friend is coming. Get the Hell out of there and back to this couch so you will not be caught snooping. Okay? Everybody try that. Very good. It is no more difficult than the first one.

Go on to the third demonstration. Four core principles. That was the first one: the reality of doing under imaginary circumstances. Third principle. You must always have a goal. Absolutely every dramatic scene has a goal and of course, it has an obstacle because if the goal were easy to accomplish there would be no drama.

We are going to give you a goal. Everybody stand up please. And put down whatever you have. You are going to need both arms. Once again, if you just say well I go along with what he is doing, you will not understand what we are talking about. You have to really be actively involved. This is the situation: the imaginary one. You are in front of a cupboard, a closet. There are shelves. And on the top shelf is something you need. Maybe it is notes for a meeting. On the other hand, it might be a box of Godiva chocolates. I do not care. Whatever it is, it is just beyond your reach. The task is under those imaginary circumstances to really physically, actually reach to get it. Do not pretend. Really try to get higher than you have ever gotten before. If anybody has a bad back, do not do this though. No accidents please. We just want you to get as high as you possibly can. Really try. Higher than you have ever stretched before.

And the fourth one. It must be spontaneous. Acting is not something you work up at home and bring in.

It must be happening right now. Let's say you and I are doing a scene. We are playing rival politicians. (standing in front of volunteer participant, Chris) Hi Chris. Tony. We are playing rival politicians. I have demanded that you release your income tax and you will not do it. We are in the middle of a scene and my job -- I say yes. I am demanding you release them and you say no. However, you have to take your no off my yes, but you have no time to analyze it. It must be spontaneous. Whatever you hear you take in and you instinctively react to it by saying no. Ready? Yes.

PARTICIPANT: No.

DR. TONY NOICE: Yes.

PARTICIPANT: No.

DR. TONY NOICE: Yes.

(Applause)

DR. TONY NOICE: That is acting. You do it for real under imaginary circumstances. But now there is always someone. We have an early scene in the first day where a man is fighting with his wife or a woman is fighting with her husband. Invariably, this will happen. A man will do something (imitates obviously fake behavior). You cannot do that. You say wait. Sorry. Nobody is going to believe that. You are not doing it. The person insists and says but that is how I fight when I fight with my wife.

That is the problem with it. You are showing us how you fight. We do not want you to show us that. We want to see you fight right now. There she is. What do you do when you are fighting with somebody? You want to make her feel bad. You want to get back at her. Use these words to get back at her and you push them.

Finally, he starts yelling and you say that is it. You are doing it. And that wonderful smile comes over their faces. They get it. It is not pretending. They have to do it now. Yes. Stage time is always now. And by the end of the first session, almost everybody gets it. We are going to have eight sessions of serious arts training. We are not going to have a fun and games thing. This is it. And of course, it gets more complicated as it goes along.

And there are always two stages. The first is you have to find out what the character is doing by analyzing the script. And the second is what we were just talking about being in the moment. It is happening now. Not something you worked up at home. And of course, they get progressively more complex because by the end, by the sixth, seventh, and eighth session, they have to do all of this, but they have memorized scripts. And they must make the memorized scripts just as real as the early exercises.

You and I are really arguing, but you know every

word you are going to say and every move you are going to make because playwrights have a union like we actors do. They say the producer must fire an actor who is paraphrasing the lines. They have that in their contract. You have to do all of the stuff from long-term memory, but you have to make it real now, this second. You have to do it. You cannot act it. Basically, that is why we think it is so effective.

We have done a number of what are called RCTs, randomized controlled trials, using this strict scientific method and we give the same acting class all the time. We have been doing this for over 15 years. Same acting class, but with different populations-- young, old, old-old, people in assisted living facilities, people in upscale retirement homes and so forth, different controls. Every time we do it, we have new control groups to rule out other things. We have compared it to visual arts, art appreciation to see if just another stimulating activity would do it. It did not work as well as acting.

Then we try to say maybe it is the performance. We tried a course of singing. It did not do as well as acting. We keep trying different control groups with every experiment to just understand all the parameters and we use different measures.

We started with just recall and recognition.

That is all we were doing. Now, we are up to over a dozen different measures that we use, eight cognitive ones, quality of life and so forth and we vary the teachers too. I am not always the one who is doing it. We have other people we have engaged to do this. We would love to think everybody here read every one of our papers. We know it is not true. So Helga will run you through a typical study.

DR. HELGA NOICE: We normally make arrangements with retirement homes or senior centers to give a talk to their residents and discuss our study. And those who are interested then fill out a form and we contact them by phone and administer the short Pfeiffer screening test for dementia. Those who are then eligible get randomly assigned to one of three groups. Now, here I am showing theater and an alternative art. Let's pretend that this was music and a waiting list control. At that point, everybody gets a test. As Tony said, those would be various cognitive measures and also various subjective measures and some questionnaires.

At that point then our four-week, eight-session intervention starts. We meet twice a week for an hour and 15 minutes. We include a coffee break to encourage socialization. Then four weeks later a posttest is administered and at that point the waiting list control as a courtesy gets the theater intervention.

I will show you the results of a recently completed experiment. In this particular experiment, our acting group improved significantly on seven of the eight cognitive measures. Not only did it improve against the no treatment control, but it also improved against the singing group.

However, even though the singing group had not shown any improvement in terms of cognitive measures, when we administered with quality of life particularly the growth scale, both groups including the singing group showed that they indeed had some improvement. There was a significant increase in their feeling of having experience some personal growth.

This leads me to the current study. In this particular study our research question was can we demonstrate changes in brain function in an act of experiencing. That is what Tony was demonstrating. An acting group compared to an about theater group. Both of them experienced theater, but one was actively doing it. The other one was hearing about theater, because possibly it is the topic of theater that is so stimulating. And to tell you about the rationale for the design and some of the predictions, I'll bring up Art Kramer who not only is our moderator, and collaborator, but also our expert in imaging. Here is Art.

DR. KRAMER: Just very briefly, what we are doing here is capitalizing on research at the University of Illinois and throughout the world using imaging measures on humans, the psychosocial and behavioral cognitive measures that we can use to examine any change whatever the intervention is.

This is Olga -- she is from Saskatchewan -- Olga is 93 years of age and holds 23 world records in track and field. A lot of our work in the past has been done on physical activity. Olga has come and visited us recently, but we have never gotten any of our folks even in a yearlong intervention to achieve what Olga does. She also does the hammer throw in addition to the triple jump long jump, and pretty much all of the sprints. But what I show here just briefly are changes in brain structure in the hippocampus as a function of exercise. And those little bar graphs indicate changes and functional connectivity among different units in a functional network, brain network.

But we have also done interventions that do not involve tremendous amounts of physical activity and hence perhaps the application to theater, not running and jumping. This is a program that we collaborated with our colleagues at Johns Hopkins, Michelle Carlson, Linda Fried, now at Columbia, George Rebok called Experience Corps.

This is really an interesting project that takes older folks who do not have high SES, haven't gotten a lot of education, do not have good health care in the United States and gets them involved in the community through providing literacy, numeracy, behavioral management, and library support for children in K through 3 in the inner city Baltimore schools. We have been involved in some of the brain imaging examining changes in brain structure and function and how they lead to enhanced memory decision making and attention.

There is now a corpus of data that suggests the possibility of using these pretty non-invasive, functional, and structural brain measures to augment what Tony and Helga have learned from the behavioral and psychosocial measures and that is what we are doing in the present study.

DR. TONY NOICE: They did ask us to investigate not just our field, but all the other participatory arts. You will find that in a paper that will be posted shortly after this. We looked at dance, music, visual art, expressive writing, and there have been studies done on all of them. More on therapy, but studies done on all of them. But relatively few. We certainly need more and particularly we would love to get more that have the real scientific foundation of a randomized controlled trial

where you can really compare one to the other as we do with all of ours and as Art is now doing. He is taking the 100 and something participants we are giving the acting class and the control class to and running them through three hours or more of MRI testing where he is looking at their brains and various behavioral testing. We should have a very good picture of what is happening by the end of this.

Also, in general there is a lack of control conditions. Artists are artists. When they do investigate things, they tend to say let's see what happens. They do not apply controls, but the types of controls you use directly affect the information you get. And there are very few artist researcher collaborations. It is either an art therapist who is trying to do something or a full-time scientist and not too many get together. I was able to. I married her. That is the way we could get together.

But we do have some thoughts on future participatory art studies because we have to fill in these gaps. In fact, it is not really a gap because that implies the picture is filled in and there are little gaps. It is really like a blank canvas with these little spots of research here and there. It really does require a concerted effort from researchers everywhere to work on this field because we think it is very promising, very important.

We did some preliminary work with sketching and painting by going to a number of the best art instructors we could find and saying how many sessions would it take because, obviously, it could be different with acting since everybody already has the equipment. We screen for dementia. Everybody else has all the equipment. They can think. They can walk. They can talk. They can feel. They are ready to go.

But with other arts, sometimes a certain amount of technique is involved, such as with sketching, obviously. We said, what is the shortest amount of time? And we got estimates between two lessons a week for six weeks to 14 weeks. But most of them were on the low side. We are proposing to do a sketching demonstration just like ours in a randomly controlled trial where they come in, get examined first, so does the control group. They get those eight weeks of sketching. And then we examine them afterward.

There are other methods, of course. There is one we have started, which is not a randomly controlled trial. It is using a convenience sample, but we found there are over 800 different senior theater companies in the United States using only seniors. And we know the woman who is the clearinghouse for all of that. Her name is Bonnie Vorenberg. She agreed to cooperate. We have a quality

life survey that she distributed at a convention and now she is sending emails, to all 800 of them, to get responses on this standard, reliable, valid questionnaire on quality of life to see if we can do a large scale study long distance where it goes from the researcher to the umbrella organization to the individual organizations down to the actors. We will see if it works. It is a pilot study, but we will try it because that is one other way to do it.

The next one is a very good a resource. (slide showing Burbank Art facility) We would suggest to any researcher in the world, especially those in LA not necessarily to use this particular one, but look for a similar organization. You find it in the phonebook or on the Internet. Every area has some kind of elder share, an arts organization. This one, EngAGE, actually has over 5000 lessons a year they give in the arts. They have all these apartment buildings. Many of them are mainly low income.

In fact, a lot of them are people who are living on under $15,000 a year. But all of them feature teaching artists, professional teaching artists giving them lessons. And certainly researchers could contact, engAGE. Every such organization would love to have research because it will help them with their fund raising, but they do not know how to do it. It is up to us. The ball is in our

court really to engage in research with these other companies.

We have put down the desired elements that we think researchers should use to plug the gaps because that is a problem. When you look at the research, there is hardly anything that is consistent with any other experiment. Everybody is going his own way. No common vocabulary. No common measures. We think there should be standardized measures and common vocabulary. Once again, if we can get a team of researchers to work with the Burbank people, they have 5000 possibilities of investigation there. There could be one for visual arts, one for performing arts and so forth and use the common vocabulary, common measures, and common behavioral outcomes, and consistent use of pre-post designs. That is so important. So many of the experimenters -- they just say that people felt better after they did this. We assume they did, but where is the documentation that would help these organizations get funding? It is almost completely lacking.

We want large enough samples to be meaningful. Assessment of long-term effects. More diverse populations. Very important. A lot of the research is done with middle class white people. We do not have enough diverse populations.

We will be opening it for questions and answers afterward, but we were charged with keeping on time. And miraculously we did get through before 9:30. We will take a minute though because our next speaker, Nina, wants to also use the clip-on mike. We are going to change it and give it to her.

One more slide and a very important slide. It is acknowledging that the National Institutes of Aging have supported all these studies we have done and it lists all the studies and shows how NIH has supported them.

Agenda Item: Music and Aging: Exercise for a Well-Tempered Mind

DR. KRAUS: Good morning. I am Nina Kraus. I am from Northwestern University. Here is what I want to talk to you about today. Aging. The communication challenges that accompany aging and the underlying biology. I want to take some time to tell you then about our biological approach because I think that it is one that can be used in terms of consistent outcomes for others in the future. That is my hope in terms of a research gap to fill.

I am going to take some time to talk about the evidence that we do have for life-long musical experience and how it can enhance communication and biology. And I am going to be going through data across the lifespan, but of course, the spotlight is going to be on older adults. I

will talk about some research gaps and some future directions.

Aging. Communication challenges. One of the most common complaints of an older adult is difficulty hearing in noise. You cannot hear your friend's voice in a noisy restaurant. Very important. The second is memory, auditory memory, and it is absolutely crucial just in terms of your being able to understand what I am saying now, for you to remember what I just said a second ago. It is this auditory working memory. And this is something that declines with age. These declines, since they impede communication, lead to social isolation, depression, poor quality of life.

Music as a remedy. This is the topic that I am hoping to really get into. Here, we know that musicians are very good at extracting relevant information from a complex soundscape. When you are playing a musical instrument, you are listening. Here are the three Bops. They are each listening to the sound of their own instruments. And they are listening for harmony lines, for melody lines. Was that string plucked or bowed?

We asked is this ability to pull out relevant information from a complex soundscape -- is this something that would transfer to hearing speech in noise because again pulling your friend's voice out of a noisy restaurant

is pulling out a relevant signal from a complex soundscape. In fact, the data are resoundingly strong across the lifespan. Data not only from my lab, but from other labs have really shown that if you take standardized measures of hearing speech in noise -- so basically you play your participant's sentences and they have to repeat back the sentences as the background noise gets louder and louder and louder. You can see that the musicians in red outperform non-musicians across the age span and specifically relevant to our age workshop here is this is something that we see in older adults.

Memory. Music involves memory. The memorization of sound and visual patterns, memorization of auditory and motor sequences. Just to tune an instrument. Again, that auditory working memory. You play a note. You have to remember it in order to then match your instrument to tuning. To improvise. You have a musical idea. If I am going to improvise upon it, I have to remember what you just played in order to play something that responds to what you have.

All of this exercise is memory. I want to give you a personal example. This is me trying to learn Chuck Berry. It is very obvious when it is Chuck that is playing. And then I have to try to hold it in my mind while I am resolving the physical complexities. You can

get a sense of how active musical experience engages your auditory working memory.

What we see again across the lifespan are results of tests on standardized measures of working memory. I give you a list of numbers. And you have to repeat the numbers back, but you have to repeat them back backwards. You have to remember them and repeat them back backwards. I give you a whole list of names. Repeat back just the names of animals that start with B. You have to remember, work on it. This is auditory working memory. There are standardized tests. And, again, we do not see benefits with visual working memory. This very much is in the auditory domain. And older adults really show this.

Biology. I am a biologist by training. We know from many lines of evidence that aging is associated with a slowing of neural activity. Obviously, the neural activity is the currency of the nervous system and there are decreased inhibitory mechanisms. There is broader neural tuning, longer neural recovery. These are mechanisms that underlie this neural slowing. There is increased background neural noise.

How all of this works has been done in animal models and we need to assess this in humans. Let me tell you about our biological approach for doing this. We use something called cABR, which stands for auditory brainstem

responses to complex sounds. Using just a couple of scalp electrodes, we can capture the electrical activity. As I am talking to you now, the nerves in your brain that respond to sound are giving off electricity. We can capture that electricity. The responses are coming from largely the midbrain, which is a very important area because it is a site of convergence. Here is information coming into the ear and there are various nuclei that feed into the midbrain.

Importantly there are areas, all of our emotional areas, our executive function areas, attention and memory. All of these areas we know anatomically feed back to our auditory system all the way out to our ears of this top-down cortical fugal network. We know that the midbrain plays a very critical role in auditory learning. We know this from animal models.

There are three attributes of the cABR, which is why I really do think that this is a very effective way of accessing biology that relates to communication, and I put to you is something that currently is occurring in specialized laboratories, but really could be translated into technology that could involve a headband and an ipad. This is a research gap where other people could use this technology to assess outcomes. Gadgets. Somebody used the word. It is an area that gets information from memory,

attention, and the limbic system and records it.

Attribute number one. Experience dependent. How you use sound in your life, the songs that you learned, and the languages that you learned. Your experience with sound very much influences these responses. That is one of the ways in which it is a very good metric of biological health with respect to how we engage with sound.

Second is fidelity to the signal. We can play any sound. Here is a speech sound "da". What is interesting about this approach is that the brain wave that we get back actually physical resembles the sound wave. We can really have tremendous control over trying to determine -- it is not some abstraction. We can really see how our elements of the sound wave transcribed by the nervous system. We can look at important elements like pitch and timing and harmonics and really see how these elements are transcribed. How might they be changed by experience? Not only do they physically look like each other.

You can take this brain wave and play it back and it will sound like the evoking stimulus. Here is the speech sound "da". Here is the brain's response to it. You will hear musical scale and then the brain's response to that scale. The beginning was Deep Purple. The second was my graduate student's brain. And importantly also these are data that are meaningful in individuals.

Attribute number three. You do not have to average across populations and groups, but we know that there are enormous individual differences. I really put to you that this is very powerful technology that is currently available in laboratories and that I think can be translated.

Communication challenges. Did you say bill or pill? We know when we look at speech sounds that speech sounds vary in terms of their complexity and their relative simplicity. And you can imagine that the fast complex part of bill and pill is "b" and "p" part. The consonant is very complex.

And what we find is that with aging -- now, this is using cABR. We find that looking at response timing. We are measuring the response of the neurons. And we see that as you get older, older is black, young is blue, the older responses are slower. This is very consistent with what we know from animal models. The older people have longer, slower neural timing, but interestingly selectively to this tricky complex part of the stimulus. It is not as though the nervous system slows down to all sounds, but the hard complex sounds are the ones that are inordinately affected. You have that consistency.

When you present a sound again and again and again, you want a stable system. You want the nervous

system to be responding to a stimulus, the same stimulus in the same and consistent manner. What we know happens with aging is that the consistency from trial to trial declines -- so here is an older person's brain response and you can see sample one and sample two are different. There is a bit of a jitter whereas a younger person will show very good stability from one trial to another. Neural response stability.

Second point. The effect of aging is neural synchrony in the form of what we call phaselocking. The nervous system is very good at accurately responding to the sound frequencies that make up music and speech sounds with precision at the individual harmonics. You can see that the measure of precision is very strong in the younger adults and in the older adults it is just gone.

The response is smaller. As you age, the response is of the nervous system, two important elements of sound, the harmonics that again really enable us to distinguish one instrument from another, one speech sound from another sound. They are just smaller. You add to that the fact that the response to the stimulus and the key elements of the stimulus are diminished. On top of that, you have increased neural background noise that happens with aging. We have seen this in animal models and we see this in our human data as well. You can see that you have

two things that are conspiring to make hearing complicated and compromised as we get older.

Through the lens of cABR, we saw an impact of aging on neural timing, how fast the neurons response, the magnitude of the response especially with respect to the harmonics, neural synchrony, precision, phaselocking, neural consistency. How consistent and stable is the nervous system in responding to sound from one trial to the next? And you see this increased neural noise that happens with aging.

Trying to offset these effects of aging. With music what we see -- musicians are always in red and non-musicians are in black. These are responses, cABRs, to speech sounds. You can see that the musician in red is not only larger, but if you really analyze these responses carefully, you will see that there is much greater precision in the response that you get from a nervous system of a musician. And this is true when speech sounds are presented in quiet and when they are presented in noise. You can see that the musician's response in noise is really not very affected by the noise relative to the non-musician whose response really goes to pot. We see this effect across the lifespan and again we really see it very strongly in older adults.

I am revealing the data that I showed you before

in terms of neural timing. This is in response to the consonant. Remember, older adults. These are older adult non-musician. They show later delayed neural timing compared to a young adult. If now you want to know, what about an older musician? Your older musician is like young adults. They have a nervous system that is responding almost indistinguishably from the nervous system of a younger non-musician. By musician, I mean a person who has actively engaged in playing music throughout their lives. They are playing a minimum of 20 minutes a day, three times a week.

Neural consistency. This, again, is something that declines with aging. The stability of the response from trial to trial. If we look at older musicians, we see that their neural response consistency is better. Again, these are very objective measures.

When we look at this measure of precision of phase locking -- signal geeks. If you want the details, we have all of this in great detail that I am delighted to talk to anybody about. But really anybody can look at this and you can see that this is a more precise response in terms of how accurately are neurons responding to the sinusoids that make up any complex sound. And, again, if you now compare older musicians with older non-musicians, again, the older musicians are looking about as good as the

younger adult non-musicians.

Look at the magnitude of the harmonics. Again, with age we see that the harmonics strength decreases. With musical experience, it increases.

We see that music can promote improved hearing in noise ability, improved auditory working memory, and enhanced biological processing of sound. And aging seems to be the anti-music in that you have these declines in hearing in noise, auditory memory and biological processing. What I have said so far is that a lifetime of making music seems to positively enhance and impact communication skills, cognitive function and biological health.

Research gaps. What about initiating or resuming musical training later in life? All of the data that really exist -- most of the data have really been on people who have been actively engaging in music throughout their lives. What about is music unique? How does music compare to other forms of training? These were already brought up.

We have some clues from short-term training in kids and for nonmusic training in older adults. I want to just review these evidence clues very briefly for you. In some studies that have contrasted music and art, kids have been randomly assigned to take music and art lessons. Then their responses to sounds have been recorded after the

intervention. And what has been found is that with music lessons, the nervous system is better able to automatically discern the differences, fine-grained differences among speech sounds. This is not something that was observed in the kids who went through the art training.

Again, these investigators reported that there were enhancements in reading and in verbal IQ in the musically trained children. These are language skills. These are auditory-based skills and it makes sense perhaps that there is a bias where music can trump the art. But, again, there are so many other factors to consider. These are just some studies.

What do we know about older adults? We look at software-based training. This is computer-based training. We have a study now where we are looking at a brain fitness program put out by Posit Science where these older adults need to interact with the computer. These are auditory based and memory-based games and exercises. And the older adults need to engage in these programs for two months for 40 minutes a day. It is quite a bit. Five days a week. We have an active control group.

And what we find is that when we look at hearing in noise -- here, it is plotted a little bit different than when you saw it before. You can see that after training again on these standardized measures of hearing in noise,

the people who went through the training are able to tolerate more noise, more background noise and still get the sentences correct. There is an improvement in hearing in noise, a measurable improvement in hearing in noise following this computer-based training in older adults. Of course, this is not really a fair comparison. But if you compare musicians -- and these are lifelong musicians -- they are obviously still way better.

If you look at auditory working memory, again, we do see gains. This is after two months of this pretty intense training in older adults, again, consistent with information that we know that the older nervous system is certainly very malleable and able to change in very positive ways. We see that there is an enhancement here. Again, the musicians are obviously better. But, again, these are musicians who have played music all their lives. They ought to be better.

Again, when I showed you before, this is the timing and response to the consonants in sound. You can see that after training there has been an improvement. These are now looking at the biological measures. These are the kinds of biological measures I would love to see in the hands of anybody doing a training study in older adults. You can measure very objectively whether there has been a change in the way the nervous system responds to

sound. Again, compared to the lifelong musician you have a long ways to go, but this is what we know so far.

Through the lens of cABR, we can see the biological impact of aging. One of the very important clear aspects of aging biologically is timing. We see that both lifelong musicianship and short-term computer-based training has an impact, a positive impact, the speeding up of neural timing.

With respect to these other neural metrics, magnitude of the harmonics, the neural synchrony, consistency, we only see these biological changes with lifelong musical experience. We have not observed them yet or maybe we never will. We have not observed them in our computer-based programs. We can begin to have, and Sunil talked about, mechanisms. This seems to be an underlying biological mechanism, a biological basis for the improvements that we can see in real-life skills that we care about. How good are people at hearing speech in noise? How good are people at remembering what they heard?

In terms of aging effects, we know that aging does affect hearing in noise and auditory memory and that there are biological impacts of aging which I reviewed for you. And they seem to be these negative effects of aging on communication and on our underlying biology. They seem to be offset by a lifetime of musical training. They also

seem to be offset, at least in part, by computer-based, nonmusic training in older adults.

When you contrast music with other forms of training, at least in kids, it would appear that music would trump art training for, again, auditory-based communication and auditory-based biological outcomes.

Research gaps. We do not know what is the impact of initiating or resuming musical education later in life. This, I think, is a very important gap. Also to be able to compare the outcome of music training in an older adult with something like a computer-based program and also to compare music versus other forms of intervention.

You want to know is music unique? How does it compare with other forms? This is something that I have not touched upon up until now, but I just want to mention it -- and that is does the older adult brain profit from musical training early in life? This is important in terms of education and social policy.

We do know that musical training early in life actually does profit, does benefit the young adult brain. We have just finished a study that demonstrates that. But we have not taken that in older adults. I do not know. I cannot tell you if you have had musical lessons as a child, will it help you when you are 65? We do know that it will help you in terms of having a more efficient brain with

response to sound if you are a young adult.

And importantly how do we obtain these large-scale biological outcomes in humans? I really want to put to you that I think that the biological approach that we are using right now -- we are using this in a laboratory -— has potential. There are some commercially available units that people can purchase, but they are cumbersome. And really the technology is such that this kind of technology should be translatable into instead of having to apply electrodes, just putting on a headband. And an iPad or an iPhone ought to be able to deliver and capture the signals. If there is a user friendly interface anybody in a school, in any kind of senior center setting, ought to be able to obtain these very objective biological measures. And again you mentioned you want to have outcomes that are standard across different groups. We had hoped to actually have cABR in the NIH toolbox for those who are involved with that.

Initiating music training later in life. It should work because short-term music training seems to work in kids. Short-term nonmusic training works in older adults. If I am going to put my money somewhere, it is going to be on music because it seems to be a very powerful model for auditory learning and auditory learning especially as it relates to language.

And I want to draw your attention to a paper that Ani Patel wrote. He has what he calls the OPERA hypothesis. And the OPERA hypothesis explains why he thinks that music is a particularly effective medium. Actively making music seems to enhance nonmusic-related skills. Why is music so effective at improving language skills?

The O in OPERA stands for there is an overlap in the biology in the auditory system between the mechanisms that undergird music and speech.

The P in OPERA stands for precision. If you learn a musical instrument the precision that is demands of you is much higher than what we need for speech, so that it helps you. For speech, we tolerate differences in accents, differences in male/female voices. We still understand that in playing a musical instrument, precision is demanded of you, which he will argue, will benefit the language demand.

Emotion. There has not been much emphasis on emotion. I think we need to emphasize emotion more in our studies and in fact even in terms of what form of training somebody might undertake. They have to like it. Somebody might like art more than music and I would expect that they would get more benefit out of the art than the music. We know in our daily experiences that we learn what we care

about. We know from controlled animal model experiments that animals learn faster and they remember longer when their limbic system, when the emotional system in their brain has been stimulated while they are learning a task. Emotion is our motivation, our reward system. It is a huge factor that we have to consider. Ani Patel says playing music certainly engages our emotional areas.

Repetition. Extensive practice tunes the system and the A is that you will have to learn to pay attention to what are the meaningful details and sound. I can tell you. My husband is a musician. And when I am trying to play something, he will come by and listen to the passage that I am trying to execute myself. He says "listen to what he is doing. You can just hear that he is pulling on the string here." Before he said that I was deaf to that aspect. Just through the process of playing an instrument, you learn to pay attention to what is meaningful and sound.

I do not know if you need a lifetime of musical practice in order to see the kinds of fundamental, pervasive enhancements that we do see with musical training throughout the lifespan. Again, this is a gap that needs to be filled. I would like to acknowledge my collaborators, in particular, Alexandra Parbery-Clark who was going to join us here and fortunately could not at the last minute. Trenton Nicol, Samara Anderson, Travis White-

Schwoch. These have been the people who have contributed to the work that I have talked about today.

And finally, I would like to encourage you please to visit our magical website. I have a bunch of cards here with the website. I encourage you to take them. I really feel a huge responsibility as a scientist to translate and to communicate our little discoveries to the general public, to parents, teachers, educators, to the many different flavors of scientists who are interested in this kind of work.

What you will see on the home page -- this demonstration is a one-minute video that illustrates our biological approach. If you want to know more about the biological approach, you can go to technologies. Each one of these topics has with it a slide show. And the slide show is a picture and one caption that encapsulates usually two years of work. You can go through the slide show and get an overview of what we are doing. If you want the nitty-gritty, you go to publications and get that. I thank you very much.

(Applause)

DR. KRAMER: Believe it or not, our group finished a little early. We have 15 minutes for open discussion and that starts at 10:05. I would like to suggest now questions for Tony and Helga and Nina.

Agenda Item: Floor Discussion

DR. MUIR: I have a question for Nina. I am Jan Muir from RTI International. I am very interested in what you described as music training. Was this limited to instruments that you play with your hands or woodwind kinds of things or did it also include singing?

DR. KRAUS: First of all, it is very important to distinguish that they are actually playing a musical instrument. Musical instrument -- active playing of the instrument as opposed to passive, listening. That first is just a very key point. I like to make the analogy. You are not going to get physically fit by watching spectator sports. It really takes the energy.

Now, we have looked across a number of different musical instruments. Most of our data has been on instrumentalists. We have a study ongoing now where we are specifically looking at drummers compared to vocalists. It will be interesting. With the vocalists, again, there are various control issues because a vocalist generally cannot practice as many hours. On the other hand, their body is the instrument. There can be something very powerful there.

One of the things that I can tell you is that although across instrumentalists we find these very pervasive fundamental differences in hearing speech in

noise, in memory, and in how the nervous system responds to sound. We do have a paper, which we call specialization of the specialized where we find not so surprisingly that our nervous system response to sound is tuned to the sound of the instrument we play. If you compare the cABR responses that you get to a piano sound in a pianist compared to someone who plays the bassoon, you will find that the bassoon player will be more responsive, their nervous system responds automatically.

I just cannot emphasize we are what we do. If we spend many hours playing the bassoon, it gets to the point where when we can record these responses to sound it does not matter if you are awake or asleep. Your nervous system just will respond to these aspects of sound that it has learned through experience are meaningful elements. I hope that answered your question.

DR. KRAMER: Let's go for one more question then we will open it --

DR. PATTERSON: I am Michael Patterson with Mindramp and Associates, which translates science for the general public. I will be delighted to -- I want to pick up on what you said and then ask Tony and Dr. Noice. It seems very clear that when we work, as you say, on one particular sensory strength, it will get better. I think one of the mechanisms or what Tony and Helga looked at was

the multi-modal approach that happens in theater where it seems to hit multiple different aspects. Could you speak to that?

DR. TONY NOICE: Yes. We are very strong believers in that that acting is one of the things that is truly multi-modal. You are using the entire instrument. We get these marvelous behavioral results that we have been getting for 15 years showing the people actually increase in the necessary components of successful aging. That is they can remember better. They can solve problems better. They are more creative. All of these are standardized, behavioral tests that we take before and after. And unlike many of the things Nina mentioned -- that original interest is often necessary and people have to be interested in what they do -- oddly enough, acting does not seem to require that because you have no self-selection. The people come in. All they know is they are volunteering for some sort of intervention in the arts. They have no idea what it is. And yet they are randomly assigned to the theater or to some other condition. Nevertheless, they all improve.

It is very interesting that people who are not picking acting training nevertheless benefit from it. But we feel it is because of that multi-modal thing because with acting it is not just you are hearing or anything else it is the entire person -- it is your mind. It is your

body. It is your emotions and everything else. We believe the multi-modal aspect is really important.

I would like to ask Art a question because we were all working for time to get three speakers in. I would like you to address very briefly. You discussed the general things that you are doing with the brain imaging. But what do you expect or hope to find from the acting study in terms of brain imaging?

DR. KRAMER: I am not sure if I want to answer that question. Maybe I will. I think the issue and I think we have heard this this morning -- maybe I will summarize a little bit because I am the moderator. I think the issue is the specificity of transfer and learning effects. In the field of training, one of the hot topics is how near or far can I get transfer. Some of the commercial products that are available, I am not mentioning any names, make pretty wild claims in terms of doing a specific kind of -- often computer-based -- training in getting very broad transfer.

I think what we saw from Nina's presentation, however, is we tend to see (and this is not new, Thorndike talked about this about 100 years ago with his theory of identical elements) that when you train on auditory skills such as music, you tend to improve on other auditory skills, be it recognition memory or sensory function. And

I think in your presentation you mentioned that the visual memory did not show the same benefits as the auditory memory.

It seems to me that if we are going to come up with interventions that can help older adults function well, maintain performance or perhaps even enhance performance, we do not need one intervention. We need a multitude of interventions that essentially exercise in a cognitive sense, perhaps also a physical sense. Nina said music is her best bet. Physical exercise is my best bet. I do not have time to tell you why that it is.

But I think we need a toolkit of interventions that focus on the various aspects of perception, cognition, and motor activity that show declines as a function of aging. And music evidently shows some real strong benefits in terms of the auditory modality, sensory, memory function, I bet working memory and long-term memory and anything to do with audition. And theater focuses on different aspects of function, more of the visual, perhaps motor memory, much like music might.

I am not sure that there is any one art form that we could consider to be, or we will ever consider to be, a panacea to negate all of the negative things that happen with aging and I think that is why we are here to talk about different kinds of art forms both from the West and I

hope we address a little bit the East because there are very important art forms from tai chi to yoga and so forth from the East.

DR. KRAUS: If I can just add to that. I would say that a good cocktail would be exercise and music. Just to amplify a little bit about the visual effects. In the measures that I showed you, we did not see enhancements in some of the visual tests that we did, but others. And in some of our other measures that I did not show you we do see visual enhancements. They are less than the auditory ones.

I really do want to put to you the fact that I think one of the reasons that music is powerful is that, like acting, -- it really does engage so many different systems-- the motor system, the visual system, the emotional system. As I think as research gaps are filled, I think we will come to understand the extent to which some of these other modalities maybe affected as well.

DR. KRAMER: I agree completely. I think even in terms of the intervention -- certainly we probably need an n-dimensional mapping of interventions to cognitive and perceptual processes to outcome measures. Because BERs, brainstem evoked response -- I was trained as a human electrophysiologist a long time ago -- but I do not use BERs now because they would not be appropriate for the

kinds of things I measure. They are most certainly appropriate for the kinds of things you measure. But I think we need a corpus of psychosocial, behavioral, and neuroimaging from electrophysiology to near infrared spectroscopy to fMRI activity to get a rich picture of the benefits and the lack of benefits under some conditions.

I want to open this to discussion. We have a few minutes left.

DR. WHITE: My name is Ashley White. I work at the National Science Foundation, but I am here mainly because I teach a course at the University of Maryland on science and music. I wanted to take the first question and ask a little further and I think this applies to both types of studies that were discussed. When we define what a musical intervention is, we can say is it singing or is it instrumental. We asked about is it a wind instrument or a string instrument or the drums. But in addition if we are going as far as talking about visual aspects as well, are we talking about someone who is usually sight reading music? Is it music they already know? Are they doing ensemble playing or solo playing? Are they improvising or are they playing classical music that is arguably more complex than rock music? How can we possibly work around all of these different factors?

DR. KRAUS: These are such important points. If

you learn music -- Suzuki style is a language compared to reading notes. Some of the data that are available, just as the question that came up before, suggest that the act of engagement in music, irrespective of how to do it, is in the end the final common denominator of what matters most. But there are a tremendous number of knowledge gaps in terms of fine-tuning of what strategies might work best, at what ages, what dosages.

I want to talk about education for a minute because much of the work on the effects of musical experience on the nervous system has been done on people who are privileged enough to be able to afford private instruction. What about music education delivered in schools? We are now involved in two gang reduction site studies. One in the Chicago area. One in LA. Even those two studies where we are looking at the outcomes of music education delivered in schools, the approaches are different. In the Chicago Public Schools, the music intervention is that the music training is done by teachers, by educators who know music. In LA, this is the Harmony Project. In LA, the music is taught by musicians. These are very important research gaps. Thank you for raising them.

PARTICIPANT: If you do not mind, I have a question for each research team following up on your

question to Nina. For much of your presentation you did talk about musicians, but there was earlier on in your presentation you spoke about musicians who are collaborative or you are in a combo or symphony or what not. There was that effect of having to listen to one another that had the benefits. I am wondering have you found a difference and maybe -- isn't large enough. Have you found a difference between those people who play regularly and alone versus those who are combo people?

DR. KRAUS: You guys are great at identifying research gaps. I think I have come to the point of finding that there really are these pervasive effects of musical experience in people who are both soloists and who play with ensembles. I am certain that there are some differences that we do not yet understand and I am so excited to learn about them with our future work.

DR. NOICE: In terms of theater, yes. The essential theater as we demonstrated is you must take in, give out, take in, and give out so you are always in theater working with others. It is always receiving, giving. In fact, a good actor actually brings out the performance in the other actors. What I do that makes you do that. What you do makes me do that. That cooperation is essential in any theatrical endeavor.

PARTICIPANT: And so does a great director like

yourself. Something I really wanted to commend both you and Helga on is your wait list. There are so many community-based studies that get proposed and actually enacted that do not bring the intervention to all the potential participants. I really want to applaud you. Thank you both for doing that.

DR. NOICE: Thank you very much.

DR. SHAM: I am Elizabeth Sham here from Indiana University. This question -- it is more a comment than anything, but I think it goes to Nina's comments about music and all the wonderful things it can do and Art's comments about physical activity and theater from Tony. I just want to point out that there is a wonderful art form that actually brings all these together. It is called dance. I am a dancer. I am interested in research of this nature in terms of dance interventions. We are about to launch a dance for Parkinson's intervention at IU, which we are very excited about. But in terms of gap research, perhaps this is a gap.

DR. NOICE: Happily, there is a lot of research on it. In fact, in the paper that everybody will have access to, that each one of the speakers is preparing, we address that. There are also some wonderful studies on dance. Both on dance interventions and on lifelong dancing. The benefits of lifelong dancing are incredible.

People who have danced for many years, ballroom dancing where they have to really learn the steps as well as the quality of movement and so forth are so much healthier. It is almost off the charts. They did it with people who have had at least 16 and a half years of ballroom dancing on the average. The results are just incredible compared to non-dancers.

DR. KRAMER: Just a follow up comment. I think these data are very interesting, but they are not causal data. They are cross sectional data. I think we really need to do the longitudinal studies. Thanks to Molly Wagster and the National Institute on Aging, we are doing such a study now contrasting walking with ballroom dancing, with toning, stretching, and strengthening with a multitude of behavioral psychosocial and neuroimaging measures that we have used in the past with our walking interventions. I think these contrasts are important.

I think dance is great because it is multi-modal and hard because it is multi-modal if you want to get at mechanism. And that is true for theater too and it is probably true for music. I think a lot of the art forms are clearly multi-modal. When we talk about mechanism, it is often tough to come up with an answer there. I am a born-again non-reductionist because I sit on NIH panels and NSF panels like many of us do. But I truly see the value

of interventions and art forms and other kinds of activities that we cannot break up into little pieces. And indeed, if we break them up into little pieces, we might lose the art form. But it is tough to get at mechanisms this way.

I think the data that Nina presented in her career is a nice demonstration that you can get at mechanism and be led by theory whether it is theory from biology or psychology or combination to examine some of the underlying aspects of audition and how they might change and how music might be important to them.

DR. HELGA NOICE: If I can just add. We included in our review one study that has been done in Germany with Parkinson's disease patients. And after one session, they showed remarkable improvement in terms of gait and other things. I will be glad to give you the website because they have the whole dance program, their whole hour that they are doing on the web. It is just an incredible program.

DR. KRAMER: Thank you all for participating in this session. We will take a five-minute break now and come back for the next session. 10:30.

(Break)

DR. REUBEN: This is one of these great convergences of topic and people where everything is so

interesting you cannot quite get enough. We do need to move on. In the words of Alfred Hitchcock, a word from our sponsor, Sunil wants to have an announcement.

DR. IYENGAR: Hi everyone. I just thought I would take this opportunity since I had a chance at the break and before, to get some questions from people in the audience who happened to be researchers as well as some of our cosponsors.

The NEA actually has an ongoing grants program and I wanted to make people aware if you are interested in it that you can go to our website at arts.gov/research. We are funding small awards to research teams that investigate high-quality data sets about the value and impact of the arts cutting across multiple domains and disciplines. If you have any questions, Joanna is in the back of the room. And of course, you can go to our website and learn more, as I said. I just want you to be aware of that. The deadline for those applications is November 6. Thank you.

DR. REUBEN: The second area we are going to cover is the comparative benefits or weaknesses of arts therapies over other behavioral and/or pharmacological interventions for older adults experiencing declines in cognitive, sensory, or motor ability. The moderator will be Becca Levy who is an associate professor of epidemiology and psychology and director of the Social and Behavioral

Sciences Division in the Yale School of Public Health. Her area of research has been on exploring psychosocial influences on aging.

Agenda Item: 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 skills

DR. LEVY: Thank you. I feel honored to be the moderator of this important session. We have three presentations and four speakers and they all are distinguished speakers who have been able to integrate aging, health, and the arts in very innovative ways. I think you will enjoy their presentations.

Our first presentation is by Kate de Medeiros and Anne Basting. Kate is an assistant professor of gerontology and a Scripps Fellow in the Department of Sociology and Gerontology at Miami University of Ohio. And her research includes looking at narrative approaches to understanding old age. She has developed and validated an instrument that assesses neuropsychiatric symptoms in dementia. She is going to be collaborating in her presentation with Dr. Anne Basting who is the executive director of the Center on Age and Community and is the associate professor of Theatre at the University of Wisconsin Milwaukee. She has written extensively on the

topic of how arts can improve the quality of life of older adults. She also directs the award-winning program, that I know many of you are familiar with, TimeSlips Creative Storytelling Project. I will turn it over to them.

Agenda Item: "Shall I Compare Thee to a Dose of Donepezil?: An Overview Intervention Research in Dementia Care

DR. BASTING: Great. Those of you who know the TimeSlips work and then how in the past couple of years we have been building it into a longer term curricular model are going to be massively disappointed because I am not even going to mention it other than right now. If you have questions about it afterwards, please let me know.

We were tasked with comparing the benefits and weaknesses of arts therapies over other behavioral and pharmacological interventions for older adults experiencing declines and cognitive sensory and motor ability. When they asked me to do that, I said "Kate, let's collaborate." We are an example of one of those collaborative teams that I am going to call for at the end of our presentation and that you all called for as well as the Noice's called for in their presentation. I think we are going to hear that quite a bit. We are a living example of that.

Clearly, the chase is on to figure out how to remediate or delay the symptoms of cognitive decline with

the changes in demographics. I think, Julene, you have some great slides just showing that for sure. I am just going to say that the chase is on.

We looked at systematic and integrative review of literature from 2000 on and there are 2900 studies that we found. Clearly, there is a lot going on. But also clearly, there is little that we are able to do at this point. We are finding very little impact. Where do we go from this point on?

What we did was create a study that assesses the systematic and integrative reviews of pharmacological and non-pharmacological intervention research with a focus on arts based. I am going to turn it over to Kate in just a second to tell you the methods that we used in really looking forward and giving some advice about how to move forward in the research. And then for the conclusion section I will come back on.

DR. DE MEDEIROS: I want to give you an overview of what our approach was in trying to look at this and trying to reign in all of these studies. What we did is basically a review of systematic reviews and also of integrative reviews. Rather than trying to look through each individual study, we felt that by drawing on things in studies that have already used really rich criteria to evaluate effectiveness that we would be able to get a broad

picture of what some of the impact areas were and what some of the weaknesses were.

Our first goal was really to set some criteria to look at the systematic and integrative reviews. I am going to talk a little bit about what the differences of those are when I present the results.

Also, I want to stress that we were only looking at people with dementia. We are not looking at older adults in general, but people with dementia. Sometimes people with mild cognitive impairment are included with that, but most often, these are dementia-based interventions.

Just a couple of disclaimers. This whole approach of reviewing reviews is not something that is well described as a method in the literature. This is novel. There are bound to be holes. There are bound to be things that kind of slip through the cracks. Also, we are limited because of the lag time in publications for the reviews. Reviews published in 2012 most likely would only include studies up to 2010. There is going to be a little bit of a lag. You may be aware of more recent research that we are not going to discuss. Just as a point of that.

The other thing is that we are really looking at three major areas and that is going to be quality of life, cognition, and also neuropsychiatric symptoms. I am using

the neuropsychiatric inventory's broad definition of neuropsychiatric symptoms based on approximately ten domains. I will get into that a little bit later too.

The whole systematic review is based generally on a very well defined clinical question in which researchers go about evaluating studies that meet this question. One of the most common criteria to be included in a systematic review is to have a randomized control trial or a quasi-experimental trial with an appropriate control group. People look at things like sample size, study design, and the potential impact. Consequently a lot of studies are excluded from systematic reviews. The authors may start out with several hundred and then end up with less than 20.

Another inclusion criteria for looking at systematic reviews -- we only looked at those studies from 2000 onward. These are systematic reviews, not individual studies. Only published in English. We used PubMed as our search engine.

We excluded studies that were nonhuman, that focused on caregiver outcomes rather than the person with dementia. Things that focused on caregiver burden were excluded.

We also excluded studies that focused on biomarkers of things other than interventions because we were strictly looking at results of studies in which all of

these intervention studies were included.

Our initial review came up with about 250 studies. We went through the list. We eliminated things that were consensus papers or again did not meet our review criteria, but instead looked at studies. We eliminated reviews that came up multiple times in the study. And we ended up with about 16 reviews.

We divide these out as pharmacologic, non-pharmacologic, and then arts based. Even though arts-based interventions are in that non-pharmacologic group we looked at those separately because those look at really psychosocial interventions. We will tell you a little bit about what we found.

I am not going to tell you about what did not find because our paper ended up being quite long. I do not want to bore you with all the messy details, but I just want to point out some highlights. I am going to point out studies that actually had some positive findings.

These are the pharmacologic studies. And really Donepezil seems to have some promise. In the review that Birks and Harvey did, they found that Donepezil showed improvements in cognition over placebo. Unfortunately, there are side effects associated with that, as many of you know.

Olazaran and colleagues included a study in their

review where they looked at Donepezil alone and Donepezil plus cognitive stimulation and found that Donepezil plus cognitive stimulation had more positive effects than Donepezil on its own. None of the studies had results based on quality of life with these pharmacological interventions.

When we looked at the systematic reviews that include non-pharmacologic interventions, those were broken out to the same three categories that I mentioned before. What looked promising in the reviews that were presented in the systematic reviews were some interventions for cognitive stimulation, in which the emphasis is on different activities centered around stimulating thought memory and not with specific memory training techniques. Cognitive training are those exercises that really focus on method of loci and other kinds of recall strategies. And then reminiscence, actively recalling the past. Different reminiscence programs really work in several different ways.

But all in all randomized control trials or quasi-experimental trials that were included in the systematic review seemed to point to these as potential areas for promise.

The whole arena of neuropsychiatric symptoms had some interventions and some approaches that looked

promising. For example, behavior modification, tailoring the environment, or withholding or giving a reward system based on enforcing positive behaviors. Cognitive stimulation, emotion-oriented care where you are really focused on the individual and his or her needs and what can be supportive of those and others. I guess the common theme here is that most of these interventions that worked for various neuropsychiatric symptoms were things that were really specifically tailored to that person.

Weaknesses that were cited in a lot of these studies of course are small sample size, lack of adequate control groups, and others. Even though a lot of these showed promise, the enthusiasm was dampened a bit by some of the study design weaknesses.

And then quality of life. Again, we saw some of the behavioral modification, cognitive stimulation and that tailored activities program study by Gitlin and colleagues that was cited earlier.

Unfortunately, when you look at arts-based interventions and systematic reviews not a lot comes up although music therapy is often one that does. We found a review by Livingston and colleagues that looked at six randomized controlled trials using different music interventions to help with neuropsychiatric symptoms. And I say that broadly because the music interventions range

from everything from participatory music to passive music. There is a really wide variety of activities that are included in those.

Overall, we just found that the things that seemed to work really involved multiple cognitive domains as others have mentioned. They really seemed to be tailored toward the individual and really seem to have some meaning base.

We included integrative reviews because a lot of the studies that are non-pharmacological arts based are excluded from systematic reviews because of that study design criteria. When we were looking at the integrative reviews, we specifically did not include the pharma things because they were often a topic of the systematic reviews. But we wanted to see what other kinds of things were being included in these reviews that were not included in the systematic reviews. We used a very similar search strategy as we did for the systematic reviews.

What we found is that there were promising non-pharmacological interventions for improving things like episodic memory and executive function. But in the review that looked at these interventions they cited limitations such as they could not really isolate whether it was the intervention itself or whether it was just the social environment that helped that or in some the retest time was

so short it was unclear whether it was retest ability or actual improvement. Other approaches that seemed effective from non-pharmacologic were the validation therapy, life review or reminiscence, and Snoezelen. They did not really mention quality of life.

When we looked at arts-based intervention, we only found four that met criteria and again these were music related. We increased our search a little bit more to via the Cochrane database to see if there was anything else that might come up and we found something on dementia and storytelling.

We also looked at the Mental Health Foundation. They did a comprehensive report on different interventions for older adults in general, but we did find some studies that were specifically related to dementia. Some of those are up there.

The outcomes were measures like observational studies. In the study from Lepp 2003, they talked about things like perceptions of pleasure and affective observations of outcomes, which make some of this comparison a little bit difficult across measures.

We did not see anything in these reviews that spoke to cognition in people with dementia. We did see some studies that spoke to neuropsychiatric symptoms. Again, it is the music studies. And some reporting quality

of life improvement. Interestingly there is some debate on people with dementia rating their quality of life better than caregivers. There are some other debates on exactly what kinds of approaches were used to actually come up with these conclusions.

The one thing that we did walk away with and I know this was mentioned earlier is that there are limitations to some of the outcomes, but no adverse effects were reported in any of the arts-based interventions.

DR. BASTING: The conclusions really of what we have been saying all morning is that in some situations we might very well be using the wrong tool for the wrong job. Rather than looking at why aren't all these studies are in RCTs, maybe we should learn from that and say let's look at alternate approaches to this. Let's try to figure out -- the measurement tools that we are using are not appropriate. Let's try to get some measurement tools that make sense.

Again, as we have said this morning, we will reiterate it and say we need to focus on finding the mechanisms. One of the things I can feel in the room also from my own sense of self-preservation in my own university is it is about theater. It is about music. It is about visual arts. No. Let's not look at where we have divided things into departments because frankly I think our school

of the arts should not have departments anymore and figure out what the actual mechanism is because there is no need to isolate one intervention. You can integrate into a themed intervention over time that builds skill that builds based on improvisation and a tailored approach that integrates music, movement - if you want to call it dance or movement. If you want to call it music and theater, you can integrate all of those things into an intervention. It does not have to pull and separate and isolate. If we are going to go multi-modal, let's go multi-modal and figure out what these qualities are that are working.

Tell us what is going on in the intervention. You did. Thank you. Not enough people are doing it. We need really deep descriptions. This is also going to help clarify this other tension that exists in the social playing field of what is happening in the discipline which is: is it therapy or is it art? and who can facilitate this? and how can we get to the big enough N by figuring out who needs to be trained to conduct this intervention? and how can we offer that training to a large enough group of people that we can get a big enough sample size -- the largest I saw was 117. Can we get into 500? I do not know. Is it possible with arts interventions to do this over time and space? The senior theater groups that are working are doing massively different types of things.

They are doing readers theater. I do not know if we will be able to get sample sizes that high unless we really figure out further deep descriptions of what is happening in the interventions.

Discussion and conclusion. Develop and measure interventions that are tailored to individual context that are not necessarily through -- I think the key thing for me is looking at something that builds skill and acknowledges where people are in the present. There is a lot movement in person-centered care work to do assessments and get interviews of whom this person was. But then you only rely on that and you are not really taking the time to figure out how to tailor that approach to make a universal design so someone can come in with a range of disabilities, cognitive, physical, whatever because people's interest with an invitation to participation may change in the moment compared to what that intake even if it is person-centered care impulse is going to tell you.

I include this thing. This is from 1994, which is David Greenberger's Duplex Planet. The subtitle there, which you cannot read, but I put it over to the side is everybody is always asking who I was. That is what we forget, I think, for people who are living with cognitive disabilities. Let's go back and rebuild who they were. The arts have this special capacity to actually grow the

person from now.

Focus on the impact beyond the individual. A lot of the work -- I was fascinated by your talk. Wow. This is the individual brain. But a lot of the promise from the studies that we found was on the socialization component of it and what it is teaching people. And early on in your slide you said something about it is about social isolation from reduced hearing and capacity and that essentially what the arts are enabling us to do is rebuild that through a common form of expression that does not rely on limited capacity. It is pretty incredible. Let's look at those more and figure out what it is and go with that as part of the mechanism of what is happening.

I also want to advocate here that a lot of these arts pieces that are not being tested are things that are investing in a product that then adds social capital to that person. It adds value to a person with a damaged and stigmatized identity. And that dramatically changes how the person functions in their day-to-day life, the kind of care they are receiving, and the kind of attention they are receiving, and the kind of relationships they are able to build. And I think that attention to what that social capital is and how it is working is really important. And that came out of your talk when you said this is serious artistic training. That means something. And in some ways

it means something that is not therapy. For some people with dementia who are over coded in a medicalized framework something to provide them meaning in their lives that actually is outside of that framework that isn't coded as medicine. I was trying to think of it as placebo plus. It is something else that is operating in a nonmedicalized framework.

That said, the coming challenge and we have not been articulating where these studies are taking place. Most of these studies are taking place in congregate care settings. I include this slide because I am working on a new project called shipwrecked, which is about social isolation, and people living isolated at home. What is the translation of even the studies that we do have that are all measured in congregate care settings to people and the wave of the future where we are pushing toward community-based care. How do these things translate across the setting?

We are going to have to be careful because while Donepezil may act the same for people who are living in congregate care or living at home these interventions do not -- you cannot assume that they will have the same value when they go translated from one setting to the other. We are going to have to be attentive to where these things are being tested, the setting in which they are being tested.

And just the challenges of getting engagement and participatory arts out to people who have cognitive disability, living at home in an isolated situation where likely they are just watching TV is going to be huge.

We should loudly question why low cost, low side-effect interventions are not implemented while some high-cost, pharmacological interventions with really serious adverse side effects are being widely implemented. Kate, can you tell me your response -- I put this slide in there. Has anyone ever died from poetry? How did you phrase it?

DR. DE MEDEIROS: I said that there were no systemized tests to concur so that we should say as of now there are no published results reporting on death from poetry.

DR. BASTING: Support collaborations between researchers and arts-based practitioners. This slide actually comes from a summer institute we just held in Milwaukee called create change transforming care for elders through creative engagement. These are two researchers who participated in a living mural through a two-hour visual arts project. I just think that the artists are the ones -- they may not be able to explain the mechanisms, but through conversations you can learn what it is that is happening between conversations of researchers and arts practitioners. I was just describing it earlier. The

artists are the chemicals, if we are doing this comparison with Donepezil, we really need to foster those conversations and then of course support that financially. You need to do that purposefully in a way that combines the language so it is understood across and then of course support the research.

There you have it. Lightening fast. I just want to thank people who actually helped us review the paper, and then of course for everyone who made this day possible in bringing us in because this conversation is really hopeful to me as we move forward in the field. Thank you.

(Applause)

DR. LEVY: Thank you. That was really interesting. It was amazing you were able to cover so much material in 20 minutes. That was great.

Our second presentation is by Dr. Gottfried Schlaug who is an associate professor of neurology at Beth Israel Deaconess Medical Center and Harvard Medical School. He is the director of the music, neuroimaging, and stroke recovery lab. He studies brain plasticity and he also conducts very interesting interventions, which include looking at the role of singing and music making to help recovery from brain injury and also neurodevelopment disorders.

Agenda Item: Music and the Brain in Health and

Disease: What we Learned from Correlational, Longitudinal, and Stroke Recovery Studies

DR. SCHLAUG: Thank you very much for the kind introduction and thank you to the organizers for asking me to come here and present our work. As Becca already said, I am a clinical neurologist by training. My PhD is in neuroscience. But I am also somebody who has a musical degree, a musical performance degree. I am an organist by my musical experience. It is really all of these experiences that actually got me to get into studying the effects that music could have on the brain. It was actually a skill that I did not have, absolute pitch, that really got me to ask what are the neural correlates of that skill in the brain? That was actually our very first study in 1995 to look at music and the brain.

I am a strong advocate, obviously, for music type interventions, but it really does not just have to be music. I am a believer that theater, that other types of physical exercise might work as well. And I am always using this example of saying who of us knows a 50 or 60-year-old professional musician that we would have a lot of respect for because they are also an expert mathematician? That is actually quite seldom that we find somebody who is a professional in one particular art and that they also have incredible skills in other domains. I am a firm

believer in having an enriched environment that consists of multiple activities.

Music, I think, is a very unique experience because it is not just an auditory experience, but it is a multi-sensory motor experience. We know that music makes us move. It creates emotion. As research shows, it engages pleasure and reward systems. And music making -- and here I include singing as well as dancing -- activates, it engages and actually it connects an auditory motor network.

I am going to show you an example of one of these experiments that we did. Here we had subjects that never played a piano before who learned to associate certain sounds with motor actions. They had to learn to play certain melodies. We contrasted that with individuals that were only passively exposed to the melodies although they were not quite the same. It was ordered in a different way. And then we did an fMRI experiment where they would hear those melodies. And at the end they had a three-tone probe task so that we could get them engaged.

The ones that were trained on associating melodies with particular motor skills – actually learning to play these melodies --activated this network of regions. The ones that were just passively exposed to those melodies activated a slightly different network. This was our most

critical comparison. Here we found that in particular a region in the posterior inferior frontal gyrus on the left side. We usually call this Broca's region. But we believe that this particular region that was active in this task is critically involved in mapping sounds to actions. This really does connect the auditory and the motor system and the mapping of sounds that music has a particular strength in.

Now, we also think of musicians as auditory and motor athletes who start early, practice intensely throughout their life, and our question has been over the years does this lead to functional and structural adaptations? Very important here is that when a musician enters a music conservatory, by that time they usually have done about 10,000 hours of practice. That is an enormous extracurricular activity if you think about this. The question has been does the enormous amount of practice to learn and become good at a particular skill translate into brain differences when we compare professional musicians with matched non-musicians?

And here are some of the differences that we found. These are cross sectional comparisons here. I will get into our longitudinal studies as well, but this was actually one of our first studies looking at the midsaggital side of the corpus callosum, which is a major

fiber track. It connects right and left side of the brain. We thought that doing a bimanual motor activity was of critical important for the corpus callosum and that integrating information from both sides of the brain had to be done through the corpus callosum obviously integrating auditory and motor information also involves the corpus callosum.

We found that in musicians they had a much larger corpus callosum and in particular the interior two-thirds or so of the corpus callosum were much larger compared to nonmusicians and that this effect was found more in those ones that started early compared to those ones that started later.

Several years later, we also looked at 3D reconstructions of brains. We were interested actually in comparing different musicians with each other. We are fortunate to have a group of keyboard players and string players. And here we looked at the 3D configuration of the precentral gyrus where the primary motor cortex is. And we found that in keyboard players compared to string players there was a difference in this configuration. String players seemed to have a more elaborate right motor cortex controlling the left hand while the keyboard player had a more elaborate motor cortex actually on both sides of the brain.

Then we went to a more microscopic level and looked at gray matter differences across three groups of musicians. These are all keyboard players here. We had a group of amateur musicians and a group of professional musicians. They differed in their amount of average daily music activities that they had. The amateur musicians had about half an hour to about an hour of activities per day while the professional musicians had somewhere between two to three hours of actually practicing their instrument. We found that there were gray matter differences on a linear scale and concentrated really in primary sensory motor regions of the brain, but also in the anterior/superior parietal lobe. And most interestingly to us, actually also in the left inferior frontal gyrus among other regions of the brain, such as auditory cortex and the cerebellum.

Now, when we actually extracted the cycle intensities, we could see that some of those regions showed a nice linear trend while others showed a slight deviation from a linear trend so that any kind of activity actually gave you a bigger effect initially, and then practicing much more would not necessarily give you so much additional effect.

However, interesting to us was that -- I am sorry about this blurriness here. There was a study that was done around the same time that looked at the preservation

of this cortical or this gray matter signal over time in orchestral musicians. It found that in musicians compared to matched non-musician controls over their lifetime there was more preservation of gray matter signal in this posterior inferior frontal region of the brain on the left side. This is a similar location where we found gray matter differences in a cross sectional study.

Recently we have also been very interested in singing. I like singing because it does not necessarily require an instrument. It is a relatively cheap type of intervention. Similar to what we did with instrumental musicians we have looked at gray matter differences comparing singers, what we call professional singers to occasional singers. We relate these gray matter differences with years of practice and basically found that there are similar quasi-causal or that there are indications that there might be structural adaptations in the brain as well.

We also looked at a connection system in the brain, which is the vesicles that connect temporal with frontal lobes in the brain and here I think you can probably see that in professional singers this particular system was much more enhanced than we would find it in occasional singers.

We are also very interested in individuals with

musical disabilities. Here is a person that cannot sing or that is an out of tune singer. We also have people that cannot synchronize to a beat. And there are actually correlates in the brain that are responsible for these musical disabilities.

Nevertheless, I do want you to remember that the connection system that connects the hearing with the doing or the motor auditory matching regions in the brain gets particularly enhanced through music training.

Now, what could potentially underlie these changes in the brain? We know from animal experiments that when we stimulate particular regions on the skin or when we undergo particularly sensory simulations then the region in the brain that becomes active usually enlarges in size. We also know that extracurricular experiences or that an enriched environment usually goes along with having a more complex architecture or actually having more spines that are connected or that are on dendrites. We know that from animal experiments that growing up in a complex environment leads to more connections in the brain. But we do not only see that there are more brain cells, more connections they also need to be more supporting cells. They are usually more blood vessels. They are usually more clear cells.

There have been beautiful experiments that have actually shown that running, for example, might enhance

neurogenesis although there is still some debate that there are not really new neurons that we can find in the brain.

And then there are obviously -- and I get a little bit hopeful about this -- there are experiments that have shown -- if I make a lesion or if I am unfortunate enough to suffer a stroke then the brain might be adaptive and plastic enough to actually overcome this particular disability.

A lot of the things that I have told you so far are actually cross sectional experiences. And we are always challenged with this. Actually I have to say that almost all cross sectional studies have been positive. Only the positive studies are actually published. It is actually really difficult to design longitudinal studies that would actually show causal evidence of this cross sectional findings.

We wanted to do a longitudinal study in five to six-year-old children that learn to play a musical instrument. Our first challenge was actually to try and find a control intervention that they could do. We went through various things that were out there that we could actually do. Ultimately the study was actually never funded by NIH. NSF was then so kind to fund it, but they reduced it to about 25 percent of what we really needed.

We had a passive music exposure where we had kids

that -- actually not really passive, but they did not learn a musical instrument. They were in schools where they had group music activities as part of their regular schooling. And we contrasted that with kids that had instrumental music experience. We followed these kids over four years. We are actually still in the middle of analyzing data. I cannot show you all of this. But the idea was to really differentiate between whether or not intense practice leads to brain changes that would support the nurture hypothesis, or whether or not those who really become good in playing a musical instrument had an atypical brain to start out with so that they self-select themselves into this type of activity which would support other hypotheses.

The results that we have so far are that we can find structural changes in the brain that are different comparing professional, or comparing the kids that learned musical instruments, compared to those ones who did not have that kind of experience. The structural changes are in regions of the brain, for example, here is the motor cortex, supplementary motor area and most important to us in the corpus callosum. These are in regions of the brain where we had some predictions or where cross sectional studies actually showed that there was some evidence that these regions would change.

We also found functional changes in the brain in

regions that we had some predictions from cross sectional studies. Here the function imaging task is a melody and rhythm discrimination task. And, again, we found over time that there were strong left hemisphere lateralizations that developed in the children's group.

And we have also structural data looking at the connection between auditory and motor regions of the brain that showed that there are differential developments over time although this part of the study is still ongoing to be analyzed.

From our correlational study, we found that there was evidence or that we predicted that there would be evidence in the primary learning domains and the motor domain and in the auditory domain. We had previously found that there were effects in the nonverbal reasoning domain using the Raven's progressive matrices test as one domain. We also had found that there were effects in the vocabulary domain. But we did not find any other effects that had been previously shown in various other studies, which are sometimes referred to as finding effects in visual spatial domains. Those were a result of our cross sectional study.

Now, when we look at the longitudinal study, and again these are very new data. We have not actually been able to analyze all of them, but we can find that there are effects in these primary domains. We also found an effect

in the vocabulary domain. And we are still working with some of the other domains to figure out how we can -- whether or not there are effects that are actually there. But if they are there I can already tell you they are probably much weaker and they may actually be bordering significance. It is very difficult to actually find in longitudinal studies, in my opinion, these kinds of transferred domain effects.

If I have a few more minutes I want to spend them on whether or not music can be used so that alternative entry of vehicle into a broken or dysfunctional system to improve neurological dysfunction. There are lots of proof of concept data that is already out there that suggests that there might be effects in Parkinson patients. There might potentially be effects in people that stutter. I will show you some data on people that have nonfluent aphasia. There is data on dyslexia. And then we are also interested, although I am not going to talk about this today, on using interventions that are musically based for nonverbal autistic children.

In individuals that have suffered a stroke, for example, (pointing to his recorded demonstration) this individual here has a disruption on the left side of the brain so that this individual is unable to speak – we are asking him here to say the words of happy birthday.

(Recorded demonstration)

This individual when he tries to speak, he has only really nonsense utterances that he gets out because he really has completely destructed this particular system on the left side that allows him to have vocal output.

The question for us is can this system that is still remaining on the right side of his brain, can that be trained to make this better for him? We have an intervention.

(Recorded demonstration in which the individual sings "happy birthday to you" quite clearly)

It has actually been a relatively old intervention, but the newer correlates of this have not been examined. There were not a lot of good behavioral data and this has never been contrasted to an alternative intervention. Here, we are teaching him, for example, to say the phrase or actually sing the phrase I am thirsty.

(Recorded demonstration of person singing "I am thirsty")

What this really was supposed to show is that in the singing mode he can sing I am thirsty. And then through various processes we get him to the point where he can actually then say I am thirsty. We can go through hundreds of phrases like this to actually get him back to speaking again.

There are numerous examples. I cannot really go all into this. But there are changes in the brain that would actually support this type of activity. For example, here when we contrast before and after therapy of using words and phrases that they can actually speak before therapy and we use the same words and phrases after therapy. We can see that there is an engagement of this right hemisphere system that supports vocal output.

And most interestingly to us when we look at this connection between the hearing and the doing regions in the brain this connection actually changes as well when we compare before and after. I have to say that these individuals here usually undergo about 75 sessions of one and a half hours of training five days a week. They usually have about 110 hours of really intense training. And we would postulate here that that kind of an intense training actually changes not just function, but actually changes structure in an aged brain.

As I already pointed out, we have this intervention. There is already a lot of data. There is proof of concept data that this actually works. But how can we prove that it is this intervention and not some other intervention of how to actually do this. We have to come up with a control intervention that would isolate the particular aspects of melodic intonation therapy which was

the intonation and the rhythmic tapping and compare this to another intervention that we could do as intensely as melodic intonation therapy, but did not have these two critical components, but would still lead to some improvement because everybody obviously wants to get better. This is actually a study that we hope to finish by this fall. It was funded by NIDCD. Hopefully at that point will be one of the first studies that will actually show in a randomized controlled trial that melodic intonation therapy might be superior to a control therapy.

We have also recently gotten into Parkinson's for various reasons. There is a speech motor disorder in Parkinson's, which is called palilalia that actually gets improved with singing. And, as was already alluded to, there is a form of rhythmic music activity, which is actually old. This has already been described in the '80s. It is commonly referred to as rhythmic auditory simulation that might actually improve gait initiation and might prevent falls. Here is a very classic example of this. I just wanted to show you because it is such a good thing of an individual that has a severe form of Parkinson's with some dystonic posturing as well.

(video demonstration --walking toward the camera person walks with difficulty, when music is turned on person walks easily with the rhythem.)

Here he walks towards the camera. The music is not on. And then after a few seconds somebody turns on the music and you will actually see a very different person. Now, how exactly that would work in the brain actually hardly anybody knows. And it is really quite a miracle that they would work like this because the motor system is really severely impaired in this Parkinson patient. On top of this, it is a neurodegenerative disorder. They will get worse over time.

What we can do here is to use this type of intervention, understand how it works in the brain, and provide it as basically a medication that they can use, but under no illusion that over time this is a disease that will progress and potentially at some point this may not work for them anymore.

Listening to and making music is not only an auditory or a motor experience. It is a multi-sensory motor experience, which can change brain function and structure. Music making has therapeutic potential. There is preliminary data from several trials using music-based interventions that can improve auditory motor impairments. We feel that the effects seem to last when the therapy is intense enough so that they can actually change and rewire the brain.

There are numerous people in my lab that have

worked very hard on this and we have been fortunate with multiple trials to actually get some grants from various organizations, but recently it has come much more from private foundations and private donors that have supported our work. Thank you very much.

(Applause)

DR. LEVY: Thank you. That was really interesting. Those dancing and singing clips really illustrate how incredibly important this work is. That was really great. Thank you.

Our third and final speaker is also an artist. She is a musician. She has a distinguished research background as well. She is an associate professor at UCSF Institute for Health and Aging. She studies older adults with mild cognitive impairment. And she also studies how community music programs in particular may benefit older individuals aging health. She was recently a Fulbright Scholar in Finland and she studied how a community choral group improved the health and well-being of older adults there.

Agenda Item: Using Music to Manage Symptoms of Dementia: What is the State of the Science?

DR. JOHNSON: Thank you very much Becca and also for the organizers of this very important workshop. We have been talking about how important it is to get the same

people in the room who think about these arts therapies from a scientific perspective.

What I would like to do today is talk about specifically music and how music is used with individuals who have dementia. This was the topic that I chose in part because there seems to be a relatively large literature and I would like to put this literature in the context of cognitive aging. First of all, what I would like to do is talk about cognitive decline in older adults and why we need more effective strategies and then specifically focus in on studies of music that are used to manage symptoms of dementia.

Today, because of the lack of time I am going to focus in on the behavioral and cognitive symptoms, but I will not talk about the motor symptoms, for example, in Parkinson's disease. And then, what I would like to do is briefly think about how these music studies compare and contrast to the other pharmacological and non-pharmacological interventions. And then finally I would like to think about what are the opportunities and research gaps that we have with these data.

First of all, I want to remind everybody that decline in cognition with age is gradual. And some individuals develop mild changes in cognition with age, and some actually continue to develop dementia. What I want to

note today is that the majority of studies that are done with music are done in the more severe stages of dementia. That is an important feature. But some individuals continue with healthy aging, and the work that was described earlier today kind of focused on that group. I will focus more on this group here where they developed dementia.

It is important to remember that there are many causes of dementia. Alzheimer's disease by far is the most common representing about 60 percent of the causes of neurodegenerative diseases, but it is important to remember that there are also other diseases that need to be studied.

The prevalence of Alzheimer's disease is going to increase drastically in the next several years. You can see from this graph here that was just published by the Alzheimer's Association that while in 2010 we had about five million people who have Alzheimer's disease at a direct cost of $172 billion. That is going to more than double by 2050 with a direct cost of close to a trillion dollars; this does not include caregiver cost, which is the primary source of care for persons who have dementia. This is not a trivial problem that we have on our hands. Currently, there are only five FDA-approved drugs that temporarily improve symptoms, but to date we do not have a drug that stops either the fundamental process of

Alzheimer's disease or even halts the symptoms for a time.

I thought it would also be helpful to think about the context of the dementia work that is being done, which is the field that I have been in, and also the arts and aging. And what you see here is over the past 30 years that there has been significant development both in Alzheimer's disease with the criteria and several of the drugs that have been developed, but also in arts and aging as far back as 1981. The NEA sponsored the arts, humanities and older adults conference, and there was a second one, and then the exciting development with the National Center for Creative Aging, and most recently with the Arts and Human Development white paper, which is over on the table over there.

What is curious about this is although in the past 30 years, these groups have been simultaneously making developments, there has been very little crosstalk between these fields. I think that one of the recommendations that we make is that we need to increase the crosstalk between these two important fields.

The early evidence for the positive impact of music on persons with dementia came up actually out of the music therapy literature in the mid-1980s. These studies focused primarily on managing behavioral symptoms and increasing alertness in people who have severe stages of

dementia. And at that same time there were numerous case studies that came out suggesting that persons who have Alzheimer's disease had a preserved memory for music and music memory and creativity. These coincided with this interest. If we look at the number of publications from about that time in the mid-1980s, you can see almost an exponential increase. This is reflecting the interest in this field of music and dementia.

To give you an overview of these studies today what I did was took the approximately 340 studies that focused on the topic of music and dementia and then narrowed them down to focus just on the studies that looked at clinical trials of adequate quality and then reviewed the Cochrane systematic reviews. And there were some new studies. Interestingly after doing that process there were only about 24 studies that met those criteria.

Just to give you an overview of these studies, the types of music interventions were quite variable. We had examples of music listening, for example, listening to recorded music. There was participatory. There was a study that involved specifically music therapy that was delivered by a music therapist. Also, this combination of music and movement was common. But as you can see, there is a lot of variability.

The participants included persons who had

dementia, but often times the diagnosis was unclear or they just focused on Alzheimer's disease patients only. The majority of the studies focused on individuals who were in the severe stages of dementia, those in assisted living situations. And the sample sizes on average were about 25 ranging from 10 to 60. Rather small sample sizes.

But on average the frequency of the music intervention was about six to eight weeks with 30 to 60 minutes being the length of the intervention that occurred about two to three times a week.

In terms of the methods, again I focused on these clinical trials or semi-clinical trial approaches. Some of the studies were randomized. Many of them were not. And the outcomes, in a similar way, were extremely varied with the most common outcome looking at behavior in terms of agitation, aggression, and anxiety. The other studies focused on cognition, engagement or social function, quality of life, caregiver stress, and a few looked at biomarkers. Of note, none of the studies included a cost effectiveness analysis.

This slide is a little busy, but it is just meant to give you a big picture view of the findings from the study. On the left side here, I have the positive findings. And on this right side, the studies that suggested no effect of using music. By far you can just

tell by seeing the terms that I am using that the use of music for persons with dementia seems to affect the behavioral symptoms. We see a decrease in aggression and agitation. Multiple studies found a decrease in anxiety, also decrease in depression. And then some of these studies used what they call more behavioral composites, like a summary score from the Neuropsychiatric Inventory. And some looked at other behaviors that were not included in the inventory such as wandering. Again, you can see multiple studies concluded that music was helpful.

There were only a few studies that looked at improvement in cognition. It is possible that memory and language might be the two domains that show some improvement after music intervention. Of note, there are also studies that show that there are no changes in behavioral symptoms after music intervention. And by far I would say that the majority of studies that looked at cognition did not find an effect of music intervention on cognition. Of note, I wrote global cognition because the majority of these studies looked at the effect of music, for example, on the Mini-mental State Examination, which is a very broad sort of screening test. I think that story is still unfolding, we do not really know if this helps yet.

This is just one example from Raglio out of Italy. You can see when we look at the Neuropsychiatric

Inventory (this top line here is the experimental group, which included 30 music therapy sessions for 16 weeks including a post). After the intervention ended, this is four weeks after. And you can see pretty clearly here. The point is that the neuropsychiatric symptoms decreased in the group that had this music intervention. But in contrast there was no effect on the functional status measure, the Barthel measure. And this sample included 59 participants who had either Alzheimer's disease, vascular dementia or a mixture of both of those diseases.

But I think this was the sobering conclusion that I think we need to think carefully about. The Cochrane Dementia and Cognitive Improvement Group recently reviewed ten of the studies that I talked about that met the criteria for this systematic review of the studies. And they concluded that there is no substantial evidence to support nor discourage the use of music therapy in the care of older people with dementia. In particular, the methodological quality of these small, short-term studies was generally poor as was the presentation of results. I think we have to keep this in consideration when we think about conclusions.

When I took the results that we had data for from this Cochrane review, we plotted them using looking at Cohen's d. I think this kind of helps us think about it.

This is actually just three studies that we actually had data where we could look at this. What you can see is that while there are some hints that the music intervention favors an improvement there are a few that do not. But I think the most important part is this confidence interval is crossing over the no effect zero point. There is a lot of variability here and I think, although there are some hints that music might be helpful, we still have a lot of work to do to really pin down what exactly this effect looks like.

What are the specific concerns in these studies? I want to note that the samples are often poorly defined. The diagnoses are unclear. They often do not use diagnostic criteria. They will often lump participants who have different dementia diagnoses into one group. The sample sizes are often very small and they come from convenience samples, for example, in assisted living; it is important to develop interventions for these settings, but it also brings a whole host of other challenges to do research in assisted living environments.

The methods are often weak. I mentioned some of the reasons why. The randomization methods are often not specified. There are multiple design flaws that I think we can improve on pretty easily coming together in groups like this. We can think about it together. In particular,

there is still debate about what the best control conditions are for these studies.

And I think several of the presentations mentioned that the interventions are not well described. That is going to really limit our ability to replicate those studies into different settings and translate them.

Also, on the outcome perspective it appears from reviewing the literature that there are only a few scales that are really used. For example, this Cohen-Mansfield Agitation Index is a very good scale, but it may not be well suited to look at the effect of music. For example, you have to rate the individual's behavior over two weeks. If you are doing an intervention just one or two times a week, this might not be a good match. I think we have to think very carefully about which scales we are using and look at our outcomes.

And the interpretation of the findings is also a challenge. The statistical methods are especially weak. There is often missing data with dropouts that are not accounted statistically and the conclusions are often over-stated. To me these are challenges that we have to overcome. I think a lot of these can be overcome with good science.

But if we compare this to, for example, --this is our challenge -- we are comparing it to a pharmacological

treatment. These are two medications that are commonly used in the treatment in Alzheimer's disease. And when they ask the question do Donepezil and Memantine have an effect on behavior in Alzheimer's disease? Sure enough in well-designed studies that met international randomized controlled trials criteria, there is no difference between individuals who took Donepezil and placebo, which is the same effect when we look at Memantine.

These drugs were not designed to treat behavior in Alzheimer's disease; and actually the medications of choice to help manage behavior are atypical antipsychotics. In these trials, you can see some effect of the medication. This is the placebo group on top and these are the three different atypical antipsychotics. They do see some effect on behavior. In this one it was agitation, but not on depression. But of course the magnitude of the benefit was also very small with these medications and there was an increased risk of death and cognitive decline, which of course is not the outcome that we would like. There was no effect on caregiver time, which translates into cost or the quality of life. I think even with these pharmacologic agents, we are still struggling with finding treatments that actually help.

Just to give you a broad overview, Kate talked about the studies they reviewed. A lot of them are the

same that I went through. Again, on the left we have the positive findings. On the right, no effect. I think the reviews are suggesting that behavior management and education both for the staff and the caregivers are an effective non-pharmacological approach. Apparently the family-based coping therapies for improving quality of life are helping. Environmental management, hand massage and touch, and physical activity and exercise.

I think these studies that look at non-pharmacological approaches suffer from the same challenges that the music and arts studies do, which is they have small sample sizes. The designs are often poorly done, and the interpretation is questionable in some of them. We, the arts people, are not the only people who are having challenges in doing these studies. They are not easy to do.

And one other thing I want to point out is that although the majority of the studies using music for dementia focus on Alzheimer's patients, we also have to acknowledge that the response to music might differ with different dementia diagnoses. This is just a very simple task that we did with patients from different dementia diagnoses: Alzheimer's disease, frontal-temporal dementia, logopenic aphasia, and two types of semantic dementia. I think you can see when we asked them to just name that tune

that there are very different responses that differ by dementia diagnoses. The fact that we are lumping everybody into one group is probably not the best approach.

The general hypothesis really is that these lifestyle factors, whether it be exercise, whether it be music. I think what we want to do is be able to diminish these behavioral disturbances in dementia or improve or maintain cognitive abilities, and also facilitate well-being. We really do not know the mechanisms yet.

I think we can look to our colleagues like Art Kramer and exercise: to look at the types of models that they have developed that might help inform our research agenda and hypotheses. They have identified these different biological processes that contribute to the effect that we see in exercise and also on brain health. I think we really need to push toward developing more biological models of the arts interventions.

But of course we all know in the room, I am preaching to the choir, that the arts, and in particular music, involve this kind of multi-modal aspect of functioning. And it is probably the fact that there is this interaction between cognition, emotion, and motor that creates something that is unique, and whether or not it occurs in a social context even adds another component to it. We have to figure out ways to model these sorts of

complex behaviors.

But I leave you with a very important point that even if we can delay the onset of Alzheimer's disease by five years, which is this blue line here, by 2047 that could theoretically be a 50 percent decrease the number of individuals who actually have clinical Alzheimer's disease. I think, despite the challenges we have in study design and coming up with biological models, this is an important area not only because it could have a very important effect on the quality of life of individuals who developed Alzheimer's disease, but also on the families and impact on the cost. We have to keep this in mind. This is really what motivates me to keep looking.

In conclusion, the opportunities we have here I will just summarize. Because of the methodological limitations, it is difficult to know at this state whether or not music interventions are effective for managing symptoms of dementia, in particular, Alzheimer's disease. But despite these limitations, there are promising trends that suggest music maybe effective.

Several studies suggested improvements particularly in behavioral symptoms, and music has the potential to improve quality of life for both the caregiver and the patient. It also has the potential to be cost-effective, have minimal risk, and be accessible especially

to culturally diverse older adults. I think we have to think about these opportunities.

And how can we do that? These are my recommendations for the panel: by far, improve the quality of the research studies that are being done. Part of this is getting teams together, encouraging crosstalk between the music researchers and the dementia researchers especially including a statistician, a methodologist, who can help with the study design, which is challenging. Also, consider using, for example, international clinical trials criteria. If those are too challenging, we might consult with groups like the Alzheimer's Disease Cooperative Study that does interventions for Alzheimer's disease. We can get the expert opinion on how to design some of these studies. And of course I make a plug for including more culturally diverse older adults because the majority of studies really focused on higher SES, Caucasian individuals.

We have to develop better models that will inform our research agenda and hypotheses. And importantly, in the previous talk Anne was talking about developing novel ways to capture the effects of music in older adults. And in particular, I think there is a need to study more about the basic processing and understanding of music of older adults before we try to use this as an intervention. And

we need to consider the effects in both Alzheimer's disease, but also non-Alzheimer's disease dementias.

Finally, considering interventions earlier in the stages of dementia and possibly the lifespan approaches that Nina talked about where this might be something we cannot come in at the last minute and try to treat these behavioral symptoms. And certainly, in the treatment of neurodegenerative diseases, the whole field is moving earlier and earlier. It is quite challenging.

I just wanted to thank the Fulbright Foundation who allowed me to go think about this topic on my sabbatical for six months in Finland in a country that supports lifelong involvement in music. It was really enlightening. And NIH and NIA, the UCSF Institute for Health and Aging, and this wonderful collaboration that UCSF and we have developed with the San Francisco Community Music Center, which is allowing us to think about delivering community music. Thank you.

(Applause)

Agenda Item: Floor Discussion

DR. LEVY: Thank you. Those were great presentations. I guess we have 10 or 15 minutes for questions if anybody wants to ask questions of any of our great speakers.

DR. NOICE: Thank you. It is a question for Dr.

de Medeiros. –You have reported on two studies on memory using a writing intervention. In one study you found improvement but in another study, a randomized control trial, you did not. In our work we have found that the quality of the instructor has a lot to do with outcomes, and we go to great lengths to make sure the instructor is properly trained. Could instructor quality have been the cause for the difference between these two studies?

DR. DE MEDEIROS: As the instructor of all the sessions, I would say the quality was outstanding. The first study involved a convenience sample of retired physicians who were much younger and also had a different motivation level as you pointed out. The second study involved a group of people living in retirement communities. Let me just say the mean age of the first group was about 70. When I did the other study and did it as a randomized controlled trial, the mean age was about 84. The people were a lot older.

And really the primary outcomes we were looking at were autobiographical memory measured by the autobiographical memory index and then some batteries using the Hopkins Verbal Learning Test. And we did not see any change between the groups. However, we are currently analyzing really important aspects of that data and that is the self-concept measures. We are looking very finely into

self-concept to see if there were changes because just observationally, people who did the writing workshop and you probably noticed this. It is in your invention as well. You mention that social -- it is people disclose things in such a way that it is a safe disclosure. You get to know each other in a much quicker way than they would normally. We are actually taking some of that data and are going to test an intervention, but we are calling it "accelerated intimacies" to see if instead of focusing on memory that we can use it as an intervention to increase social connectedness and reduce loneliness. Same instructor across all the interventions, and all the groups, actually.

PARTICIPANT: I was intrigued with the last presentation in terms of the conclusions of MMSE. I would like to ask everyone about the nature of what happens when we choose an outcome measure. What messages are we saying to the community? What are the consequences of not powering on an MMSE, yet concluding that when you review the literature on that there is no impact? And how does that fit with the conversation we had earlier about near and far transference and specificity versus global impact of these interventions?

DR. JOHNSON: If I understand your question correctly, you are asking me to reflect on the conclusion

that music may not have an impact on cognition.

PARTICIPANT: -- ethical issues associated with the nature of how we do business.

DR. JOHNSON: Well, I think the challenge in using cognition as an outcome is that to measure cognition well, it takes a lot of time. Traditionally, the MMSE, for example, is a screening test that is administered in probably less than five minutes. A screening test that we use for dementia -- it is not very sensitive. I think in these assisted living situations it is very difficult to, for example, administer a two-hour neuropsychological battery. We go from using screening tests to a more comprehensive neuropsychological test to try to look at those issues. I do not know that it is an ethical issue. I just think it is a focus.

I think if we expect our interventions to impact the screening test is a different question than if we, for example, ask the question can a music intervention affect memory, working memory, long-term memory, and short-term memory. There are so many aspects of it.

My personal opinion is it is not a good test to use as an outcome measure. That is just my personal opinion.

DR. LEVY: Can I ask you what you mean by ethical issue?

PARTICIPANT: Every time these publications come out there are groups of individuals who translate it and then groups of people who interpret it. When you have significant results, there is an interpretation, but there are also interpretations of nonsignificant results. And as a function of that when you have an evidence-based review that looks at MMSE, which was not powered for the original purpose of that, your concluding that MMSE are global cognitive health is not affected by that. And that is really a premature message, yet it has gotten out there.

DR. BASTING: I would expand that a little bit too and say -- who has seen that viral video of the guy who wakes up with the iPod attached to his ears. That scared me to death because the care system we currently have operating in our country wants every excuse to not engage with people, to reduce personnel hours. If even a study gets interpreted that this activates people -- waking people into what? Into what context are we waking them up? If whatever arts intervention is not looking at the -- if it is reduction and behavioral symptoms, and so you are making people more compliant without raising quality of life. You are creating an intervention for a system, not for a person actually. Who is that intervention designed for? The ethics, I think, are also there. Can we do reduction in problem behaviors without increasing and

looking at simultaneously quality of life issues? That is all.

PARTICIPANT: I had a question for Dr. Johnson. I am a first year PhD student at the University of Pennsylvania. I had a question for you. You mentioned your studies that you looked at that most studies looked at using music in people with severe dementia. Do you see a potential in working with mild to moderate dementia patients?

DR. JOHNSON: Absolutely. I see potential to use music in earlier stages of dementia. The challenge is it has not been tested yet. We need to do the studies that really look at that. I think it is an unanswered question, but I absolutely see potential. And the whole field of dementia is moving in that direction because we know that, for example, the prodromal period of Alzheimer's disease might be as long as 15 to 20 years. The first trial this year, is looking at the preclinical treatment of Alzheimer's disease before symptoms whereas the music interventions are still focusing on moderate to severe dementia. That was my argument for we need more crosstalk. That field has changed. We need to stay connected with that.

PARTICIPANT: Daniel Potts -- a neurologist from the University of Alabama. My father who had Alzheimer's

disease became an artist in the throes of Alzheimer's disease and painted over 100 original watercolors. This got me interested in the arts as an intervention.

I think the dialogue is wonderful. I think one of the things that we have to continue to emphasize is the impact on self-concept, the preservation of self and this person-centered care rather than disease-centered care. We are certainly used to focusing on disease. I think that the person still persists. I think one of the things that is happening in our society as a whole is that we are deemphasizing humanity and personhood and that we need to begin to infuse that back. How one assess that is, I think, one of the things that we have to come up with. I think we have to recall that these interventions including into late stage illness, late stage Alzheimer's disease still help us assess the self and that self-expression is very important.

One of the things also is a relational identity that I think individuals have as they progress into Alzheimer's disease. I think their identity may become more relational and less based on occupation and those early life experiences.

DR. BASTING: Thank you for that comment. I will mention TimeSlips now because one of the studies we did in an experimental design in a control of 20 nursing homes, 10

nursing homes where we did implement. It is an improvisational storytelling technique that is actually facilitated -- it can be learned and facilitated by staff. It invites people from wherever they are at the moment into the creation of a new story based on a prompt. The way we decided to test the impact of it was looking at the improvement of the relationship between staff and residents with that leap in there that improving the relationship between staff and resident will improve quality of life and quality of care.

We found that that is indeed what happened. That sense of relationship built actually not only with the people who are trained in TimeSlips or using TimeSlips, but actually had a spillover effect on the entire unit because it is modeling engagement in a different way using creativity and creative expression and creative engagement. I think that is actually what we were pointing to -- of looking beyond individual impact toward relational impact.

MS. HENRY: Hello. My name is Leslie Henry and I am music therapist at the Milwaukee County Behavioral Health Division. I have been practicing for 18 years. I am just absolutely thrilled this day is going on. I would like to thank the panel because I follow many of your articles and your scholarly work.

I want to ask a question. If you are aware of

any research out there utilizing the use of sensory profiles that occupational therapists use? I have recently in the last couple of years started working with occupational therapists where I work to develop some of the typical interventions a music therapist might use and kind of correlate those to sensory profiles of an individual. Since doing that I have been seeing even better results than what I used to see. I am wondering if you are aware of any research out there utilizing these sensory profiles or if that could possibly be something for the future. Sensory profiles include four different types. Low registration, sensory seeking, sensory sensitive, and sensory defensive. They look at people. They assess them and they figure out kind of what type of sensory needs they fall into place. Maybe that is a future topic for research.

DR. LEVY: Thank you.

PARTICIPANT: -- from Center for Aging Health and Humanities at GW. This is a question for Anne. I want to thank you for bringing up the fact that maybe we are using the wrong tools because as I read the literature it seems that so many researchers are having the challenge of designing a good RCT. If we change that into designing as you said a deep description or some kind of deeper qualitative description of these programs though it

probably would require a re-education of the funding streams coming from the funding streams. My impression is that they want to fund RCTs.

DR. BASTING: I am going to punt that to Kate. I think the future is mixed methods. I do not think it can only be qualitative. I think you have to collaborate across and do mixed methods. I know you and I have talked a lot about that.

DR. DE MEDEIROS: I guess one of the things that we have talked about a lot is the issue of design and how do you do a good solid rigorous design and I think an issue that goes along with that is money. How can you get enough people across enough sites in this kind of intervention to really test the effectiveness? I think that is one issue.

I think another issue though is looking at the measures that are used. Julene mentioned the CMAI, which has a two-week look back time and it is looking at aggressive and agitated behaviors. But the neuropsychiatric inventory is something that a lot of studies use. It takes less than two minutes to do.

And then there is some debate on how much you can really learn from that. There are ten domains. There is a screening question that if the caregiver who is responding on a four-week look back time if that person says no then that whole domain is skipped. You are looking at and

thinking about behaviors in terms of an answer to a screening question and making conclusions based on that.

I think that one thing that really needs to be done is not reinvent instruments per se, but to really take a close look at what kinds of outcomes can we expect and what are the best measures. And if we can get comparisons even across trials of people using the same measures would be great. If we could get much larger studies where we could agree that these would be likely outcome measures. And certainly I think the qualitative portion is really helpful although sometimes it is a much more difficult sell especially when you are trying to look at measurable change, but the qualitative data will give us at least the rich description through which to further consider additional measures that could be used.

PARTICIPANT: Since we have been talking about measures, I feel compelled to mention that the NIH has recently invested quite a bit in development of tools. Some of them are patient reported outcome and others are more objective measures. As this field is starting to coalesce and develop in new studies, I would encourage everyone to think about promise as one instrument, also, the NIH toolbox. The cognitive module is 30 minutes after much struggle. We have come down from two hours to 30 minutes. I would encourage people to actually go on the

website and get the information. Those are going to be free to the public. They were developed through contracts. It is actually going to be free to the public.

DR. LEVY: I quess one last question. It is great to have so much interest and we can continue these questions later in discussion.

PARTICIPANT: -- from OBSSR. It is a much more a global question. We have an age cohort right now that will age. There is a significant group of people who also will shortly be in your age cohort of folks who have created their own personalized soundtracks to their entire lives through smartphones and iPads. You mention waking up to an iPad. How do you think the frequent, if not constant, stimulation of music can prepare or impede this type of research?

DR. BASTING: There is a study that Christine Kovach did called Balancing and Connecting, which I think is the training that comes out of it. I cannot remember the exact training. That looks at particularly people with Alzheimer's. I cannot remember actually how she broke out dementia in the study. That looks at the need for up time and down time as a balance during the day, how to chart it, and how to figure out when activities might be beneficial. It is almost a dosing issue of when for stimulation and when for reflection and down time. And that too much

stimulation is not good either. The context of when and how these things are put into the day and the environment in which they are put in.

One of the conclusions of that study is actually written down. People need ten minutes of meaningful human engagement a day. That is horrifying to me, but it actually goes back to the ethics of the context of how and what and where we are doing this research and kind of the setting in which these things are taking place and how they are going to be interpreted.

DR. LEVY: Thank you everybody. Great session.

(Applause)

(Luncheon recess)

A F T E R N O O N S E S S I O N

Agenda Item: Cost-benefit analyses associated with the inclusion of arts programs and interventions in healthcare delivery for older adults

DR. REUBEN: If people could take their seats. Welcome back. I feel like there is some very interesting and stimulating discussions going on up on the third floor. We are starting back with the third issue and that is cost-benefit analysis associated with the inclusion of arts programs and interventions in health care delivery for older adults and I am going to moderate.

We happen to have this very interesting topic for the time when everybody is the most alert and awake and engaged. We do have some terrific speakers for this afternoon's session and one of them is my dear friend Emmett Keeler and fellow Californian who is a senior mathematician at RAND and professor at UCLA and the Pardee School, RAND Graduate School. He has done a lot with cost effectiveness dating back from the RAND health insurance experiment and onward. He is going to try to put everything in perspective in terms of what we have heard this morning and some other studies with respect to cost effective analysis.

Agenda Item: A Primer on Cost Benefit Analysis

DR. KEELER: Thanks. I saw a lot of fascinating things this morning. They all relate to interesting and fulfilling things that you get people to do and then there are some benefits to them. The United States has the most expensive health care system in the world. Whenever someone suggests let's do something else, we always have to say it sounds like a good idea, but what is it going to cost? Indeed the cost benefit test for any proposal is -- are the benefits going to be bigger than the cost?

Cost benefit analysis and cost effectiveness analysis are standard ways of evaluating health programs. If you want to say you are doing health programs then you will be subjected to this thing. In the next 30 minutes, I am going to explain just some basic ideas. I am going to hit some of the more controversial ones harder. There is a textbook that you can refer to for some of the things. I just want you to get a feel for what people do in this area. I am going to bring up some specific issues for the arts and for geriatrics. And then Julene Johnson was nice enough to send me a paper by Cohen and I am going to do a practice cost benefit analysis on that paper. That is the last five minutes of my talk.

Cost benefit analysis. It is a systematic listing of all the anticipated costs and effects of a spending decision. All effects are given a dollar value.

And in public decisions, which most of these are going to be, all of society counts. Sometimes people will say I have to make a business case for something. A company will come to you and basically what they are saying is my company wants to make money on this, but that is not what goes on in public cost benefit analysis. In public analysis, all of society counts, not just the business.

By economic theory, you do not want to do things unless the benefits are bigger than the cost. That is a bottom line on any program. If the benefits aren't bigger than the cost then it is not a good idea.

Maximizing net benefits takes you to economic efficiency, but there are many more factors that go into making a decision. Efficiency is just one of the inputs into the decision process.

Let's suppose we are trying to evaluate an arts program for older people like the one by Cohen that was sent to me. You have to pick measurable objectives. You have to decide when you are starting. What is it that I am trying to do? And you have to figure out some way of measuring it to see if you have succeeded in that. Cohen in his project picked health benefits that were measured.

Some of these benefits -- what is a little tricky is that some of these benefits are tangible and others are intangible. For example, EPA does a lot of analysis of

whether air should be cleaner or not. Some of the benefits is it is just nice to smell and see cleaner air. But that is not quite the same thing as reduced cases of asthma or something like that. In addition to these tangible benefits, there are intangible benefits. Of course in the arts program, there are a lot of intangible benefits. It is feeling better, people feeling fulfilled, and so forth. It is hard to put a dollar value on those things.

The second thing you have to do is to test if a program works to improve the objectives. Ideally with a design that shows that the gains that you see in the participants are due to the program. Cohen's design was pretty good. It was before and after with the control group and that is a strong design. You can have some confidence that what you are looking at is indeed due to the program.

The third thing -- is the cost analysis. You have a program that works. You have to see if this program is worthwhile compared to other ways we can use the money and that is where the cost analysis comes in. There are a million people, not just the people in this room, but people in other rooms that do other things, and they all want money to do something good. You just have to say that the thing you do is more worthwhile.

There are a number of cost analyses that you

might possibly do. The one that you always start with is a table of the cost and effects for each of the options under consideration. Here is an example of a table. On the columns you put all the different outcomes that you are interested in. Here we have direct cost, indirect cost. If it is a health program, maybe there will be something called medical care offsets, that is, keeping people out of the hospital, or something like that. It will be a downstream benefit.

And then you also have the effects. An effect might be better health. In the case of arts, it might be the inherent value of the activity.

And on the rows you have the various options under consideration. A might be some new program that you are trying to implement. B might be the status quo. And you are going to fill in all the entries of these tables and look at them. Sometimes, if you are a certain agency, you may have a whole bunch of programs you are deciding between. There will be rows A, B, C, D, E, F and so forth. And you fill in all the entries. It is not so easy. That is what researchers do -- fill in these entries. And where do the entries come from? It might come from your own data. We have seen some examples of that. It might come from literature reviews. We have seen some examples of that. Or worst-case, expert opinion where 'experts' might

be real experts. Or super worst-case it is your own opinion and you put it in. If you are going to judge a program, you have to fill in all the cells. You have to make a guess about what everything is going to cost.

Let's go back to the other kinds of analyses. One kind of analysis that sometimes people try and make you do is a cost only analysis. And in a cost only analysis, the research question is does this program save money. Sometimes people say this is the business case, so-called business case for this program. It is not a very good analysis because it does not include things that you are interested in like the effects. Basically you have to ask what the medical care system does. For example, say there is a rival way of improving health. Basically, you spend money and you buy health with it. It is not like you spend money and that saves you money. That is not the way it works. There may be some cost offsets, but basically you spend money and you buy health. That is what the medical care system is all about. Many worthwhile programs do not save money. What do they do? They generate something that we want. Let's skip cost only analysis. Not a very good idea.

The two real contenders are cost effectiveness analysis and cost benefit analysis. And what happens with cost effectiveness analysis is you sum up all the cost and

you look at one major aggregate effect of generally some kind of combined measure of health. With cost benefit analysis everything is put in dollar terms. When you get down to the health or whatever it is, you put a dollar value on that health and you see if the dollar value is bigger than the cost of the program.

As a researcher sometimes you have to decide between two methods, but it sounds like nobody has got to this stage yet. But when you get to this stage, you will have to decide. Do I want to do a cost effectiveness analysis or a cost benefit analysis? It depends somewhat on the purpose of what you are doing. Cost effectiveness analysis is useful to maximize the health effect within a given budget. It turns out that cost effectiveness analysis is fairly standard for medical treatments.

Cost benefit analysis answers a different question. It says "is the program worthwhile?" The program according to economic theory is worthwhile if the benefits are bigger than the cost. You need cost benefit analysis if there is a lot more going on besides health. For example, in many EPA analyses you have a whole bunch of things. Health is one thing, but you also have the fish swimming in the river. Is the river nice to look at? Is the air clean? All these other things. And health is perhaps incidental to that. If health is just one of many

factors, you have to figure out some way of combining health with those other factors. The way it is typically done in the government is by putting a dollar value on everything. Most so-called regulatory impact analyses are done with cost benefit analysis. There are big shops in EPA and the National Highway Safety Agency and so forth that do this cost benefit analysis.

Here are the steps of the CBA. This comes out of a textbook by Boardman that I use in a class that I teach. These are all pretty obvious. If you do not know exactly what you are doing, you do not specify it exactly then you do not how much it costs or whatever. And you have to decide early on which and whose benefits, costs and impacts to count. You have to decide "who are the subjects." I guess in dementia you would have to say "am I just interested in the demented people or am I interested in their caregivers or am I interested in somebody else." You have to decide. You have to say *who* is this analysis about? What impacts are we going to count?

Then you either take data out of your project or you predict costs and impacts and you make out that table that I showed you. And then for a cost benefit analysis, you monetize them. I will show you later how you monetize them.

I am not going to talk much about discounting.

Many of these interventions, like the Cohen one, are just a one-year interventions. We do not have to worry so much about the future. Discounting relates to distant things that happen compared to current things we have. I am not going to talk about that.

You calculate the net benefits, which are the benefits minus the costs. In theory, you choose the program with the maximum net benefit. And when you actually write these papers, towards the end of the paper there will be something called the sensitivity analysis. Why you do that is because as you do your analysis, you will be making a lot of assumptions. Some of them are pretty good and some of them are shaky. And you want to know what is the impact of changing these assumptions on the bottom line? Does it always look the same or is it different? The sensitivity analysis tells you that.

I am now going more into the details of how you do it. First, we are going to say how you measure the cost. It is pretty easy I think for these interventions. You guys could probably set up some way of measuring the cost fairly easily. Basically, you make a list of everything that you do. You collect the time that it takes to do it. You collect the qualifications of the people who are doing it. Figure out what their average wage rate is and that gives you the labor cost. That happens with the

training costs: getting the program rolling, the set-up costs, and then also the continuing operation and maintenance costs. And you have to decide how long the time span is that you are evaluating.

And then maybe there will be downstream cost offsets. For example, in this Cohen study there were slightly improved health effects. Maybe a little bit of cognition effects. Maybe that will impact whether someone goes into a nursing home ten years from now. You can have a model of that, but that is very speculative compared to the actual things that happen in the first year. It depends on the field how speculative it is. But I would suggest probably at this point forget about that.

You collect the units of labor, the supplies, the overhead and so forth. The costs are typically the sum of units times the prices. The price would be the wage rate or what you pay for equipment and that is given by the market for most items. But some items are not marketed much.

A big issue in this field is what the cost of family care giving is. I think if you talk to a lot of people they would say "I want to do something for my parents, but I want to buy out of giving them 24/7 care. I would kind of like to do something." That first something is really is not any cost at all. That is something that

is part of being a family. To the extent that they would really rather have someone else do it you would have to say let's cost that care giving by what you would have to pay somebody else to do it. So very high priced people might take care of their parents at times. But even so, you do not want to say that that care cost a thousand dollars an hour or whatever they bill their clients.

Another question that comes up is the cost of patient time. In many kinds of medical care, the patient has to invest quite a bit in their own care. The issue is what is the cost of that time that they are investing? Is that time a negative for them or is it a positive? I think with the arts it is not so much a negative. It is actually a positive. To the extent that the treatment itself is fun, that is a benefit. That is not a cost. I think some exercise programs where people really would not want to do it then it is a cost. You just have to ask them.

Now, I am done with cost. I am going to go on to the benefits. There are a whole bunch of health benefits. People have commented on this already. All the different dimensions of what it is that you measure. Typically if we were doing breast cancer or something like that, the primary benefit would be extending the life of the women that have it. Particularly when you get to older people a lot of it is not so much what the quantity of life is, but

more of what the quality of that life is. And the quality of that life comes from things like functioning, feeling healthy or fit, being comfortable, feeling useful, having a good social life, things like that. They are all, more or else, health. People draw the lines in different places.

For the cost effectiveness analysis we would like to have a unified measure of health that we can just call health and say we want to spend our dollars to maximize health. It turns out there is a standard metric. There is something called quality adjusted life years and that is the standard way that economists in this field aggregate mortality, which is the life year's part of it, with the quality of that life. That is the quality adjustment. It is a funny concept, but I am going to show you how it is done.

QALYs. That is the nickname for Quality Adjusted Life Years. This is an example. This might come out of a computer model of blood pressure treatment. In the computer model, there would be thousands of people who would have different life paths with and without treatment. But what is happening in this life path? On the horizontal or X-axis, we have the years following treatment, how long this particular person lived in the computer. They lived 20 more years. Unfortunately for them they have a stroke after ten years. We will get into what happens to them

then.

On the Y-axis, we have a scale that measures the quality of their health and on that scale you get a value of one if you are in good health. You get a value of zero if you are dead. And intermediate values of health life after a stroke get some intermediate number.

Here you see the person lives in good health for ten years. That counts ten quality-adjusted years because there is no adjustment because they are in good health. Then they have the stroke and somewhere someone has figured out (and I will explain in a minute how we do that) that life after a stroke is 70 percent as good as life before the stroke. The ten years that they live after the stroke only count for seven years, seven quality-adjusted years. The ten years are adjusted down by multiplying by 70 percent. In total, this particular person lives 17 quality adjusted life years.

But whenever I present this, the natural question is "where does the 70 percent come from? How in the world can you do that?" It is done by surveys. I will give you one example here. This is the so-called time tradeoff method of eliciting this number 70 percent. You tell people suppose you might live 20 more years and then you describe some state. I am not an expert on stroke. The state that you might describe is your speech is slurred.

You have trouble walking. I do not know what all the different manifestations are. And you say how many years would you give up if instead of living in this reduced state of health, you could live in good health? If someone says for me 14 years of good health is like 20 years in this bad health. Then the factor is 14 divided by 20 or 70 percent. You ask this of a whole bunch of people. See what they say on average. That is where the number 70 percent comes from.

There are websites. You can look up pretty much anything. It will have ten studies that have surveyed this and you can take the median. There is an unbelievable amount of information on how people have rated impaired states of health that you could use in your studies. Maybe it won't come up. Not so much on cognitive impairment, but certainly for any kind of physical problems.

The other kind of sticky issue in cost benefit analysis is how do you put a dollar value on health? That is another interesting question. What is an extra year of life worth? That is what we are trying to get to. According to economic theory, the value of anything is what people are willing to pay for it. The value of health is what people are willing to pay for it. There is a huge literature on this, but there are two main ways that people have tried to get those dollar values. One is from what is

called implicit choices and the others are from surveys. The implicit choice refers to hazard premiums for workers. If you observe people who have dangerous jobs, they have been paid extra to take those jobs. They have been paid extra for that risk. It is kind of hard to see because typically they are young, crazy guys that are in those jobs. I have done this calculation for example with the bonus for enrolling in the Army when there is a war going on. You adjust for the workers characteristics and you try and get the pure hazard premium that people are being paid to take extra risks in their jobs.

The other way is you do surveys and you ask people "what would you pay for a better surgeon?" Imagine that the normal surgeon -- with a normal surgeon you have two chances in a thousand of dying. With a better surgeon you have one chance in a thousand of dying. What would you pay for that better surgeon?

If you look at the literature it turns out for one in a thousand reductions in the chance of dying people are willing to pay a thousand to ten thousand dollars. This is middle class people that are surveyed. And you can do some calculations and that will tell you that the value of an additional year of life is between $50,000 and $250,000. Those are the kinds of numbers that you stick into these analyses of what the extra health is worth.

There are some special issues for arts in the elderly. Everybody has talked about this already. Doing arts may be valued by participants for more than their health gains. Participation makes them feel good about themselves and they are fun to do. How can you get at that value? You do willingness to pay. What are people typically willing to pay for a nice hour of stimulating fun? That is one issue.

Another issue is that with older people the tradeoff between length of life and quality of life maybe a little different than it is for younger people. I know from talking to David that geriatricians really focus on making the quality of their patient's lives better more than they do on extending their lives. Those are just two special issues that will come up if you do these analyses.

Now, I am going to get to my example. This is the choral singing program. I rounded a lot of numbers to make the calculations easier. I also re-analyzed the data. Basically, 80 people were assigned to choral singing and they had a control group of 80 other people. They did a before and after analysis and looked at what happened to certain measures of health. There were 30 sessions. These choral sessions were run by professionals so it was a pretty classy thing all the way around. And the health results were: better mood, better self reported overall

health. It is .2 standard deviations better. They had two fewer doctor visits. Over the year they had a little bit less meds. They had a little bit less falls and they did more weekly activity. At the end of the year, a lot of minor positive things had happened. But they did not really report anything about cost.

I sang in a choir myself. It is about the same size, about 80 people. I know what we spend and that is what I am going to assume they spent. Now, if you were doing it yourself, you would want to do better than this on the true costs. But anyway I am saying $50,000. That is the cost of having these professionals do 30 sessions. They did some other stuff too.

Let's talk about the medical cost offsets. The big one is the two doctors' visits. A few other minor things. I am going to assume that is $250 per participant. These are the 80 people in the choir times the $250 lower medical expenses. That is a saving of $20,000. The net cost is the $50,000 that you paid the professionals minus the $20,000 that you saved on medical care or $30,000. The net cost of this choral program is $30,000.

What are the benefits? I calculate them to be $800 per person and here is how I got that. I assumed that the .2 standard deviations of improved self-reported health were the same thing as 1 percent difference on the scale of

health where zero is dead and one is perfect health. We could do better than that if I had more than 15 minutes to work on this problem. That is what we are doing. We are saying it is .01 better on quality adjustment. The program lasted for a year. The .01 becomes .01 quality-adjusted years. That is the health benefit. If a QALY is worth $50,000 that health benefit is worth $500. There is $500 worth of better health.

In addition, I assumed that the fun of singing was worth $10 a session. They had 30 sessions. That is another $300. They add $500 of health, $300 of fun. That adds up to $800 of benefit per person. There are 80 people. That is $64,000 of benefit from this program. The benefits, $64,000, are bigger than the net costs $30,000. You might do the program again.

I did not make the next point earlier and I probably should have. We are not interested in seeing whether the research is worthwhile. We are interested in seeing whether the program is worthwhile. If there is any research cost, you do not consider them in the cost benefit analysis. You are not trying to tell other researchers what to do. You are trying to tell other community health promoters what to do.

The benefits are bigger than the net cost, but the program is not cost saving. The program costs $30,000.

We spent $30,000. We get $64,000 in benefit. That is the end of the analysis. It is rough. One purpose I have shown you that there is a lot of warts in this. You can do it better. But that is cost benefit analysis and that is my talk.

(Applause)

DR. REUBEN: I am certain that some people may have some questions for Emmett. We will catch those at the end of the session. Our next speaker will be Melissa Castora-Binkley who is a doctoral student at the School of Aging Studies at the University of South Florida. She is going to lead off.

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

DR. CASTORA-BINKLEY: Actually I'm a doctoral candidate now. I just passed my exam. I am sure all of you that are familiar with this research are wondering how the heck we are going to talk about cost and cost effectiveness when there is really no reporting on costs on a lot of these programs. Today what we are going to do is we are going to briefly describe how 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.

We are going to describe the overall process of translation of research to practice and the role of cost in successful translation of arts programs into evidence-based programs.

We will also identify key issues and barriers in determining cost, cost effectiveness, and public health impact as well as replicating evidence-based practices and programs.

We will define cost and cost effectiveness in the context of public health impact and finally provide strategies for soliciting and identifying the most promising models to determine the greatest impact of participation in the arts among older adults.

When we are working with a field that does not have a breath of research or a framework in which to answer cost and cost effectiveness we might want to borrow from another field that does such as physical activity. There is quite a wealth of research that exists in relation to physical activity. One of the reasons we may choose physical activity as a framework for these questions is because unlike programs like nutrition, where we all eat so it is beneficial to understand nutrition, we do not all participate in physical activity programs. We do not all participate in arts programs. We are going to borrow some of the questions from that area and apply them to the arts

and aging.

One question we are going to address is what are the types and levels of physical activity among diverse older populations. We are going to take that question, apply it to the arts field. This question is really epidemiological in nature. We want to understand the surveillance data. We want to understand the psychosocial factors, demographic factors, and things of that nature. We want to know who is and who is not engaged in these programs. We want to understand not just the scope of participants, but also the scope of arts programming. Question two. What are the health benefits of physical activity in older adults and the consequences of sedentary behavior in older adults? We can easily translate this to the arts world as well. We need to understand the impact of the arts programs. Without the evidence of benefits we do not have a lot of motivation to move forward.

We also are going to talk about the factors that influence participation in regular physical activity -- in this case, arts activities. And this identifies correlates of participation such as the factors that are related to initiation of participation as well as the maintenance of participating in these programs.

Finally, can we develop successful interventions and policies to promote physical activity, in this case

again, arts programs in older adults? And this question establishes the criteria necessary for the efficacy and the effectiveness of these programs, which leads to best practices.

Let's take each one of these questions and briefly apply it to the arts and aging area. Taking the first question, what are the types and levels of physical activity among the older adult population? How do we define or operationalize arts? Are we talking about arts and crafts? Are we talking about art therapies? Are we talking about community-based programs? Community-based programs should actually be on that list as well. Those three we really need to understand are we talking about all of them, are we talking about one specifically, two out of the three, et cetera. Are we talking about performing arts, creative arts, and abstract/conceptual arts? Are we talking about participatory arts? That concept has been used often this morning where are we actually doing the painting or are we observing and trying to interpret a painting. We need to have clarity on what we are talking about.

We also need to understand the intensity of these programs. Researchers tend to be really good at reporting the research methods, for example, how long observations occurred or how much time elapsed between measurements or

how long a testing session lasted. But sometimes we are less conscientious about reporting the duration of the arts participation. For example, there is little evidence on the dosage of how long the programs lasted. We need to understand that. If we apply that back to physical activity, we kind of have a general understanding that 30 minutes for 5 days a week is the key to receiving some benefits. But we do not understand exactly how much and for how long it takes when it comes to these arts programs.

This slide is an example of some of the research that exists in this area. We are borrowing this from a review that myself and my colleagues conducted. What we need to know is how many days a week, for how many weeks, for how long. Based on the majority of the studies that were included in our review, we have a lot more questions here than we do answers. We need to also report on these factors.

What are the benefits? We have to understand the benefits of these programs before we can really get to understanding cost and cost effectiveness. This is not exhaustive as of today, but this is generally where we see some benefits. We see benefits for general health, decrease in medication use, decrease in falls, better cognition, improved balance, decrease in hostility, anxiety, depression, increased sense of mastery, and

increased well-being. We need more organization and structure around these benefits. We need to be able to classify them into broader domains such as pathology, risk factors, impairment, quality of life, et cetera.

A priority is to conduct enough research that enables compelling consensus statements about the benefits of participating in arts programs. The evidence is not yet conclusive, but we certainly do have enough evidence that points in the direction of the positive outcomes for people participating in the arts programs.

What factors influence participation in regular physical activity among older adults? Again, easily translatable to the arts program. We want to look at things like past experience. While we cannot manipulate past experience, we know that future behavior or the potential for behavior is based on one's past experiences. We need to understand the perception of the activity as well as just a whole realm of things that motivate people to not only participate, but to maintain participation. Things like self-efficacy, perceived barriers, availability, accessibility, resources on several levels. And we want to be able to understand the psychosocial factors, demographic factors as well as the program-related factors.

Activity fit is also something else that is

important as it relates to cost. An activity needs to have the appropriate fit and that really speaks to maintaining the program participation. If a program is too challenging and the individual skill level is too low then there is going to be frustration that is fostered from the program. And there might be some drop out. We need to understand exactly how we can frame these programs, what resources are needed in order to help individuals maintain participation in these programs.

Can we develop successful interventions and policies to promote arts programming in older adult population? If so, what are the criteria on which to evaluate their success? First, we need to establish the efficacy and the effectiveness of these programs before we can translate the research for broader dissemination. Translation of research to community-based programs is premature in this field at the moment, but given the considerable gaps in the research –and yet the considerable benefits that we all have experienced in the research, we have potential to move forward. But we cannot answer this question as of yet until we really hone in on answering the first three questions.

Before I turn it over to Tom, this is kind of a summary of the questions related to cost. We need to be able to understand the scope, intensity, activity fit,

benefits, and how we need to promote these programs to understand motivation and maintain program participation. All these things will go into a cost benefit analysis, but we do not really have the answers to all these questions yet to be able to provide a true analysis to date. With that, I am going to let Tom go ahead and take over. Thank you.

DR. PROHASKA: We will go ahead and just briefly go over very quickly what those four questions were about. Essentially all research can be subsumed under those four questions. If you really look at that, everything we do in our field is one of identifying incidents, prevalence, the nature of the antecedents, the proving of its association to a cost outcome, and then looking for the factors contributing to the initiation maintenance of it and then bringing it up to scale.

Since Emmett did such a great job of setting up the cost analysis that gives me the opportunity to focus on the real reason why we do what we do for a living. We do these interventions. We do these trials and devote our careers to having it be widespread, to be used for the public good. While public health is oriented around that, another way of evaluating cost is looking at the true value of what we have and the true public health impact of what we have done. Nothing could be any worse than having a

meeting like this five years from now having the same conversations again. We should have as an outcome that many of these arts interventions will have already begun to be disseminated. To some degree, I would like this to be one of the objectives that we have.

It also shows you the futility of trying to operationally define costs at this point, but you have to pay attention to cost because cost is associated with the next consumer, the older adults themselves. As you all know, the arts programs like many other activities are in a broader ecological perspective. Much of the intervention research that you have seen here is oriented towards the individual in a controlled or semi-controlled situation. We recognize and everyone in this room recognizes that the interpersonal, institution and the larger community has an impact on cost as well as the settings in which these programs occur. Understanding these ecological factors contributes to the degree to which we can begin to estimate true cost.

Unfortunately, what happens is that many of these programs never see the light of day. And unfortunately some of these are seen and really should not have been disseminated. Just say no. Project DARE. We have a whole litany of these.

When the Noices have their program and talk about

the need for a professional orienting the participants on their program, to what degree can this program ever be passed on to a group of nonprofessionals who could accomplish the same thing? We are looking at treatment fidelity and the degree to which this thing could be largely disseminated in places where professionals are not available. I am really interested in seeing if we have something here that has a larger public health impact. Some of it, I think, does and some of it rightly so will always be a therapeutic strategy under the guidance of professionals rather than one in which it is a public health train-the-trainers strategy.

And the lessons learned from these practitioners out there who will be delivering these programs should be embedded in the way we think right now. For instance, every program has what is called the delivery mechanism and every program has a therapeutic element. Some have suggested that social interactions are part of the delivery mechanism, but Cohen has noted that the psychosocial factors that are associated with the behavior itself are one of the therapeutic elements. Do we say is that social interaction is part of the cost or is it part of just doing business? And if so, is that left up to the practitioner out in the community or is that one of those essential elements to your program that has to be embedded in the

program and never touched. These are important discussion points in order for us to move on in this.

Despite these health benefits, progress is very slow. Alameda County population studies demonstrated in the early '80s that there are health benefits of lifestyle among older adults. Everyone knows this now. How come we still do not have sufficient number of lifestyle programs out there for older adults? Are we going to wait another 30 years for these programs to be out there? What we have here I think is worth emulating. I do think that we can identify a therapeutic element and do not propose that we dissect it. Take it for what it is worth. If a program has multi-faceted elements to it, that is the reality of the world. That is the reality of how it is going to be delivered. We do not have to isolate each element of the program. I support your strategy of having multiple control groups where we begin to look at the relative impact of these various strategies.

Many of these are oriented towards healthy older adults as well as those with moderate and significant health conditions. What are we really saying when we have a program for a person with significant cognitive impairment, modest cognitive impairment, or cognitively intact? Are we saying that you can wait until you are cognitively impaired before you have to join this arts

program because it is reversible? We have to watch out how we tailor these programs and the messages we give to the public.

We have to document this impact on meaningful health outcomes. A meaningful health outcome to a researcher is an MMSE. That is not the case to the consumer, the older adult. And the cost effectiveness of the program is critical for the agency director, more so than you would expect. Regardless of the nature of the type of research you are doing now, you need to build in some of these components so the next level of dissemination and diffusion is more readily acceptable, more ready to be disseminated, more ready not to sit on the shelf.

Where we are with this is we have evidence-based wellness and health promotion programs that are both comprehensive and multi-faceted already out there. We can use those as models. We can use those as a strategy for thinking about the arts. More importantly we can use them as strategies for embedding them in already existing infrastructures whether it be the aging service network or other key stakeholders out in the community who would have a vested interest in the health and well-being of older adults where these programs could exist. We do not have to reinvent the wheel for disseminating these programs.

How does your program get out there? There was a

discussion earlier today about evidence-based reviews. Not every set of literature on a topic gets reviewed. If you want your program to be one of those evidence-based reviewed programs, it must go beyond efficacy and effectiveness. There are some other characteristics. Here are six examples of programs that have made the grade. These are identified by the Administration on Aging, now the Administration on Community Living, that have considerable merit to where they are recommended under Title 3D for monies to be embedded in the community. There is no reason why the arts program could not be the next program.

You do need to first establish efficacy and effectiveness. It is apparent that we do have some work to do here. The essential elements have to be clearly defined. That is you have to say to everyone who takes your program --do not touch these essential program elements or you risk losing efficacy. This is the essential element of the program. If you want to play with the program delivery option -- these are things that you can touch. Again, differentiate between essential therapeutic elements and delivery strategies.

You need to incorporate the priorities and the realities of the community and the situation under which the programs occur. I do think that you need to pay close

attention to cultural, ethnic, and other factors that are associated with the nature of the preferences for these kinds of programs.

Documenting cost and cost effectiveness is very tricky, but you have to try and go ahead do that to some degree ahead of time because the very people who will adopt it, the agency directors will say how does this program that you are proposing to me matches with the cost of programs I already have and to what degree is this one in which I will then substitute for the existing programs I have. If you do that you also have to have a certain degree of demonstrated program flexibility to where you say this program is still what we intend it to be even though we have changed this, this, and this and tailored it to the community needs.

How are we going to evaluate costs when these programs are community based? Let me go to that. We use this model, the RE-AIM model. The RE-AIM model is a framework, which we use in public health to think about the nature of how we have successfully accomplished what we wanted to do – dissemination and diffusion of innovative programs. If you look at this, some of these are very familiar. Efficacy and effectiveness have to be established. However, we really evaluate the quality of a program on how many people you have actually reached and

the nature of that population.

We also look at the degree to which it was adopted the way it was supposed to be adopted and implementing in the settings that make sense.

The one that we really fell on our face with is maintenance. The maintenance of the behavior. At some point you will have a program where a person takes 14 weeks, 22 weeks in the intervention. You have to hand it off to them to continue on their own or you have to have a booster program later. How long do they have to stay in the program before they are able to maintain this behavior without you? It is not cost effective to continue it all the time. We have to have tested the long-term impact of this without the intervention being provided continually.

And also one other thing about maintenance. It is also evaluated at the institutional level. If you bring it to an area agency on aging, how long do they keep it or do they just throw it out after a year or two?

How do we deal with cost? Greater focus on reach. There is no reason why you cannot have different costs for different populations. Low hanging fruit is very cheap. Arts programs for the homebound elderly may cost more, but it is worth it. Do not equate cost across all older adult populations. Understand that these things are value based. Understand the essential elements. The cost

for the essential elements will be the ones for which you can quickly operationally define cost and cost effectiveness. The delivery mechanism will vary in terms of cost and is up to the deliverer of that program.

Understand the contextual factors within the environment that will actually affect the cost and cost effectiveness. There are some things that you just can't deal with. And then, most important, look at the long-term sustainability.

A critical element to affecting this overall impact is right from the beginning get other stakeholders engaged in this program. You should have advisory and stakeholder groups who are already doing these kinds of programs and incorporate their recommendations.

You actually should be developing your interventions with dissemination in mind. I heard a number of boutique and very costly kinds of measures here, which are appropriate for the scientific world, but we should have outcome measures that are meaningful to the older participants to where they can see their own progress with the intervention.

And then there is the continued development and refinement of the program. Although Cohen's and the Noice's work could eventually be called the gold standard --gold standards are meant to be toppled. Gold standards

are meant to be ones in which you say now I have something even better. By all means we should start with what the best that we have and keep on going towards that and then investigate new modalities.

I want to wrap up here with what we really should think about bilateral associations. What is the nature of the eventual user of these programs and how they think of it? How can arts programs be built so we have a better probability of having these programs brought into a greater public health impact? Larry Green has a great one-liner. He said if we want more evidence-based practices, we need more practice-based evidence. And I do not think that we should go in a single track where we focus totally on the RCTs and controlled trials. I think we should go into community trials rather than waste time.

I mentioned all of this before. To some degree it is in there. It is in the paper. The only other thing I want to bring up is that we have an unfortunate state in the field where even today there are relatively few generalizable, effective and sustainable programs. I really do not want arts programs to be one of them. It will require you to start thinking about where you are in the continuum. You do not have to be the person who is the translator. You can be the person who does the RCT, but let's talk. Thank you.

(Applause)

DR. REUBEN: Our final speaker is Bill Spector who is a long-time colleague. When we first started working together, neither of us had gray hair. And he is now the senior social scientist at the Center for Delivery, Outcomes and Markets, CDOM for those who like acronyms, at the Agency for Healthcare Research and Quality which has gone through quite a few names since Bill has been there. He will speak to us summarizing and discussing what we have heard.

Agenda Item: Discussant

DR. SPECTOR: I am Bill Spector from AHRQ. So that you know what my background is. I am a long-term care researcher with experience with design, implementation, and evaluation of interventions for the elderly amongst other kinds of topics. I have absolutely no research credentials in arts impact on health.

However, based on our earlier discussions it sounds like I am doing some of the right things in terms of my own personal life. About three times a week I am taking lessons in ballroom dancing. I am an amateur chamber music player and started the clarinet at the age of seven. I am thinking about a complex intervention -- trying music camp for amateur musicians. I do not know if David remembers this, but at one of our Brown University

annual dinners he and I performed a piece together. He sang, played the guitar. I played the clarinet. I think it was a lullaby or something. I do not remember. I just wanted to refresh that. It was a nice moment and I wanted to refresh that background.

I think I have some insights into this. I am not really going to be a discussant for the papers, but I will talk about some of the questions about what are the cost and benefits and what does it depend on and for whom. When we think about interventions, we think about drug interventions. In the work I do, we think about complex organizational change. I wanted to go through an example, which I think of as a complex arts intervention. I thought about it as a group music program. It could be a chamber music camp or something or it could be a chorus, but it is a group. It is a team. I did not like the acronym. I went to a group arts program, which would be GAP instead of GMP.

Since we are talking about a team, it is what are the benefits and for whom. I want to pick up on this. We heard about cost benefit analysis for the society. The cost and benefits do not always go to the same people. Let's put this in the context and what are our goals if we are trying to implement the program that is actually going to get implemented. Then maybe we have to think about the

cost and benefits associated with an implemented program.

I know the meeting is about health, but wouldn't it be nice if we could show the arts programs affect health care costs or sick days? Maybe insurance companies will be interested in this. We could take this further and think about what our goals are and think about whom the players are and who we are talking to.

Just making the point. A program has no benefits if nobody offers it and nobody participates. And then ask this other question. We heard before that we were talking about arts programs are like exercise. I was thinking about this and then I said maybe it is more like baseball. Again, it will depend. I am going to try to answer that question or at least think about it. Maybe I have set this up because we are talking now about arts program as a team, but I am not going to worry about it.

Who are the players? In the world that we are thinking about the cost benefit analysis is good for the funders, for the foundations thinking about what do we do for society. The people that are going to do most of these programs -- we are talking assisted living facilities, nursing homes, adult daycare potentially and then there are all these programs that are out there aimed at amateur musicians and artists and choral singers, et cetera. Those people are doing these programs because they are poor.

They cannot make enough of a living so they are starting camps so that the professionals can teach amateurs. Well, maybe these things should be subsidized because they have benefits for health et cetera. It is something to think about.

And of course the participants are the older adults we are talking about and depending on what kind of outcomes we are trying to study. It could get insurance companies interested. It could get corporate programs interested. And certainly exercise has gotten to that level. We are certainly not there yet.

The context that I want to just remind us about is that a lot of these organizations that we would want to try to implement this is are they for profit, the nonprofit, but not all the costs and benefits to society would be -- they would get those benefits. It is not internalized by them. That has real implications for why things potentially are not getting done.

I did some theoretical work a while back based on how things are being funded and reimbursed. They are really interested from the revenue side of how many private pay residents that they can attract to their place. Now, will a good arts program do that? It might. But that is what they are interested in. That is what you have to try to sell for them. That is some of what we have to think

about.

The other thing and sort of the market will that we live in the consumer probably does not have a good ability to evaluate a good arts program. We were having trouble in our discussion earlier. What is the intervention that is going on here? They need to try to figure out what the benefit is going to be for them and they are also probably making choices about what assisted living facility do I join and the arts program is only one piece of what they are choosing. We just have to understand where we can make an impact.

I want to talk about thinking about an intervention, not like the clinical trial that is sort of hovering over there, but something that is actually disseminated, implemented and what is it going to take. The question is what is the intervention? and what is our goal? And if it is an implemented program, there may be things we have to package this intervention with. For example, the educational program necessary to let the consumers know the benefits or at least the theory behind the benefits of these arts programs is something that the assisted living facility is not going to go because they do not get the benefits for all that. There are some public gain arguments for why a foundation or somebody might want to do it once and disseminate the educational program.

In long-term care we also have to realize everybody is really busy. Nobody has enough money to do what they are supposed to do. If you wanted them to do something extra then you have to train them to do it. You have to figure it out. That has to be part of the strategy of thinking about doing this.

I want to go through this GAP, group music performance program. The reason I do this is because -- we talked about it earlier. I was thinking are they coming up with good thoughts about this since I do not know the field real well. I did cram a little bit on the brain plasticity research. That helped me a lot in terms of the theory about thinking about this.

I want to just go through an exercise. What I mean by a complex intervention is that there is a team of players that people have different roles. They have to interact with each other. They all have different challenges in relationship to the overall goal. This could be nursing home quality improvement team or something, but it is now our chamber music group. That is in contrast to something like a simple intervention. The first thing I could think of was maybe singing in the shower. There is no team involved.

What is this group arts project? Emmett talked about the choral group. I am thinking is that an

intervention. What is the intervention? I started to think through this again. You have a chamber music group of people that are trying to do something. We have not decided what we are trying to do yet. We still do not know what the intervention is.

There are basically three components that I can think of. There are the rehearsals. There is the practice that goes on so that you do not embarrass yourself in the next rehearsal. And then there is the performance. And based on my reading of the brain plasticity, the outcomes for each of these pieces cognitive and physical, et cetera are going to be different. I am just briefly thinking about this.

In the rehearsals, we are now talking about interactions. I might play the clarinet so I have now learned that both hands are involved, both sides of the brain. There are lung effects. It is not just like the piano. It is not the violin. Benefits to me might be different than other people as well.

We have to interact. We are talking about making music together. This is decision making. It is learning about making pitch match. It is rhythm going together. It is orientation, concentration. There are a huge number of possible benefits when we are talking about this. We just assume that you have control over your instrument at this

point. But in an amateur chamber music camp I will tell you people have different levels of control over their instruments.

And then there is practice. There were some studies that I saw on the brain plasticity thing that professional musicians that practice more have different kind of brains than those that do not. Retirement to me means that -- and I was glad to hear that I was on the average. I practice about a half an hour a day. Professionals practice about two hours a day. When I think about retirement, I think I will go from half an hour a day to about two hours a day. I will tell you that is a huge difference in terms of how you get into the music and what you can learn.

The other thing that is worth thinking about and it comes to this issue about the coach. In the chorus or in the theater example we had, the effect might be the coach. That was talked about. In the chamber music program, we have coaches. Other times if you are doing just chamber music activities, you might not have a coach. The question is are you just doing it to have fun or are you doing it to get better. I believe over the years I have gotten better as a musician and I bet, but I do not know as a researcher the fact that I have gotten better probably means that the overall impact on my life

expectancy, et cetera or not dying from Alzheimer's like my father did may be different. That gets down to this issue.

And practicing is an isolating task. It is not interactive in any way. We really need to think about -- my main point is these interventions -- it is not just chamber music. The issue becomes how much practicing did you do? That is part of what the effect is.

Again, I am going to pick up on David's comment about there is no side effects. We have heard this twice. People get injured. There is a whole industry out there of people that work with professional musicians. But amateur musicians also will get injured. Your shoulders, your elbows, your hands, the inside of your mouth, from the reed and mouthpiece. There are a lot of injuries that happen. There is some risk involved. There is some injury risk if you get involved in this.

When we think about the intervention, is there a performance because then that is a whole different experience than a rehearsal. There is a whole sense of risk involved stress. What if the performance is a dud? What if all of a sudden and this happens to amateur you have to stop? It just fell apart or something like that. I would bet that the stress from that might counteract all the benefits that you have gotten cognitively from what you are doing. These are things that are worth thinking about.

Coaches have techniques. You take lessons. I had lessons for a while. I did not learn as much as I learned from somebody else. If you do not do something about what the coach is doing and standardize that then this is not a replicable intervention. It is not like this coach is going to go to every assisted living facility and do your intervention. If that is not the case then maybe you need to train the trainer manual. You need to do that. A facility might prefer to have somebody come in and just take the whole package or they might prefer to have their own recreation staff do it, if what you are trying to do is possible.

The effects depend on the cognitive and physical challenges for the individual. This is this intensity issue. We heard that we need to document the intensity of the intervention. But it is not just how many hours you did this thing. It is not how many hours you practiced. There is some musical pedagogy literature that will tell you it is how you practice that matters. It is not that you just play the same easy stuff over and over again. You need to focus on the hard stuff. I think if you focus on the hard stuff that is probably where you are getting your cognitive benefits for the future.

The trick in this I think is trying to figure out what the intensity and that is like exercise. We had an

experience where had an NIH-funded project that we were replicating at AHRQ. And the study had effects. We replicated in assisted living facilities. We did not get an effect. And part of the problem was when we looked back at it that in the field people were not that careful about replicating the intensity. You want to get people in the program and people are in there to have fun and enjoy the social activity. But if you wanted to get a health effect, you have to have the intensity up to where it is supposed to be, but not too far because then you hurt people. Again, I think the same thing.

Chamber music camp can be dangerous. You have amateurs. You are used to practicing half an hour a day. You go to chamber music camp, six hours a day you are doing this stuff. And if you are cellist, you are carrying the cello on your back to the rehearsal.

If you are in your 80s, you are probably are trying to figure out do I have my music? What is my schedule? Do I go to this room or that room? That is part of the intervention it seems to me. Did I lock my door in the dorm? Again, it is a complex thing, but there are a lot of things to think about. Otherwise you are nor going to have an intervention. You think you have replicated, but you have not. Or you have not replicated what is important and then it is not an intervention. That is

important.

Again, this came up before. I was happy that a lot of these things have come up. And then again I go to chamber music camp. I do some of these things. It is a motivator because treadmill is boring. Ballroom dancing isn't. Chamber music is just something I have been doing for a long time. I try to get better and I think I get better and hopefully this has an impact.

Let me touch on a few of these issues. I think we need educational programs. They are probably part of the cost of the package. Making educational programs for the consumer, for the provider is probably part of the cost that you want to incur to implement an intervention. The business case I think is another one that is again a cost.

You need to really spell out the eligibility criteria for the coaches if there are any, for the staff and the time -- it is not just time, but of course you need to do all that.

And then it may be that if you want to make it easy for people. Maybe there is a manual that helps the recreation department learn how to integrate arts programs into their program where all they have done up to this point is turn on the radio.

Let me jump to this one. We are thinking about a team. Ballroom dancing is a team. But the man

orchestrates and, however women feel about this, the women follows. That is the rules of the game. And I was told therefore I think the man gets different benefits than the woman in this because orchestrating, executive functioning, et cetera is part of something. But then I was told and I think this is famous quote. Women dance backwards on high heels. That has a separate impact.

What is accomplished? There is a group in Rockville, Maryland. Every Friday night they meet -- chamber music. They sight read. We have heard the impact of sight reading is different than learning a new piece and trying to work on it. And then if the piece is challenging for somebody and not challenging for somebody else there are different impacts.

One other piece that might be important, and we have done in some of our own interventions, is to build in a facilitator. Instead of just handing somebody a training manual, you have somebody that either that gets trained from the organization that teaches them how to integrate the arts program into their organization, and works with them over the phone or whatever. A facilitator may be a cost as well.

My conclusion is I think what we are talking about is more like baseball than an individual exercise program. I do not know who gets the benefit. Is it the

worst players or the best players? I do not know. But the issue is I think that we really need to think about is what is the intensity of the intervention and how do we do it. And if we are talking about an implementation, do not think of just as an intervention, but think about a toolkit.

(Applause)

Agenda Item: Floor Discussion

DR. REUBEN: We have time for maybe one or two questions.

DR. SHERMAN: I am Andrea Sherman. I am with the National Center for Creative Aging with the Washington, DC Geriatric Education Center. We are in the process of developing a toolkit for health care providers using the humanities and the arts to teach core competencies in aging. I think it is really important to include in the conversation about cost benefit and cost benefit analysis the health care providers. The -- arts and humanities -- I do not think we should leave them out because they have been a subtext of some of the conversation.

Also, for family caregivers. There is an enormous benefit of the arts and humanities to them as well. I would like to include care giving in the conversation.

DR. REUBEN: Thank you. Well, I am going to take back my original introduction where I said that this is

something that does not have adverse events, adverse side effects. I am still wondering about that question somebody raised. Has poetry ever killed anybody? If somebody can come up with an answer to that, I am still dwelling on that.

We are going to give you guys a seven-minute break. Meet back here at 2:30. Thank you so much.

(Break)

Agenda Item: 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

DR. REUBEN: The last of the issues before we have a final discussion and a lot of audience participation this is on the relationship of aesthetics and design factors to health and quality of life outcomes among older adults in long-term care and assisted living facilities. This is something very different. In the word of Monty Python, now for something completely different.

Our moderator through this is going to be Sandra Crewe who is a professor in the faculty of School of Social Work and the Graduate School of Arts and Sciences of Howard University and who is the director of the Multidisciplinary Center for Social Gerontology.

DR. CREWE: Thank you David. Today, I am joined

by a really fabulous panel. We are going to talk about the relationship of aesthetics and design factors to health and quality-of-life-related outcomes for older adults in long-term care and assisted living residences. I am going to be joined by Victor Regnier, Kathy Hathorn, and Valerie Fletcher.

For many older persons making the transition to long-term care and assisted housing residences is very difficult. It signals giving up independence and moving to a place that is often unfamiliar. The comforts of home are gone and relations are uprooted with neighbors who have become the support network. Yet, this move is necessary for many of them to ensure that they receive the needed care and attention so they can be as safe and as healthy for as long as possible.

The challenge that we face as health and social care providers is to ensure that the new environment is stimulating and that it does not exasperate the loss that many are experiencing. As a social worker and social scientist, too often I have observed that the move from home to an institutional environment adds to cognitive and emotional distress.

Hawthorn and Nanda in 2008 in their Guide to Evidence-Based Art write that the physical environment is not a mere backdrop for health care and delivery. It is an

integral part of the hospital experience. The same appears to hold true for assisted living and long-term care. This ties neatly with my field of practice social work where a person and an environment are critically important.

Thoughtfully designed interior and exterior spaces can enhance the livability of the residences and less in the loss of home and environment. Additionally, it is imperative that we pay attention to avoiding cultural blindness. It is important that when we take on this topic that we pay attention to the different cultural needs of individuals. While there is wide recognition of the importance of culture in health care beliefs, health seeking behaviors and acceptance of treatment, less attention has been given to how to incorporate these cultural differences in the design and even more challenging it is to measure them.

Our colleagues before us had presented on the value of participatory arts, music, art therapies and other innovations. This presentation adds to their work by addressing building design and aesthetics as equally important considerations and quality of life and well-being. Residents like my aunt and my mother of assisted housing and long-term care need our best thinking on this topic so that they and others like them are not discounted by their environment and that the topic is given due

diligence to optimizing their well-being. I am honored to be a member of this group today.

We will start with Victor Regnier. Victor is an ACSA Distinguished Professor at the School of Architecture at USC. He holds a joint appointment with the Davis School of Gerontology. He holds fellowship status both in the American Institute of Architects and the Gerontological Society of America. What I know about Victor though is that he really appreciates interdisciplinary dialogue regarding this matter. Please welcome Victor.

Agenda Item: How the Design of the Assisted Living and LTC Environment Impacts the Success of Arts Programs

DR. REGNIER: Thank you. It is so good to be here at this conference. What an incredibly interesting conference. It is always so nice for me to be among gerontology colleagues too because very frequently in other conferences – they think architecture and gerontology – so you study old buildings, right? I am among a group of people who actually get it that I have this weird joint appointment, the only one in the world, and somehow I pay attention to people and not to old unreinforced brick buildings.

David, I am so glad that you gave a little Monty Python explanation because when Nancy called me I asked her

what she wanted me to talk about at this conference. She said "David knows. He thinks you are interesting". Now I know it is that David's 86-year-old patient that really got him thinking about this topic.

What I am going to start with is some discussion that comes from this book. It is not my latest, but it is the next to the latest book. This monograph is based on an analysis of about 250 buildings in northern Europe and 50 buildings in the United States. I visited these settings, conducted mini post-occupancy evaluations, used the findings in combination with my background to create One Hundred Critical Design Considerations. In preparation for today's talk I went through these hundred considerations and mined out of them ideas that might be useful to this audience.

I am not going to talk much about design, but there are two things that I think are important to keep in mind. Art reminded me that there is probably also a third. The first, of course, is the residential noninstitutional character of the building. We want something that looks like home. We want people to feel as if they are in a residential setting and not in an institutional setting, not in a hospital, not in a nursing home.

And number two is the desire to figure out how we can attract family members and friends and young people

that can be part of the mix. I do not care how good the staff are, they are never as good (or as effective) as the family. And if you can figure out how to make the family feel comfortable within the context of this building, you have really done a lot. But neither of those has to do with arts program. They are just little caveats that I want to throw out.

The third, -- that we always tell clients about, is exercise. If one digs through those 100 considerations there are probably six to eight considerations that deal with how to embed opportunities for exercise of various sorts within the context of the building. This is an extremely important element that really needs to be paid much more attention to and it is, by the way, pretty inexpensive to do. It is mostly furniture considerations and landscape interventions. Sometimes exercise features are the easiest things to add and given our cost-benefit way of thinking measuring impact--they certainly pay off.

The building should look good from the street. It should have residential character. We should make certain that landscape is treated exactly in the right way. Part of that has to do with saving old trees and making certain that the building itself conforms to the existing palate of landscape materials on the site. Once you enter the building, it should feel good. The interior design

should be such that you feel a level of comfort. You should want to come back. You should just feel good about the place.

When it comes to family friendliness, there are a lot of things that we can do. One thing is to find places within the building where family members can go and feel comfortable and welcome. Those places can be for two or four or six or eight. Sometimes it is all of the above. But more often than not the places for two or four are the most popular. They can be connected to community activity, but they can also have a kind of private or semi-private character where family members and residents can talk with one another. You can always do that in the unit, but it is nice to be able to have a place to meet within the shared space of the building.

If you are thinking about how to formally connect the family, like in this example in a project in Wisconsin which has set aside space really for dementia family members to interact in a peer discussion format. They can come here to share problems with other family members or to learn about what is happening to their loved one. Finding a way to attract children is also important. A toy box that children know is intentional or the playground space in this mixed use building that combines 120 units of assisted living with a 60-person childcare setting is

another strong message that children count.

I identified six things that I thought were interesting and worth talking about. I think sometimes they are overlooked, and are often not used as the basis for decision-making. When you design a building you have to spend money wisely, and you have to make decisions with very little knowledge. You often hope for the best and you hope you do not make too many mistakes. But there are thousands of decisions that go into the development and design of any building and all kinds of problems that you must overcome as well. These six characteristics, I believe, can make a difference.

The first one is the identification of the primary pathway and the 100 percent corner. This goes back to the work of Sandra Howell maybe 20 years ago when she was looking at the relationship between the route from the front entry door to the elevator and the disposition of social activity. That is the primary path. In many building like the one in the lower right hand corner -- a four-story building--lots of people take that pathway.

What Sandra found was that if the spaces that were set aside for social exchange and social interaction somehow have a relationship with the primary path, they are more heavily used. It is kind of common sense. But she found really good support for that idea. She also

discovered if you had what she called "cul-de-sac social spaces" that is spaces that were divorced from this primary pathway they were not used as much. You can spend the same amount of money, build the same space, and it just would not be used as much.

This idea of thinking about how the building operates and trying to make it evident to family members and to residents exactly what the opportunities are for interaction is really important.

The building in the lower right hand corner is a building I did in Bellevue, Washington about ten years ago. It is a four-story L shaped configuration plan. About 40 to 50 feet from the entry is the elevator. But as you enter this building, there are eight different views that take in many different spaces/places. All of these spaces or objects are things that are evocative like a fireplace, which might be a comfortable place to sit down, or a library/bistro where you can have a drink or listen to music. The trajectory and route of the primary pathway can develop a route that is evocative and connective. I will tell you as simple as it is, it not used very frequently. It is kind of surprising that something as simple as this is not picked up on.

The other thing that I think is kind of interesting -- and this comes from much of my empirical

work in post occupancy evaluations – is that you can create activity. You can pick a space in a building -- I did it in this building in Boston, and you can make it the most popular space in the building. Me – the architect, not the executive director, nor the activities director can do this. I can pick it and I can make it the most popular place in the building. I did it with this building because the developer said "you cannot control that." It continues to be the most popular place in the building -- because everybody wants to sit around this table and there are only eight chairs. They have to take turns waiting to sit here. It is used all the time, in the morning, in the afternoon, and in the evening.

What makes this particular space so attractive and interesting? One thing is that it has these connections, these visual and physical connections to a whole set of surrounding adjacencies. People like to watch the parking lot -- is that the FedEx guy or UPS? -- They like to watch people enter and exit the building. They like to watch the staff walk around. They like to watch people entering the building and saying hi to the concierge. They enjoy the idea of being near food. They enjoy the idea of having all kinds of support nearby (like a restroom). There is a collection of eight other qualities and characteristics that we also embedded in this

particular space that made it even more attractive. These features had to do with lighting, decentralized storage, seating comfort and that sort of thing.

If you think it out in a very careful way -- by the way you have to tell the management what you are doing. If management does not recognize intention, who knows what they will do with that space. They can put a computer in the middle of it and ruin it. You have to communicate with them the intention that this is to be a social space. This is a place that you want to utilize 24/7 if you can. People should be having breakfast coffee there and they should be playing cards at the end of the day.

This is all something that can be figured out on a drafting board and then can be utilized as the basis for establishing a kind of centroid for social exchange and social interaction. What are the side effects that we are trying to work for? We want a friendly building! We want people to interact and connect with one another. That is the number one priority.

Number two is the idea of previewing and vicarious observation. This is also important in a building like this. If you were living in a building and you were sharing it with 50 other people, think about that for a second, or maybe more - 60 or 70. There would be days when you get up and there are people you would like to

interact with. And there would also be days when you get up and know there are people you definitely do not want to see that day. You want to have control over that. You want to be able to manage your private or semi-private life within the context of this congregate building. Being able to preview space is really important.

On the left hand side is a stair – a preview example. From this landing of the stair going from the second to the first floor you can check out 85 percent of the public space – in advance. You can see into the public space and you can make a decision before you embarrass yourself and get at the bottom of the stairs and then have to see there is Margery -- again. That is the one person I do not want to see. You can make the decision -- YES --you want to talk to somebody or --NO --you want to avoid somebody. It allows the resident to have control over the environment. And we know how important "control" is and how powerful it is as a concept.

The same thing is true with the simple idea of transparency between the corridor and a common space. You can see into the space before you make a commitment to enter the space. Once you have made the commitment to enter the space, there is Margery and she is going to tell you all the things you do not want to hear, whatever that is. The idea of previewing before you enter a space is

extremely important.

The next one I find interesting is vicarious and unobtrusive observation. This assumes that watching the activities that take place in a building is intrinsically stimulating and interesting. But what you want to avoid is having everybody line up on both sides of the entry stem (with their oxygen canisters) watching as other people are entering and exiting the building. This is not wonderful for the resident sitting there or for the family member entering the building. We want both residents and guests feeling good about the place.

This porch is 30 feet away and it is possible to create a space where someone can sit and oversee activity in the surrounding neighborhood or watch people entering and exiting the building. The photo on the left here is an atrium space. Not that different from the one we had lunch in today. The table on the second floor is closely coupled to each unit and overlooks the activity that takes place below. From below, you do not see the person above. Sitting on the upper floor, they get the benefit of seeing, but also know that they are not being seen.

This is a project I consulted on in Boston where we wanted to replicate the 100 percent corner location. Here two heavily trafficked corridors cross. The big idea is to create a way so that residents can see into the

space. Then they will notice what is going on, and they can decide if they want to join in or avoid the activity. It is very empowering and very important because often social spaces are located on the third floor, or some decentralized place and you can never find them. When you do find them, you are not exactly sure what to do with them. An arts and crafts room with a built-in window display can also provide previewing. You have a display shelf which provides the excuse of looking at all of the artwork while allowing you to check out the room and the activity that is happening there. A sculpture class is taking place and you ask yourself. "Gee, I wonder if I would be good at that. John is in there. I am just as good as John for God's sake. He is all thumbs!" It makes it possible for residents to take risks and to do so in a way that adds to the social excitement of the place.

The third issue is the whole design of the arts room. This is one of those cost-benefit decisions. Each square foot in a high quality (steel or concrete) building is about $165 to $175. $1700 let's say for ten square feet. $85,000 for 500 square feet. Five hundred square feet is getting dangerously close to $100,000. If we can figure out how to make a 550-square-foot room work for performance and for watching a movie and if the acoustics are good and the light levels are variable and high enough

to accommodate art work and there is a hard surface floor where activities can take place, you have a pretty flexible space.

You need to decide what those environmental characteristics are when you design a space that is flexible enough to accommodate the multi-modal interventions that we have been talking about. Do we need more than the 1500 square feet for the artists? That is nice. But what about the actors? What about the other activities where acoustics and lighting are more important. Yes, you can have a great arts and crafts room, but that is what you got. One room.

It is interesting that the Artist Colony in Burbank, CA was mentioned. It is a wonderful setting to visit. I have taken my students there three times now. The residents and management are wonderful. It has a very broad-based arts program. These are some examples of some arts spaces that are in larger buildings. The Burbank building has approximately 140 units. Some of the buildings represented here are larger. Continuing care retirement communities (CCRC) have large unit counts that allow more space to be set aside for shared activities.

In larger CCRC's the cost of high-end creative amenities like a recording studio are being explored -- because the cost of this equipment is going down. Someday,

all this equipment will be in a single computer managed by one program and you will push some buttons and this is how it will work. But now it is cheap, not like it was ten years ago when people were paying real money for it. The idea of using a recording studio to document with video tape and other devices important events – will soon allow this material to be shared with others --like in this case the Cox cable network.

It is very important to think about what the future is going to be. This kind of arts expression is really what I see coming around the corner. Residents are very interested in it. In this Maryland project there are 90 people who have signed up to be a part of the recording studio. It is the most popular activity in the whole building, a 1500 person continuing care retirement community. The idea of connecting with staff, but also allowing them to do their work is really important. We do not think much about staff communication. But a Dutch door or half wall or transparent plane can allow privacy, but also foster connectivity. Those are the kind of solutions that we should be thinking about because very frequently staff will "cocoon" in their own office if you make it too private. Conversely, if you make it too public they do not get their work done. We have to think about how to design offices so that it satisfies both demands.

Computers, as I have mentioned, are in the vogue now. People love autobiographies and organizing their photos into a narrative. They love to use a lot of the communication packages that are available. This is something that I have seen grow enormously in the last five years -— especially for assisted living. In the past, computers have been popular with a few residents. Today, maybe as many as 15 to 20 percent of people in the age range of 82 to 87 bring a computer with them. Many know how to use one – still others want to learn. They want to use it. Figuring out how to support that desire is important.

We have talked a little bit about dementia and dementia programs. In Denmark and the Netherlands Snoezelen is a popular communications therapy. It can be music Snoezelen or Snoezelen bathing or a Snoezelen sensory room that creates the intervention. Who knows whether or not there are measurable outcomes associated with this therapy, but everybody believes that these programs are important in building communication.

With regard to programs for arts and activities, an important consideration is that programs are not just for large groups of 15 or more. If we orient programs to groups of that size or larger, all we are going to do is bingo. The activity will need to meet a lower bar, a

common denominator. We have to think about all the kinds of competencies that residents have. Many of them we have talked about today. We do not just pick one. We need to think how do we all six and how do we do that in a way that works effectively.

To be quite honest programs that deal with painting or sculpture aren't that complex. We know from a lot of exemplars that use peer instruction that it is possible to carry out these programs with smaller numbers.

Many of the really excellent programs that I have seen here and in Europe are carried out in a resident's unit or in their own home. They will set aside part of their unit and they will do most of their work there.

This I just thought you would find interesting. This is a guy who is a really accomplished artist in Rotterdam, NE at the Humanitas Akrpolis apartment for life housing development. He started to have memory loss problems and decided -- I have the drawings and the citation if you are interested -- he decided he would do a self-portrait every two months for the rest of his life. It starts in the upper left. There are 12 of them. And you can see -- again, he is a doing a self-portrait by looking at a mirror and drawing his own face. On the right hand side is what was produced two weeks before he died. The whole process of selective perception and changes in

skill level is really interesting. When you see this kind of evidence where somebody had the wherewithal and the desire to document his gradual decline this way, you start to understand what is occurring at least for this individual.

I talked a little bit about staff offices, but also this idea of having staff much more integrally involved in programming is extremely important. That was referenced in an earlier presentation as well. Having them trained to help and encourage but knowing when and how to step away to encourage independence is the goal -- like you would with your own kid. You need to develop the courage and competency to start something and then slowly step away when you are confident that the resident knows what they are doing and can carry it out alone.

Using artwork and accessories is also very important and can add all kinds of interest to the place. I am always surprised in the United States how we spend money, in a typical building, on institutional art. A typical assisted living building might spend $5000 to $10,000, —- maybe more, on artwork.

If you go to Europe, what you discover is most of the artwork belongs to the people who live there and a lot of it is original artwork or photography or drawings. This is a double-loaded corridor in a housing project in the

Netherlands. The artwork on the corridor wall represents the experiences of the person who is living on the other side of that wall. The Motion Picture TV Fund in Woodland Hills, CA has set aside one corridor on the third floor of its building as a gallery space because they had so much high quality art work that residents were producing. There was no really good place to display and savor it. We really have to think about how to exhibit resident artwork in places where it will create visual delight.

I am a really strong believer in the power of interior design to support older people physically and psychologically. There are all kinds of affective messages that can result from art, accessories, color, pattern and texture. And whether it is affect laden or Norman Rockwell or something silly like a dog with a hat – these elements introduce whimsy and affect. In the upper right hand corner this is a South Seas sitting lounge located within a dementia facility, in Weesp, NE, which is really cool. I really liked it. I wanted to stay there when I walked by because it smelled good. There was like coconut odor from who knows where. There were palm trees that were wisping back and forth. There was the music of the surf and there was sand on the floor and then you could also sit in these seats and they rocked back and forth. It was really very interesting. This whole idea of creating

something that is just unusual and great for somebody is also part of the art expression. It is a little piece of the way in which interior designers can make a difference.

These showcases I think are interesting as well. The work of William Whyte talks about "triangulation" as a basis for communication between two people supported by a third object that stimulates conversation. The one on the right is called "Night at the Opera". It has eight objects that represent what it was like to go to the opera in the 1930's. The older person can tell the story. It becomes the basis for sharing experiences and the objects themselves help in recall and help to make it much more interesting. This building has a 5000-square-foot dementia museum, which is open to everyone in the city. The displays represent residential and commercial scenes in 10-year or 15-year timeframes from 1850 to 1950 so that you get a sense of what it was like. They use it therapeutically (for older residents). They use it educationally (for younger students). They use it lots of different ways.

These bay-window shaped large showcases are from a dementia facility. The one on the right side was done in a continuing care retirement community in West Pomona Valley in LA. I said why don't we just buy showcases, window showcases. We did that. There is no institutional

art at all. It is the most fascinating corridor to walk down because people have brought all of the objects and they have displayed it. They cannot tell their story because they are demented, but these objects tell a very complex and quite beautiful story about each of these individuals. They are no longer just patients. They are people who have ideas and accomplishments and a history.

The last topic is architectural differentiation. We need to do more thinking about orientation. Some people think that color-coding is the only thing to do. It is really not very effective. I never do color-coding. Using large strategically placed objects -- what we call architectural differentiation -- creates a way to remember a place and a relationship with that place is really important. This large baseball player statue and the blue marlin mounted on the wall are both examples of strong memorable features. You do not have six marlin. You only have one. You only have one baseball player. And to mark the door of a demented resident's unit with a wreath or planter box also works. This idea of creating differentiation and making it meaningful to the person is what that is all about. Of course lots of ideas have been developed to help residents who have dementia. Dutch doors that link a unit to the corridor sometimes help. The notion of seeing through spaces to other destination spaces

can also work. Dementia residents know what they see and if they have a wall they cannot tell you that there are stairs on the other side of that wall. But if they could see the stairs, they would know it. Ways in which you can design the environment or just this shaker-inspired shelf and peg from Woodside Place is another example of that. You can make objects that people are interested in viewing or articles of clothing much easier for people to see and comprehend.

The last slide demonstrates the desire to avoid symmetrical shapes. A symmetrical floor plan is difficult to comprehend. A symmetrical floor plan is particularly bad in nursing homes, although frequently used. The square donut -- like the one at the top provides no way to see out of the building. You just keep walking around that corridor for the rest of your life. There is no way to see out. You are never oriented in the right way. There are very simple and easy ways to break the corridor and to make it possible for people to see out and orient themselves. That is something you cannot do after the building is constructed very easily, but you certainly can do it easily when it is on the design table.

That is at least a quick primer about how I see arts programs fitting within the context of assisted living and maybe a little bit about design as well.

(Applause)

DR. CREWE: Thank you Victor. There are many takeaway points from this, but in particular the emphasis on being family friendly and person centered. I think that is really important for us to think about in terms of well being and quality of life.

Our next presenter is Kathy Hathorn. She is the CEO of the American Art Resources and executive director of the Research Education Design Center. Kathy is well known for her innovative work in the area of patient-focused art programs for health care facilities. She emphasizes that art is not an extravagance, but an essential part of developing health care facilities that maximize quality of life.

Agenda Item: The Role of Visual Art in Improving Quality-of-Life-Related Outcomes for Older Adults

DR. HATHORN: When Nancy contacted me, I started thinking what an amazing opportunity. As I got into working on the paper and thinking about some of the things that I wanted to talk about today, it struck me how very little information we have, not necessarily about participatory expressive kinds of arts programs, but really the passive art program. As far as my background is concerned, I started a firm in 1982 that was dedicated completely to working with the health care industry putting

art on the walls in various types of facilities including assisted living and nursing homes at that time. It is one of those things where I tell my staff be careful what you do. In the case of hospitals that art is going to have a shelf life of 20 to 30 years. In nursing home, you've probably got an audience for 1.2 years statistically of residents in those homes.

Also, one of the things about coming later in the afternoon is a lot of material has been covered. A lot of it has been set up so beautifully as Victor did for this presentation. These are the items that will be in the paper talking about some of the same things we have talked about, some of the cognitive and emotional issues. Design effects. How people perceive art in the built environment and then some of the benefits of both viewing and making art. We touched upon it this morning a little bit of what art in the environment does for caregivers because that is hugely important.

I look at this whole presentation. The goal of this presentation is to stimulate you as researchers to think of how many things have not been done in terms of passive art. It is huge.

I also wanted to give you one other piece of information because I could not possibly cover all of this in this presentation. I have started a research division,

really an altruistic research division, within the company that I lead. That center, which is called the REDCenter, the logo you see there. We have produced 14 studies in six years. It is self-funded. If any of you have any interest, I would be glad to share with you. It is primarily acute care. I did not want to bring that information in necessarily. But there are lots of studies there.

Dr. Upali Nanda who has a PhD in architecture from Texas A&M worked under Roger Ulrich and Mardelle Shepley leads the research department for me. I am very much indebted to her.

I wanted to give you just a quick timeline. Art has been in health care for 600 or 700 years. That's an argument you can make. Of course, the church owned the hospitals back in the Middle Ages. There was art in hospitals then. But what it did was -- it was heaven or hell damnation -- the last opportunity to repent. It has been around with its message for a long time.

Even though Florence Nightingale did not talk about art, per se, she certainly inspired modern thinkers, modern designers, modern deliverers of health care to understand the importance of fresh air and light in the wellness of patients.

And if we skip to the 1900s there are other

examples. But very important is 1984. Roger Ulrich who was also at the Texas A&M is now living in Sweden really did a landmark study that is the basis for what we know about visual art especially passive art in the health care setting.

And then in 2003, I designate that as the year that evidence-based design was identified as following evidence-based medicine.

To understand what we know about visual art, that passive art that hangs on the wall. There are three theories. But before we talk them, I want to take just one second. I am going to ask you to close your eyes for just a second, become perfectly still. I would venture to say there is not a single individual in here who would not describe himself as a highly motivated, overworked, incredibly stressed in the stream of productive professional life. Think of a photograph that is so relaxing, so tranquil, and hold that image in your mind for a moment. I doubt seriously -- you can open your eyes now. I doubt seriously that anyone thought of a photograph of graffiti on a building or a pattern of bricks on a wall. How many of you had some beautiful nature-based image, the beach, the mountains, the sunrise, the sunset? Almost everybody's hand goes up. There are three theories involved in visual art that are applicable and it is what

all those researchers draw on. Prospect and refuge just are simple ability to see and hide if we need to. It is what helped us survive as a species.

Emotional congruence, which means that a rainy day may be beautiful to us. It may be the saddest day of our lives. It is how we perceive the world around us based on our own emotional state. You can see how that would impact elderly viewers.

And lastly biophilia, which basically says we are just hard wired to interpret the world around us.

The amount of study that has been based on nature and art is significant. This is that study by Ulrich that sort of set the pace for considering that the whole concept that art imitates nature. This was done in a hospital in Pittsburgh. He analyzed nine years of patient discharge records. These were patients who were in one wing of a hospital on one side. They were all postoperative gall bladder patients. One set of rooms faced a brick wall. The other faced a park. Look at the difference in outcomes. This was just analyzing patient records. Almost a day less stay over nine years, fewer strong analgesics, fewer notes from the nursing staff. This was significant.

Richard Coss at UC Davis also did a study -- it was interesting because his hypothesis was if we could have art that we viewed in a preoperative holding area that was

exciting and passionate, with a lot of motion to it, it would be a positive distraction to these patients. And just the opposite was found. These were images that were ceiling mounted in a hold area. The non-arousing nature images were much more effective in reducing stress and anxiety in these patients, lowering blood pressure 10 to 15 points.

And then some other researchers. I wanted to give you their names. Heerwagen, who did dental office studies. Miller, Hoffman, Diette, Schneider, people who have looked primarily at the reduction of pain or perceived reduction of pain through viewing nature art or nature. It was still art. It was virtual reality video. It seems that nature can be translated in many forms of what we call art or passive art.

Victor is out there as he talks about buying art for assisted living nursing homes. Obviously there are certain considerations that we have to take into play when we select that art. And the different issues affecting perception of art. If you cannot see it then not only can you not appreciate it, but it also becomes a very negative distraction. It reminds you. I tell people all the time. If you had an ophthalmology clinic and somebody wanted to give you a wonderful van Gogh painting, it might not be the best choice. You cannot see it so it is a negative

message.

There are all sorts of conditions from cataracts to glaucoma, glaucoma macular degeneration, lens sclerosis, but conditions that affect the way art is seen. If you have a painting that is predominantly blue and green, someone with eyes of an 80 or 90 year old who has very difficult time seeing that blue-green, yellow-blue range that could be very frustrating. Lens sclerosis tends to yellow the lens of the eye. It affects the way they see color. What does glare do to passive art that is on the wall and framed in glass creating more glare?

Cognitive. All of these things. Cognitive conditions can affect the way we perceive art. Things that we do not understand. Even when younger patients or younger individuals view artwork that is confusing. There are a lot of studies on negative effects of abstract art on people who are highly anxious. But we do not understand it. It becomes difficult for us. It may be something as simple as something that is out of context. If you do not understand time and place to begin with and you are in an assisted living home in California and here is a picture of the Brooklyn Bridge. That can just add to the confusion in that individual's mind.

An emotional -- of course all researchers in dementia and Alzheimer's talk about the four A's, behaviors

that come out of the disease itself. But the good news is that the areas of the brain that are least affected are the areas that have that creative part that draws on emotional. Think of the types of visual art, things that could evoke emotion, reminiscence, sensory perception.

We did a very small pilot study at Laguna Hospital in San Francisco. We showed the quintessential. That image that you created in your mind. That beautiful screen saver is what some others call the Savannah landscape, which is that beautiful image that is so pristine and open.

We did this pilot study at Laguna Honda. These were patients who had mild cognitive disability. The typical comment was that is so lonely. That is sad. Where are all the people? To me the information that we have as far as passive art it is all pretty much an opportunity for research.

What is interesting and sometimes unfortunate, but I guess it is just a way of life. We are driven by legislation and all of these things have brought us to a point where we do have noninstitutional design now. It is very interesting because Victor also talked about selling these homes, these facilities to family and children. The people using these facilities are not the ones that the facility is being sold to so often, but it is the children.

What does it look like? How pretty is it? But then it does come into the category of can we really afford to even have art on the walls? Can we have a room that is big enough for a dance program? For an art studio? Does it have enough light?

My mother, who died at 92 and she did have dementia for probably eight or nine years, was in the finest nursing home that money could buy in Baton Rouge, Louisiana. The family and activity room was two patient rooms. The wall had been knocked out and that was it. And that was the best care that she could be given. There are huge considerations. But we are in an interesting time in design.

RAND did an interesting study in 2000 predicting what the profile of the patient would look like in 2010. They predicted a much different and very consumer oriented patient. It is only going to become more so.

I thought this was interesting. This was a study that the Society of Arts and Healthcare and Joint Commission did originally in 2007 and then updated it in 2009. I drew some conclusions from that. In their survey, 43 percent of the respondents said that they have visual art displays in their facilities. I am assuming for nursing homes and assisted living it is much higher than that. Look at all the reasons why they do it. If you just

use -- I think everybody here understands. There is nothing on the left side of my head. I am using a very simple mathematical formula. If you take the number of assisted living in nursing homes and use that same percentage that we use with 5000 hospitals, there are over 20,000 facilities theoretically that would say that they use visual passive art displays. Like I say, I am assuming it is much more. That is huge.

I am not going to read this because I am running short on time, but it is a beautiful quote about how desperate it is, even under the best conditions, to live in assisted living or a nursing home.

These are some of the things that we have talked about and I am not going to go into all of this again. But viewing art is very important. It can add to wonderful experiences. It can add to brain plasticity. It can extend our lives in a wonderful way. In my paper, I talk about the Artists for Alzheimer's program. It is really a wonderful program. It was launched a number of years ago. It has been taken up worldwide. But here is my question. If you look at the states where dementia and Alzheimer's are growing -- it is in the West, the Northwest, Montana, Wyoming, Idaho, North and South Dakota -- how many museums are there available for those people to attend? In that wonderful nursing home my mother had there was no museum.

It is going to be imperative to design spaces in these facilities where people can enjoy the arts and benefits from the arts.

This is another great study, which I will just leave to the paper as well.

I wanted to show you this to maybe get some thoughts going. This was an interesting small study done in five Midwestern nursing homes and it was during the shower/bath procedure. And what they did was they created a natural environment including using pictures of birds and bird calls and then sounds of other small animals. The caregivers were trained to have a dialogue with the patient and that must have improved outcomes. I have not been able to find out the extent to which the visual art was a central part of it, but that would be interesting. Once again, just so much that we have to learn.

This is very similar to what Victor showed us and once again in the paper there is more detail of three well-known artists who developed Alzheimer's and it is sort of the question of how we in our lives and how we deal with something like Alzheimer's, Erickson's concept of wisdom and integrity versus longing and despair.

Utermohlen -- when he was diagnosed, he said I am just going to paint myself -- very similar to the idea that Victor shared with us. This is how it changed in three

years. There are additional images, which I do not yet have permission to show you, but his self-portraits, of course, diminish almost to nothing but black and white and indistinguishable.

These demonstrate some of the issues that we need to be cognizant of in designing art programs, picking out art, in architecture as well in terms of perspective, understanding spatial relationships. You can look and see how Carolus Horn's work changed to the point where he could no longer do what he was doing only maybe six years before. But look at the intent. If that creativity, that emotional component. It is there to the very last. We saw it in Victor's slides as well.

de Kooning from the '50s. Look how the color, how the use of rectilinear shapes diminishes to the point where some art critics did not think the work was even de Kooning's. We know nothing about form, shape, composition, color. We know very little.

And lastly I wanted to talk for just a moment about how important it is to consider visual art and the effect it has on caregivers. I cite probably half a dozen studies. We did a huge study at MD Anderson Cancer Center, a pre and post-study. We had roughly 250 both patient responses and 250 staff responses. Something like close to 70 percent of the staff said it makes me a better

caregiver. That visual art that I encounter every day in the design of the space, but some people think we just spent all this money to make this place look pretty. It reduces my stress. It helps me provide better care to my patients.

And the interesting part, which we do not have time to talk about today, but it is something that Dr. Nanda and I have been focusing on in the past two or three years in our research is that cost benefit. What does that mean when 70 percent of the staff and physicians at MD Anderson say because of the visual passive art that is in this space I do my job better? I go home. I do not kick the dog and yell at my wife. You know what. People go out and say I sure am glad I came to MD Anderson. This place just feels like it is going to help me.

One of the best anecdotal comments that we got in our qualitative data was a gentleman who said MD Anderson is not a hospital. It is a health care consumer experience. Pretty amazing stuff.

There is that Savannah landscape that we could all get lost in, our screen savers. We know a lot about viewing art, making art in terms of people participating in these things, but we know almost nothing about viewing art in an unstructured, unsupervised, unnavigated, unfacilitated way. I always steal this quote from Upali

who steals it from a researcher friend of hers in the UK. The question is what happens when the art does night duty. These wonderful programs. If people even have access to them, they are maybe once a week. You guys pointed it out. It is once a week, 30 minutes for a couple of months. But these people spend days, months, years in these facilities and they are drastically affected by the art that does night duty. We as designers and practitioners and researchers have an incredible opportunity to look at art as a passive, constructive tool in the environment.

(Applause)

DR. CREWE: Thank you Kathy. She really has provided us added insight on the therapeutic value of passive art and mindfulness in selecting the art for residences.

Our final speaker discussant is Valerie Fletcher. Valerie is the executive director of the Institute for Human Centered Design in Boston, Massachusetts. She served as the former deputy commissioner of the Massachusetts Department of Mental Health. She has the -- her passion for quality mental health with the importance of a built environment to support well-being. Thank you.

Agenda Item: Discussant: Valerie Fletcher

DR. FLETCHER: Thank you Sandra and a special thanks to Nancy. This has been an extraordinary gift to

the day. I am sure that everyone else in the room thinks so too. I am going to use some images and I may need the tech person to make sure that I set this up appropriately. I am afraid I got addicted to everybody using images and I thought I had better just use a few.

Forgive me for the delay, but I am reminded that I wish very much that Victor had designed a particular assisted living program in Boston. He seems to have designed most of them, but not the one in which my friend Betsy lives. I am her guardian. She is a 76 year old woman with schizophrenia and a very serious abstract expressionist painter. I am afraid though I felt very lucky to be able to get her into this program on the basis of a Medicaid waiver program which she would never have otherwise been able to afford a $5500 a month assisted living. But she suffers greatly every day because her big social experiences are three times a day feeling deeply anxious to go to meals and to worry about who is in the dining room. It has been so exhausting to her that she chooses to eat in her room for a fee. She has been unable to paint in the years that she has been in the house. They provided her with a wonderful painting studio. Everything is extremely generous. But the physical environment so compromises her that she cannot find the energy to do more than recover from each meal. Just a reminder about how

much detail matters.

And just a quick note on Kathy's comment. I would actually suggest that her wonderful historical sequence of how those ideas came to have currency could actually be bumped backwards a bit. If you have ever been to the Palace Museum in Taiwan, there is a terrific exhibit of bronze age artifacts, including a great deal of jewelry. The idea that we need aesthetics after we have solved everything else is actually Maslow's mistake. We need aesthetics quite deeply and fully whatever our life circumstances.

And the second point on that, even going back a little further. In the Middle Ages, you may remember the story of Cluny an extraordinary physical environment in which vaulted stone rooms were filled with monks singing Gregorian chants. Pilgrims made their way there when they were dying to be in an environment in which they were sung to their deaths, in a quality of life experience that is extraordinary to consider even today.

I am just very quickly going to go through a few slides to offer a perspective on the role of design. The Institute for Human Centered Design is an international educational and design nonprofit focused on inclusive design that has been around since1978. Our headquarters are in Boston.

I am going to just quote a couple of people who I think speak about design as we would like you to think about design this afternoon. We have over a hundred feet of window on our downtown street with quotes about inclusive design in seven languages. "Design is the way we decide how we want things to be." (Richard Simmons, former Chief Executive of the Commission for Architecture and the Built Environment in the UK) It is not restricted to the professionals who do it as their career. And "design is a social art" is from Raymond Lifshez, Professor of Architecture at UC Berkley. Everything that we do is driven by two core ideas. First, that design is powerful and profoundly influences everyone and our sense of confidence, comfort, and control. These are critical issues as we age. I promise you that design impacts every older person. Unfortunately it impacts them negatively too much of the time. The other thing that we believe in is that variation in abilities is ordinary. It is not special. Most of us can expect to live for at least part of our lives with some personal experience with functional limitation, particularly when we live 30 years longer today than we did 100 years ago.

Our work is often described as universal or inclusive design, design-for-all. It is really thinking about the diversity of the world today and knowing that

design that anticipates that diversity is critical. We use the term human-centered design because it is easy. Equitable use and experience is the most significant overarching and transcending principle of design. And these principles are used worldwide. But it is really about changing human experience.

Something that has come up for me today in the course of listening to people's presentations is the concept of participation. I think we began the morning with the most delightful sense of the active experience of theater and Tony and Helga talking about that. For us in design, this idea of working with user experts, people at the edges of the spectrum who experience most intensely when design fails, but also when design works. We have a user expert lab where we have over 100 people across the lifespan and working with them every day is an extraordinarily rich and dynamic experience. It is that notion of active experience in play and respecting that expertise to guide design innovation.

The extraordinary demographics of our time build a sense of urgency and I think they need to shape how we define ourselves today. We give a great deal of attention to all of our crimes in the 20th century regarding environmental sustainability. We give too little attention to what we did so well in the 20th century, which is add 30

years to the average lifespan through breakthroughs in science. We live longer and survive more. We need design to help to make that work.

I would just suggest on the research side we need to be thinking about some of the overlapping qualities of environmental and social sustainability. They carry a number of core concepts: a respect for diversity, a respect for interdependence, and of data-driven choices. If we are to design for a socially sustainable 21st century, like green design, we must take the long view that everything that we do has implications over time. We are very good at thinking about that from the green side. We need to be thinking about that equally for socially sustainable design.

Global aging. I do not need to tell this group how significant this is. But I will tell you that the United States is slipping far behind other people who actually believe that aging is a fact. I work a lot with Asia. They actually understand that aging is not actually discretionary. The only alternative is to die young. It is seldom a choice that we make.

Three broad categories of functional limitation pretty much cover the spectrum: physical, sensory and brain-based issues. We have heard a lot about the brain-based issues today. I am a champion for how significant it

is to figure out what are the design features that truly enhance brain function. We know very little. The Academy of Neuroscience for Architecture in San Diego is actually one contribution to that, but it is barely noted in the architectural community.

Global policies. I just want to remind you that we actually have a terrific set of global policies that speak to the value of design. The Madrid International Plan of Action on Aging and the Priority Direction III, "ensuring enabling and supporting environments" is an ideal aspiration clearly beyond barrier removal. Barrier removal is not anywhere near far enough. And the redefinition of disability in the World Health Organization's International Classification of Function, Disability and Health is the most significant policy in terms of being a catalyst for thinking differently about the role of design. WHO's ICF states that functional limitation is a universal human experience in the 21st century. We live on average too long for it to be otherwise. It is not about them. It is not about some discrete set of 'them,' it is about 'us.' The definition equalizes mental and physical reasons for functional limitations. Critically important. My friends at the World Health Organization tell me they could have done their work in one year if they did not insist on this issue being important. It took them nine years to get

agreement on that.

They defined disability as a contextual variable that functional limitation is a fact of human life in the 21st century, but disability occurs at the intersection of the person and their many environments. The physical environment is no longer enough. It is the communication environment, the information environment, policy and social or attitudinal. Sounds great. We are making some progress.

I am an addict of Saul Steinberg and I do not know how many 'yes buts' he did. But I have 15 of them. I know there are probably 15 more. I got back to Saul Steinberg all the time because I am always thrilled with excitement about possibility—the 'yes' and then hit the 'but' on constraints.

Neither incremental strategies nor special solutions will be enough. You may know that we have hit this year the magic number of 100 million Americans over 50. We have a few people over 50 in the room. We do not have any time to figure out how to design for a world more diverse in age and ability than ever before. We think we have time, but we do not. And you may have noticed we do not seem to have much money and that is not likely to get better.

I think we have understandably looked at issues

of what are the environments where we can do critical research now. Just a reminder about the small percentage of people in those physical environments specially designed for older people. We already have 37 million Americans over 65 to say nothing of the 100 million over 50. We have to be thinking about the fact however much we talk about aging in place as a new phenomenon. Home is the only place that most people have ever aged. It is a small percentage who have either the need or the choice to be elsewhere. We have to be thinking about how to do this critical research in places where the majority of people are really living.

We have to develop a way of thinking about design as critical to being successful. It is intrinsic to doing whatever else we are doing in terms of positive intervention. This idea of disability as contextual. My God it is a powerful notion. Think about Stephen Hawking. Did anyone see Stephen Hawking hosting the Paraolympic Games' opening ceremony? Did anyone see that? Go back and watch it. It is on YouTube. You know Stephen Hawking. Might I suggest that we have to rethink quality adjusted life years when we think about Stephen Hawking. I think it is one of those challenges. We can minimize our limitations by the environmental context in which we live. This notion of engaging user experts. We cannot avoid design -- we are forcing people to suffer bad design every

day in the quality of our environment, in the quality of our streets, in public spaces, in the quality of the products we make. Go to a durable medical equipment store and weep. A miserable environment.

Too little research on the human impacts of design. What is the information we need about lighting and acoustics? It is more than we have, I promise you. And lighting and acoustics are just two examples of aspects of the built environment. This notion of respect for the role of environmental context is deeply significant for all the discussions today.

And just a last image. This is actually a reminder from my friends in Sao Paulo, Brazil one of the biggest cities in the world that has a policy on inclusive design. They are still largely a poor city, but they are committed. New development does not occur without inclusive design at its core. A reminder that it is in all of the wonderful work that you are doing. It is really about us, not about some artificial them and us. Thanks very much.

(Applause)

Agenda Item: Floor Discussion

DR. CREWE: Thank you very much Valerie. We now have time for questions.

DR. BASTING: It is Anne Basting from this

morning again. Just sort of uniting the first and the last presentation too. I think the reality is that the spaces that we have the chance to build from the ground up are few even though they are multiplying right now. And the way to adapt current environments is I think a really interesting moment.

And one of the ways that I think we might consider arts interventions -- I just did a project two years ago called the Penelope Project where we for two years read the Odyssey in a continuing care community with the goal of creating community across all of the levels of ability and disability. It was a universal design of an arts program. Any kind of arts program, any approach or method had to be accessible to anyone with physical or cognitive ability. It had to be adaptable to it.

And then the other thing we did with it was move it around the space. It culminated in a professional theater production, which looked at the use of the space and actually did the performance on promenade and rewrote the institutional history of that space. It was a way for the arts actually to rewrite the double-loaded corridor meaning and the use of some of those spaces. The temporariness of it locked into an institutional history that rewrote the use of the space in a really interesting way. I just think it is an interesting example of how to

pull together some of the things from this morning and then some of the great points that both of you made. It is more of an example than a question.

DR. FLETCHER: Is that written up somewhere? Do you have an article about that?

DR. BASTING: I am trying really fast really hard to write it up. Actually we have a documentary that is going to be released at the end of October. We are trying to get a screening here in DC. I will let you know when that happens.

DR. REGNIER: I think when you see the vast majority of people living in normal housing in the community, apartments, single-family houses or whatever, it is an eye opener that there are so many people that are not being benefitted by any of this stuff we are talking about. The idea, the village movement, which of course we did not talk about that. That is very interesting when you see something like that happening and you recognize that it is possible for community facilities to be tapped by a broader range of people living in normal housing and it just takes some organizing. It is not terribly complex. That is why I go to Northern Europe all the time, not in the winter, but in the summer anyhow.

Because of the way in which 'service houses' in that context work it is very interesting because if you

look at the average age in a service house, which is normal housing with services that are linked to it. It is usually the same as assisted living. 83 to 86 or something like that. When you see the people who come to service houses to take advantage of a lot of the activities that are provided there, they are ten years younger. They are 75. They are all people living in the surrounding community who happen to go to that place. For us it is like having a senior center linked to housing. It is just a sad commentary that we do not have anything like that. We took the wrong route back in 1955 and too bad because we went to the wrong place. We are now suffering as a result of it.

Thinking about it that way or thinking about how we can help people who are in their own homes to have a more well balanced and delightful and fun and stimulating life is a real burden. We have to do that.

PARTICIPANT: Earlier you talked about the role of the environment is critical. I just heard some discussion here about environment and how it relates. I could not help but think about what Bill said when he said what happens when you are the worst artist or musician in the group. What does it do to you? It reminded me of this person environment fit. Have we incorporated person environment fit into the understanding that for some people the same environment is less conducive for good health than

to other individuals?

DR. REGNIER: I think there is enormous diversity in the populations that we work with and we often do not think about how individual that fit formula should be. It is not about averages. It is really about individuals. I do think that being able to allow people to have great commonality and great privacy is the most important thing you can do in a building like this. They ought to be able to maintain and control their sense of privacy and their sense of connecting with other human beings whether it is their family or friends or people that they like to play pinochle with or whatever.

I think what should take place in these settings is just optimizing choice as much as we possibly can and looking for mechanisms that allow people to have control as much control as they possibly can over their life. I talked about some of those things in my book. I have a lot of other things that are along that same line. But I do think that that is the way I deal with it because I have the same problem of thinking of how diverse people are and then thinking about the kind of solutions that we think everybody has to have a slipper solution. You cannot have a shoe solution like minus ten and a half A. Actually, it is a very narrow foot. The idea that somehow we all have to wear slippers because there is no way to custom fit that

context to our own personal size is sad. It should not be that way.

Valerie will tell you about all the wrong dimensions that are used for accessibility standards that do not fit old people. We have a whole set of standards that have nothing to do with older people and we are forced to use those standards in housing projects for older people. It is like what kind of weird world am I in when that kind of logic takes place because it is the law and it is civil rights. You do not screw with that. They put you in jail when you do things that violate that. It is a very insidious set of ideas about how we want to make everything average. Just take the highs and the lows and split it right in the middle and that is how we are going to solve the problem. Bad idea.

DR. FLETCHER: If I could just reinforce Sandra's point earlier that we are desperate for research that looks at multicultural communities and that is critically significant aspect about diversity in choice because people have very different choices through a cultural lens and we know almost nothing about how to do that well.

DR. NOICE: Just one little point that I think applies to everything we have been talking here today is one of the things that really traditionally do. Yes, there is tremendous diversity. But what I always try to

emphasize, specifically in the acting, but in everything else you can be as good a you as you. If you tell the truth through your art -- Robert De Niro cannot be as good a Victor as Victor. It is impossible.

DR. CREWE: Please join me in thanking our panelists.

(Applause)

DR. REUBEN: Take 10 minutes and come on back. Thanks.

(Break)

Agenda Item: Research Gaps and Opportunities: A Summary

DR. REUBEN: The title of this session is research gaps and opportunities: a summary or to paraphrase one of my favorite aging song writers who is still very prolific in fact just released a new album from one of his early albums. This is the bringing it all back home session. If you guys know who that is.

We have three summary speakers. We will start with Margie Lachman who has not presented earlier today. She is the Fierman Professor of Psychology and Director of the Lifespan Developmental Psychology Lab at Brandeis University. Her areas of research focus on area of lifespan development with a focus on mid and late life.

DR. LACHMAN: Thank you so much for inviting me

to this very exciting and stimulating conference. I have about ten minutes to summarize this amazing set of presentations and discussions that we have had today and I will do my best to stick to the time. Really what I feel like doing is singing and dancing, but I will not do that. All of you, I admire you for staying so late to -- I guess what we all really feel like doing is getting up and doing something after this wonderful discussion. And what I think I take away just two points is that we all want to go out and do something related to art. The earlier the better. But hopefully it is never too late.

This is an overview of the points that I would like to discuss today. First, linking in general behaviors to healthy aging. Possible mechanisms for linking art and health. When we talk about designs and this is one of the issues that was raised many times is what design should we use. It depends on the question. And then I think as we talk about aging and art, we need to think about adapting and art is very flexible. That is the good news. And then a little bit about the future, prospect and promise for art and older adults.

First, linking behaviors to healthy aging. A lot of work has been done that shows associations between performance, cognitive performance, happiness, and lots of different behaviors. But very little has been done to look

at changes. What can we do to slow aging or minimize declines or enhance quality of life? It turns out that art is not alone in this regard. There is a lot of observational anecdotal information in many domains. In many domains we talk about associations with performance or even try to look at changes but studies are not really done very well. We do not really have conclusive evidence. It is not just in the art domain. Education is something we talk about as associated with longevity and decrease in risk for dementia, but we do not really know what the mechanisms are.

Cognitive stimulation has come up many times. We all know about the crossword puzzle dilemma. Many people ask me should I do crossword puzzles. We really do not know. Brain games. We have talked a little about today.

In physical activity, we do know thanks to some of the work by Art Kramer and others that it is good for you, but we really do not know much about what intensity, for how long, how frequently should we be doing this exercise?

And then we know about social engagement is good for you. We know that loneliness is bad for you. But we really do not understand how social support or social relationships really do affect, if they do, changes associated with aging.

In thinking about this conference today, one of the big things we talked about is what are some of the possible mechanisms? I cannot go into all of them. This is just a set of possibilities that are more behavioral. But think about art in many ways is a conduit or it may be the means by which we engage in physical activity. Take dance, for example, or even just going to some sort of a program. Art involves cognitive activity. It involves education, social activity, and sensory stimulation. It may give you purpose and meaning in life. It may give you a sense of mastery and control. It may reduce stress. It may give you a sense of generativity or passing on things to the next generation. These are some of the possible links. Art in a way does so many different things. It is this conduit or this mechanism.

We now could talk about many of the other links here. Why is it that physical activity affects health? We may think about things like brain function or plasticity and so on. This is not a direct link. There are going to be other ways or pathways that could link to health.

Now, let's come to the kinds of questions that we might ask and what are the different designs that we might use to do that. We have talked mainly about experimental designs and the gold standard of randomized control trials and interventions. Yes, those are very desirable, but

there are other ones as well. There are developmental and quasi-experimental designs. And there are also within person designs, daily diary designs, or experience sampling. I would like to just say a few things about each of these and some of the kinds of questions that we could answer if we move forward in this way.

For experimental designs, some of the questions that people have suggested and some preliminary studies have addressed. Is art more effective than other behaviors or treatments? Comparing art to some other intervention. What is it about art that is effective? This we can vary the different conditions or use different control groups. Maybe we want to look at art alone versus in groups. Participation versus observation in light of the last presentation. Moderate physical activity versus light physical activity. We can begin to look at mechanisms. We mentioned choice actually in the last set of presentations versus assignment.

If we assign people to art, it may not be something they really want to do or like. To what extent can we give somebody a choice in which program they want? And then we might be able to do a yoke design where for every choice that is made we do randomly assign somebody to that same condition.

Maintenance and transfer become very important

for all the studies that we do. To what extent is this going to last and have an effect on many different domains in life? Who participates in this research? The selection not only has issues in terms of threats to the internal validity of the design, but also in terms of the applicability. And person by treatment effects. We must look at those as well. Who benefits the most from which programs? Not all programs are designed for all people. Not everybody is going to benefit in the same way.

This is your typical RCT design. I will not spend time on it because we are all familiar with it. It has come up many times today.

Developmental and quasi-experimental designs. We might look at long-term effects of art and longitudinally or retrospectively. The kind of work presented earlier by Kraus, for example, looked at some of the long-term effects of music training. Does art affect the aging process? Does it reduce or slow declines? If we follow people over time over the long haul, we may be able to get information about that. We do not have to start new longitudinal studies to the extent that there are existing longitudinal studies that have this kind of information already. We may be able to glean that from those studies.

Is art better for older than younger adults? We could look at cross sectional or longitudinal studies to

see to what extent. What is the timing and sequencing of art training? Does it have a different impact at age 20 than it does at age 40? And then looking at individual differences in preferences and benefits. Personality may play a role. Culture may play a role. These are some of the variations that we would like to look at.

Here I am illustrating a longitudinal design where you follow the same people, in this case, from age 10 to age 70, and compare those who engage in art with those who do not over time, for example. We see on the right here one of the prolific long-term painters. Rembrandt painted self-portraits from early on until the end of his life.

Cross sectional design we can look as I said different ages and different subgroups at one point in time to compare to what extent we find that art perhaps has a positive effect.

Another design that has not come up today is the A-B-A-B reversal design, which is within group or within person design. It is not a randomized control design. But when you look to see if you give some sort of an art treatment, does it make a difference? And then you can take it away and see what happens when the effects are removed and then you can bring it back again. It is illustrated here. You have a baseline. You give a

treatment, take away, reverse it, see if you can extinguish it and then bring it back and follow on and on to see to what extent the presence or absence of the treatment has an impact within a group or within a person.

This has not come at all today. Daily diaries and experience sampling is another really interesting approach for us to look at the effects of art. First of all this is typically done in natural settings, not necessarily in the lab and certainly not only in retirement communities and so on, but it could even be done in the home. It is a within person design. It looks within the person. The person serves as their own control if you will. On days when you are doing art, are you happier, for example? At times of the day when you are doing art, are you better off in terms of your blood pressure, your heart rate, your cortisol and stress, your anxiety? Are you in a better mood?

You can look within person to see, for example, across the top on days in which you are playing music do you look better off than days than you do not. You can look across time in terms of lag effects. If you play music on one day, does that have an impact to the next day? Or if you start out not in a good mood, are you more or less likely to play music? You begin to look at some of the lag and causal relationships.

We can also do it in terms of experience sample. If you do it more than one time on a day, you could vary. You could meet people or somehow remind them to respond to your questionnaire or every time they play music they respond and tell you or you take measurements of their blood pressure, et cetera.

As we are doing this research, not only do we ask different questions, but the kind of design also has to be tied to what kind of outcomes we have. Are they momentary outcomes, more fluctuating outcomes or are they more general, long-term kinds of outcomes? And that will have a big impact on the kind of design that you use. We could look at physical health, psychological well-being, cognition, memory, longevity, social engagement, sensory abilities just to name a few. And, again, depending on the kind of outcome your design may have to be much more specific and much more fluctuating in terms of looking over short periods of time versus long periods of time.

Let me wrap up by talking about possible prospect and promise of work on art. Many of the studies today talked about learning something new, taking people who are really naive in theater or whatever. Here we can really talk about the effects of learning something new on plasticity, neuroplasticity, for example, or sense of mastery or enjoyment starting out by not having prior

experience with this.

By the same token, some of the other presentations today focused on lifelong engagement and the long-term benefits of art. Here we have to think about adaptation and aging. Many of the studies that we have looked at in the literature on cognitive aging suggest that it is really doing something new that is very beneficial to you. Denise Park's work, for example. But here we also have evidence that is doing something the same thing over a long period of time can be beneficial. It is an interesting juxtaposition here.

But I think when we are looking at long-term engagement, we cannot assume that just because we start arts at an early time in life that we will not have to make adjustments in adaptation and be flexible. And art may allow us to be flexible.

One of my favorite examples comes from the Selective Optimization with Compensation theory. And Baltes and Baltes gave the wonderful example of Arthur Rubinstein who played music into his 90s. He gave this example of how he had to adapt even though he had played for so many years and was a wonderful pianist. He had to be selective. He could not play as many pieces as he did when he was younger. He had a more reduced repertoire. He used optimization. He had to practice more often than he

did when he was younger. And an example of compensation, maintaining goals in the face of losses. In this case he gave the example of slowing down. We all know with aging people slow down. And in order for him to give the illusion that he was playing something quickly he would slow down his playing right before the piece that was supposed to be fast. It gave the sense that he really was playing quickly, but it was this illusion of slowing down. A wonderful example of compensation.

In conclusion, I think there is so much promise for looking at art and its impact on aging and really lifespan development. We can think about prevention to optimize lifespan development. Remediation. There were examples today about using art for dementia. Parkinson's disease as examples. Quality of life and health.

I have looked at a number of different ads for senior housing whether CCRSs, long-term care, some of the places that actually Victor has been to. Here is one example. So much more than a place to live. And what do they use to illustrate that? A woman painting. Many of these housing places use art as one of the selling points. It is something that attracts people. But we know it is not necessarily evidence based.

And then the question is does it need to be or not. They are getting people to come. People are

participating in these arts. Does it really matter? I have talked to many directors and program directors at these facilities and they are not necessarily interested in finding out what the research says about it. They know it is working and they do not necessarily want to do this evidence-based work. That is a whole other set of issues I think that we need to take into account that we can do translational research and it may be something important, but it is already something that is going on in a widespread basis.

Just to make a plug for training in lifespan development and aging. Many people talked today about getting together scientists and artists. I think this is an incredibly wonderful idea. And as much as we would like to hear more about art, I hope that artists are more interested in learning about development and aging and then they can realize the tremendous potential and application of their skills and their trade to understanding and helping to optimize development across lifespan. Thank you.

(Applause)

DR. REUBEN: And for someone who needs no introduction. Art Kramer.

DR. KRAMER: I do not have any slides for two reasons. One reason is it forces me to listen because my

hobby is mind wandering. I cannot mind wander when I have to listen. Two, I have been reading the biography of Steve Jobs. Maybe some of you have. There was a quote in there that I figured is a good statement when I do not put a presentation together and that is if you know what you are talking about, you do not need PowerPoint. That is Steve Jobs. I think he did not like competitors like Bill Gates either. I am not sure what the motivation is.

But I have a few points to make and I think they will be complementary rather than overlapping with what Margie said. First, we all got smarter today. Those of us who are still here got a lot smarter than those who left earlier. We got a good deal of mental, emotional, and a little bit of physical. We had to walk up to the third floor, but other than that not much physical exercise. We know stimulation is really quite good for our minds and brains.

Second, I think today we heard a lot of sometimes implicit, sometimes explicit statements about the importance of inter and multidisciplinary teams. We cannot just be artists or we cannot just be cognitive scientists or biologists or neuroscientists and do these studies well. In fact, I think it goes way beyond the kinds of teams that I have put together which are pretty broad. I think even if we are basic researchers, we need to think about the

future and maybe incorporate public health folks and health economists and of course animal models perhaps in parallel with the human models and some computational models that have plausibility with respect to neural function and computation. We definitely need enlightened architects like Victor to help us think about these things.

I think of the Beckman Institute, which won the science building of the year when it opened in 1989. It was a place designed to encourage interaction. I am one of the bad guys now because I am administration as well as faculty. I need to worry about actually funding the place, which costs quite a bit of money every year to fund. I am really not supposed to lose money in any of the operations. But I do and I would be happy to. We have a cafeteria that has generated so many studies when a theoretical physicist sits down with a neuroscientist and a dancer and all kinds of combinations. We have scientists and humanists from 44 different departments and 8 colleges. And designing the building to encourage interaction was extremely important. And fortunately for all us it was well designed.

Another point is that I think we pretty much ignored Eastern approaches to the arts today. I know there are some of that in the papers. But those of you who came today and did not read the papers could not really -- or you can get that, but perhaps later. I do not think it is

East versus West. I think it is East plus West.

If you are interested in reading a little bit about this, I would suggest a TiCS reviews. That is Trends in Cognitive Sciences by Yi-Yuan Tang, a Chinese physician, and Mike Posner. If you know anything about cognitive science, you know that name Mike Posner. He is an old guy with a lot of creative and crazy ideas. And the two of them work together to study both what they call attention state training, changing state using something called integrated body mind therapy, which is a combination of meditation and mindfulness training with a little tai chi mixed in and attention training, which Mike has made his career about. It is the Western and Eastern approaches integrated. It is really beautiful and crazy work and it is something you do at the end of your career when you do not really care what people think about what you do. It is just great stuff.

I think we have heard before that aging starts at birth or perhaps before and we really shouldn't start studying aging when people are 65. I think there are a lot of interesting questions we can address if we take a lifespan position such as when to begin with interventions, duration, intensity, starting and stopping. Nina said she was interested in that as am I. In terms of physical activity, I am convinced the no free lunch hypothesis is

true. That is stop it and the benefits go away pretty quickly with some exceptions. I bet this is true. There might be some long-term benefits, but they might be a bit larger if you continue.

I think another way to think about the kinds of studies we do and I think Nina illustrated this very well with her studies today is one interesting approach is the approach to match the art form to the kinds of changes that we see and often the negative changes we see in the context of aging as a way to enhance perhaps auditory sensory function, auditory recognition, and perhaps auditory recall.

I think what we can do is almost map out the relationship to the extent that is possible between art forms, between changes we want to remediate or improve and outcome measures. And outcome measures are critical also. We have talked a little bit about this. Some of them are appropriate for the lab.

fMRI is a good example. Those magnets are really heavy and to bring them out into the community would be hard although some of them exist on flatbed trailers for hospitals. And some of the measures are very easy to bring out such as the autobiographical or perhaps the diary and even some of our computer-based measures. There are a number of batteries now that exist on iPads and phones,

androids, and iPhones. In fact, some of them you can download from the iTunes store and I would be happy to point you in that direction. I make no money on any of this. But I do collaborate with gamers.

I think also the studies of clinical populations. We talked a little bit about Alzheimer's, dementia, and Julene made the point that we often do not make the distinctions. It is not cleared between Lewy body dementia or vascular or Alzheimer's. I think we can actually learn a lot about examining the efficacy and mechanisms of these interventions with different populations. For example, something that I recently learned from Henrietta Van Praag that lives close to here. She works at NIH. And that is although exercise seems to benefit many different aspects of populations from AD patients and Parkinson's and multiple sclerosis and seven-year-old kids. It shows negative effects, that is costs with Huntington animals. Animals that are created. They are knockouts and transgenes. And why is that? Can that be informative with respect to mechanism? I bet it can.

And then finally the issue of nature. I thought that was missing and then it came in from Kathy's presentation. There really has been a resurgence in the study of nature which can be an art form or just what we experience does not always have to be an art form, but can

be. In this study, I did not know about the biophilia theory. I knew about Wilson, but I did not know about his theory.

There is a new theory and I cannot forget the name. Even when I am demented I will know what it is. It is ART, Attention Restoration Theory. And this was a theory by a fellow by the name of Kaplan of the University of Michigan. And some of these more recent studies have focused on cognitive and brain changes to go along with stress reduction and other kinds of changes we have seen.

One interesting issue is how we put these different interventions together whether they are physical or social or art or exposure to nature to augment to essentially create synergies between these different interventions. Do we get more bang for our buck if we eat right and exercise than if we only do one of the two? Do we get more bang for our buck if we socialize and exercise?

I use these two examples because they are animal studies on both of them and the answer is yes. Sometimes additive, some multiplicative effects. To do these kinds of studies it would be nice to understand the underlying mechanisms, but I am not sure we need to wait from a public health perspective to look at these multimodal interventions that we can create by putting together art forms and exercise.

I was interviewed a number of years ago and somebody said what is the best intervention you can imagine. I said it does not exist yet, but it is a walking book group. You read the book. You take a walk with friends. Remember the BOTA from -- I think that is what it is called from the 1960s because you would want to drink good red wine high in antioxidants. You have the good diet. You have social interaction and intellectual stimulation and a little exercise simultaneously. I do not know that anybody has looked at it, but I think it is worth looking at. That is what I have to say. Thanks.

(Applause)

DR. REUBEN: Our final speaker will be Becca Levy.

DR. LEVY: Thank you. Thank you for giving me the opportunity to provide you with some comments about the things that jumped out at me as being really exciting and thank you for the sponsors for making this possible and Nancy for all you have done to make this possible and all the participants particularly those who wrote the commissioned papers because they have been very helpful to give me an overview of the field.

My overall impression from reading the commissioned papers and from today is that I think the research findings are very promising. I think there are

some really outstanding examples of research that were presented today. Some great examples are the research that the Noices have been doing including their research with Art Kramer and the qualitative work that Anne Basting and Kate have been doing. But as we have talked about, there is also some evidence that the field can be strengthened. I want to talk about four opportunities that jumped out at me as things to think about as we go forward.

The first is the opportunity to encourage research that builds on theories. That is something that Julene mentioned in her paper and her presentation. The idea is that if we have a theory or model that we can build on maybe ideas will come together and advance a little bit more.

The first example of a theory that I thought might have some applicability is Dean Simonton's Model of Creative Careers. What is exciting about some of his work is he has some really testable hypothesis. For example, one of the things he talks about is that domain really matters. That is something that has come up today. The question is whether we can put the domains together from a multimodal approach or whether we should keep on comparing different domains of creativity.

And the other thought that he presents in his model is that it is good to change creative outlets over

time, for example, Grandma Moses. She switched from embroidery. She got some arthritis. She could not use a needle anymore. She switched to painting at 76 and suddenly became very prolific and popular. She is a nice example of changing creative outlets over the lifespan.

I also wanted to mention a theory that I have been thinking about which is stereotype embodiment theory. It is the idea that we have these age stereotypes or beliefs about aging that exist in our culture. We can take them in at a very young age starting at about three or four. We have evidence that children already have them at these ages. These could lead to self-definitions, which can have influence in functioning and health in later life.

I think that some of these stereotypes that are really popular in our culture have applicability to creativity and older artists. For example, a very popular stereotype is that old age is a time of decline cognitively and physically. Also there is a positive age stereotype on the other side that old age is a time of creativity. I think it is good to think about how those stereotypes may inform the experience of being an older artist both in terms of continuing creative endeavors from earlier and in terms of picking up new creative outlets.

I thought I would just present one quick piece of evidence that we have gathered from an ongoing National

Institute of Aging funded study. I have been collaborating with people at the Baltimore Longitudinal Study of Aging. This shows a study in which we found that age stereotypes that are expressed before the age of 30 can have an impact on cardiovascular events after the age of 60. The blue lines are those who express more negative age stereotypes at baseline. As you can see they have twice the risk of having a cardiovascular event after the age of 60. We found the advantage of more positive age sterotypes on cardiovascular health after we adjusted for a number of covariates as well.

The second opportunity I wanted to mention is to look at ways to make art interventions most effective and a number of these we have talked about throughout the day. One is the idea of passive versus active art forms. I think after the last presentation about architecture I am thinking maybe passive is not quite the right term. As was said in the previous session if paintings on the walls have night duty, it is maybe something that is much more dynamic than I was thinking about before. Just the whole idea of how engaged we are I think is really important.

And this topic has come up a couple of times. The idea of whether we choose the art form or were randomly assigned -- I guess randomly assigned can still be effective, as we heard from the Noices.

And also the role of cultural art has come up. I know Art just mentioned that. I think there is the idea that we want to include more ethnic minorities, but also we want to think about the role of ethnic or culturally-specific art. I do not think we know yet whether there is more benefit from having a congruence of cultural specific art or whether it is better to be exposed to novel cultures. That is something that I think we can test.

The third opportunity is to develop rigorous designs. I will not spend much time on this because it has been covered. The only thing that I think maybe has not been covered is just the idea that art itself is perhaps operating on some level in an unconscious processing mode. It would be nice to think about how we get at that. What are those measures that get at unconscious thinking? There have been some great advances in measuring unconscious thinking. Maybe some of those could be incorporated in some of our research.

The last opportunity I wanted to mention is the idea of identifying mechanisms that art promotes health. The first is something that is really exciting is the neurocognitive plasticity that we have talked about today. Gottfried Schlaug's work and Nina Krause's work which was featured in the New York Times this week have some exciting evidence of how art can affect our brains.

Another level that I think is really interesting to think about is the idea of art as an opportunity for reminiscence and making meaning as we approach death. There may be some specific things that are happening with older adults that are not happening as much at other stages of the lifespan that are important to think about.

I thought I would give one quick example of an artist or writer who maybe exemplifies this last idea. Henry Roth, a well-known American writer wrote his first novel at the age of 28. And then for the next 45 years had writer's block. And then between age 73 and 89 he had this surge of creativity and he wrote six autobiographical novels. He argued that that this surge in later life was due in part to his approaching death; it really inspired him to think back on his life and it allowed him to come to terms with actions that he regretted and it allowed him to come to terms with his own mortality. This is a quote from one of his later autobiographical works from an older protagonist who is writing about the process of writing. He writes writing is a window into my remaining future. It is my survival and a penance.

And the last thing that I wanted to mention is this documentary, which you probably are already aware of, but I actually just heard about it very recently. Actually my dad read something about it and told me about it when he

heard about this conference. This is a documentary called I Remember Better When I Paint, which fits in very well with the early session that we had on the role of art in dementia. I actually just received it by mail right before I came here so I watched it on the train coming here.

I was delighted to see that Robert Butler is featured prominently in it. I know he is near and dear to many of the people in this room and he is one of my favorite people. I thought I would end with his observations about the field. I think if he was alive he would be here and be very excited about the direction of this workshop.

He talks about how baby boomers need to overcome their denial of aging and be their own advocates for developing new ways to prevent Alzheimer's disease and improve quality of life of those with Alzheimer's disease. He also talks about how arts can be mobilized as a key resource to give individuals purpose. Although the research that he talks about is not about purpose specifically in art although I think that is something that we can look at, but he cites research that looks at purpose in general as contributing to improving health and longevity.

I would like to acknowledge my collaborators.

Luigi Ferrucci, Martin Slade and Alan Zonderman who worked with me on the research that produced the one figure that I showed. I would also like to acknowledge the Donaghue Foundation, the NHLBI, and the NIA for their generous support of our research. I will end with an image of Grandma Moses. Thank you.

(Applause)

Agenda Item: Floor Discussion

DR. REUBEN: Thank you all panelists. This is almost the moment you have been waiting for. This is what we call in the business open mic. At this point, we would like to actually solicit comments from people in the audience about what they heard today. Questions that could be raised to any of the speakers who are still here or just things that you want to get off your chest. If it gets too long, I will cut you off. But it is a time to really feed back to the group and then I will have some summary comments at the end. If you want to raise your hand or go to the mics.

PARTICIPANT: Art Kramer just mentioned the use of animal models and Nina mentioned them earlier this morning. And certainly I think animal models will be useful to get at mechanisms of neural mechanisms underlying response to sound or learning or something like that. But my question is are the arts a uniquely human phenomena or

is there something equivalent in nonhuman organisms.

DR. KRAMER: I am not sure specifically about the arts, but to echo what Nina talked about this morning and I agree completely. Without our facilities, our perceptual, our cognitive, our motor facilities, it would be tough to appreciate and engage in art. I think to the extent we can understand memory, sensory function, perception, and action, which we can most certainly understand from animal models. Animals are certainly creative.

You have all seen the monkey videos with the monkey getting the insects out of the hole with a stick and so forth. Whether they create art. I think Koko created art. I think the great apes can be taught to create art, but whether they naturally do it I do not know. But I am not sure they have to to garner benefit from animal models.

I think perhaps the easiest lifestyle choice to scale up from animal to human models is physical activity. Running wheel, treadmill. It works. And that is how we know so much about the molecular and cellular mechanisms. But despite maybe mismatch between art and what animals do I think the basic processes are going to be important to the extent we understand them.

PARTICIPANT: When you said open mic the first thing that came into my mind was that neuropsychologists and artists and a biostatistician walk into a bar. It got

onto my chest and I just had to get it out. But seriously folks -- I really appreciated, Margie, your discussion. Once you got past the RCTs and -- presented all non-RCT designs as equal. Some of us at NIH have been talking about how do we promote non-RCT research. And given that we are all working on a new interdisciplinary collaboration, how do you folks think that we could foster that collaboration and equalize designs as we go forward together?

DR. LACHMAN: I think my main point is that it really depends on the question. Not all questions are necessarily answered by RCT designs. I think that is really the point. In part you can develop questions related to methods and you can develop methods and relate it to questions. But I think the main thing is to develop the question and then to talk to people who are familiar with lots of different kinds of methods. In the end it is not just one design. Typically to answer the questions as well you have to do multiple kinds of designs. But I do think that RCT is not the only one. I think that is all I would say at this point.

PARTICIPANT: My name is -- I am a visual art therapist. I really appreciated listening to the many perspectives today. And I know from my own experiences as an art therapist working with older adults who are both

healthy and those with dementia and through my own research, a lot of these points about the challenges of research and connecting it with human developmental aspects and certainly the value of visual arts, creative arts therapy, creative arts in general are obvious.

But I guess my question is a lot of people I have met today are doing some really wonderful research. But how do practitioners connect up with researchers? I think that is a big question for me. How can we get the people who are actually on the ground doing this wonderful work and know for a fact that this is working? How do we connect it up with empirical researchers and the funders to get some of these things we talked about today actually moving?

DR. KRAUS: If in fact you have groups of people who can be studied and you have programs where people can come on in and apply standardized or individualized tailored to your program rigorous scientific methods to get outcomes.

PARTICIPANT: I am wondering if there is some sort of facility or facilitation between arts therapies, artists, practicing artists who are running these groups already with some of the research who might be involved or already are involved. How can we connect the people together? That is my practical question.

DR. KRAMER: I think one way to do it perhaps is that a number of us are media hams and we like to talk to the media. I think we are also pretty friendly. Send us an email. Give us a call. I think many of us also like to do public presentations. I did one 2 nights ago. It was pretty interesting because I had a number of interesting characters come up to me. One of them I knew in the theater department at the University of Illinois who happens to be the go to guy when any actor wants to learn how to fence. For example, he taught Johnny Depp how to fence. He said to me I am really interested in what you are doing. Could we sit and talk? I said let's go out to lunch. You never know what is going to happen. Send us an email. Nina is easily accessible. She was just in the New York Times. You can find her.

DR. REUBEN: In addition, there is a whole area that we did not talk about today and that is the idea of dissemination or diffusion research. There just was not time on the agenda. In fact, there are ways of getting things out there. But it is a whole other Pandora's Box that we just did not get to today.

DR. NIELSEN: I am Lis Nielsen from the National Institute on Aging. And actually I was going to address the question that was just asked a little bit. Talking about some funding opportunities that are out there already

that are really ripe for this group to exploit. We have an existing program announcement that seeks to pair researchers with community organizations. Julene Johnson has a grant from the NIA on that theme.

And I think the challenge really is making the connection. We do not have a facility for making those connections. Really it has to go both ways. But being exposed to these kinds of networks is important.

At the same time, my colleagues Bill Elwood and Deb Olster and others in the room are members of a large NIH wide basic behavioral and social sciences network called OppNet that has two funding announcements out right now. One is on multi-sensory processing and looks at processing across modalities, which was a theme that came up here. I think one of the key things while we focus on basic behavioral and social sciences research in OppNet we are interested in exploring basic processes within the context of interventions. There may be opportunities for leveraging that RFA for some of the research people are engaged in now.

And then Bill has led an initiative on culture, health, and well-being, which is really about forging networks to help develop science in very interdisciplinary areas. The NIH has a number of mechanisms that can promote science in these areas. Some of them may already be on the

books. I see Bill probably wants to comment a bit on the culture one. Investigator initiated ideas are very welcome in this area without very specific announcements. But I wanted people to be aware of those opportunities.

PARTICIPANT: Thanks Lis. In fact, I was very happy to see early on in the day that the 20 copies of the basic social and behavioral research on culture RFA flew off the table. This is a one-time offer. Operators will stand by until the middle of December to receive your applications. What is so exciting about this not just for practicality is that it is about bringing people together who never may have had an opportunity before to work together. That could actually include our therapists as well as transdisciplinary people. The RFA expressly includes language that arts and humanities disciplines are welcome so long as arts and humanities do not exceed -- since the focus on basic social and behavioral research, arts and humanities needs to be 49 percent or less.

PARTICIPANT: Thank you Jonathan. If you have never applied for federal grants before, you may want to start there early at grants.gov to register yourself and your area institution with -- Broad Street number and you will end up also creating yourself an NIH profile so you can follow your application through the entire submission and review process and get your summary statement which I

certainly hope would have a fundable score for you.

DR. IYENGAR: I did not mean to jump the queue, but I could not help to say that as part of this whole federal taskforce initiative on the arts and human development we very much send those kinds of announcements and promoting them to a broader community so people can email at fedtaskforce@arts.gov to learn about such things as we learn about them and make them available at the federal government.

One thing that Julene said yesterday though I think is really important in our closed meeting about communication between these different parties. I think you said this about the need to find better ways to get these people talking to each other in the language that they can understand and whether that means including -- I do not know if you want to comment on this, but bringing in statisticians, methodologists. I think you said some of this actually in your presentation -- on the research team so that they can mediate between these different parties.

PARTICIPANT: I am -- music therapist. I was curious since we are talking about expansion of services or greater integration of the arts into preexisting programming if any of the members of the taskforce or anyone else might know of any initiatives that are going to be implemented through the health care reform with regard

to looking at evidence-based practice or evidence basis for the types of programming that we are talking about today.

PARTICIPANT: Generally, you cannot talk about funding opportunities that are not announced yet. But in addition to anything that may be coming out of NIH -- point out that -- because very few people know about it at the moment, The Patient-Centered Outcomes Research Institute. I do not know if they have anything in the pipeline at all related to this. But PCORI as it is known here in DC has actually been rolling out funding opportunity announcements, some of which may or may not have a component there that would be handy. I only mentioned it because nobody knows to look. It is unfortunately yet another different grant submission system. Jump on the website to find out what you would have to do to get ready for that.

PARTICIPANT: This is a question for Art. Gene Cohen had this idea of the arts were for older people like chocolate for the brain. He theorized that the two spheres communicated more as people age. I guess the term is asymmetry. That is a pleasurable feeling and that older people experience that more. Is there any research that backs that up?

DR. KRAMER: I would suggest to take a look at some of Laura Carstensen's research and others. But what

Laura looks at is the change in the balance between maybe intellectually and occupationally driven kinds of pursuits that we do when we are younger and building our career. More importance placed on emotion and other kinds of factors, as we get older. It is interesting.

It is not always -- we talked about closeness to death being important in the way you behave. And there have been a few studies done that suggest that is true. We change our preferences and we change the way we behave, but it is not just due to aging because there are some studies done where people had chronic conditions. They might have been younger. They were closer to death. And they changed to a more emotional social lifestyle and then they recovered. And then they went back to their old style. It is not just aging. It is closeness to death seems to have implications.

But I would say look at Laura's research. Look at some of Margie's research. There are a number of people that bring the psychosocial to the cognitive to the emotional. There is research on the topic.

PARTICIPANT: I just wanted to say thank you. This has been a wonderful conference. And also I wanted to make a point that those of us who have walked the road as a caregiver with an individual who is expressing like we have been talking about. There is a spiritual aspect also that

comes to play as well. I think we are riding a very exciting cusp here between art, science, and the spiritual. Some folks in those fields probably would be interested as well in contributing to some of the research.

DR. REUBEN: Let me say a few summary comments. We have covered a lot of territory today. We heard about mechanisms early on. We heard a lot of different participants ranging from people who have specific diseases such as dementia, Alzheimer's disease to people who are healthier.

We heard a lot about interventions. We heard about interventions that ranged all the way from very active improvisational types of things, to choral, to group types of things, to more passive types of interventions and even aesthetic design- when what something looks like is an intervention.

Things that still need to be clarified. There are some soft spots about what type of intervention might work best or how different things compare for different populations. The doses. How much do you really need? The settings that interventions are best offered in.

Margie gave a wonderful review on design there and the kinds of design issues that need to be considered. Outcomes not only health outcomes, but cost outcomes and cost effectiveness types of outcomes and cost benefit

outcomes.

We talked about the barriers. Some of the things that did not come up so much today, but certainly came up some in the papers and in other literature is technology. The technology that is out there and the technology that is waiting to be developed. Much of the research did not have technology that is available today and won't be available until tomorrow and how technology can help both in the implementation of the arts, but also in the evaluation of programs and their effectiveness.

Other barriers included the paucity of the workforce in terms of the researchers who are actually going into this kind of research and ways to fund them. Also mentioned was the crosstalk between different kinds of disciplines. Those who are the content experts and those who are the research experts.

We did not talk a whole lot about scalability and fidelity. But what we are seeing mostly in research that was presented today are relatively small studies that if you are going to bring them out to the community or really generalize them to what it would take to bring them up to scale and to make sure that they were faithful to the original effective intervention.

And finally cost effectiveness. The whole idea of being beneficial and whether it is worthwhile to

implement these. Someone mentioned that there were a lot of programs that were implemented that did not have any evidence behind them. It kind of went by the wayside.

In closing I would like to just say a couple of things. One is that art as a route to successful aging is a lot like life. It is complicated and messy. I would like to encourage particularly those who were the sponsors of research and those also who are conducting the research is do not run away from the messy. It is really easy to do incremental types of differences.

When I first went into research, I sat across the table from a woman who is the project officer for a foundation. She had been getting grants for decades and decades and decades. She was giving me a young researcher some advice. She said there are two kinds of people who knock on my door. There are people who are very senior researchers who have long track records of great research. They want to study something that is a tiny incremental gain here. You have tremendous amount of confidence that they will get it done. And then there are people who come in with fantastic ideas and you have absolutely no confidence whatsoever they will get it done. We want to be somewhere in between those. We want to take some risks. We want to take the stuff that was presented today and the stuff that the people in this room are thinking about or

want to do next should be risky. It should be risky otherwise we are not going to move this field forward.

Although it is not within the funders mechanisms to do this without going through the peer review process, we as peer reviewers also have to be willing to take risk a little bit. And study sections are the most conservative people in the entire world. The idea is to really try to make those quantum leaps because if we are incremental we will be left behind. In conclusion, I would like to make some thank yous. First, Nancy Kirkendall who is just wonderful to work with as the administrative lead here and to Connie Citro from the National Academies of Science, Committee on National Statistics. A special thanks to Agnes Gaskin who did all the detail work and it was orchestrated perfectly. To the steering committee members, Sandra Crewe, Art Kramer, Nina Krause, Becca Levy, and Helga Noice.

Let me just say this was a dream team from my perspective. Everybody delivered on time and the products were really great. It was just a pleasure. Believe it or not we never met each other in person until yesterday and all this was done by conference calls and people doing their jobs.

Also, to the sponsors, all the "N's", NEA, NIA and NCAM and OBSSR which could be considered NIH. And

finally to all the speakers who stayed on time and gave very complementary and telling talks and the audience. The audience was great. Thank you. Safe travels and be well.

(Whereupon, at 5:12 p.m., the meeting adjourned.)