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Stress, Science, Saliva, and a Symphony



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Stress, Science, Saliva, and a Symphony

The Phoenix Symphony, Arizona's only full-time professional orchestra, places a high priority on enhancing the quality of civic life and engaging with communities through music outside the concert hall. The organization has had success with an education initiative that has shown positive results. Other grant-funded programs have focused on wellness and have brought live music to hospitals, homeless shelters, and specialized healthcare facilities. The case focuses in particular on the symphony's efforts to improve the lives of those suffering from Alzheimer's disease and related dementias. The Phoenix Symphony developed a consortium of research and health care partners. The group launched a pilot study intended to lower stress of patients and their caregivers through interventions of live music. Encouraging results have led to subsequent phases of the study. The symphony's management considers a host of questions concerning how the Alzheimer's program might expand.



This case study was prepared by Michael Alan Anderson, Associate Professor of Musicology at the Eastman School of Music. ***The Eastman Case Studies*** are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements or sources of primary data nor are they to serve as illustrations of effective or ineffective leadership or decision making. This case study is a collaboration of the League of American Orchestras and the Eastman School of Music.



People, Pets, then Arts

Founded in 1947, The Phoenix Symphony (TPS) had humble beginnings, offering concerts four times per year in a high school auditorium. Not only has TPS now established itself as Arizona's only full-time professional orchestra, it has also become the state's largest performing arts nonprofit organization. Playing over 200 concerts annually, TPS serves a wide cross-section of Phoenix's metropolitan population—more than 300,000 people each year. Part of the symphony's mission statement underscores an organizational commitment to providing “civic value” to the state of Arizona. Through its music, TPS endeavors to be a driver of Phoenix's local economy, a social magnet for the city, and a catalyst for a “creative workforce” among younger generations.

The board and management of TPS insist on the organization's integration into the community, and the symphony aims to become an asset to Phoenixians, whether they attend formal concerts or not. This forward-looking perspective for an arts organization of its size is carried out in a series of accessible and musical opportunities for diverse communities. A broad-based education and community outreach program reaches over 125,000 students, adults, and families every year in Phoenix. TPS has joined forces with 295 schools and community venues to share the gift of music and promote the spirit of true community. Other targeted community-based initiatives are beginning to hit stride and make deep impact.

The CEO of The Phoenix Symphony, Jim Ward, was appointed to his position in 2010 and brought experience strictly from the private sector. He saw many obstacles upon taking the reins of TPS, but also great upside. Jim viewed Phoenix as a vibrant, youthful city known for professional sports. This metropolitan energy was balanced by a glaringly low commitment to the arts in the state. Shallow support of the arts was further the result of the state's demography, which is partly made up of “snowbirds,” that is, those who reside in more northern states and live in Arizona

for only the coldest months of the year. Snowbirds represent some of the most promising patrons of the arts, but are spread thin with residences in at least two cities.

After his first year as CEO, Jim Ward summarized the Phoenix market with an aphorism: “People, Pets, then Arts.” What little philanthropic support comes from state government and corporations is foremost directed at human services, or assistance to help people's needs, whether it be in hospitals, correctional facilities, homeless shelters, family services, or related

institutions. Surprisingly, the second highest category of philanthropy is “pets,” an area which has contributed to improved animal welfare in Arizona. Remaining funding is given to projects and organizations in the arts. While TPS's mission places community development as a core objective, the organization competes for a small piece of the philanthropy pie available for the arts to advance these intentions. Ward needed to pivot the organization from being perceived as simply a provider of classical music at Symphony Hall to a full partner in the revitalization of Arizona by creating supporting programs outside of the concert hall that intersected with both the educational and health and services needs of the community.

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Mind over Music

Soon after his arrival at TPS, Jim Ward gathered together parties invested in community initiatives. A department of Education and Community Engagement would house these efforts and has been directed by Valerie Bontrager since 2014. Her office was small though: Valerie had only one manager beneath her and no staff beyond that, an arrangement that would burden any ambitious community undertaking.

Musicians of TPS, however, played a role in the conversation on civic engagement. The symphony has long promoted the well-being of its roster of performers and is committed to meeting the needs of its players. Jim discovered that many players find fulfillment in developing non-musical skills. As a result, non-compulsory seminars were organized to enrich members' experience with TPS. As it relates to community engagement in particular, musicians have expressed satisfaction at the idea of interacting with people young and old of the Phoenix community, apart from the concert hall. As Jim and his team saw it, the musicians have as much value outside Symphony Hall as they do on the concert stage.

With the funding landscape favoring human services and musicians showing interest in opportunities to connect with Phoenixians outside the traditional concert space, Jim proposed programs to meet these needs. Among them was an initiative in schools, not uncommon in arts organizations. TPS wanted to be different though, using music as a means to an end to teach core curriculum and not simply as a luxurious bonus in the school day. With support from

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nearly a dozen sponsors, TPS launched "Mind over Music" in 2012, an education initiative that moves well beyond the typical "in-school concert" model to which many symphonies have traditionally adhered. "Mind over Music" puts music directly into the service of STEM disciplines (Science, Technology, Engineering, and Math), where it has not customarily played a role. STEM subjects have received much attention both in education circles and at the

federal and state levels as areas of emphasis among students. In its current state, symphony players

in the "Mind over Music" program train alongside licensed teachers to develop custom plans to meet student needs, forgoing state curriculum guidelines. With specialized training, musicians and classroom instructors develop their plans from the ground up, designing lessons that draw on music to serve STEM-related goals. These teaching interventions are then evaluated through a longitudinal quantitative research metric aimed at measuring a myriad of analytics including logic, retention, vocabulary usage, test scores, state curriculum scoring, and overall knowledge of the STEM subject areas.

Over an academic year, musicians commit to a grade level and are paired with classroom teachers to develop collaborative lessons. Following a three-year pilot phase, musician-teacher pairs committed to ten joint lessons per year through the school year and to three professional development sessions, which covered the topics of STEM, collaboration, integration, and inquiry. At present, a mass of longitudinal data demonstrates the program's efficacy, which is tracked by external evaluators in the selected schools during the year. Current conversations have centered on whether low-performing schools should be a priority for the program, given the success of "Mind over Music." TPS is encouraged by the ongoing value of this ambitious initiative program and remains the only American orchestra to attempt it. The program represents a fundamental and surprising rethinking of how STEM subjects might be taught.

B-Sharp Music Wellness

Jim Ward approved additional programs for TPS that Valerie Bontrager and her Education and Community Engagement department have stewarded. With a generous grant from the Melani and Rob Walton Fund of The Walton Family Foundation, TPS was able to introduce "B-Sharp Music Wellness, a W.O.N.D.E.R. Project," a multifaceted program in music wellness intended to bring the healing and transformational power of live music from Symphony Hall specifically to people in hospitals, homeless shelters, and specialized

healthcare facilities. These programs are designed to impact everyone who is involved in them, from the target population and staff to TPS musicians.

In the “B-Sharp Music Wellness” partnerships geared toward local hospitals, players are invited to devise and perform a range of musical programs for patients, family members, and hospital staff. The hospitals initiative distinctly provides music where people receive care in contrast to reception areas. Live music thus becomes part of an integrated program of recovery within rehab spaces and healing areas. The “B-Sharp” initiative for the homeless involves five partner facilities in the Phoenix metropolitan area. Here, TPS’s primary goal is to provide music for individuals who may feel that they have no voice in their present circumstances. TPS finds that as those without homes connect with music, they may regain lost talents, confidence, and self-esteem. The artistic support is part of a larger program to create self-sufficiency in society.

The third and final prong of the “B-Sharp Music Wellness” involving specialized healthcare facilities has made an especially deep impact in Phoenix and with TPS musicians. While efforts began modestly as a series of “coffee concerts” specifically for patients with early onset Alzheimer’s disease and related dementias (ADRD) and their caregivers, the project quickly moved beyond these mere site visits and demonstrated the impact of musical intervention on Alzheimer’s and dementia patients. With added support from the Getty Foundation and a gift from the Twiford Family Foundation, this program grew to become the “Alzheimer’s Expansion Pilot Initiative,” in an effort to address one of the leading causes of death in the United States. Efficacy would be shown with the help of researchers who could provide qualitative and quantitative data measurement in the administration of the program.

Alzheimer’s Pilot Launch

Nationally, nearly one in three seniors die of Alzheimer’s

disease or another dementia. Arizonans in particular are hit hard each year. Deaths due to the disease have nearly doubled since 2000. The Arizona Department of Health Services estimates more than 170,000 Arizona seniors (about one in ten statewide) will suffer from Alzheimer’s by 2020. A projected 42% increase of cases expected among Arizona seniors (65+) by 2025 would put the state at the highest rate of increase in the country by far.¹ The need in the community for assistance with Alzheimer’s is thus deeper and more urgent than ever on many fronts.

Because of the pervasiveness of the disease, it was inevitable that Alzheimer’s would hit close to home at The Phoenix Symphony. CEO Jim Ward’s mother passed away from Alzheimer’s in 2002. The mother of associate concertmaster Maggie Martinic-Jercic was also afflicted with the disease and living in a nursing center in Virginia. Her daughter would visit regularly from Phoenix, bearing witness to her mother’s decline. Jim and his team posed a bold question: what could an American symphony do to affect treatment of ADRD?

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To answer this, TPS gathered a consortium of partners beginning with representatives from Huger Mercy Living Center, an assisted living facility in Phoenix that provides directed care for residents with Alzheimer’s disease and other dementias. The symphony also tapped researchers from Arizona State University’s College of Nursing and Health Innovation led by Dr. David Coon, as well as Dr. Eric Reiman of Banner Alzheimer’s Institute. The consortium confirmed that the symphony wasn’t going to cure Alzheimer’s, but that it might have a chance to impact in the quality of life of patients living with dementia. The researchers

¹ 2019 Alzheimer’s Disease Facts and Figures. <https://www.alz.org/media/Documents/alzheimers-facts-and-figures-2019-r.pdf>. Accessed 22 May 2019.

knew that a key factor in the quality of life of ADRD patients and the experience of their caregivers is the high level of stress this disease creates in care facilities. Anecdotally, one hears about how music can soothe patients, but researchers wanted to test if music could be scientifically shown to affect stress in ADRD sufferers and their surrounding environments. A review of the medical literature yielded a surprising dearth of statistical data on the relationship between music and stress levels in dementia. The consortium concluded that it would be a dramatic step forward if TPS could lead a study proving this vital relationship.

The working group designed a music intervention pilot project over a twelve-week period, which would take place at Huger Mercy Living Center and involve 48 of its patients. Data collection would not only concern those residents but also their caregivers, family, living center staff, and even the musicians themselves. Crucial to the program was finding ways to measure outcomes both quantitatively and qualitatively in order to demonstrate effectiveness. The objective, as stated by the researchers was to “develop, implement, and evaluate the feasibility, acceptability, and preliminary efficacy of a live music-based intervention protocol for residents with moderate to severe ADRD patients in assisted-living directed care.” The Alzheimer’s Expansion Pilot Initiative project was not simply centered around the enjoyment of music by residents at Huger Mercy Living Center but focused critically on the specific measurement of patient stress outcomes in light of participation by TPS musicians.

Program researchers and partners from TPS and Huger Mercy Living Center met regularly for well over a year to develop protocols for the Alzheimer’s Expansion Pilot Initiative based on focus groups in the study (caregivers, family, musicians, and Huger staff). Following music therapy interventions, researchers could measure the stress levels for all parties involved (musicians included) and stress “events” of patients. Most notably, TPS and researchers would incorporate

quantitative biomarker evaluations, utilizing saliva tests to measure the level of stress indicators—cortisol and alpha amylase—in the system of those subjects before and after the musical intervention. Something like this had never been done with an orchestra.

Affecting the stress levels could produce a host of positive outcomes, and other quality of life outcomes could likewise be measured. Family caregivers might expect less “on-call time” because their loved one is more compliant after involvement in TPS’s music therapy program. Staff at Huger might also look forward to directing their energies and workload differently if lower stress levels were achieved among residents.

Further outcomes of the study were laid out by the researchers in anticipation of the twelve-week study. They envisioned the establishment of a “forum to share common experiences and enjoyment.” Family members of the patients and caregivers could look forward to meaningful time together in a more relaxed atmosphere where the bonds of kinship could be reinforced. TPS musicians were an essential part of the investigation, but were limited in supply if the pilot were to expand significantly. Researchers envisioned that the players could eventually develop a template for families that would allow them and their caregivers to apply best practices in music therapy from the pilot program.

In the advent of the study, the research group refined the protocols and submitted the project to separate Internal Review Boards for improvement. Modifications to the study shortened the twelve-week testing period to six weeks and would require additional phases of the study. Dr. Coon and Dr. Robin Rio (from the ASU

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Music Therapy Clinic & School of Music) designed the protocols for TPS musicians to address patients' physical and mental challenges. These procedures involved an assessment of each resident in the study and recommended, goal-based activities emphasizing rhythmic movement, singing and vocalizing, improvisation, and verbal communication. Along with a test of residents' stress levels, these approaches would be evaluated using qualitative and quantitative data collection measures. From the researchers' perspective, this pilot project could inspire new methodologies, quantitative measures, and qualitative observations that would allow the program to expand and help treat the growing number of Arizonans afflicted with ADRD. The upside for The Phoenix Symphony was likewise clear. Successful efforts by its musicians in the pilot program would reflect positively on its community mission and could grow into a model for other musical arts organizations and music therapy around the world.

Intervention: Symphony and Saliva

The Phoenix Symphony has 66 full-time players who are eligible to participate in the Alzheimer's pilot study, and about one-third registered to assist, an auspicious sign of the member buy-in at the outset. The service work is outside the players' contract,

but would be compensated by grant funding, giving them supplemental income that they often seek as musicians. By offering players paid community service on its behalf, TPS is able to keep these talented individuals active "inside" the organization, fulfilling its community-oriented mission. Many musicians would otherwise entertain non-TPS side gigs. Musicians did not need to commit to all

weeks of the Alzheimer's study but were required to participate in 80% of the sessions offered with patients. Their work is not to be confused with that of music therapists, but the players are nonetheless informed by that discipline. (Professional music therapists require certification and clinical hours and are called to create individualized health treatment plans.) In the Alzheimer's pilot study, certified music therapists led part of the introductory training sessions. They also provided the musicians with observations about the ADRD patients and realistic expectations for the music interventions. Residents' reactions to music would inform the musicians as they plan repertoire and other engagements with these clients.

Preparation for the pilot study at the Huger Mercy Living Center involved meetings among TPS musicians, staff of the assisted living facility, and ASU researchers in early 2015. The ASU investigators scheduled two days of mandatory training for players and Huger staff, which included background lectures on ADRD, explanation of the research protocols, and basic concepts in music therapy. Another meeting in the run-up to the study reviewed protocol procedures and specific preparations for the first "anchor" event. Anchor events at Huger were concerts by TPS members at the beginning and end of the study and were to be attended by patients, their families, caregivers, and Huger staff. The first anchor event was also a moment to test the first biomarkers of stress through saliva samples. These stress levels were measured against what the Huger staff deemed as a "stressful events," usually an afternoon bath or shower.

One advantage of the Alzheimer's pilot study was the sample size. All 48 residents at Huger Mercy Living Center were eligible for the study, all at different stages of the disease. Dozens of family members and caregivers were associated with this test group. The assisted living center has four houses with Alzheimer's patients—twelve patients in each house. Each house would have a weekly music intervention with select members of TPS for the six weeks of the study.

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Interventions lasted 90 minutes, which included time for staff, musicians, and music therapists to hold discussion before the intervention and debrief.

Amid their responsibilities for the Alzheimer's program, TPS musicians were helping families connect in new ways through music. One caregiver requested from the players George Gershwin's "Embraceable You," to which he was able to dance with his wife and sing the lyrics to her. The song had deep meaning for the couple. As musicians orchestrated these kinds of breakthroughs, patients were growing attached to the players who visited them. Residents remarked about their anticipation of sessions with TPS members. Summoning positive musical memories was just the start. The researchers were encouraged by the impact that the interventions seemed to be having on the desired participant outcomes. But what boosted confidence further was the ability to measure results of the musicians' efforts quantitatively, in areas such as mood, stress, behavior, and perceived benefits.

On days with music intervention, researchers found that cortisol levels were stable compared to increased levels on "no music" days.

Following the first phase of the study at Huger, researchers analyzed the salivary cortisol (an indicator of stress) and other biomarker measurements. They found on days with music intervention that cortisol levels were stable compared to increased levels on "no music" days. For its part, Huger Mercy Living Center was able to report that its residents showed higher levels of

positive mood from the interventions and lower levels of distress. In the qualitative ratings assessment, patients were judged to be more cooperative and less contentious. Nurses rated the "environment" at Huger as more positive in terms of levels of resident cooperation and mood on the evenings when morning

musical interventions had taken place, compared to evenings that were not preceded by morning events. After some promising results from the pilot launch but with many questions remaining, researchers and TPS alike were ready for another phase of testing.

Maravilla and Beyond

As with all research, no test environment is perfect, but test results often initiate more questions for future investigation. Qualitative results self-reported by nurses at Huger, for example, would become a valuable measure to investigators and could be emphasized in future studies. The test environment itself was of a specific type and could be re-evaluated in an expansion of the initiative. Huger was a facility solely devoted to ADRD patients, and residents tended to be more affluent than what would be expected in a typical assisted living center. Further, the staff-to-patient ratio was high, and scheduled activities for residents and their family members were many. ASU researchers wondered if placing TPS musicians in a different environment would achieve similar results. In the second phase of the Alzheimer's program, the research protocols were brought to a more mainstream care facility and would include a more deliberate environment study. The Maravilla Care Center was selected as the site of the next investigative phase, in part because the conditions were markedly different than Huger. Maravilla tended to serve patients of lower economic backgrounds and often without the family network of support seen among Huger residents. Court-appointed conservators were not uncommon among Maravilla patients, and residents with ADRD were just a segment of a larger population at Maravilla who required long-term health care needs. Planned weekly activities for residents were also far fewer than those seen at Huger. In sum, ADRD residents at Maravilla were relatively disadvantaged compared to Huger clients. Researchers were curious if TPS musicians could still make inroads in reducing stress and creating a positive environment at the new care facility.

Results from a six-week study in 2016 at Maravilla were as promising as the first phase of research. The ASU team was able to show that music interventions carried similar positive results among not only patients but also caregivers and musicians. Dr. Marianna McCarthy, an associate professor in the College of Nursing and Health Innovation at Arizona State University, was herself genuinely moved when recounting the effect of TPS musicians on site. Patients would ask her and others when the musicians would be returning to Maravilla, even recalling the names of those who played music for them. McCarthy also noted that some residents would be sure to fix their hair and even put on makeup in anticipation of appearances by TPS members.

The gathering data was illuminating for those discerning its implications, including TPS. Scientists were at a point where they could report general findings to fellow researchers (**Appendix 1**). Days featuring music at Maravilla were accompanied by high levels of resident cooperation and overall mood of the unit. The number of patient accidents (e.g., falls), acute illnesses, and deaths (all termed “critical events”) also declined in the time of the study at the care center. Maravilla further witnessed decreases in disruptions (verbal or physical) during mealtimes and shift changes. It was conceivable that policy implications for the treatment of patients with ADRD residing in general long-term health care facilities might begin to form from

these encouraging results. With this environmental data analysis, TPS and researchers were hopeful that they could begin to demonstrate a reduction in costs to health care institutions following the interventions. Positive press was emerging as well, including among health care industry professionals (**Appendix 2**).

Policy implications for the treatment of ADRD patients in long-term health care facilities might begin to form from these encouraging results.

A third site for music interventions in Phoenix was afoot for 2018-19—Sunshine Village Care Community. This assisted living center was an 84-bed facility dedicated strictly to ADRD patients, similar to Huger. Sunshine Village is divided into seven houses, treating progressive stages of Alzheimer’s and dementia. The patient demographics at this facility struck a balance between those at Huger and Maravilla in terms of economic status and family involvement. These characteristics presented yet another critical data point for the expansion of the study with some new measurements of effectiveness following learning from Maravilla.

Research by Nature

While the research group awaits preliminary salivary results of stress levels and other environmental measures at Sunshine Village, all signs were encouraging in this third phase, giving the team a sense of momentum as further questions were raised in the course of the current study. TPS representatives were discovering the nature of the research process, to which many of them were unaccustomed. Investigative projects of this sort tend to be ongoing and progressive, not as finite as the symphony might have presumed at the outset. The researchers from ASU, the Arizona Alzheimer’s Consortium, and the Banner Alzheimer’s Institute thought these studies were moving quickly from stage to stage with positive results. While researchers were becoming more energized about both refining their questions and growing the data points in the study with these new phases, some TPS donors, who had supported the Alzheimer’s initiative from the pilot, were wondering when results would be unveiled from the study and when a grander scope of impact might materialize. Even musicians, who were subjects of the research, were wondering when results would become public. The release of a full set of data with topline conclusions was still a few years away.

No memory care facility could possibly yield a set of wide-ranging and conclusive results for scientists. But based on initial indications from the Alzheimer’s

The Phoenix Symphony realized that community-level music-based intervention was becoming more central to the organization than it could have imagined.

program, TPS itself realized that community-level music-based intervention was becoming more central to the organization than it could have imagined, and it was ready to consider the next leap. The symphony was on the cusp of something very powerful in Phoenix and indeed among symphony orchestras across the country: its players were on the front lines of meaningful

research that produced data-driven results to improve the quality of life of local residents. The refined protocols for care institutions in the study demonstrated that live music interventions could have great appeal and possible implementation on a broad scale. Preliminary data showed stress levels and critical events in decline in addition to affirmative environmental results among assisted living center staff, administration, families, and musicians who were involved. While researchers were eager to schedule additional studies to replicate the interventions in more facilities, the administration was considering how the symphony could maximize the effects of the program and improve even more lives of Arizonans.

ASU's lead investigator, Dr. David Coon, had begun to share some of the initial findings of the ADRD study. His presentations to the Gerontological Society of America in 2016 and 2017 were eye-opening for TPS administration and players to witness. There was statistical proof that customized music interventions were effective for ADRD patients and on many other fronts. With additional testing, care centers could reasonably expect reductions in cost if music interventions were scheduled and executed according to the protocols. Staff members observed in the study were spending less time on critical events and able to focus on quality care. Staff turnover was also down. Residents in these facilities were not only relieved

of some daily stress, but they were reported to be eating and sleeping better, contributing to overall well-being. With the arts long considered a lavish "add-on" in medical environments, TPS management was considering whether the case could be made that music in particular should be a core ingredient of care facilities from the outset.

Pressure Points

These positive signs generated internal pressure at TPS to advance the Alzheimer's program. Momentum needed to be sustained internally and among the members of the research consortium. Jim Ward imagined growth of this particular initiative, given its scientific, data-rich underpinning. Expansion of the program could be aided by federal funding in the form of a grant from the National Institutes of Health. With inspiring preliminary results of this research-backed program, an NIH grant could allow the program to scale upward while researchers continued to gather data to support the findings.

Personnel questions loomed with any proposed expansion. Participation by TPS musicians was not compulsory, though it was compensated. Valerie Bontrager estimated that it would be hard to expect a higher rate of participation among TPS players, given the commitment needed for the study. And further, the ADRD initiative was just a part of a larger B-Sharp Music Wellness effort at TPS. Sending musicians to a new assisted living facility or revisiting a former site could spread the organization too thin with its full-time players. Could other professional or even amateur musicians from Phoenix be trained to join the effort? TPS had unwittingly been cast as a gatekeeper of quality control for talent and protocol for ADRD patients, with all eyes fixed on Valerie's office under Jim's ultimate supervision.

TPS management also saw growth opportunities in other groups of underserved Phoenixians. If TPS's tailored music interventions could relieve patient stress, there were certainly other institutions that

If the symphony's tailored music interventions could relieve patient stress, other institutions could benefit.

could benefit. For example, end-of-life care is a major area where tensions may run high. Without a research apparatus in place, TPS struck an agreement with a local hospice care center in Phoenix, where musicians will create performances for patients similar to ones they were trained to do for ADRD patients. There have even been discussions about developing partnerships with sections of hospitals with terminally ill children or in oncology units, for example. No longer are the performers just playing sets in a lobby; they are providing flexible programming to suit resident needs. Care centers for veterans have also been mentioned by senior management as a possible target for music intervention. The growth will have its limits in practice if not in theory.

In preparation for a meeting with musician representatives of The Phoenix Symphony, Jim has asked Valerie to draft a set of near-term strategic recommendations for the organization's community

engagement initiatives. She has a rewarding story to tell, of which musicians have already been an integral part. But many questions remain about the direction of the flourishing Alzheimer's program. The parties involved have different goals, and it falls on management to uphold the enthusiasm among these groups for continued success of the program, in the absence of an NIH grant.

TPS is pleased, however, that musicians are enmeshed in both community outreach and scientific research. Jim hopes institutions will also recognize the power of these community engagement programs and will want to participate or even lead them. How can expansion of the Alzheimer's program take place under the current conditions? What role will research play if programs expand? Who should ultimately support these promising initiatives? From her director position in a department of two, Valerie also wonders: who will manage these programs?

APPENDIX 1

Executive Summary of Phase 2 research on the Live Music-Based Intervention for Long-Term Care Residents with Alzheimer's Disease and Related Dementias at Maravilla Care Center

David W. Coon, PhD, Marianne McCarthy, PhD, RN, Robin Rio, MA, MT-BC, MSHA, Michael Todd, PhD, Valerie Bontrager, and Mary Burleson, PhD

Overall Goal of the Collaborative Project

Develop, implement, and evaluate the feasibility, acceptability, and preliminary efficacy of a music-based intervention protocol for residents with moderate to severe Alzheimer's disease and related dementias (ADRD) residing in assisted-living directed care.

Program/Intervention Development/Planning Period

The intervention was developed from the research team's experience and data from five focus groups with family caregivers, long-term care staff, and symphony musicians. Analyses revealed several key themes that were shared by all three types of participants: music as a "key to unlock the memory door", "a portal" and "a time stamp"; music as a shared experience and vital communication tool across dementia's trajectory; and music improves quality of life, even at the end of life. However, participant role (family caregiver, staff, and musician) also revealed several contrasts: Staff sang to help manage challenging personal care tasks; family members unwittingly constricted music selection based on their loved ones' past preferences; and, musicians raised questions/concerns about effective interactions with residents. All of these themes helped guide the design of the project's intervention.

During this period, a model emerged to guide the intervention protocol. This model incorporated 3 parameters to help distinguish delivery of the music-based contacts across the intervention: (a) residents' involvement moved from receptive to active participation; (b) programs changed from very planned to more improvisational, incorporating residents' requests; and (c) musician interactions with residents transformed from observations to relationships/connections.

Ultimately, the intervention was designed as a series of community-wide music-based events. These 7 events were delivered in 6 weeks across 3 intervention phases that moved along the model's 3 parameters. Opening & Closing events involved all residents, musicians, interested family caregivers, and available staff. Teams of 4-5 musicians and a music therapist or music therapy graduate student provided the remaining 5 events between the Opening and Closing. The residents were organized into different groups categorized by level of dementia. The research team also selected standardized measures to characterize the intervention program's participants. Measures were also developed to capture changes in participant affect and behavior as a result of the intervention, as well as perceptions of benefit from program participation. Investigators also collected participant saliva samples to investigate the intervention's impact on biomarkers of stress (salivary alpha-amylase and cortisol).

Alpha amylase is activated during behavioral arousal, whether positive (e.g., joy or happiness) or negative (e.g., anger or stress). Elevations in cortisol are often associated with negative events. Nurses rated resident affect and behavior before and after each event while symphony musicians, facility staff, and family caregivers provided similar self-ratings.

To date, the program's intervention has been offered in two distinct long-term care facilities: one with a highly enriched activity-based environment serving middle and higher income residents and the other in a facility focused on serving low-income, underserved residents.

Intervention Implementation Period

In both facilities, significant positive changes were found in resident mood and behavior ratings, particularly with regard to increases in positive energetic mood (happy, cheerful). This was especially true for participants from the facility serving low-income, underserved residents. Musicians reported even greater levels of change than residents in both facilities.

Musicians and the residents living in the more activity-rich environment with middle and higher income residents also reported increases in behavioral activation as measured by salivary alpha-amylase. These findings mirrored the changes in positive energetic mood reported in both musicians and those residents. Increases in behavioral activation as measured by salivary alpha-amylase were not found residents from the low-income, underserved facility. However, these residents had significantly higher levels of functional impairment and lower levels of overall quality of life indicators than those residing in the higher income activity-rich facility and may account for those differences.

Results from a sub-study using salivary cortisol suggested that morning music events may have enabled residents in both facilities to better regulate their stress responses around an afternoon stressor (i.e., bathing). And, musicians, family caregivers, nurses, and other facility staff rated the acceptability and perceived benefit of the intervention for themselves and the residents very positively.

Staff reports from the middle and higher income activity-rich facility encouraged the development of an environmental rating scale to capture changes in the milieu. Nurse ratings of environmental factors in the low-income facility were significantly more positive on evenings when morning music events occurred versus those without morning music events. These factors included levels of verbal and physical disruption at change of shift and dinnertime; resident cooperation during evening care; overall mood of the unit; and, number of critical events such as falls, acute illness, deaths, staff shortages.

In sum, project results and lessons learned support the project's conceptual model integrating three key parameters (receptive to active; observation to relationship; and planned to improvisation) that bridge science and practice and hold policy implications for the importance of community-level music-based interventions in long-term care.

Next Steps

The evidence for this community-level music-based intervention continues to grow and is extremely promising; however, additional research is warranted. While we offered the intervention programs to all residents in the facilities, we were able to obtain consents from the durable powers of attorney for only 64 residents across the two facilities. Moreover, the sub-study with afternoon bathers involved slightly fewer than half of those residents. Additional research is needed to help replicate the intervention program in similar facilities as well as in those that lie in the “middle.” Next steps could also expand to other underserved, but well-deserving populations such as facilities serving our veterans.

APPENDIX 2

Article from *Provider Magazine* (April 2017)

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RESEARCH PROJECT TAKES PERSONAL TURN *for* PHOENIX SYMPHONY

Patrick Connoles

The words symphony and saliva testing are not usually found in the same sentence. But through an innovative research project by Arizona State University (ASU) in conjunction with the Maravilla Care Center and the Phoenix Symphony, they do go together.

By bringing music—from Neil Diamond's "Sweet Caroline" to classical compositions—to the Phoenix-based nursing care center's patients with Alzheimer's disease (AD), or neighbors, as Maravilla calls residents, researchers are learning how the power of the symphony's playing affects persons with cognitive and behavioral impairments.

And to do this, saliva testing is performed to compare anxiety levels of selected neighbors when listening to the music versus their most stressful regular activity: bathing.

A COMMUNITY EXPERIMENT

David Coon, PhD, associate dean and professor of nursing and health innovation at ASU, says the question driving the research is clear.

"What is the impact of a community-level, music-based intervention offered by an interdisciplinary team (symphony musicians, music therapists, nurses, and behavioral scientists) on the mood and behavior of residents with dementia residing in long term care communities?" he says. "Is such an approach feasible for and acceptable to the community?"

Initial results of nurse ratings suggest there have been positive changes in resident mood (for example, increases in positive affect) and behavior (increases in interaction).

Nurse ratings of the environment in the evenings during baths, on the days that morning music events had occurred, "were more positive in terms of levels of resident cooperation and mood, in comparison to evenings without morning music events," Coon says.

"Finally, the intervention was rated highly by musicians, facility staff, and family caregivers in terms of its overall benefit to residents and themselves."

SYMPHONY REACHES OUT

Jim Ward, president and chief executive officer (CEO) of The Phoenix Symphony Association and a key proponent of the program, says the idea to bring musicians to the nursing care center went hand in hand with the organization's mission, which is in part to give back to the community and align the symphony's needs with the needs of the community.

The fact that Arizona has a healthy number of elderly residents helped point the symphony to the nursing care setting, and specifically to the AD community.

"One of the key issues around AD is quality of life. And the key driver for quality of life is stress levels, not only the stress level of patients themselves but also of the caregivers of the facilities who have the difficult task of dealing with AD and family members who are going through the grieving process because of the loss," Ward says.

"So we asked, is there a way that we could affect those stress levels and enhance quality of life?"

And a program was born.

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NURSING CENTER WELCOMES THE RESEARCH

But to make the Phoenix Symphony's outreach come to life, a willing nursing center was needed, and in Maravilla, under the stewardship of CEO Jeffreys Barrett, they found one.

Barrett says the ASU research team, working with the symphony, approached him about its effort to look at music and memory by utilizing not only standard research protocols of observation, but also through the saliva testing procedures as they relate to stressors in the brain. "And what this also took us into wasn't just the encounters with the musicians but also

bathing. Now, how could bathing potentially be looked at from a music standpoint? Well, it is an intriguing program," Barrett says.

To explain further, he notes that the program, which concluded in December, started with a concert for the entire Maravilla community, followed by seven encounters lasting around 30 minutes, matching musicians with smaller subsets of neighbors with AD.

HOW PROGRAM PLAYED OUT

"We broke the musicians into two groups, and we broke our neighbors down into groups, so the musicians and the neighbors



Ward

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were assigned to each other over the next seven Mondays," he says. The saliva measurements took place following the seven encounters, and were compared with levels taken separately following a neighbor's regular bathing.

STAFF HELP RESEARCHERS

To prepare for the events, facility staff also took preparations. "Several of our [certified nurse assistants] went through training to be research assistants, as well as our licensed nurses. So the entire intent was to see music and memory and throw it in on how it all relates to bathing," Barrett says.

Valerie Bontrager, director of education and community engagement for the Phoenix Symphony, says Maravilla actually marked the second round of collecting research, with the first round happening at another facility. "But we needed to look at a larger group of data to verify some of the initial findings," she says.

Bontrager notes that the ASU team also included the musicians in the research by taking their saliva measurements as well to collect data on how performing outside of the regular symphony space and in the community impacted them.

"Some really interesting larger questions started to emerge," she says, like how does a symphony and art community provide information for other art communities and other long term care facilities.

MUSICIANS, NEIGHBORS FORM BONDS

To get ready for the experience at Maravilla, Bontrager says, the 20 musicians selected went through mandatory training on AD and dementia and the specifics of the research. "We did these interventions on Mondays because those are the dark days for our musicians. It is the only day they are not scheduled for their regular rehearsal and bigger concert contracts," she says. "So, they are opting to do this project on their own time and on a day off."

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And in doing so, in going to Maravilla, something more than research took place, Barrett says, as the entire community of musicians and their matched AD neighbors formed not only a bond via the research, but also personal connections.

"They made close attachments to neighbors," he says, and in turn the neighbors also are now missing their new friends. "One of the most amazing developments was the relationships that were built over this period of time. The musicians developed relationships with special and unique people and crossed that bridge of humanness that is very often overlooked in our profession," Barrett says.

The nursing care center profession, he explains, is seen as something less than what it is. "And when you have a group come in like the Phoenix Symphony, it validates processes as well. And celebrates work and what we do as a profession," Barrett adds. ■





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