Play products for children with special needs

BEAMZ
Beamz Interactive Inc.

Beamz is an interactive music system that is played by interrupting up to four laser beams with your hands creating up to 12 different sounds of instruments, music clips and vocals. The Beamz system includes Bluetooth technology that wirelessly connects one Apple device to the Beamz player at a time. After downloading the free Beamz Interactive app through iTunes, the Apple device becomes the speakers of the Beamz Player. The Bluetooth technology allows for greater accessibility during play. All ages and abilities can easily play together or independently to make music through laser beams! A music background is not required to play the Beamz. The Beamz includes a FREE downloadable Sample Family Activity Guide at www.thebeamz.com. Beamz is a hardware and software solution. Software download instructions are provided for Windows, Mac and iOS systems. When using a Mac or Windows device, Beamz connects to the computer via a USB cord. When using iOS, Beamz connects via Bluetooth and power is sourced directly from the outlet.

Features and Benefits:

- Durable
- Auditorily Stimulating
- Visually Stimulating
- Wide Age Range
- Inviting Due to Uniqueness
- Open-Ended
- Innovative
- Wide Range Volume Control
- Independent Activity
- Group Activity
- Provides Auditory Cues
- Provides Visual Cues
- Hands-On Approach to Learning
- Includes Activity Guide
- One-Piece Unit
- Game Variations

Developmental Processes Promoted:

- Visual Attention
- Visual Tracking
- Auditory Attention
- Visual Processing
- Auditory Processing
- Sound Imitation
- Cause and Effect
- Eye-Hand Coordination
- Reaching/Arm Extension
- Functional Finger Movement & Exploration
- Social Interaction
- Coordinated Movement
- Motor Planning
- Creativity
- Bilateral Coordination
- Strategic Thinking

"The Bluetooth technology feature makes the Beamz player so accessible! My son has cerebral palsy and the iPad used as the interface and speakers make the Beamz player ultra-convenient for portability and positioning purposes." *–Karina A., Mother of 5 year old Felipe with cerebral palsy*

"Beamz has provided our Lekotek families with a new way to interact with music! The Bluetooth technology helps us engage more kids of all abilities through music in our family play sessions and play groups." *–Hayley A., CTRS (Certified Therapeutic Recreation Specialist) & Family Play Specialist, National Lekotek Center, Chicago, IL*

Physical

Description

- The Beamz offers opportunities for many levels of play- beginner, intermediate, advanced play and beyond. The child can start playing the Beamz through free exploration and move on to creating and recording his own music.
- The Beamz provides a large margin of error as children can be successful making music with any voluntary or involuntary movement through the large laser beam openings on the Beamz player.
- Moving to the rhythm of the Beamz sounds can encourage large muscle movements.
- The Beamz can be played in different positions for successful play. It can be placed horizontally, vertically, upside down, etc. for optimal positioning for individual needs by caregivers holding the Beamz player or mounting the player to different surfaces.
- The Beamz player is durable for strong, unrefined movements.
- The Beamz provides many options for play: Beamz player, mouse, touch screen computer (if applicable), Apple device and through the keyboard shortcuts created by the Beamz.
- The Beamz Bluetooth technology offers many options for accessibility through play. A child does not have to access the computer to play. The Apple device becomes the speakers and interface to operate the Beamz player and make music.
- The Bluetooth technology offers more capabilities with positioning during play. The Apple device is wireless and the Beamz Player includes a long cord so that a child can sit where it is most conducive to play and not be connected to the computer.
- The Beamz Family Play Guide includes 10 activities that stimulate and encourage physical development. A free sample of the Beamz Family Play Guide with 4 activities is downloadable at www.thebeamz.com.

Skills

- Using the mouse to select and play the laser beams on the computer assist children with isolated finger movements and eye hand coordination.
- When using songs like “Old MacDonald”, the child must swipe the laser beam when it is time to include an animal in the song.
- This will encourage coordinated and cooperative hand movements.
- Encourage vocalizations while playing the Beamz. Pick out sound effects for the child to mimic. For example, the child can mimic sounds from the song, “That’s a Rap” like “yeah” or “uh.”
- Children may enhance fine motor skills when isolating one finger to “pluck” the laser beams in the air. This strengthens fine motor skills used for dressing, eating, writing and etc.
- Children may enhance motor planning skills when playing the Beamz.
- Eye-hand coordination is promoted as children watch the lasers move on the computer screen or iOS device when crossing the lasers on the Beamz Player.
- Reaching and arm extension are promoted as children can reach out to swipe a laser beam to play.
- Child can learn to “swap” out different instruments using the Beamz player by pushing the buttons that coordinate with the computer or iOS screen on the Beamz Player to rotate the vocals, sounds and instruments.

Physical Continued...

Play Ideas

- Swipe the laser beams using other body parts like your foot, elbow or forehead.
- Play a game of follow the leader. The leader can play a sound on the laser beams and then others can mimic the sound.
- Encourage a child to engage in her non-dominant side. For example, only use only her left hand for the left side beams and only her right hand for the right side beams instead of only using her dominant hand. This will strengthen a child's weaker side and promote bilateral coordination.
- Have two children play the Beamz Player. One child can be responsible for the playing the left side beams and the other child can be in charge of playing the right side beams.

Adaptations

- Use strong double-sided mounting tape, Velcro or mounting brackets to modify the position of the Beamz for play.
- Use a ruler or pointer to assist a child with reach when swiping the laser beams. Children who have tight muscles or limited range of motion may benefit from this.

Sensory

Description

- The Beamz is auditorily stimulating with a variety of songs, sound effects, and vocals that vary from popular radio hits to classics and kids' songs.
- The Beamz is visually appealing with a contemporary style and innovative design.
- The Beamz can be used to introduce different tones, chords and sounds to children.
- Child can activate the Beamz Player by interrupting the laser beams with his hands, using the mouse or using a touch screen computer or tapping the Apple device screen to play.
- Each song has 12 different musical instruments or sound effects, a background track, to hear and explore. Some songs have video, vocal and karaoke lyric accompaniment.
- The Beamz provides a wide volume range. Note: the volume is controlled by your computer or Apple device. Sound is projected from the speakers of those devices.
- The Beamz' screen has a black background and uses bright green and bright purple colors which highly contrast to show when you are playing a laser beam and when it is silent.
- The Beamz provides many options for play: Beamz player, mouse, touch screen computer (if applicable), Apple device and through the keyboard shortcuts created by the Beamz.
- The Beamz Family Play Guide includes 10 activities that stimulate and encourage sensory development. A free sample of the Beamz Family Play Guide with 4 activities is downloadable at www.thebeamz.com.

Skills

- When using songs like "Old MacDonald" in the Family Bundle, the child must swipe the laser beam when it is time to include an animal for the songs. This will encourage auditory processing and attention.
- Children may enhance motor planning skills when playing the Beamz.
- Children may enhance fine motor skills when isolating one finger to "pluck" the laser beams through the air. This strengthens fine motor skills used for dressing, eating, writing, and etc.
- Music is an avenue to express individual creativity. Children can use the Beamz to express themselves.
- Auditory processing is a part of play when children cross the laser beams on the Beamz Player and listen to the response.
- Visual processing and tracking can be enhanced when the child is interacting with the Beamz Player using an iOS device as the speakers. Crossing the laser beams on the Beamz Player triggers a visual response on the screen.

Sensory Continued...

Play Ideas

- A caregiver can play different instruments on the Beamz and have the child guess which instruments he hears and vice versa.
- Encourage the child to explore the different features on the Beamz like changing the tempo of the instruments, vocals and sound effects which can assist in auditory attention and processing. *Caution: Be sensitive to over-stimulation.*
- Have the child record her own song to share with family and friends.
- If you have access to traditional instruments like a guitar, a caregiver can play the guitar while the child plays the Beamz (and vice versa) to compare the different sounds.

Adaptation Ideas

- Using the Beamz player and computer screen or using the Beamz player and Apple device can be overwhelming to take in at once. Provide focus by paring down the interfaces. For example, only use the computer or only use the iPad to play and explore the Beamz software or app until the child is ready to move on to multiple paired devices for children who are easily over-stimulated, reduce the number of sounds you present and/or turn off the background rhythm. Gradually increase the sounds as a child's ability and frustration levels permit.
- Play a music video/YouTube video or theme song to child's favorite cartoon on the computer screen instead of the Beamz player. She can use the Beamz Player to play along.

Cognitive

Description

- The Beamz is visually appealing with a contemporary style and innovative design.
- Creating music through the Beamz system is an inclusive activity that children with and without disabilities can enjoy together.
- The Beamz allows for open-ended play; there is no right or wrong way to play and there are an infinite number of ways to create music.
- The Beamz offers opportunities for many levels of play- beginner, intermediate, advanced play and beyond. The child can start playing the Beamz through free exploration and move on to creating and recording his own music.
- Play duration can be altered according to a child's needs.
- Child can use the Beamz to express himself in many different facets as music is a way to express individual creativity.
- Music and creativity through instruments (even via an interface) can help children express and release anger and frustration.
- The Beamz allows you to play all instruments, create your own masterpieces and even record them for future enjoyment. There are infinite ways to play with the Beamz.
- Each song has 12 different musical instruments or sound effects, a background track, to hear and explore. Some songs have video, vocal and karaoke lyric accompaniment.
- The Beamz Family Play Guide includes 10 activities that stimulate and encourage cognitive development. A free sample of the Beamz Family Play Guide with 4 activities is downloadable at www.thebeamz.com.

Cognitive continued

Skills

- Beamz encourages imagination through the genres of music, band or world famous musicians in the Beamz Family song bundle and the song videos available to watch.
- Cause and effect learning takes place as children swipe the laser beams and hear an immediate response.
- Locational learning takes place as children play the Beamz player and locate the sounds coming from the iOS device.
- When using songs from the Family Bundle such as, "DJ Sampler," the child can cross the laser beam on the Beamz player or tap the iPad "beat box" laser along to the beat of the rhythm playing. This will encourage auditory attention and sequential thought processing. *This works best with songs that have sounds, vocals or instruments with 1/16 notes.*
- The Beamz can assist with pre-literacy skills and word association when the child hears the vocals, instruments and sound effects made through the laser beams and sees the written sound on the computer or iPad screen. For example, the song "Super Freak-Jam" shows the words "Superfreak" and "Ohs" on the screen. When the laser beam is crossed, the vocals play.
- The Beamz may heighten a child's self-esteem when she makes and records her own creation and can proudly play it back for herself and others or send the recording to others via email.

Play Ideas

- Download the free Family Sample Guide at www.thebeamz.com or purchase the full guide for more play ideas.
- Children can be encouraged to pretend that they are in a band or are a music teacher.
- Children can have a sing-a-long using the Beamz.
- To encourage listening, memory and recall skills swipe the laser beams and have the child copy that same pattern. Take turns so the child has an opportunity to create a pattern for you.
- Incorporate math during play by dividing and counting out the beats in the song rhythms- "1 and a 2 and a."
- Find a book from the library or online with sheet music on the drums or a woodwind instrument and try to play the songs using the lasers on the Beamz.
- If you have access to traditional instruments like a guitar, a caregiver can play the guitar while the child plays the Beamz (and vice versa) to compare the different sounds.
- Find household items that sound like the different sounds of the laser beams. Play along to the rhythms using nontraditional instruments.
- Look up YouTube video versions of the family bundle songs, copy or add dance moves to inspire fine arts.

Adaptations

- The Beamz player and computer screen or Beamz player and Apple device can be overwhelming to take in at once. Provide focus by paring down the interfaces. For example, only use the computer or only use the iOS to play and explore the Beamz until the child is ready to move on to multiple devices.
- When using the computer to interact with the Beamz player, lock the computer, turn on the screen saver or display a picture on the desktop that would not distract the child from play. Note: The Beamz must be connected to a computer when using this adaptation idea.
- For children who are easily over-stimulated, reduce the number of sounds you present and/or turn off the background rhythm. Gradually increase the sounds as a child's ability and frustration levels permit.

Communicative

Description

- The Beamz may encourage social interactions through music and singing.
- The Beamz allows for open-ended play; there is no right or wrong way to play.
- Play duration can be altered according to a child's needs.
- Music and creativity through instruments (even via an interface) can help children express and release anger and frustration.
- Music is an avenue for a child to express himself through creativity and song- the Beamz has many features to create and record songs included in the Beamz Family Bundle.
- Parallel, interactive and cooperative play can all be encouraged when using the Beamz.
- When playing rhythms on the songs in the Family Bundle, songs will loop until you turn off the rhythm.
- Some of the songs in the Family Bundle like "Splish Splash" include lyrics to follow along when interacting with the Beamz system.
- The Beamz Family Play Guide includes 10 activities that stimulate and encourage communicative development. A free sample of the Beamz Family Play Guide with 4 activities is downloadable at www.thebeamz.com.

Skills

- The Beamz can assist with pre-literacy skills and word association when the child hears the vocals, instruments, and sound effects made through the laser beams and see the written sound on the computer or iPad screen.
- Encourage vocalizations while playing the Beamz. Pick out sound effects for the child to mimic. For example, the child can mimic sounds from the song, "That's a Rap" like "yeah" or "uh."
- Pretend play can be a part of the Beamz as children pretend to be in a rock band or pretend to be a famous musician.
- The Beamz can help children develop and strengthen auditory processing when children cross the lasers on the Beamz Player and hear the sound on the computer or iOS device.
- Following auditory directions is reinforced during play when watching the visual aid tutorial videos on the computer.
- Using a touch screen computer or the mouse helps directly connect the action on the screen and the child's response. This can help reinforce cause and effect learning.

Play Ideas

- Find a child's favorite song or a theme song to his favorite television show on YouTube to play on the computer (instead of using the Beamz on the computer screen) and accompany the song using the instruments, sound effects and vocals on the Beamz. **Note: This play idea does not work when using an Apple device. The app must be open on the screen.*
- Create a "jam session" and have the child dance and sing while playing the Beamz with family and friends. The Beamz is big enough for multiple people to create music at the same time!
- Have the child record her own song creation to wish someone a happy birthday or send them a greeting through song vocals and/or sound effects via the Beamz recording device via email or share in person.
- Encourage children to mimic the sounds they hear through the Beamz songs, sound effects and vocals.
- Verbally ask the child to play a specific laser beam (ie: tom drums) and then have him ask you to play a specific laser beam instrument.
- Have the child create his own personal playlist on the Beamz so that all of his favorite music is easily accessible to play and share.
- Have two children play the Beamz Player. One child can be responsible for the playing the left side beams and the other child can be in charge of playing the right side beams.
- A caregiver can video record a child playing with the Beamz and replay it back to him to increase awareness of his vocals and oral movements.
- A caregiver can have the child read the Family Play Guide activity (free sample guide or full guide) instructions and explain how to play a game to others.

Communicative Continued...

Adaptations

- Using the Beamz player and computer screen or using the Beamz player and Apple device can be overwhelming to take in at once. Provide focus by paring down the interfaces. For example, only use the computer or only use the iPad to play and explore the Beamz software or app until the child is ready to move on to multiple paired devices.
- When using the computer to interact with the Beamz player, lock the computer, turn on the screen saver or display a picture on the desktop that would not distract the child from play. Note: The Beamz must be connected to a computer when using this adaptation idea.
- For children who are easily over-stimulated, reduce the number of sounds you present and/or turn off the background rhythm. Gradually increase the sounds as a child's ability and frustration levels permit.

Social/Emotional

Description

- The Beamz allows for open-ended play; there is no right or wrong way to play and there are an infinite number of ways to create music.
- The Beamz offers freedom to explore and create music allowing the child to be independent with choices and length of play.
- The Beamz Family Play Guide includes 10 activities that stimulate and encourage social/emotional development. A free sample of the Beamz Family Play Guide with 4 activities is downloadable at www.thebeamz.com.
- Play duration can be altered according to a child's needs.
- Child can use the Beamz to express himself in many different facets as music is a way to express individual creativity.
- Music and creativity through instruments (even via an interface) can help children express and release anger and frustration.
- The Beamz may encourage social interactions through music and singing.
- The Beamz provides a large margin of error as a child can be successful making music in any fashion by interrupting the laser beams with her hands.
- Beamz can be played independently or shared with others.
- Rhythms are automatically looped/repeated giving a child further time to hear, see and retain the song and beats for future recollection.
- Playing the Beamz can be made as simple or elaborate as a child's ability and frustration levels permit.

Skills

- The Beamz may heighten a child's self-esteem when she makes and records her own creation and can proudly play it back for herself and others or send the recording via email.
- Music is an avenue to express individual creativity. Children can use the Beamz to express themselves.
- Cooperative play can encourage turn taking, sharing and social skills.
- Beamz encourages exploration and discovery allowing kids to build confidence while learning.
- Precision, patience and response time can be enhanced by using the Simon Says feature on the computer. The child must repeat back the rhythms played.
- Children can become more self-aware of how they act and react to others when playing music together.
- Interacting through the Beamz Player with others promotes spatial awareness.

Play Ideas

- Have the child record her own song creation to wish someone a happy birthday or send them a greeting through song vocals and/or sound effects via the Beamz recording device via email or share in person.
- Have two children play the Beamz Player. One child can be responsible for the playing the left side beams and the other child can be in charge of playing the right side beams.
- Have the child create his own personal "moods" playlists on the Beamz so that all of his favorite music is easily accessible to play when feeling different emotions.

BEAMZ & MUSIC BENEFITS IN VARIOUS APPLICATIONS

Memory Care
An important element of a Memory Care program in assisted living and senior care communities is the use of sensory-based programming with the aim to help residents function at the highest level possible for as long as possible. Beamz and active music making is ideally suited for seniors up to stage 5 dementia (moderately severe cognitive decline / “mid-stage” dementia) for mental functioning improvement and maintenance.

Incorporating music cognitive activities at early dementia stages (stage 1 to stage 3) can have a greater impact to the improvement mental functioning.

Beamz: Contributing To Maintaining Highest Level Of Function
Beamz music making activities focus on short, achievable goals given its recreational music making orientation of interactive songs; there are no specific technical skills required, no music theory, no music reading to experience the benefits of interacting with music. Beamz may be used by multiple professionals providing care across professional disciplines including activities professionals, dementia care specialists and therapists.

Brain Fitness
Music in of itself contributes to brain fitness given that the brain uses both hemispheres to process just the listening of music. Interacting with and/or making music utilizes critical cognitive skills for overall brain health: focus, sequencing and concentration. Structured activities with the Beamz additionally also include elements specifically for working on problem solving and memory skill building.

Music Making & Beamz
Music is a great means to spark interest with patients and residents, which creates engagement, then motivation to complete brain fitness activities for cognition, which is an important element of memory care programs.

Music is an enjoyable activity for most people – and combining movement and interaction and/or creation of music provides even greater benefits. Music also naturally promotes increased socialization and may prevent isolation and depression.

Using laser beams as the “trigger” means for making music enables Beamz to be used with patients and residents of varying physical skills. Without requiring tactile feel or pressure to make the music, Beamz is an effective low intensity therapy/intervention device – and the actions controlled by the buttons are responsive and soft to touch.

Physiological effects of a technology-based music-making program in skilled nursing residents

Brigid Lyons, BS, CTRS
Rhonda Nelson, PhD, CTRS
Pei-Chun Hsieh, PhD, CTRS

Abstract

This study evaluated the effectiveness of a technology-based music-making intervention (the Beamz) in elevating heart rate and producing a relaxation response in skilled nursing home residents. Using a quasi-experimental counterbalanced design, results indicated that this brief intervention produced a statistically significant elevation in heart rate and systolic blood pressure when played at a fast tempo. Heart rate was also significantly elevated when slow tempo music was used. In addition, participants reported a statistically lower level of relaxation following the slow tempo session and expressed that they found this new activity intervention enjoyable. Implications of findings and future research possibilities using technology-based music-making interventions in recreation therapy practice are discussed.

Key words: Beamz, geriatrics, music, older adults, physical activity, relaxation, skilled nursing, technology, therapeutic recreation

Introduction

According to a recent report by the Centers for Disease Control and Prevention, there are approximately 1.5 million Americans residing in skilled nursing facilities.[1] Of these individuals, most have at least one chronic health condition, with an increasing number of older adults experiencing multiple chronic conditions. Additionally, research has found that most nursing home residents spend the majority of their time sitting idle with little to do.[2] As previous studies have clearly established the negative association between a sedentary lifestyle and health outcomes,[3] the need to identify interventions that can lead to improved health outcomes for frail older adults is pressing.[4]

Participation in recreation therapy interventions has been identified as one kind of treatment for improving or maintaining the health of skilled nursing facility residents. However, it is often a challenge for recreational therapists to identify age-appropriate physical activities for elderly residents of nursing homes due to their physical and cognitive limitations. Such interventions are important as physical activity, particularly exercise, is a recognized health promotion intervention for individuals with and without disabilities.[5] More importantly, even though physical activity has been shown to improve physical functioning in frail older adults,[6] participation rates in physical activity tend to decline with increasing age and physical limitations.[7]

Relaxation interventions are seen as another important activity given the number of individuals residing in skilled nursing facilities who experience levels of anxiety or agitation which impact their quality of life.[8] Unfortunately, as participation in traditional exercise and relaxation programs typically requires a certain level of physical and cognitive functioning, many frail nursing facility residents, who have multiple health conditions and limited functional abilities are often excluded. Therefore, recreation therapists frequently struggle to identify alternative options to promote physical activity and relaxation in this frail population.

DOI: 10.5055/ajrt.2013.0050

Technology and physical activity

In recent years, skilled nursing facilities have begun to use technology-based activity interventions to promote physical activity in older adults. Most specifically, the Nintendo Wii has introduced new and innovative physical activities in this population. While it was unknown how older adults would respond to a new technology, many recreation therapists have found Wii sports games a popular activity once individuals gain experience with use.[9]

Nintendo Wii sports games have been effective interventions in improving the overall physical well-being of seniors in long-term care facilities.[10] Specifically, previous literature has found that the Wii sports games can increase energy expenditure and heart rate in older adults[11] and have positively impacted psychological outcomes, such as affect and self-esteem.[10] The Wii Fit program has also shown promise in improving balance in older adults[12,13] as well as in individuals with acquired brain injuries.[14]

Given the success in using technology-based interventions to promote physical activity in the older adult population, additional resources beyond the Wii would be helpful in adding diversity to therapeutic recreation programming; in particular, interventions that focus on activities unrelated to sports might better appeal to individuals who are not interested in sports and fitness activities. Therefore, one aim of this study was to examine the feasibility of using a new technology-based music-making intervention, the Beamz, with the older adult resident population of a skilled nursing facility.

Music as a preferred activity

Looking specifically at the activity preferences among older adults in a long-term care facility, Kracker et al.[15] found that music was one of the high-interest activities in this population. Music has also been identified as a positive coping strategy for individuals in skilled nursing homes,[16] and activities that engage older adults in music-making may even contribute to positive physiological changes and immunological responses aligned with decreased stress.[17] Music can be incorporated into a variety of activity interventions, and Sole et al.[18] documented improvement in the quality of life of older adults following participation in several different music activities that included not only music listening but also music-making.

Technology-based music-making

As technology begins to play a greater role in all aspects of people's lives, including leisure, new devices have emerged that enable individuals to participate in music-making activities in new ways. The Beamz is a new device that has been embraced by some therapists and therefore has begun making its way into activities for individuals in healthcare facilities.

The Beamz is a laser-based music-making technology device, built on the concept that anyone can create music. It comes in two different models (C6 and C4) and sits on a table top. It is played by passing hands through the laser beams (six different beams on the C6 and four different beams on the C4), which trigger multiple streams of musical notes and sounds. The unit allows for different musical selections and tempos. It is simple to use, requires very limited physical skills, is portable, and can be used while sitting in a wheelchair (Figures 1 and 2).

The Beamz may have particular appeal for individuals living in skilled nursing facilities who have limited functional skills, but a strong interest in music. Additionally, the Beamz might be a particularly useful intervention in skilled nursing facilities as music-based interventions are generally considered to be low risk and appealing[19] and the movements

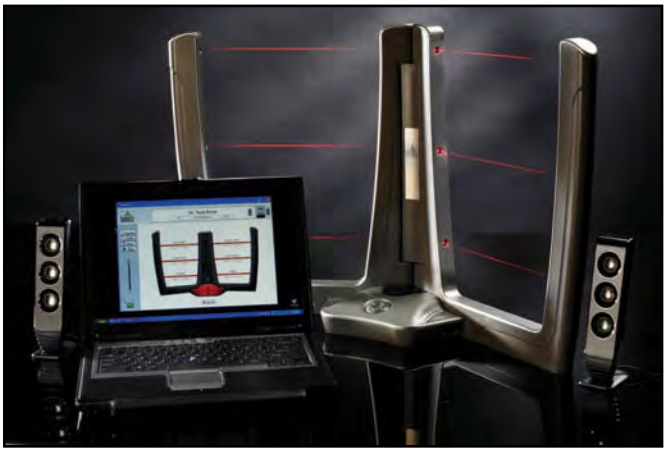


Figure 1. The Beamz C6 system.

Figure 2. Technique for playing the Beamz.

required to play the Beamz may be sufficient enough to provide physical activity in this frail population.

Although studies have paired music listening with exercise adherence[20] and music listening with a relaxation response[21] or heart rate elevation,[22] few studies exist that examine the physiological response that occurs when music is created using a technology-based system like the Beamz. Music tempo and heart rate are both measured in beats per minute (bpm), so the ability to set the Beamz tempo at different rates allows one to either create a stimulating (120-140 bpm)[22] or relaxing (60-80 bpm)[23] music-making experience.

Previous studies have addressed the potential benefits of using a new technology as well as the benefits of music creation in this population. However, little is known regarding the pairing of these two interventions. Additionally, the use of the Beamz with this population and how residents respond to this new activity have not been documented. Therefore, this study was designed to evaluate the following questions:

1. Does participation in technology-based music-making at a fast tempo (120-130 bpm) safely elevate heart rate in skilled nursing residents?

2. Does participation in technology-based music-making at a slow tempo (60-70 bpm) produce a relaxation response in skilled nursing residents?

3. How long are skilled nursing residents able to maintain participation in a technology-based music-making activity?

4. Do skilled nursing residents enjoy participating in technology-based music-making activities?

Methods

Study design

A quasi-experimental, counterbalanced design was used, with individuals participating in two 10-minute sessions using the Beamz technology. One 10-minute session was at a fast tempo, and the second 10-minute session was at a slow tempo. Between the two 10-minute sessions, there was a 10-minute resting period. To control for order effects, half of the participants completed the fast tempo session first, whereas the other half completed the slow tempo session first. At the beginning and end of each 10-minute session, the following data were collected: heart rate, blood pressure, and Visual Analog Scale-Anxiety (VAS-A) for relaxation score. In addition, individuals were also asked to rank their enjoyment of the activity on a 10-point scale. The therapist not only encouraged each participant to play continuously during each 10-minute session but also instructed them that they were permitted to stop at any point. The time of participation was recorded to capture the length of each session for individual participants.

Participants

The 20 participants in this study were skilled nursing residents, aged 70 or above, who had physical clearance from their physician or nursing staff to engage in a physical activity for a total of 30 minutes. Individuals were excluded if they 1) had a score of 15 or less on the Mini-Mental State Examination (MMSE), 2) were younger than 70 years, or 3) had a health condition that would restrict participation in a physical activity for 30 minutes, as determined by their physician or nursing staff.

Informed consent

The study's procedures and consent process were reviewed and approved by the affiliated institution's Institutional Review Board. All participants had the opportunity to discuss the purpose and procedures of the study with the investigator and to ask questions prior to their consent to participate. Participants were required to agree to participate in two activity sessions which involved a seated music-making activity using the Beamz music system. They were informed they would need to move their arms up and down but did not need any musical training or skills to participate in this intervention study. Participants were made aware that each session would last approximately 15 minutes. During this time, their blood pressure and heart rate would be taken and they would need to report their feelings of relaxation and enjoyment of the activity.

Intervention

Music-making sessions used the Beamz C6. Activity sessions were held in a quiet room with just the participant and recreation therapist. All participants were given basic instructions on how to play the Beamz and were asked for preferences on background music. Half of the participants participated in the fast tempo session first, whereas the other half completed the slow session first.

Fast tempo session. During the fast session, the Beamz music was set at 125 bpm. Individuals were given a choice of different music selections including Moonlight Redux, Café" Carnival Jams, Louie Louie Jam, Chamber Concerto, and Celebration. Participants were instructed to move their arms up and down through the Beamz attempting to keep pace with the beat of the music. They were encouraged to maintain participation as long as possible for up to 10 minutes.

Slow tempo session. During the slow session, the Beamz music was set at 60-65 bpm. Individuals were given a choice of different music selections including 3 AM Blues, Classique, Moonlight Redux, and Chillaxin Jam. Participants were told the goal was to try and relax, so they could play as slow as they wanted to promote a relaxed feeling. Movements could be as simple as slowly moving their hands in and out of the Beamz or just moving their fingers.

Measurement

A combination of physiological and self-report measures was used to evaluate response to the intervention. A wrist blood pressure monitor was used to collect physiological measures of heart rate and blood pressure, and participants were asked to self-report their level of relaxation using the VAS-A and level of enjoyment of the activity using a 10-point enjoyment scale. Duration of participation was also recorded using a stopwatch.

Wrist blood pressure monitor. The wrist blood pressure monitor device used in this study (Panasonic EW3003W) collected heart rate and both systolic and diastolic blood pressures. This instrument was selected because of its size, portability, and ability to collect these measures in a nondisruptive manner. The device is capable of measuring blood pressure within a range of 0-280 mm Hg with an accuracy of readings of ±3mm Hg. It measures heart rate within a range of 30-160 pulses per minute with accuracy readings of ±5 percent.[24]

VAS-A. The VAS-A scale is a self-report measure using a 100-mm visual analogue scale with five descriptors along the continuum (0 mm = "at peace"; 100 mm = "very tense"). The VAS-A has been found to be significantly correlated to the 20-item Spielberger State Anxiety Inventory.[25] The VAS-A is considered a sensitive subjective measure and is accurate in assessing levels of anxiety and relaxation. The tool is noted for its ease of administration, so as not to interfere with relaxation. Its simplicity is also well suited for use with older adults with some levels of cognitive impairments.

Enjoyment of activity. Following each session, participants were asked "On a scale from 1-10, how much did you enjoy this Beamz music-making activity?" with one corresponding to "not at all" and 10 indicating "very much so." The visual rating page also had other words linked with numbers including "slightly," "moderately," and "quite a bit."

Duration of participation. The timing of each session was started as soon as the participant began to move their arms. If an individual paused at any time, the therapist would ask, "Are you finished playing?" or "Do you feel you need to stop?" to either cue

the participant to continue playing or identify whether the individual was fatigued or disinterested. If participants chose to stop before meeting the desired 10-minute session limit, the total time of participation was recorded as well as the reason for discontinuing the activity.

Data analysis

The statistical data were analyzed using SPSS 17.0. Descriptive statistical analysis was performed to understand the characteristics of the participants in this study. In addition, normality tests were computed to understand the distributions of all dependent variables. For normally distributed variables, parametric inferential statistics (ie, paired-sample t-tests) were used to examine the effects of a technology-based music-making intervention (Beamz) on promoting physical fitness and feelings of relaxation and enjoyment. For those variables which were not normally distributed, nonparametric inferential statistics (ie, Wilcoxon signed rank tests) were performed to understand how the Beamz intervention impacted the dependent variables.

Results

Characteristics of participants

A total of 20 participants enrolled in the study and all completed both activity sessions. Most participants were Caucasian females (80 percent), who were permanent residents in the skilled nursing facility (65 percent), and scored above 25 on the MMSE (70 percent) which indicated their cognitive abilities were in normal ranges. The mean age of the participants was 87.65 years, ranging from 72 to 100. On average, they participated in the activity for 6.51 minutes during the fast tempo session and 7.03 minutes during the slow tempo session. Summary information on the demographic characteristics of all participants is given in Table 1.

Physiological response

Fast tempo session. The results of the Shapiro-Wilk tests indicated that the data for heart rate in the fast tempo session were not normally distributed. Therefore, a Wilcoxon signed rank test was conducted to examine if the mean heart rate before the fast tempo session was different than the mean heart rate after the session. It was found that the average heart rate significantly increased from time 1 to time 2 ($z = 2.52$, $p = 0.01$). In addition, the results of paired t-tests suggests that there was a statistically significant difference between systolic blood pressure at time 1 and time 2 ($t = -2.93$, $p = 0.01$). It was found that the mean systolic blood pressure increased from time 1 to time 2. The results of the physiological responses during the fast tempo session are given in Table 2.

Slow tempo session. The results of the Shapiro-Wilk tests suggested that the data of both systolic and diastolic blood pressures were not normally distributed. Therefore, Wilcoxon signed rank tests were used to compare the mean systolic and diastolic blood pressures before and after the slow tempo session. Results indicated the mean systolic and diastolic blood pressure readings were not significantly different between two time points. However, the results of paired t-tests suggested that there was a statistically significant difference between the mean of heart rate in time 1 and time 2 ($t = -2.241$, $p = 0.04$). It was found that the participants experienced an increased heart rate at time 2. A summary of physiological responses for the slow tempo session is given in Table 3.

Feelings of relaxation and enjoyment

Participants reported the same level of enjoyment for the fast and slow tempo session. On average, participants rated the level of enjoyment as "quite a bit" (6.75 on a 10-point Likert scale). In rating their level of relaxation, participants reported a statistically lower level of relaxation following the slow tempo session ($t = -2.175$, $p = 0.04$), as indicated by a higher rating on the VAS-A. Results of the VAS-A are included in Table 3.

Discussion

Results indicate that participation in this technology-based music-making intervention was effective in elevating heart rate in skilled nursing residents. Although it was hypothesized that playing along with

Table 1. Demographic characteristics of participants (N = 20)					
Variable	**N**	**Percent**	**M**	**SD**	**Range**
Age, y	20		87.65	6.92	72-100
Duration of participation, min					
Fast	20		6.52	3.43	1.00-10.00
Slow	20		7.04	3.35	0.66-10.00
Enjoyment					
Fast	20		6.75	2.20	3-10
Slow	20		6.75	2.34	3-10
Gender					
Male	4	20			
Female	16	80			
Race					
Caucasian	20	100			
MMSE					
Normal	14	70			
Mild impairment	4	20			
Severe impairment	2	10			
Residency status					
Permanent	13	65			
Short-term rehab	7	35			

fast tempo music would facilitate physical activity that could elevate heart rate, this study revealed that movements to slow tempo music increased heart rate as well. The elevation in heart rate occurred after a very short period of participation (10 minutes or less). This is noteworthy as brief interventions would be very easy for staff to provide and individuals with both cognitive and physical limitations will benefit from physical activity that elevates heart rate.

Although it was hypothesized that playing along with slow tempo music might produce a relaxation response, this was not supported by the study's results. Rather, the direct opposite occurred, and the Visual Analog Scale results indicated that individuals were more relaxed before participation in this activity. It appears that the physical activity involved in this particular intervention was more stimulating than relaxing regardless of the tempo of the music. Given the physical limitations of many participants, any movement at all appeared to be arousing rather than calming. Therefore, although the Beamz may not be suited for relaxation in this population, future studies may find that it is a good intervention to stimulate, arouse, and engage frail, elderly individuals presenting with lethargy.

Evaluation of the protocol

The protocol was designed so that participants would engage in continuous physical activity (music-making) for 10 minutes. However, many of the individuals in this study had physical limitations (use of only one arm or poor endurance), sensory impairments (hearing loss), and cognitive limitations

Table 2. Physiological responses for fast tempo session (N = 20)				
Variable	**Mean T1 (SD)**	**Mean T2 (SD)**	**t value**	**p**
Systolic blood pressure	123.35 (10.85)	130.40 (13.23)	−2.93	0.01*
Diastolic blood pressure	69.45 (7.78)	75.25 (13.17)	−1.86	0.08
Heart rate†	65.30 (11.72)	67.65 (11.85)	2.52	0.01*
*p value < 0.05. †Related samples Wilcoxon signed rank test run.				

Table 3. Physiological responses for slow tempo session (N = 20)				
Variable	**Mean T1 (SD)**	**Mean T2 (SD)**	**t value**	**p**
Systolic blood pressure*	124.21 (14.02)	126.89 (16.62)	1.16	0.25
Diastolic blood pressure*	68.40 (9.50)	72.90 (10.89)	1.55	0.12
Heart rate	64.70 (11.15)	69.15 (12.37)	−2.24	0.04†
Visual Analog Scale	36.57 (19.89)	43.86 (19.79)	−2.18	0.04†
*Related samples Wilcoxon signed rank test run. †p value < 0.05.				

(decreased attention) that prohibited them from participating for the full duration (10 minutes). Many had a very limited range of motion and struggled to reach all levels of lasers on the equipment. Therefore, while this study demonstrated that this is an appropriate intervention for some individuals in skilled nursing facilities, this particular device and protocol may have even greater potential and be better suited for older adults in Assisted Living or Personal Care facilities and/or for individuals receiving short-term rehabilitation services in a skilled nursing facility.

Based on the investigator's observation, it is also possible that a simple restructuring of the protocol with skilled nursing residents may yield more successful results in terms of duration of participation. In this study, the protocol developed required individuals to play continuously during the session. Once participation stopped, the session was ended. Future studies may want to examine whether introducing or allowing brief rest periods would be effective in increasing endurance and physical activity over greater periods of time.

Additional findings

Although this particular intervention was a new activity for participants in the study, the majority indicated that they found it enjoyable. Some admitted to initial reservations about trying something unfamiliar as they did not know what to expect, and this may have contributed to the individuals feeling less relaxed following participation. However, participants did indicate that they enjoyed the activity. As this study only involved one intervention session, it is unknown if increased exposure to the equipment and activity would result in even greater interest and/or ability to participate for longer periods of time. Additional sessions might also lead to an increased sense of competency and motivation based on past experiences.

During this study, it was noted that not only was this novel device accepted by the older residents but also it generated interest from the facility staff. Many individuals from a variety of departments were curious about the equipment and how it was being used. Several employees asked if they could try it and expressed enthusiasm after engaging with the device. This suggests that

staff would be highly motivated to use the equipment with residents if it was available in public areas. Therefore, it could be a resource not just for structured therapeutic recreation programming but could also be available for diversion and supplemental opportunities for residents to engage in meaningful activities.

Future study possibilities

The intervention in this study used individual sessions held in a quiet space to minimize distractions. However, holding sessions in a public or more visible space may also have benefits, enabling residents to see their peers participating in the activity, thereby inspiring curiosity and intrigue. Interest from other individuals may also motivate the participant to engage for longer periods of time. Variations on the intervention that incorporate some type of group interaction might also be beneficial as higher levels of social engagement in skilled nursing residents have been linked to longer survival[26] and a greater sense of fulfillment in life.[27]

A greater selection of music might also have led to increased engagement. For this study, the researchers selected four or five songs for participants to choose from based on the researchers' opinions about the musical styles the skilled nursing residents would prefer and enjoy. Future studies might look at evaluating additional preloaded songs and their appeal to skilled nursing residents to see if there are other selections older adults may prefer, as using preferred music would most likely contribute to increased interest and motivation to participate.

This study primarily focused on whether the Beamz would be a feasible device to increase heart rate and promote physical activity levels in the older residents in a skilled nursing facility. However, through the sessions with participants, it was noted that recreation therapists could certainly develop additional protocols to focus on other outcomes that might be addressed with the Beamz. For example, given the different levels of lasers, there is the potential to work on increasing range of motion. The software has notations indicating where instrument sounds are located on different laser beams. Therefore, cognitive goals such as reading and problem-solving could be addressed by asking individuals to locate and play specific instruments. Once located, the written information specifying instrument location could be removed to work on memory. As physical activity has been linked to increased alertness, the increased physical activity may also reduce the risk of cognitive decline[28] and enhance cognitive functioning in older adults.[29] The physical nature of engaging with this device could also be a good outlet for individuals with the excess energy or agitation sometimes associated with various types of dementia. Additionally, the Beamz can be played either sitting or standing, so it could be a motivating leisure activity while clients work on standing balance.

Conclusion

Given the large number of skilled nursing residents who have limited options for physical activity due to their chronic health conditions, this intervention provides an opportunity to engage in an activity that promotes physical activity in frail older adults. The fact that positive physical outcomes can be achieved in only a short period of time makes it extremely practical for widespread use.

The Beamz appears to be an activity that older adults are interested in and enjoy, which is important to motivate individuals to participate on a regular basis. The fact that individuals find the intervention enjoyable indicates that therapeutic recreation sessions using this protocol hold the potential to not only impact physical functioning but also enhance quality of life.

Recreation therapists should be able to incorporate use of the Beamz into their regular schedule of therapeutic programming with very little time and effort. The cost of the equipment is minimal, and training to develop skill in use can be completed in a very short period of time. The diversity of ways that the equipment can be used enables flexibility in program design and holds the potential to meet a variety of therapeutic goals for clients.

Acknowledgments

This study was funded by Temple University's Office of the Vice Provost for Undergraduate Studies as part of the Creative Arts, Research and Scholarship (CARAS) awards. The authors thank the staff of the Philadelphia Protestant Home for their collaboration on this project.

Brigid Lyons, BS, CTRS, *Department of Rehabilitation Sciences, Temple University, Philadelphia, Pennsylvania.*

Rhonda Nelson, PhD, CTRS, *Associate Professor, Department of Rehabilitation Sciences, Temple University, Philadelphia, Pennsylvania.*

Pei-Chun Hsieh, PhD, CTRS, *Assistant Professor, Department of Rehabilitation Sciences, Temple University, Philadelphia, Pennsylvania.*

References

1. Centers for Disease Control and Prevention: *Nursing Home Care*. 2011. Available at *http://www.cdc.gov/nchs/fastats/nursingh.htm*. Accessed October 4, 2011.
2. Ice G: Daily life in a nursing home: Has it changed in 25 years? *J Aging Stud*. 2002; 16(4): 345-359.
3. Kvaavik E, Batty G, Ursin G, et al.: Influence of individual and combined health behaviors on total and cause-specific mortality in men and women: The United Kingdom health and lifestyle survey. *Arch Intern Med*. 2010; 170(8): 711-718.
4. Schnelle J, Kapur K, Alessi C, et al.: Does an exercise and incontinence intervention save healthcare costs in a nursing home population? *J Am Geriatr Soc*. 2003; 51: 161-168.
5. Centers for Disease Control and Prevention: *Physical Activity and Health, Disabled*. 2011. Available at *http:// www.cdc.gov/nccdphp/sgr/disab.htm*. Accessed October 4, 2011.
6. Matsuda P, Shuymway-Cook A, Ciol M: The effects of a home-based exercise program on physical function in frail older adults. *J Geriatr Phys Ther*. 2010; 33(2): 78-84.
7. Studenski S, Perera S, Hile E, et al.: Interactive video dance games for healthy older adults. *J Nutr Health Aging*. 2010; 14(10): 850-852.
8. Hicks-Moore S, Robinson B: Favorite music and hand massage: Two interventions to decrease agitation in residents with dementia. *Dementia*. 2011; 7(1): 95-108.
9. Brandt K, Paniagua M: The use of Nintendo Wii with long-term care residents. *J Am Geriatr Soc*. 2011; 59(12): 2393-2395.
10. Jung Y, Li KJ, Janissa N, et al.: Games for a better life: Effects of playing Wii games on the well-being of seniors in a long-term care facility. Paper presented at the Proceedings of the Sixth Australasian Conference on Interactive Entertainment. ACM, New York, 2009.
11. Graves L, Ridgers N, Williams K, et al.: The physiological cost and enjoyment of Wii fit in adolescents, young adults and older adults. *J Phys Act Health*. 2010; 7: 393-401.
12. Bateni H: Changes in balance in older adults based on use of physical therapy vs the Wii Fit gaming system: A preliminary study. *Physiotherapy*. 2011; 98(3): 211-216.
13. Hermes D, Hitch S, Honea A, et al.: Benefits of the Wii Fit as an exercise program for older adults. Paper presented at the Proceedings of the 6th Annual GRASP Symposium, Wichita State University, 2010.
14. Gil-Gomez J, Llorens R, Alcaniz M, et al.: Effectiveness of a Wii balance board-based system (eBaViR) for balance rehabilitation: A pilot randomized clinical trial in patients with acquired brain injury. *J Neuroeng Rehabil*. 2011; 8: 30.
15. Kracker J, Kearns K, Kier F, et al.: Activity preferences and satisfaction among older adults in a veterans administration long-term care facility. *Clin Gerontol*. 2011; 34(2): 103-116.
16. Hunter R, Gillen M: Stress coping mechanisms in elderly adults: An initial study of recreational and other coping behaviors in nursing home patients. *Adultspan J*. 2009; 8(1): 43-59.
17. Koyama M, Wachi M, Utsuyama M, et al.: Recreational music-making modulates immunological responses and mood states in older adults. *J Med Dent Sci*. 2009; 56(2): 79-90.
18. Sole C, Mercadal-Brotons M, Gallego S, et al.: Contributions of music to aging adults' quality of life. *J Music Ther*. 2010; 47(3): 264-281.
19. Robb S, Carpenter J, Burns D: Reporting guidelines for music-based interventions. *J Health Psychol*. 2010; 16(2): 342-352.
20. Ziv G, Lidor R: Music, exercise performance, and adherence in clinical populations and in the elderly: a review. *J Clin Sport Psychol*. 2011; 5(1): 1-23.
21. Bernardi L, Porta C, Sleight P: Cardiovascular, cerebrovascular, and respiratory changes induced by different types of music in musicians and non-musicians: The importance of silence. *Heart*. 2006; 92: 445-452.
22. Karageorghis C, Jones L, Priest D, et al.: Revisiting the relationship between exercise heart rate and music tempo preference. *Res Q Exerc Sport*. 2011; 82(2): 274-284.
23. Gooding L, Swezey S, Zwischenberger J: Using music interventions in perioperative care. *South Med J*. 2012; 105(9): 486-490.
24. Panasonic: *Specifications, EW3003W*. 2013. Available at *http://www.newegg.com/Product/Product.aspx?Item=N82E16881200050*. Accessed December 6, 2013.
25. Chlan L: Relationship between two anxiety instruments in patients receiving mechanical ventilator support. *J Adv Nurs*. 2004; 48(5): 493-499.
26. Kiely D, Simon S, Jones R, et al.: The protective effect of social engagement on mortality in long-term care. *J Am Geriatr Soc*. 2000; 48(11): 1367-372.
27. Brownie S, Horstmanshof L: Creating the conditions for self-fulfillment for aged care residents. *Nurs Ethics*. 2012; 19(6): 777-786.
28. Buchman A, Boyle P, Yu L, et al.: Total daily physical activity and the risk of AD and cognitive decline in older adults. *Neurology*. 2012; 78(17): 1323-1329.
29. Colcombe S, Kramer A: Fitness effects on the cognitive function of older adults: A meta-analytic study. *Psychol Sci*. 2003; 14: 125-130.

Using the Beamz Interactive Music System in Recreation Therapy Practice: Presenting Treatment Protocols for Diverse Settings and Populations

Rhonda Nelson, Ph.D., CTRS, MT-BC
Al Ingallinera, MBA

Music Overview

- **Benefits of music in serving clients are well documented**
  - Music is often a great tool to invoke response and a motivator for engagement and participation in social activities
  - Music connects us with friends and family, memories, places, emotions
  - Listening to music can improve mood and invoke recall of memories; providing a framework for better communication and ongoing alertness
- **Music is uniquely processed by the brain; making music is great for brain fitness**
  - Music memories are stored in varying locations in both brain hemispheres
  - “Processing” (listening) music is also done by both hemispheres
  - Making music uses even more brain processing

Technology

- Combination of **Beamz Interactive Music** and the **Beamz Laser Controller** provide opportunity for people of varying abilities to recreationally make music
  - Interactive music is purposely constructed to provide framework for a range of music making experiences, including use as a therapeutic tool
  - Laser beams provide an inviting means to make music by “playing” light
    - Red, class 2 laser beams are safe to touch and are not harmful to eyes with recommended use

Introduction to the Beamz

- **Birth Of The Idea – Musician Jerry Riopelle**
  - Vision for combining laser beams and music technology into a music experience product that ANYONE can play
    - Loved the idea of using “light” as the interface; setting up laser beams in a means that precision play and developed skills would not required to make great sounding music
    - Providing a range of interactive songs for “beginner” to “advanced” play
    - Above all, recreational music making – getting more people experiencing the joy and benefits of making music
  - Phoenix Children’s Hospital – Pilot Program
    - Child Life Services – recreation room for distraction therapy
    - OT/MT – potential therapy applications identified

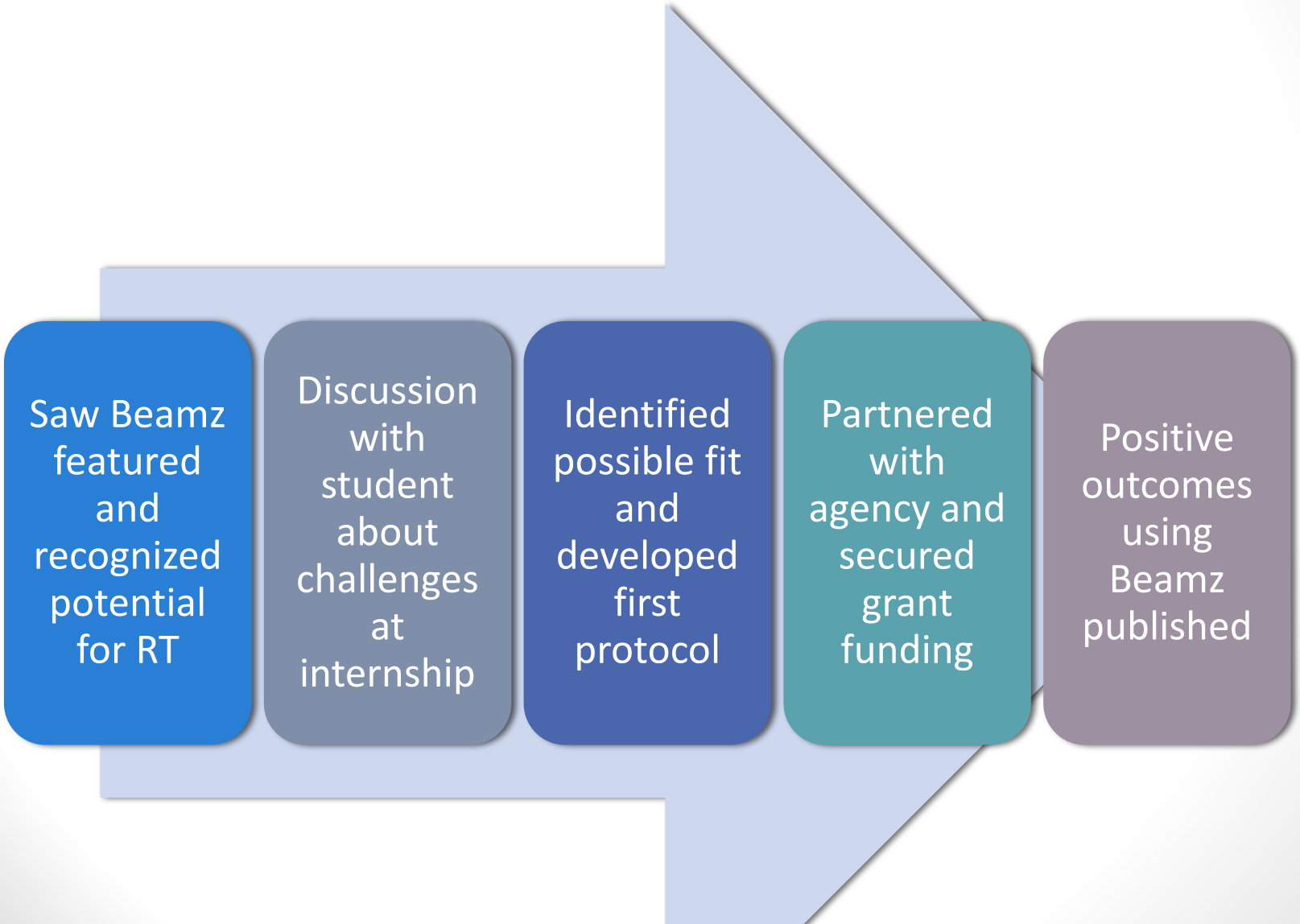
- **Product Launch and Evolution**
  - Consumer Launch – 1st Generation Product
    - Get EVERYONE into music making; therapists and special needs educators also purchase – recognizing the accessibility benefits
  - 2nd generation product broadens music library and interactive music features
    - Identified need for structured content for educators and therapists
  - Current product – 3rd generation
    - Broadened compatibility beyond PC to MAC and iOS for use with iPads/iPhones
    - Design improvements for storage, travel use with diverse populations
      - Carrying and transport cases
      - Laser beam adjustment
      - Sample Activities Guide for educators, therapists and professionals to lead activities; structured content for families with special needs for home play

Beamz Features

- **Universal**
  - Everyone can play; non-tactile orientation provides opportunity for anyone to participate
  - Anyone (including non-musicians) may use as a tool for leading activities using interactive songs
- **Great Sounding Music**
  - Interactive music is built with rich, authentic digital samples to replicate/emulate natural sounding instruments and sounds
- **Diverse & Complex Music Library**
  - All music styles & genres; hundreds of instruments
  - “Beginner” songs – very easy to make great sounding music without any specific sequence of interaction with laser beams
  - “Complex” songs – multi-section songs with instrument variation providing wide opportunities for personal creativity

Using the Beamz in RT Practice

The First Evidence-Based RT Protocol



Study Overview

- Residents of a SNF participated in two 10-minute sessions of "Continuous Play" using the Beamz.
  - One 10-minute session was at a fast tempo.
  - The second 10-minute session at a slow tempo.
  - Between 10-minute sessions, there was a 10-minute resting period.
  - Counter-balanced research design utilized.

- At the beginning and end of each 10-minute session, heart rate and blood pressure recorded. During slow tempo sessions, also asked how relaxed they felt using the Visual Analog Scale – Anxiety (VAS-A).

- Individuals were also asked to rank their enjoyment of the activity on a 10-point scale after both the slow and fast tempo sessions.

- Participants were encouraged to play continuously during each 10 minute session, but were permitted to stop at any point.

Results

- Fast Tempo Session
  - Heart rate significantly increased ($z = 2.52$, $p = 0.01$).
  - Systolic blood pressure increased significantly ($t = -2.93$, $p = 0.01$)
- Slow Tempo Session
  - Systolic and diastolic blood pressure readings were not significantly different between two time points.
  - There was a statistically significant difference in heart rate

    ($t = -2.241$, $p < .04$).
  - Participants experienced an increased heart rate at time 2.

Conclusions From Study

- Participation in this intervention was effective in elevating heart rate in skilled nursing residents during both fast and slow tempo sessions
- Elevation in heart rate occurred after over a very short period of participation (10 minutes or less).
- Brief interventions can be very easy for staff to provide
- Individuals with both cognitive and physical limitations could benefit from physical activity that elevates heart rate.
- This particular intervention was a new activity for participants in the study. However, the majority indicated that they found it enjoyable.
- While it was not a primary focus of this study, it was noted that the introduction of a novel activity intervention in this setting resulted in interesting responses from staff in the facility.

Beamz & Temple RT Connection

- Shared findings and thoughts for future possibilities
- Identified desire to work collaboratively to best serve both clients and therapists
- Explored ways to enhance use of Beamz in RT practice

Current Project

- Creation of “Beamz Therapy Guide”
  - Developed 15 protocols designed for diverse populations
  - Structured to address a variety of treatment goals
  - Augmented with additional resources to assist in data collection and documentation during treatment sessions
  - Focused on evidence-based practice

Field-based Trials

- Wanted to ensure that protocols were effective in sessions with clients
- Knew that input from multiple therapists would strengthen protocols
- Recruited 12 agencies to partner with us, utilize protocols in their setting and provide feedback/evaluations on protocols

Participating Sites

Brandywine Hospital, Coatesville, PA (Behavioral Health)
Children's Specialized Hospital, New Brunswick, NJ (Pediatric)
Help-U-Bridge, West Chester, PA (Community Intellectual Disability & TBI)
Inglis House, Philadelphia, PA (Physical Disability, Long Term Care)
Madelyn & Leonard Abramson Center for Jewish Life, North Wales, PA (Geriatric LTC)
NJ Clubhouse, Woodbury, NJ (Traumatic Brain Injury Day Program)
The Philadelphia Protestant Home, Philadelphia, PA (Geriatric LTC)
SPIN, Inc., Philadelphia, PA (Developmental Disabilities Day Program)
Temple University Hospital, Philadelphia, PA (Physical Disability, Short-Term Rehab)
Temple University Hospital, Episcopal Campus, Philadelphia, PA (Behavioral Health)
Voorhees Pediatric Facility, Voorhees, NJ (Pediatric)
Waverly Heights, LTD., Gladwyne, PA (Geriatric LTC)

Training Process

- Therapists from all participating sites received:
  - Basic training on Beamz Equipment
  - An overview of purpose of the project
  - An introduction to protocol format
  - Instructions for sending feedback

Protocol Design

- Each protocol utilizes a standard format that includes:
  - Possible goals
    - Cognitive
    - Physical
    - Social/Emotional
  - Staff requirements
  - Group Size
  - Setting
  - Duration
  - Music Suggestions
  - Procedure (Step by Step)
  - Adaptations

- Session Forms accompany several protocols to assist with recording treatment information

Sample Protocol

Beamz Intro

Possible Goals:

Cognitive	Physical	Social/Emotional
Concentration		Self-Exploration
New Learning		
Memory		
Problem Solving		

Staff Requirement: 1 therapist

Group Size: One-on-One

Setting: Private treatment room, client room, or area with limited distractions

Duration: 10-30 minutes (depending on client interest and ability)

Music Suggestions: Allow client to review music list in Appendix to choose music pertaining to their interest

Procedure:

1. Connect the Beamz unit to either the computer or Apple device in advance of the session in a quiet space where there are limited distractions. Choose a song that may be of interest to the client to start your introductory session.

2. Tell the client you have something new to show them that will allow them to participate in making music while also meeting some of their goals. Indicate that you will be doing a more structured activity, but wanted to begin by introducing the equipment first.

3. Explain that the unit works by selecting music on the computer or iPad, and then emits sound once the beam of light from the laser is interrupted or once the beams are touched on the iPad or computer. Give a demonstration of this as you say it.

4. If applicable to your session's main activity, introduce the rhythm button to indicate that music can be played to compliment the instruments.

5. Show the client how to switch between pages and access more instruments for the music by pressing the middle button on the unit.

6. Allow a few moments for the client to experiment with the unit, iPad or computer to actively engage with the equipment and gain comfort through hands-on learning.

7. If applicable to the main session activity, show the client how to switch to a different style of music, possibly allowing them to pick one that sounds interesting to them.

8. Allow for a few more moments of experimentation with the unit before introducing the activity.

9. If assessing memory for new learning, in a future session utilize the "Demonstrates at later session" check-off column on the orientation checklist.

Beamz Intro Adaptations

- If it is appropriate for you client, part of the introduction may include a demonstration of how to set up the unit.

- The Beamz Intro may be set up as a group activity, explaining the unit and its features to a group of clients, and giving them a chance to play with the Beamz or try different techniques one at a time, or in small groups. This may be particularly effective if the protocol selected for the main session will be delivered in a group format.

- If the Beamz is a new unit within the facility, conduct this activity in a common area to generate interest with other clients.

Session Form

Beamz Intro

Session Form

Client Name: _____

Use this orientation checklist to record items that you have reviewed with the client. It is recommended that only skills that will be needed for the selected activity be taught to the client at the time of the initial orientation. For example, if the activity will not involve recording sounds, introducing activation of the record button will not be necessary.

To evaluate retention of information in a future session, ask the client to demonstrate the previously instructed task. Use the column on the right to record if the client was able to correctly demonstrate the task.

Task	Oriented	Not Applicable	Demonstrates in Current Session	Demonstrates at Later Session
Plugging unit into power source	☐	☐	☐	☐
Able to hook up to computer or Apple device	☐	☐	☐	☐
Selecting Beamz app or icon	☐	☐	☐	☐
Volume adjustment	☐	☐	☐	☐
Song selection	☐	☐	☐	☐
Playing a specific instrument using the Beamz laser	☐	☐	☐	☐
Playing an instrument on the app or software	☐	☐	☐	☐
Switching between pages on the Beamz device	☐	☐	☐	☐
Switching between pages on the app or software	☐	☐	☐	☐
Activating the rhythm button	☐	☐	☐	☐
Activating the voice button	☐	☐	☐	☐
Activating the record button	☐	☐	☐	☐
Retrieving recorded files	☐	☐	☐	☐

It is recommended that multiple copies be made of forms before use.

Evaluation Process

Evaluation Process

- Protocols developed by CTRSs
- Therapists receive and review protocols
- Implementation of protocols with clients
- Therapist completes and submits evaluation form
- Evaluations reviewed and protocols updated

Beamz Protocol Evaluation Form

General Information

Name		Date	
Facility		Size of group	
Protocol Name		Setting	
Brief Group Description			

Ratings

Check boxes by double clicking and selecting "checked".	1 = Not at all	2 = Mostly not	3 = Somewhat	4 = Mostly	5 = Definitely
Protocol was easy to read & understand	☐	☐	☐	☐	☐
Comments					
Protocol was easy to carry-out as written	☐	☐	☐	☐	☐
Comments					
Goals were appropriate for activity	☐	☐	☐	☐	☐
Comments					
Forms associated w/ protocol were useful	☐	☐	☐	☐	☐
Comments					
Clients enjoyed the activity	☐	☐	☐	☐	☐
Comments					
I enjoyed conducting the activity	☐	☐	☐	☐	☐
Comments					
Music used (if different from suggested music)					

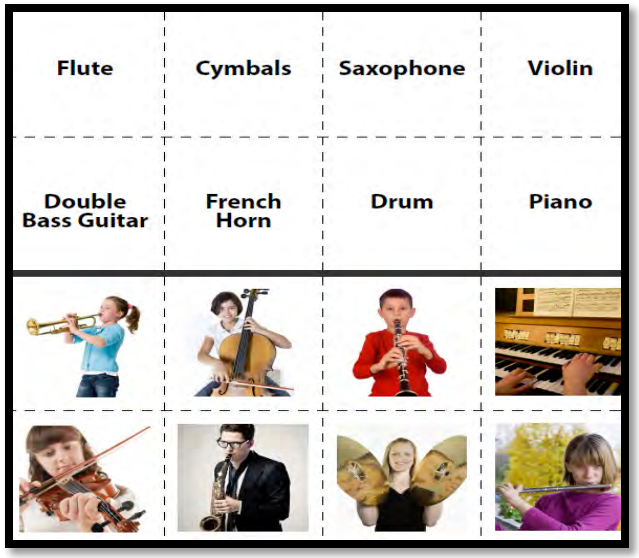
Comments

SUGGESTED ADAPTATIONS:

ADDITIONAL COMMENTS:

Beamz Therapy Guide Format

- Ringed binder format allowing for:
  - Personalization and rearrangement of content
  - Insertion of updates and new information
  - Storage of session reports



- Content
  - Introductory Information
    - Technical Tips
    - How to use the manual
    - Navigating the Protocols
    - Cleaning and Care for Beamz
  - Guide to Possible Goals and Outcomes
  - Suggested Measurement Tools
  - Protocols and Session Report Forms
  - Appendices
    - Song List and Music Recommendations
    - Supplemental Materials for some protocols

Guide to Possible Goals and Outcomes

Guide to Possible Goals and Outcomes

This table identifies some of the goals that can be addressed with the Beamz. You may be able to identify additional goals that align with the attached protocols. For this reason, we are providing blank spaces so that you can shade in boxes that correspond with the activities that address the goals you have identified.

	Beamz Intro	Follow the Leader	Song Writing	Rhythm & Movement	Name That Sound	DJ Dance Party	Beamz Memory Match	Hand Choreography	Mood Music	Continuous Timed Play	Sound Match	Team Free Play	Song Stretch	Tune Trivia	Beamz Concert
Cognitive Goals															
Attention															
Concentration															
Focus															
Following Directions															
New Learning															
Memory															
Problem Solving															
Reading Comprehension															
Sequencing															
Physical Goals															
Endurance															
Fine Motor															
Gross Motor															
Range of Motion															
Social/Emotional Goals															
Creative Expression															
Decision Making															
Empowerment															
General Social Skills															
Interpersonal Relating Skills															
Listening															
Self-Confidence															
Self-Exploration															
Team Work															
Verbal Expression															

Suggested Measurement Tools

Cognitive:

Brief Interview for Mental Status (BIMS): A brief assessment used as a part of the Minimum Data Set (MDS) to determine an individual's orientation and ability to recall and store new information.

Canadian Neurological Scale (CNS): Measures level of consciousness, orientation, aphasia, and motor strength in clients following a stroke.

Children's Kitchen Task Assessment: Measures a child's judgment, initiation, planning, organization and completion while creating with play dough.

Clock Drawing Test (CDT): Assesses attention and visuospatial abilities in clients with cognitive impairment, by having them draw a clock face, the numbers on the clock, and placing the hands at a certain time.

Executive Function Performance Test (EFPT): Measures the ability of a client with cognitive impairment to perform everyday tasks such as bill paying, cooking, taking medication, using the telephone, and hand washing.

Frontal Behavioral Inventory (FBI): Uses a 24-question self-report inventory for caregivers of clients with dementia to report behaviors experienced by the client.

Kettle Test: Measures cognitive functional ability in clients with cognitive impairment by having them go through the motions of making cups of tea using a stovetop or electric kettle.

Mini-Mental State Exam (MMSE): A 30-question exam that is commonly used in cognition screening, and measuring a person's cognition or memory over a period of time.

Montreal Cognitive Assessment (MoCA): A rapid screening instrument designed to test memory, attention, verbal fluency, abstraction, and delayed recall in older adults in approximately ten minutes.

Royal Prince Alfred Prospective Memory Test (RPA-ProMem): A twelve-item event-based measurement designed to assess retention of information over long and short intervals of time. Developed for clients with brain injury, stroke and dementia.

Saint Louis University Mental Status Exam (SLUMS): A clinician-administered exam used to identify neurocognitive impairment in clients with eleven-questions measuring orientation, memory, attention and executive functioning.

Short Orientation-Memory-Concentration Test of Cognitive Impairment (OMCT): Six-item questionnaire to detect level of memory impairment in older adults with cognitive impairment, or following a stroke.

Physical:

Action Research Arm Test (ARAT): A 19-item assessment measuring observed performance in tasks using the upper limbs. Four sub-categories measure grasp, grip, pinch and gross motor arm movements.

Canadian Neurological Scale (CNS): Measures level of consciousness, orientation, aphasia, and motor strength in clients following a stroke.

Comprehensive Evaluation in Recreational Therapy - Physical Disabilities (CERT - Phys. Dis.; CERT - Rehab): An assessment designed to examine a client's functional ability in eight areas: gross motor function, fine motor function, locomotion, motor skills, sensory, cognition, communication, and behavior.

Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH): A 30-item self-report questionnaire designed to measure arm, shoulder and hand movement abilities over time.

Functional Fitness Assessment for Adults Over 60 Years Old: An assessment designed to determine physical functioning of older adults through eight areas: body composition, flexibility, agility/dynamic balance, coordination, strength, endurance, body weight, standing height measurement in approximately 15 minutes.

Lower Extremity Functional Scale (LEFS): Twenty-item questionnaire rating a client's ability to perform everyday tasks. Designed to measure initial progress, and progress over time of individuals with lower extremity impairments.

Needs Assessment Checklist (NAC): A self-rating questionnaire that measures perceived independence in mobilization in clients with physical disabilities and Spinal Cord Injury (SCI). The checklist focuses on nine-domains, including mobility, wheelchair and equipment, ADL's, community preparedness, etc.

Nine-Hole Peg Test (NHPT): Measures finger dexterity by having client take nine pegs from a container, and one-by-one place them in nine different holes as quickly as possible.

Stroke Rehabilitation Assessment of Movement Measure (STREAM): A 30-item quantitative measurement of upper-limb, lower-limb and basic mobility measures used for clients who had had a Stroke.

Tinetti Falls Efficacy Scale (Tinetti FES): A ten-item questionnaire, measuring a client's perception of balance and stability, as well as fear of falling, while performing ADL's.

Wolf Motor Function Test (WMFT): A 17-item quantitative measure of upper extremity motor skills through timed and functional tasks.

Social/Emotional:

Cooperation and Trust Scale (CAT): An assessment which measures cooperation and trust amongst adults and adolescents with chemical dependencies.

FOX: An assessment evaluating reactions to others, reactions to objects, attention seeking, interaction with objects, concept of self, and interaction with others in clients with developmental disabilities.

Geriatric Depression Scale (GDS): Assesses level of depression in older adults, using a 30-question self-report questionnaire with yes/no questions.

Life Satisfaction Questionnaire 9: A measurement tool that can be obtained with nine or eleven items measuring life as a whole, self-care management, contacts with friends, vocational, family life, partner relationships, financial, leisure situations and sex life.

modified Differential Emotions Scale (mDES): A self-report examination which asks clients to report on emotions experience over the past 24 hours.

Participation measure for post-acute care (PM-PAC): A self-report short form measuring a client's participation outcomes in their living setting post-acute care stays. Uses the ICF classification scheme to measure communication, social activity, interpersonal relationships, etc.

Positive & Negative Emotions Scale (PANAS): A self-report questionnaire which asks clients to identify emotions that they have experience over the past week or are experiencing currently.

Reintegration Into Normal Living Index (RNLI): Measures the capability of people who have experienced a traumatic incident or illness to return to normal social activities through an eleven-question self-report questionnaire measuring seven elements from self-care to recreational activities to daily activities (work/school).

Sickness Impact Profile: A 69-item tool measuring quality of life and dysfunction following a life-changing illness. There are three-dimensions (physical, psychological and social) with two sub-scales under each dimension.

The Social Attributes Checklist: An observational checklist measuring social skills amongst children.

WHO Quality of Life-BREF (WHOQOL-BREF): Assesses client's quality of life within the context of their culture, life goals, standards and concerns. Uses 26 questions to measure four QOL domains, including physical health, psychological health, social relationships and environment.

Demonstration

Follow the Leader

Possible Goals:

Cognitive	Physical	Social/Emotional
Attention		
Focus		
Memory		
Problem Solving		
Sequencing		

Staff Requirement: 1 therapist

Group Size: One-on-One

Setting: Client room, or quiet space where there are limited distractions

Duration: 10-20 minutes

Music Suggestions: East, Classique, Green Onions, Razzmajazz, R N Beast, Rastafari, Night After Night, Rock Your Body, I Like to Move It, Beamz Suite

Procedure:

1. Set up the unit and decide on the music in advance of the session. For anticipated longer sequences, it is suggested that sequences be written in advance of the session, so that the therapist is able to focus on the response of the client, instead of on remembering the beams sequence. Sit adjacent to the client, instead of across from the client, so that the sequence is clearly visible. Use the attached session forms to record client response and take general notes during the session.

2. Explain the activity to the client. "I will be playing a sequence with the lasers, and I would like you to repeat back what I am doing. The sequences will start off short and will get longer as we progress through the activity. If you feel as though you are uncomfortable with the pace or number of the beams played in the sequence, please let me know."

3. Start by playing one beam, and having the client repeat the beam. If successful, progress to two beams in the sequence. If unsuccessful, repeat the exercise using one beam until the client is able to repeat it, and at that time, progress to two beams. The session should continue like this, adding one beam to the sequence every time the previous sequence is correct until the sequence is five beams long.

4. Continue with the five beam sequences two to three times to verify mastery at this level before progressing to a higher level. If a client has difficulty successfully

repeating given the number of beams in the sequence, regress and remove beams from the next sequence, so that the client can demonstrate success with the lower number before attempting to advance to a more difficult progression again. Once the beam sequence gets to five beams, the therapist may try switching pages during the sequence to increase difficulty.

5. The activity should end when the client has continuously reached the goal number in their beam sequence. To prevent boredom or cognitive fatigue, the activity length should be limited to 15-20 minutes.

6. The activity should be repeated on a schedule determined by the therapist and the client for maximum cognitive benefits.

Follow the Leader Adaptations

- To further assess cognition, ask the client to recall information in addition to the sequences, such as the name of the activity, the first instrument used, the first sequence, etc. A form for recording this information is provided (Session Form 2).

- After a few clients become familiar with the activity, have them work together in a small group, assisting each other in recalling beams and taking turns to play the beams in sequence.

- If a client is having difficulty remembering the sequences, repeat them twice, before asking client to play the beams.

- For an activity variation, ask clients to initiate sequences that must then be repeated by the therapist. This is a good way for clients to demonstrate that they understand the rules of the game, and may build empowerment as clients receive a chance to become the leader. It may also motivate clients to engage in the activity for longer periods of time.

Follow the Leader

Session Form 1

Instructions: Use this form to record any general information from the session. Use a new form for each session with the client.

Client Name:_____ **Date:**_____ **Session #:**___

Beams in Sequence	Pages in Sequence	Client Response	Level of Assistance	Percentage Correct
5	2	Remembered first 4 beams, missed page change	Minimal verbal cueing	4/5 – 80%

General Session Notes:

_____

_____

Follow the Leader

Session Form 2

Instructions: Fill in item(s) that you would like the client to remember throughout the session, and record the client's ability to recall them after 5 minutes, 10 minutes, 15 minutes, and at the end of the session. At the start of the session, inform the client that you would like him/her to remember the desired information (i.e. "We're going to do an activity, and I'd like you to remember the name of it. It's called 'Follow the Leader'.").

Client Name:_____ **Date:**_____ **Session #:**___

Item to Remember (i.e. Name of the game, specific instrument, first sequence, etc.)	5 Min.	10 Min.	15 Min.	End

Item to Remember (i.e. Name of the game, specific instrument, first sequence, etc.)	5 Min.	10 Min.	15 Min.	End

Item to Remember (i.e. Name of the game, specific instrument, first sequence, etc.)	5 Min.	10 Min.	15 Min.	End

Additional Notes:

_____

_____

Hand Choreography

Possible Goals:

Cognitive	Physical	Social/Emotional
Concentration	Endurance	
Memory	Fine Motor	
Reading Comprehension	Gross Motor	
Sequencing		

Staff Requirement: 1 therapist

Group Size: 1:1

Setting: Private area with limited distractions.

Duration: 15-20 minutes

Music Suggestions: Allow client to choose music of interest, using music appendix for guidance.

Procedure:

1. Set up the Beamz unit in a private area with limited distractions, and sit either next to client or across from client.

2. Explain to the client that they will be creating a hand choreography (or hand dance) to go along with the Beamz music that they enjoy, but that you will begin by introducing some basic hand choreography moves. Explain that they are not limited to the movements that you show them.

3. Allow client to choose music of interest.

4. Incorporate a combination of hand choreography moves (described on following page). For the first session, or when client is first learning the different moves, have them complete 5-10 repetitions of each movement so that they can gain comfort and familiarity.

5. As client develops competence and confidence with different movements, the therapist should play the background rhythm and model a choreography "hand dance", shifting fluidly from move to move.

6. For more advanced clients, allow them to create their own hand choreography, and make notes on the different movements incorporated in the choreography. At a later date, see if client can replicate their hand choreography.

Hand Choreography Adaptations

- After different clients have composed their own hand choreography and have practiced their moves, structure a group activity where multiple clients can showcase their individual choreographed hand dances.
- Tell clients the name of each move as you demonstrate it. Next, either call out the name of specific movements and have the clients demonstrate the moves, or demonstrate different moves, and ask clients to call out the correct name for that movement. (Additional goal: memory/cognition)
- Without first demonstrating the moves, give the client the sheet describing each of the different moves, and see if they can demonstrate the move based on the instructions. (Additional goals: written/verbal comprehension, problem solving).
- If clients do not have use of their hands, ask them to replicate some of the moves using a different part of the body.
- Have clients create hand choreography routines to perform at the DJ Dance Party or Beamz Concert.
- Have clients work together to create a hand choreography routine.

Hand choreography movements could include, but are not limited to:

The Wave	Move hands in a wave-like manner, hitting one or both lasers on each side.
The Flip	**Start with the palm facing down, and the back of the hand facing upward. Turn the hand 180 degrees so that the palm is facing upward and the back of the hand is down.**
The Chop	**Place one straight hand perpendicular to the lasers, and bring up and down to hit both lasers on one side.**
The Robot	**Place both hands perpendicular to the lasers, and bring up and down to hit both lasers on both sides.**
Fists	**Make hands into fists, then open them, interrupting the beam of the laser with the fingertips.**
Spirit Fingers	**Wiggle fingers hitting at least one laser at a time.**
Plucking	**Create a plucking movement with the fingers, as if plucking on a guitar string, curling one finger at a time and bringing it in toward the palm.**
DJ Scratch	**Move hand as if pulling a record back and forth similar to what a DJ would do.**
Knocking	**Make a fist with the hand and do a knocking motion into a laser by bending the wrist.**
Drumming	**Flatten and straighten hand and move up and down similarly to beating on a drum. Move hands through one or both lasers on each side in rhythm with the background rhythm.**
Finger touches	**Place thumb directly below a laser and touch each finger to the thumb, one at a time, intercepting the laser each time.**
Pointing	**Make a pointing motion with the index finger, and move it through the laser.**
Pushing	**Hold hand out in front of the body (palm out, back of hand parallel with body), and make a pushing motion through the lasers, hitting both lasers on one or both sides.**
Swimming	**Hold hands out, perpendicular to the lasers with pinky fingers on top and their thumbs on the bottom (palms should be facing away from each other), and make a movement similar to the breast stroke through the lasers on each side of the unit.**

Next Steps

- Release of Beamz Therapy Guide
- Strengthen evidence base through additional research studies utilizing protocols
- Ongoing feedback from therapists
  - Protocols
  - Adaptations and assistive technology
  - Music and song needs
  - Web community for idea sharing
- Develop additional content

Questions

White Paper
Usage Profile with Learning Specialist Anne Fishburne
Summary Observations of Beamz Over 3-Year Period

Anne Fishburne is passionate about working with kids, especially the students that struggle with learning or behavioral difficulties. As a learning resource specialist for El Cajon Schools in San Diego, Mrs. Fishburne has been using the Beamz in her classroom over the past three years.

Positive Effects

Mrs. Fishburne uses the Beamz daily in a variety of ways. She uses it to give her special needs students a sensory break, where they are really not touching anything, but are able to get their body up, moving and creating. It has become an alternative way for kids to get active when they can't go to recess or be outside. It's also used as a reward for many of her students who get their work done early. She also uses the Beamz as a station while she is facilitating independent small group discussions.

Over the past few years, Mrs. Fishburne has focused usage of the Beamz with her autistic students to meet their sensory goals. Beamz has empowered these students to learn how to take a sensory break and time themselves, as well as teach them sequence. How they can manage the Beamz from step 1-2-3 to create music on their own.

Beyond Expectations

"Sometimes sounds and activity can overwhelm kids with autism," said Mrs. Fishburne. "I thought a couple students would step back from it because of the beat, sound and rhythm was just too much. I'm always surprised when they go for it and get such joy creating music and sounds on their own. My kids are amazed when playing the Beamz. I'm amazed how they quickly catch on to navigating it with the computer and being able to select the songs they want and go back and forth to pick the rhythm, lead and bass. Kids as young as 1st and 2nd grade can manage and navigate the Beamz system with ease."

Measuring Results

In terms of measuring the effects of using the Beamz over a period of time, Mrs. Fishburne has witnessed individual students as well as specific groups flourish from their interaction with the Beamz. Some kids start off uncomfortable at the beginning and end up teaching other younger small groups how to use the system. "It also teaches my kids responsibility in being in charge of special equipment. This is a big deal in our classroom," she added.

Benefiting Kids with ADHD

Mrs. Fishburne said kids with ADHD have different needs. They really don't have sensory needs as much, but mostly inattention and focus issues. The Beamz allows their bodies to get the energy out so they can get to focusing on their learning activity. They are moving and watching what ever is happening on the computer screen while creating something. That in itself allows them to focus, and it also gives them a break from sitting in the classroom and learning the conventional way. So when they are done with a 5-10

minute period with the Beamz, they are able to join the group and do a typical division lesson or whatever is going on. It gives them the break and the movement they need to stay focused.

IEP Meetings

Mrs. Fishburne has shared her experience with parents of specific special needs students at their IEP meetings. "I talk about all kinds of strategies and modifications I might use in the classroom and have brought up the Beamz and how the kids are using it for sensory breaks, a focusing tool and motivator or reward. I stress how fortunate these kids are to be able to use the Beamz as a part of my resource program. It is awesome to have a technological device that helps me engage my students both educationally and physically. Nobody else in our school or district has this special program. Teachers want to come and see it in action, people want to try it out, and kids are fired up about it."

Movement in Using Technology

Teachers are being held to the standard of 85% engagement in their classrooms, and every kid has plans to receive a one-to-one device now. There is a big technology movement in education. "We are bringing in Chrome Books, Tablets, iPads and have had iPods for some time. We are now going to be teaching to kids learning on a computer. Yet, kids need to still be able to get up, get creative, be imaginative and change their activities than just answering questions on a Chrome Book or using an iPod to access information. The Beamz allows kids to create something. It allows them to get up and move, to have sensory input, be artistic. Kids can be successful at something they don't have to put too much thinking power into," Mrs. Fishburne said.

The reason for technology is not to just produce work, you are actually being taught through technology so teachers can facilitate independent small groups. The Beamz offers creativity, sequencing, sensory, while still freeing up teachers to pull small instructional groups. It can be its own rotation. It's an invaluable interactive tool that helps educators do something unlike any other device out there – be creative and engaging at the same time.

General Ed

The Beamz is versatile and can be used in the younger grades, even general education, not just special education. It is an engaging active learning feature for the classroom to have kids be able to create their own music. It teaches rhythm, beats and patterns. "You can add academics around it for general education kids. You can add math to it. 3rd grade times tables. For the older kids without special needs, they think they are DJs. It boosts their self esteem when they use this interactive system," Mrs. Fishburne added.

Images on TV change every 13 seconds. So today's kids are depending on that type of movement to stay engaged. "A standing lecture in front of a classroom is only hitting the visual learner and maybe some auditory learners, but not any kinetics learners. So, if we are not using all multi-modalities to teach our kids, they are not going to get it. They are not used to watching someone stand and give a lecture for 20 minutes. Beamz offers a new modality to keep young learners, both general ed and special ed, engaged!"

Developing an Interactive Music Making Program Using Beamz Therapy Resources

Rhonda Nelson, Ph.D., CTRS, MT-BC

Director of the Therapeutic Recreation program under the Department of Rehabilitation Sciences at Temple University

BACKGROUND INFORMATION/RATIONALE

Music as a Leisure Interest/Recreational Activity

- **Music is a popular leisure interest**
- **Many individuals indicate they "enjoy music"**
- **People can participate in a variety of ways making music a great modality for use in recreational therapy**
- **Benefits of music are well documented**
  - Music is often a great tool to invoke response
  - Music is often a motivator for engagement and participation in social activities
  - Music can connect individuals with friends and family
  - Music can improve mood
  - Music can be used to produce a relaxation response
  - Music can invoke memories; providing a framework for better communication and ongoing alertness
  - Music is processed in both hemispheres of the brain making it great for cognitive stimulation

Why Active Music Making?

Actively engaging individuals in music making can result in:

- A different way to experience music
- Heightened attention
- Greater cognitive stimulation
- The use/development of multiple skills
  - Physical
  - Social/Emotional
  - Cognitive
- A highly individualized experience
- Opportunities to contribute to a group experience

Why Technology?
Why the Beamz?

- Advances in technology have created unique new leisure experiences for people with disabilities/health conditions
- Technology often allows individuals to engage in an experience that they previously thought impossible or challenging/frustrating
- With the Beamz, the steep learning curve to playing a musical instrument is eliminated
- The Beamz does not require previous music experience (a plus for both participants and therapists)
- Individuals can produce something that sounds good
- The Beamz can be set up and moved quickly
- Reasonably priced

THE BEAMZ IN CLINICAL PRACTICE

Applicable for Diverse Clients/Settings

- Individuals across the lifespan can enjoy
- Individuals with diverse diagnoses can benefit
- Therapists in a variety of settings can use the Beamz in their clinical practice

Evidence Based Practice

- First research study documenting the effectiveness of using the Beamz for positive health outcomes conducted by recreational therapists .
- Study utilized set protocol (“Continuous Timed Play”)
- Participants were residents of a long-term care facilities

Conclusions From Study

- Participation in this intervention was effective in elevating heart rate in skilled nursing residents during both fast and slow tempo sessions
- Elevation in heart rate occurred after over a very short period of participation (10 minutes or less)
- Brief interventions can be very easy for staff to provide
- Individuals with both cognitive and physical limitations could benefit from physical activity that elevates heart rate
- This particular intervention was a new activity for participants in the study; however, the majority indicated that they found it enjoyable
- While it was not a primary focus of this study, it was noted that the introduction of a novel activity intervention in this setting resulted in interesting responses from staff in the facility

Other Beamz Studies in Progress

- **Effects of Recreational Music Making on Cognitive Functioning, Mood and Engagement in Assisted Living Residents**

  Population: residents in an assisted care retirement community

  Status: data collection continuing through Q2 2016

- **Impact of Cognitive Stimulation Sessions Using a Technology Based Game on Cognitive Function in Older Adults with Cognitive Decline***

  Population: residents in a senior care community

  Status: data collection completed August 2015; currently reviewing preliminary results

- **Effects of Family Music Making Sessions on Social Responsiveness and Parental Stress in Families of Children Receiving Early Intervention Services**

  Population: pediatrics and families; therapy services provided via community service organizations and measurement of home use effectiveness

  Status: definition phase; data collection to begin in Q1 2016

*All studies utilizing protocols from the Beamz Therapy Guide

OVERVIEW OF PROTOCOLS IN THE BEAMZ THERAPY GUIDE

Beamz Therapy Guide Overview

Includes 15 protocols designed for diverse populations (written generally with possibilities to adapt)

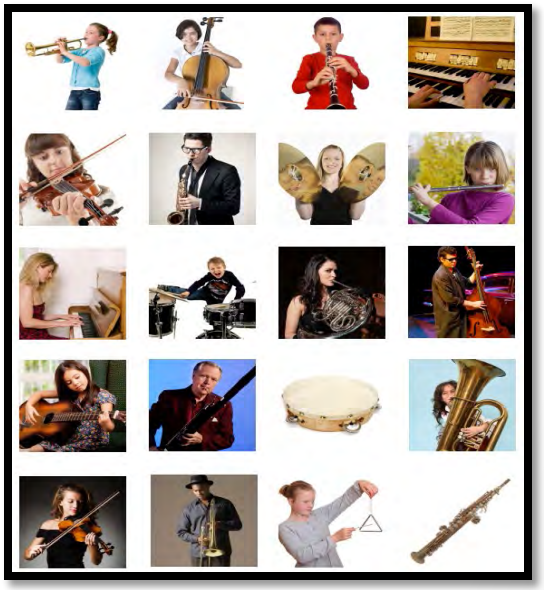
Structured to address a variety of treatment goals

Augmented with additional resources to assist in data collection and documentation during treatment sessions

Beamz Therapy Guide Format

- Ringed binder format allowing for:
  - Personalization and rearrangement of content
  - Insertion of updates and new information
  - Storage of session reports

- Content
  - Introductory Information
    - Overview of the Guide
    - Navigating the Protocols
    - Technical Tips & Tricks
    - Cleaning and Care for Beamz
  - Guide to Possible Goals and Outcomes
  - Suggested Measurement Tools
  - Protocols and Session Report Forms
  - Appendices
    - Song List and Music Recommendations
    - Supplemental Materials for some protocols



Field-based Trials

- Wanted to ensure that protocols were effective in sessions with clients
- Knew that input from multiple therapists would strengthen protocols
- Recruited 12 agencies to partner with us, utilize protocols in their setting and provide feedback/evaluations on protocols

Participating Sites

Brandywine Hospital, Coatesville, PA (Behavioral Health)
Children's Specialized Hospital, New Brunswick, NJ (Pediatric)
Help-U-Bridge, West Chester, PA (Community Intellectual Disability & TBI)
Inglis House, Philadelphia, PA (Physical Disability, Long Term Care)
Madelyn & Leonard Abramson Center for Jewish Life, North Wales, PA (Geriatric LTC)
NJ Clubhouse, Woodbury, NJ (Traumatic Brain Injury Day Program)
The Philadelphia Protestant Home, Philadelphia, PA (Geriatric LTC)
SPIN, Inc., Philadelphia, PA (Developmental Disabilities Day Program)
Temple University Hospital, Philadelphia, PA (Physical Disability, Short-Term Rehab)
Temple University Hospital, Episcopal Campus, Philadelphia, PA (Behavioral Health)
Voorhees Pediatric Facility, Voorhees, NJ (Pediatric)
Waverly Heights, LTD., Gladwyne, PA (Geriatric LTC)

Protocol Format

- Each protocol utilizes a standard format that includes:
  - Possible goals
    - Cognitive
    - Physical
    - Social/Emotional
  - Staff requirements
  - Group Size
  - Setting
  - Duration
  - Music Suggestions
  - Procedure (Step by Step)
  - Adaptations

- Session Forms accompany several protocols to assist with recording treatment information

Review of the Protocols

PURPOSE

- Provide general overview of each protocol
- Discuss clinical relevance and possible use
- Introduce Session Forms
- Help you start to identify possible opportunities for your practice

Level I Protocols

Great for orienting clients and working on basic skills

ORIENTATION

- Beamz Intro*

MUSICAL SOUNDS

- Follow the Leader*
- Name that Sound
- Sound Match
- Memory Match*

Level II Protocols

- Build in additional and more complex skills
- Some include additional resources
- Rhythm & Movement
- Hand Choreography
- Continuous Timed Play*
- Mood Music
- Song Stretch
- Tune Trivia
- Song Writing

Performance Protocols

- More appropriate after clients have developed comfort and skill with Beamz
- Enable individuals to showcase their skills

- DJ Dance Party
- Team Free Play
- Beamz Concert

PRACTICE USING SPECIFIC PROTOCOLS WITH BEAMZ

Beamz Intro

- Important to orient participant to the equipment
- Helps to alleviate apprehension
- May assist in motivating individual for participation in other protocols
- Allows therapist to assess baseline competencies
- Assists in smoother implementation of other protocols
- Session form records individual client orientation

Follow the Leader

- Good “starter” activity
- Typically very non-threatening (working with musical sounds rather than complete songs)
- Can be used to address a variety of treatment goals
- Easily adapted to different skill levels
- Includes session form

Continuous Timed Play

- Activity for promoting physical endurance
- Great for measuring progress over time
- Challenges to increase times can be motivating for participants
- Can be structure to incorporate breaks (counting and recording those) if better suited for participant

Memory Match

- Utilizes the Beamz Memory Match Cards
- Can provide variation on other matching activities individual may be familiar with.
- Beamz can serve to reinforce/reward successful matches
- Assists individuals in learning more about musical instruments
- Easily adapted to varying levels of difficulty

Contact Information/Resources

Rhonda Nelson
Temple University
Rhonda.nelson@temple.edu

Al Ingallinera
Al.ingallinera@thebeamz.com

Beamz Website
www.thebeamz.com
Therapy & Rehab section has info on Beamz Therapy Guide

Music therapy helps nursing home residents

Published: Sunday, April 08, 2012, 12:01 AM

By Body and Mind staff

Follow

1

Share Email Print

View full size DAN GLEITER, The Patriot-News Al Glover, a resident at Bethany Village Oaks Skilled Nursing in Lower Allen Twp., uses a Beamz interactive music system to create music by pushing his hands through six laser triggers. For Glover, playing the Beamz helps his range of motion and it also bridges the generations with his 8-year-old granddaughter who visits him at the nursing home. "Grandpappy wasn't supposed to make music like that!" the 84-year-old former church choir member said. "She never saw anything like it."

When she hears the strains of the Glenn Miller Orchestra begin, Carolyn McMillen is a high school senior again in the arms of her boyfriend at the Valencia Ballroom in York. Her eyes shine brightly and a wide smile spreads over her wrinkled face.

No matter that it is now decades later; the music has transported the 89-year-old Bethany Village resident back to a time of warm memories and youth.

"My boyfriend invited me to go see Glenn Miller. Oh, it was so exciting!" said McMillen, who grew up in Gettysburg. "We stood in the front of the orchestra and listened, and then we danced to all his songs."

Those songs are now part of McMillen's personal playlist on her iPod, thanks to a music therapy program at Oaks Skilled Nursing at Bethany Village in Lower Allen Twp.

"There are all sorts of studies in regard to how music affects the brain. People associate music emotionally with different events in their lives. We remember all the faces and the emotions we were having when that song was

originally played," said Susan Crossley, director of rehabilitation at Oaks Skilled Nursing. "It seems innate after your memory has started to fade."

Indeed studies have shown that music is linked to areas of the brain that control memory, emotions and movement, according to the American Music Therapy Association.

First introduced in 1950, music therapy is increasingly being used to help nursing home residents cope with the grief that comes with losing much of their independence and physical strength as well as to improve memory, movement and calm.

"We know that when people engage in music, the brain changes for the better and we also know that music is stored all over the brain and so even when one area of the brain is injured, we can still access it through another area," said Ann Dinsmore, supervisor of music therapy at the Masonic Village in Elizabethtown, where residents sing, move and play instruments.

"If we can tap into the right music at the right time, provided in the right way, we can communicate," she said. "For many older residents, it's with live music. They gathered around the piano every Sunday afternoon to sing and that was an important recreation."

Research shows that we engage best with music we enjoyed from age 15 to 30, which is the time of life associated with major events such as education, marriage and parenthood, said Dinsmore, one of three board certified music therapists at the Masonic Village.

Increasingly, research studies are showing what board certified music therapists have seen anecdotally for years: Music is helpful in a wide range of ailments.

For people with Parkinson's disease or movement disorders, making or listening to music can improve gait, balance, range of motion and coordination, Dinsmore said. For people with dementia or Alzheimer's disease, music can unlock memories and improve communication.

"Sometimes people are not able to speak, but they can sing every word of a song. If they are able to get those consonants and vowels out, they can relearn speech without the melody," she said.

Music can lessen perception of pain, ease anxiety and promote relaxation and sleep, she said.

Bethany Village recently earned a research grant to look at the positive effects of individualized music therapy for long-term care residents, awarded by the Music and Memory Foundation and the Institute for Music and Neurologic Function in New York.

 View full sizeDAN GLEITER, The Patriot-NewsSusan Crossley, director of recreation at Bethany Village Oaks Skilled Nursing in Lower Allen Twp., helps resident Geri Nadler set up her iPod. Nadler likes to follow the escapades of "The Green Hornet."

Since introducing the iPods to residents last fall, Crossley said staff has seen a decrease in anti-anxiety medications needed by some residents and a decrease in agitated behavior, which has translated into a calmer atmosphere on the floor.

"It took hours to sit one on one with each resident to find out what songs they wanted on their playlist — sometimes it meant playing 15 second snippets of songs — but it was all worth it for the wonderful reaction it has gotten," she said.

With her iPod, Bethany Village resident Geri Nadler, 82, can once again follow the escapades of "The Green Hornet," a newspaper publisher by day, vigilante crime fighter by night.

"For Sunday night supper, we would have lunch meat — it was expensive and you couldn't get it very easily during the war — and sit around the radio to listen to 'The Green Hornet,'" said Nadler, recalling her teenage years. "As I look back on it now, it was really propaganda, but my sister and I loved it."

Crossley's interest in music therapy began when she started a drumming circle with residents and saw the joy it brought them.

"Music unites people like no language can," she said. "It gives them a sense of community because everyone is participating together."

Crossley also introduced residents to Beamz, a computerized interactive music manipulation system that works with laser beams. Six laser triggers and two button-controlled triggers activate up to 64 independently controlled sequences of musical notes. Residents can choose a genre of music and insert different instrumental

accompaniments by pushing their hands through the beams.

For Al Glover, playing the Beamz helps his range of motion and it also bridges the generations with his 8-year-old granddaughter who comes to visit him at the nursing home.

"Grandpappy wasn't supposed to make music like that!" the 84-year-old former church choir member said. "She never saw anything like it."

Monaghan Twp. piano teacher Della Cosey knows well the positive impact that music can have on dementia patients at Messiah Village in Upper Allen Twp., where she takes her students to play.

"While some residents are seemingly oblivious to our being there, others are visibly engaged with our music through a tap of the hand or a foot to the beat. There are even those who swing their arms in beat, clap their hands or dance in their seats. Usually these are the people who were very connected to music in their past," she said.

"It's amazing to see a person who can communicate very little verbally still sit at a piano and play music they've learned in the past. To participate in music uses many different areas of the brain. Although one area is ravaged by disease, other areas take over and make playing the piano possible."

Whether making music or just listening, the effects are undeniable, said Linda Grobman, a music practitioner certified by the Music for Healing and Transition Program. She plays live therapeutic flute music at the bedside of residents at the Jewish Home of Greater Harrisburg and those served by Compassionate Care Hospice.

"Music has been shown to lower blood pressure, anxiety, respiration rates and have calming physical effects," she said, noting that therapeutic music is different than music therapy in that it does not usually include participation of the patient. "It's a very human connection to have someone come in and play beautiful music."

Written by CAROLYN KIMMEL For The Patriot-News
Related topics: bethany village, health, music therapy

Bethany Village Sees Life-Changing Results in Assisted Living and Skilled Nursing Residents with High-Tech Music Therapy

Residents respond quickly to personalized iPod playlists and laser beam music technology

MECHANICSBURG, Pa., March 8, 2012 /PRNewswire/ -- Bethany Village has seen surprisingly rapid and positive results through two new high-tech music therapies for residents in assisted living and skilled nursing at the continuing care retirement community. One program has put 48 iPods and personalized playlists into the hands (and ears) of residents age 85 to 97. Another tool, Beamz, lets residents create music by interacting with laser beams, offering a unique and motivating type of fine motor therapy.

"We have seen remarkable results rather quickly with these music therapies that ultimately improve residents' quality of life," said Susan Crossley, director of recreation, Oaks Skilled Nursing at Bethany Village. "The iPod program, especially, has changed residents' behavior, which then affects the whole attitude of other residents around them."

Last fall, Bethany Village was awarded one of 15 nationwide research grants through the Music and Memory Foundation and the Institute for Music and Neurologic Function in New York. The Music and Memory grant seeks to provide evidence that individualized music therapy will improve the quality of life and generate a variety of therapeutic outcomes for long-term care residents. Crossley just started recording measurable decreases in behaviors such as communicating distress, depression, pain and gains in improved quality of life.

"It means so much more than us bringing in entertainment for an hour," said Crossley. Residents use and respond to the music for different reasons. For some, it's just enjoyable. For restless residents or those who just need to be busy all the time, the music has a calming effect. For some with cognitive or memory loss, medications have been decreased and some anti-anxiety drugs were eliminated.

Resident Carolyn McMillan explained, "Words to songs that I forgot come rolling over me when I hear the songs. I didn't think they were still in my head, but they are. I love music, especially stage shows. When I hear the songs and things I like, it just carries me along. With an iPod, you can listen for a long time. It just makes me happy and makes me feel good."

For one resident, 94, whose particular kind of deafness caused her to often communicate distress, the iPod was life-changing. "This resident sometimes seemed to enjoy very little in life, and now she's singing along to the music," said Lori Geissler, LPN and charge nurse. "The whole attitude of the other residents was affected, and when the music calms her, it calms the rest of the residents, as well."

That resident's son, who wanted to remain anonymous, described the music therapy's effect on his mother like this. "From her earliest memories, she has taken comfort from music," he said. "We decided to move ahead and determine whether [the iPod] was a good thing or not. Many of us have witnessed the calming effect of the music, sometimes almost instantly. . . . It has eliminated her 'as needed' medication. We can see her softly singing and recognizing the sound. It's almost as though the iPod has given her music back."

Beamz system fun but with serious applications

Beamz, which is used by Bethany Village primarily for occupational therapy, has met with similar success at the community. "One gentleman comes in first thing in the morning before I'm here and turns it on to play. However, Beamz does have serious applications and benefits," said Crossley. Six laser triggers and two button-controlled triggers activate up to 64 independently controlled sequences of musical notes or events.

A resident whose Parkinson's disease creates difficulty with coordination and spatial perception has been using the system routinely. "She may want to pick up her fork, but ends up moving her hand a few inches in the wrong direction," explains Crossley. "The sound emitted from the lasers helps give her feedback on where she needs to be. She knows immediately if she moved her hand in the right direction. It helps her adjust her movements to make up for the perception deficit. The Beamz also allows creativity, enhancing self-esteem and maintaining individuality, but it's also just plain fun."

Bethany Village is located near Mechanicsburg in Lower Allen Township and is an accredited continuing care retirement community. Bethany Village provides a wide variety of programs for retirement living. For more information, visitwww.BethanyVillage.org.

Bethany Village is a CARF-CCAC-accredited continuing care retirement community that is part of Asbury Communities, Inc., which provides management and support services for a system of continuing care retirement communities for older adults. It is ranked by Leading Age and Ziegler Capital Markets Group's AZ 100 as the 15th largest not-for-profit multi-site senior living organization in the country.

SOURCE Bethany Village

Using the Beamz Interactive Music System in Recreation Therapy Practice: Presenting Treatment Protocols for Diverse Settings and Populations

Rhonda Nelson, Ph.D., CTRS, MT-BC
Temple University

Music Overview

- **Music is a popular leisure interest**
- **Benefits of music in serving clients are well documented**
  - Music is often a great tool to invoke response and a motivator for engagement and participation in social activities
  - Music connects us with friends and family, memories, places, emotions
  - Listening to music can improve mood and invoke recall of memories; providing a framework for better communication and ongoing alertness
- **Music is uniquely processed by the brain; making music is great for cognitive stimulation**
  - Music memories are stored in varying locations in both brain hemispheres
  - “Processing” (listening) music is also done by both hemispheres
  - Making music uses even more cognitive processes.

Technology

- Combination of **Beamz Interactive Music** and the **Beamz Laser Controller** provide opportunity for people of varying abilities to recreationally make music
  - Interactive music is purposely constructed to provide framework for a range of music making experiences, including use as a therapeutic tool
  - Laser beams provide an inviting means to make music by “playing” light
    - Red, class 2 laser beams are safe to touch and are not harmful to eyes with recommended use

Introduction to the Beamz

- **The Idea – Musician Jerry Riopelle**
  - Vision for combining laser beams and music technology into a music experience product that ANYONE can play
    - Loved the idea of using “light” as the interface; setting up laser beams in a means that precision play and developed skills would not required to make great sounding music
    - Providing a range of interactive songs for “beginner” to “advanced” play
    - Above all, recreational music making – getting more people experiencing the joy and benefits of making music
  - Phoenix Children’s Hospital – Pilot Program
    - Child Life Services – recreation room for distraction
    - OT/MT – potential therapy applications identified

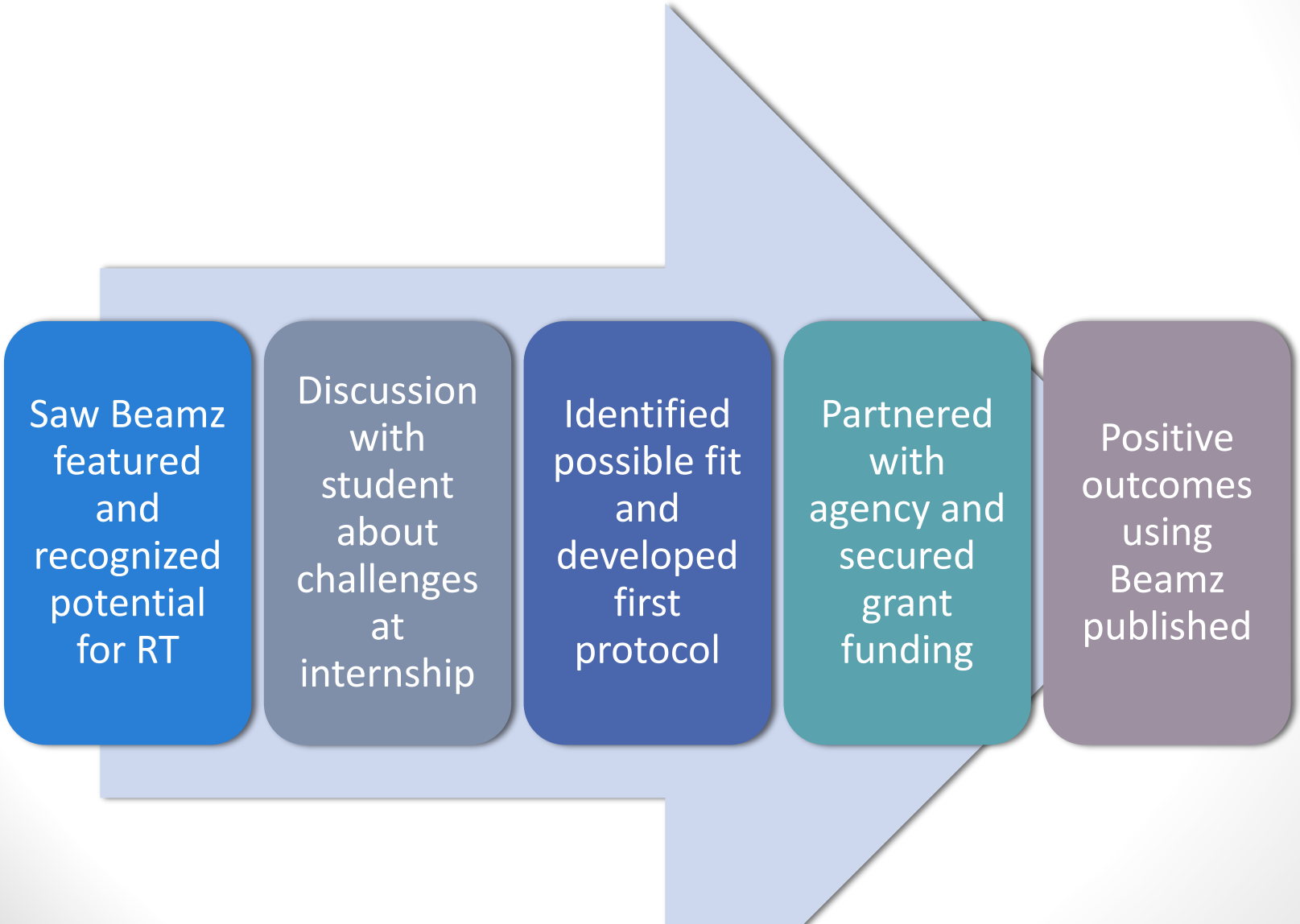
- **Product Launch and Evolution**
  - Consumer Launch – 1st Generation Product
    - Get EVERYONE into music making; therapists and special needs educators also purchase – recognizing the accessibility benefits
  - 2nd generation product broadens music library and interactive music features
    - Identified need for structured content for educators and therapists
  - Current product – 3rd generation
    - Broadened compatibility beyond PC to MAC and iOS for use with iPads/iPhones
    - Design improvements for storage, travel use with diverse populations
      - Carrying and transport cases
      - Laser beam adjustment
      - Sample Activities Guide for educators, therapists and professionals to lead activities; structured content for families with special needs for home play

Beamz Features

- **Universal Design**
  - Everyone can play; non-tactile orientation provides opportunity for anyone to participate
  - Anyone (including non-musicians) may use as a tool for leading activities using interactive songs
- **Great Sounding Music**
  - Interactive music is built with rich, authentic digital samples to replicate/emulate natural sounding instruments and sounds
- **Diverse & Complex Music Library**
  - All music styles & genres; hundreds of instruments
  - “Beginner” songs – very easy to make great sounding music without any specific sequence of interaction with laser beams
  - “Complex” songs – multi-section songs with instrument variation providing wide opportunities for personal creativity

Using the Beamz in RT Practice

The First Evidence-Based RT Protocol



Study Overview

- Residents of a SNF participated in two 10-minute sessions of "Continuous Play" using the Beamz.
  - One 10-minute session was at a fast tempo.
  - The second 10-minute session at a slow tempo.
  - Between 10-minute sessions, there was a 10-minute resting period.
  - Counter-balanced research design utilized.

- At the beginning and end of each 10-minute session, heart rate and blood pressure recorded. During slow tempo sessions, also asked how relaxed they felt using the Visual Analog Scale – Anxiety (VAS-A).

- Individuals were also asked to rank their enjoyment of the activity on a 10-point scale after both the slow and fast tempo sessions.

- Participants were encouraged to play continuously during each 10 minute session, but were permitted to stop at any point.

Results

- Fast Tempo Session
  - Heart rate significantly increased ($z = 2.52$, $p = 0.01$).
  - Systolic blood pressure increased significantly ($t = -2.93$, $p = 0.01$)
- Slow Tempo Session
  - Systolic and diastolic blood pressure readings were not significantly different between two time points.
  - There was a statistically significant difference in heart rate

    ($t = -2.241$, $p < .04$).
  - Participants experienced an increased heart rate at time 2.

Conclusions From Study

- Participation in this intervention was effective in elevating heart rate in skilled nursing residents during both fast and slow tempo sessions
- Elevation in heart rate occurred after over a very short period of participation (10 minutes or less).
- Brief interventions can be very easy for staff to provide
- Individuals with both cognitive and physical limitations could benefit from physical activity that elevates heart rate.
- This particular intervention was a new activity for participants in the study. However, the majority indicated that they found it enjoyable.
- While it was not a primary focus of this study, it was noted that the introduction of a novel activity intervention in this setting resulted in interesting responses from staff in the facility.

Beamz & Temple TR Connection

- Shared findings and thoughts for future possibilities
- Identified desire to work collaboratively to best serve both clients and therapists
- Explored ways to enhance use of Beamz in TR practice

Content Development Project

- Creation of “Beamz Therapy Guide”
  - Developed 15 protocols designed for diverse populations
  - Structured to address a variety of treatment goals
  - Augmented with additional resources to assist in data collection and documentation during treatment sessions
  - Focused on evidence-based practice

Field-based Trials

- Wanted to ensure that protocols were effective in sessions with clients
- Knew that input from multiple therapists would strengthen protocols
- Recruited 12 agencies to partner with us, utilize protocols in their setting and provide feedback/evaluations on protocols

Participating Sites

Brandywine Hospital, Coatesville, PA (Behavioral Health)
Children's Specialized Hospital, New Brunswick, NJ (Pediatric)
Help-U-Bridge, West Chester, PA (Community Intellectual Disability & TBI)
Inglis House, Philadelphia, PA (Physical Disability, Long Term Care)
Madelyn & Leonard Abramson Center for Jewish Life, North Wales, PA (Geriatric LTC)
NJ Clubhouse, Woodbury, NJ (Traumatic Brain Injury Day Program)
The Philadelphia Protestant Home, Philadelphia, PA (Geriatric LTC)
SPIN, Inc., Philadelphia, PA (Developmental Disabilities Day Program)
Temple University Hospital, Philadelphia, PA (Physical Disability, Short-Term Rehab)
Temple University Hospital, Episcopal Campus, Philadelphia, PA (Behavioral Health)
Voorhees Pediatric Facility, Voorhees, NJ (Pediatric)
Waverly Heights, LTD., Gladwyne, PA (Geriatric LTC)

Training Process

- Therapists from all participating sites received:
  - Basic training on Beamz Equipment
  - An overview of purpose of the project
  - An introduction to protocol format
  - Instructions for sending feedback

Protocol Design

- Each protocol utilizes a standard format that includes:
  - Possible goals
    - Cognitive
    - Physical
    - Social/Emotional
  - Staff requirements
  - Group Size
  - Setting
  - Duration
  - Music Suggestions
  - Procedure (Step by Step)
  - Adaptations

- Session Forms accompany several protocols to assist with recording treatment information

Sample Protocol

Beamz Intro

Possible Goals:

Cognitive	Physical	Social/Emotional
Concentration	Fine Motor	Self-Exploration
New Learning	Gross Motor	
Memory		
Problem Solving		

Staff Requirement: One therapist

Group Size: One-on-One with possible adaptations for groups

Setting: Private treatment room, client room, or other area with limited distractions

Duration: 10-30 minutes (depending on client interest and ability)

Music Suggestions: 3AM Blues, Beamz Suite, Beyond The Sea-Jam, BlueGrass Song, Brass Knuckles, Café Carnival, Classique, Gathering Of The Tribes, Green Onions-Jam, Honky Tonk Hoedown, Pharaoh's Remix, Take Five-Jam, Twist And Shout-Jam

These songs include popular instruments and can serve as great "starter" songs for clients new to the Beamz.

Procedure:

1. Connect the Beamz unit to either the computer or Apple device in advance of the session in a quiet space where there are limited distractions. Choose a song from the music selections above, selecting a song from a genre of music that may be of interest to the client and/or a song that includes an instrument of particular interest to the client (refer to Song Index in Appendix A to review the complete song list).

2. Tell the client you have something new to show them that will allow them to participate in making music while also meeting some of their goals. Indicate that you will be doing a more structured activity later, but want to begin by introducing the equipment first.

3. Explain that the unit works by connecting to selected music on the computer or iPad. It emits sound once the beam of light from the laser is interrupted or once the beams are touched on the iPad or computer. Give a demonstration of this while saying it.

4. If applicable to the session's main activity, introduce the rhythm button to indicate that music can be played to accompany the instruments.

6. Allow a few moments for the client to experiment with the unit, iPad or computer to actively engage with the equipment and gain comfort through hands-on learning.

7. If applicable to the main session activity, show the client how to switch to a different style of music, possibly allowing them to pick one that sounds interesting to them.

8. Allow for a few more moments of experimentation with the unit before introducing the activity.

9. If assessing memory for new learning, in a future session utilize the "Demonstrates at later session" check-off column on the orientation checklist.

Beamz Intro Adaptations

- If it is appropriate for you client, part of the introduction may include a demonstration of how to set up the unit.

- The Beamz Intro may be set up as a group activity, explaining the unit and its features to a group of clients, and giving them a chance to play with the Beamz or try different techniques one at a time, or in small groups. This may be particularly effective if the protocol selected for the main session will be delivered in a group format.

- If the Beamz is a new unit within the facility, conduct this activity in a common area to generate interest with other clients.

Session Form

Beamz Intro

Session Form

Client Name: _____

Use this orientation checklist to record tasks that you have reviewed with the client. It is recommended that only skills that will be needed for the selected activity be presented to the client at the time of the initial orientation. For example, if the activity will not involve recording sounds, introducing activation of the record button will not be necessary.

To evaluate retention of information in a future session, ask the client to demonstrate the task previously introduced. Use the column on the right to record if the client was able to properly demonstrate the task.

Task	Oriented	Not Applicable	Demonstrates in Current Session	Demonstrates at Later Session
Plug unit into power source	☐	☐	☐	☐
Connect Beamz unit to computer or Apple device	☐	☐	☐	☐
Select Beamz app or icon	☐	☐	☐	☐
Adjust Volume	☐	☐	☐	☐
Select Individual Song	☐	☐	☐	☐
Play a specific instrument using the Beamz laser	☐	☐	☐	☐
Play a specific instrument on the app or software	☐	☐	☐	☐
Switch between pages on the Beamz device	☐	☐	☐	☐
Switch between pages on the app or software	☐	☐	☐	☐
Activate the rhythm button	☐	☐	☐	☐
Activate the voice button	☐	☐	☐	☐
Activate the record button	☐	☐	☐	☐
Retrieve recorded files	☐	☐	☐	☐

Evaluation Process

Evaluation Process

- Protocols developed by CTRSs
- Therapists receive and review protocols
- Implementation of protocols with clients
- Therapist completes and submits evaluation form
- Evaluations reviewed and protocols updated

Beamz Protocol Evaluation Form

General Information

Name		Date	
Facility		Size of group	
Protocol Name		Setting	
Brief Group Description			

Ratings

Check boxes by double clicking and selecting "checked".	1 = Not at all	2 = Mostly not	3 = Somewhat	4 = Mostly	5 = Definitely
Protocol was easy to read & understand	☐	☐	☐	☐	☐
Comments					
Protocol was easy to carry-out as written	☐	☐	☐	☐	☐
Comments					
Goals were appropriate for activity	☐	☐	☐	☐	☐
Comments					
Forms associated w/ protocol were useful	☐	☐	☐	☐	☐
Comments					
Clients enjoyed the activity	☐	☐	☐	☐	☐
Comments					
I enjoyed conducting the activity	☐	☐	☐	☐	☐
Comments					
Music used (if different from suggested music)					

Comments

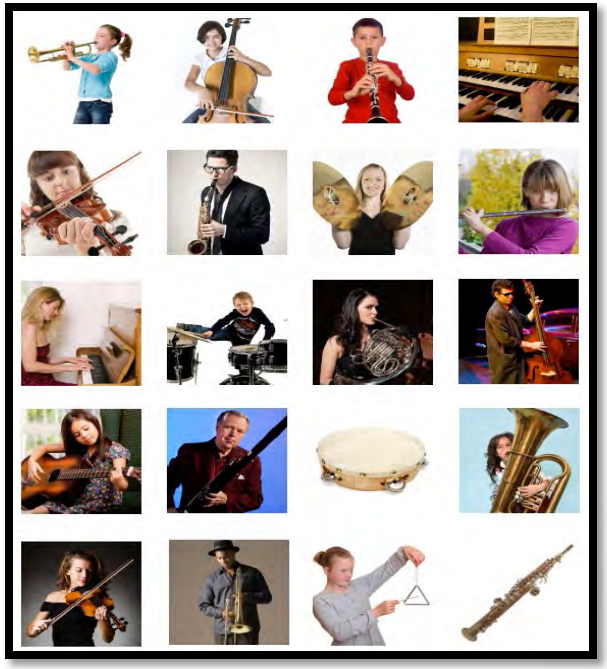
SUGGESTED ADAPTATIONS:

ADDITIONAL COMMENTS:

Beamz Therapy Guide Format

- Ringed binder format allowing for:
  - Personalization and rearrangement of content
  - Insertion of updates and new information
  - Storage of session reports

- Content
  - Introductory Information
    - Overview of the Guide
    - Navigating the Protocols
    - Technical Tips & Tricks
    - Cleaning and Care for Beamz
  - Guide to Possible Goals and Outcomes
  - Suggested Measurement Tools
  - Protocols and Session Report Forms
  - Appendices
    - Song List and Music Recommendations
    - Supplemental Materials for some protocols



Guide to Possible Goals and Outcomes

Potential Goals and Outcomes Grid

This table identifies some of the goals that can be addressed with the Beamz. You may be able to identify additional goals that align with the attached protocols. For this reason, we are providing blank spaces so that you can shade in boxes that correspond with the activities that address the goals you have identified.

	Beamz Intro	Follow The Leader	Song Writing	Rhythm & Movement	Name That Sound	DJ Dance Party	Beamz Memory Match	Hand Choreography	Mood Music	Continuous Timed Play	Sound Match	Team Free Play	Song Stretch	Tune Trivia	Beamz Concert
Cognitive Goals															
Attention															
Concentration															
Focus															
Following Directions															
New Learning															
Memory															
Problem Solving															
Reading Comprehension															
Sequencing															
Physical Goals															
Endurance															
Fine Motor															
Gross Motor															
Range of Motion															
Social/Emotional Goals															
Creative Expression															
Decision Making															
Empowerment															
General Social Skills															
Interpersonal Relating Skills															
Listening															
Self-Confidence															
Self-Exploration															
Team Work															
Verbal Expression															

Suggested Measurement Tools

Cognitive:

Brief Interview for Mental Status (BIMS): A brief assessment used as a part of the Minimum Data Set (MDS) to determine an individual's orientation and ability to recall and store new information.

Canadian Neurological Scale (CNS): Measures level of consciousness, orientation, aphasia, and motor strength in clients following a stroke.

Children's Kitchen Task Assessment: Measures a child's judgment, initiation, planning, organization and completion while creating with play dough.

Clock Drawing Test (CDT): Assesses attention and visuospatial abilities in clients with cognitive impairment, by having them draw a clock face, the numbers on the clock, and placing the hands at a certain time.

Executive Function Performance Test (EFPT): Measures the ability of a client with cognitive impairment to perform everyday tasks such as bill paying, cooking, taking medication, using the telephone, and hand washing.

Frontal Behavioral Inventory (FBI): Uses a 24-question self-report inventory for caregivers of clients with dementia to report behaviors experienced by the client.

Kettle Test: Measures cognitive functional ability in clients with cognitive impairment by having them go through the motions of making cups of tea using a stovetop or electric kettle.

Mini-Mental State Exam (MMSE): A 30-question exam that is commonly used in cognition screening, and measuring a person's cognition or memory over a period of time.

Montreal Cognitive Assessment (MoCA): A rapid screening instrument designed to test memory, attention, verbal fluency, abstraction, and delayed recall in older adults in approximately ten minutes.

Royal Prince Alfred Prospective Memory Test (RPA-ProMem): A twelve-item event-based measurement designed to assess retention of information over long and short intervals of time. Developed for clients with brain injury, stroke and dementia.

Saint Louis University Mental Status Exam (SLUMS): A clinician-administered exam used to identify neurocognitive impairment in clients with eleven-questions measuring orientation, memory, attention and executive functioning.

Short Orientation-Memory-Concentration Test of Cognitive Impairment (OMCT): Six-item questionnaire to detect level of memory impairment in older adults with cognitive impairment, or following a stroke.

Physical:

Action Research Arm Test (ARAT): A 19-item assessment measuring observed performance in tasks using the upper limbs. Four sub-categories measure grasp, grip, pinch and gross motor arm movements.

Canadian Neurological Scale (CNS): Measures level of consciousness, orientation, aphasia, and motor strength in clients following a stroke.

Comprehensive Evaluation in Recreational Therapy - Physical Disabilities (CERT - Phys. Dis.; CERT - Rehab): An assessment designed to examine a client's functional ability in eight areas: gross motor function, fine motor function, locomotion, motor skills, sensory, cognition, communication, and behavior.

Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH): A 30-item self-report questionnaire designed to measure arm, shoulder and hand movement abilities over time.

Functional Fitness Assessment for Adults Over 60 Years Old: An assessment designed to determine physical functioning of older adults through eight areas: body composition, flexibility, agility/dynamic balance, coordination, strength, endurance, body weight, standing height measurement in approximately 15 minutes.

Lower Extremity Functional Scale (LEFS): Twenty-item questionnaire rating a client's ability to perform everyday tasks. Designed to measure initial progress, and progress over time of individuals with lower extremity impairments.

Needs Assessment Checklist (NAC): A self-rating questionnaire that measures perceived independence in mobilization in clients with physical disabilities and Spinal Cord Injury (SCI). The checklist focuses on nine-domains, including mobility, wheelchair and equipment, ADL's, community preparedness, etc.

Nine-Hole Peg Test (NHPT): Measures finger dexterity by having client take nine pegs from a container, and one-by-one place them in nine different holes as quickly as possible.

Stroke Rehabilitation Assessment of Movement Measure (STREAM): A 30-item quantitative measurement of upper-limb, lower-limb and basic mobility measures used for clients who had had a Stroke.

Tinetti Falls Efficacy Scale (Tinetti FES): A ten-item questionnaire, measuring a client's perception of balance and stability, as well as fear of falling, while performing ADL's.

Wolf Motor Function Test (WMFT): A 17-item quantitative measure of upper extremity motor skills through timed and functional tasks.

Social/Emotional:

Cooperation and Trust Scale (CAT): An assessment which measures cooperation and trust amongst adults and adolescents with chemical dependencies.

FOX: An assessment evaluating reactions to others, reactions to objects, attention seeking, interaction with objects, concept of self, and interaction with others in clients with developmental disabilities.

Geriatric Depression Scale (GDS): Assesses level of depression in older adults, using a 30-question self-report questionnaire with yes/no questions.

Life Satisfaction Questionnaire 9: A measurement tool that can be obtained with nine or eleven items measuring life as a whole, self-care management, contacts with friends, vocational, family life, partner relationships, financial, leisure situations and sex life.

modified Differential Emotions Scale (mDES): A self-report examination which asks clients to report on emotions experience over the past 24 hours.

Participation measure for post-acute care (PM-PAC): A self-report short form measuring a client's participation outcomes in their living setting post-acute care stays. Uses the ICF classification scheme to measure communication, social activity, interpersonal relationships, etc.

Positive & Negative Emotions Scale (PANAS): A self-report questionnaire which asks clients to identify emotions that they have experience over the past week or are experiencing currently.

Reintegration Into Normal Living Index (RNLI): Measures the capability of people who have experienced a traumatic incident or illness to return to normal social activities through an eleven-question self-report questionnaire measuring seven elements from self-care to recreational activities to daily activities (work/school).

Sickness Impact Profile: A 69-item tool measuring quality of life and dysfunction following a life-changing illness. There are three-dimensions (physical, psychological and social) with two sub-scales under each dimension.

The Social Attributes Checklist: An observational checklist measuring social skills amongst children.

WHO Quality of Life-BREF (WHOQOL-BREF): Assesses client's quality of life within the context of their culture, life goals, standards and concerns. Uses 26 questions to measure four QOL domains, including physical health, psychological health, social relationships and environment.

Demonstration

Follow The Leader

Possible Goals:

Cognitive	Physical	Social/Emotional
Attention	Fine Motor	
Focus	Gross Motor	
Memory		
Problem Solving		
Sequencing		

Staff Requirement: One therapist

Group Size: One-on-One with a suggested adaptation for a small group

Setting: Quiet space where there are limited distractions

Duration: 10-20 minutes

Music Suggestions: Name That Sound songs, Blue Suede Shoes-Jam, Café Carnival, Fun Fun Fun-Jam, Green Onions-Jam, Haunted, Honky Tonk Hoedown, Margaritaville-Jam, Rock Star, Shout-Jam, SOS-Jam, Take Five-Jam, That's A Rap

The instruments within these songs do not vary throughout the rhythm track; to increase complexity, experiment with songs that include "simple" variation.

Procedure:

1. Set up the unit and decide on the music in advance of the session. If it is anticipated you will be using longer sequences, it is suggested that sequences be developed and written down in advance of the session. This will allow you as the therapist to be able to focus on the response of the client, instead of on remembering the correct beam sequence. Sit adjacent to the client, instead of across from the client, so that the sequence is clearly visible. Use the attached session forms to record client response and take general notes during the session.

2. Explain the activity to the client. "I will be playing different sequences or instrument patterns with the lasers, and I would like you to repeat back what I am doing. The sequences will start off short and will get longer as we progress through the activity. If you feel as though you are uncomfortable with the pace or number of the beams played in the sequence, please let me know."

3. Start by playing one beam, and having the client repeat that. If successful, progress to two beams in the sequence. If unsuccessful, repeat the exercise using one beam until the client is able to repeat it, and at that time, progress to two

repeating given the number of beams in the sequence, regress and remove beams from the next sequence, so that the client can demonstrate success with the lower number before attempting to advance to a more difficult progression again. Once the beam sequence gets to five beams, the therapist may try switching pages during the sequence to increase difficulty.

5. The activity should end when the client has continuously reached the goal number in their beam sequence. To prevent boredom or cognitive fatigue, the activity length should be limited to 15-20 minutes.

6. The activity should be repeated on a schedule determined by the therapist and the client for maximum cognitive benefits.

Follow the Leader Adaptations

- To further assess cognition, ask the client to recall information in addition to the sequences, such as the name of the activity, the first instrument used, the first sequence, etc. A form for recording this information is provided (Session Form 2).

- After a few clients become familiar with the activity, have them work together in a small group, assisting each other in recalling beams and taking turns to play the beams in sequence.

- If a client is having difficulty remembering the sequences, repeat them twice, before asking client to play the beams.

- For an activity variation, ask clients to initiate sequences that must then be repeated by the therapist. This is a good way for clients to demonstrate that they understand the rules of the game, and may build empowerment as clients receive a chance to become the leader. It may also motivate clients to engage in the activity for longer periods of time.

Follow the Leader

Session Form 1

Instructions: Use this form to record any general information from the session. Use a new form for each session with the client.

Client Name:_____ **Date:**_____ **Session #:**___

Beams in Sequence	Pages in Sequence	Client Response	Level of Assistance	Percentage Correct
5	2	Remembered first 4 beams, missed page change	Minimal verbal cueing	4/5 – 80%

General Session Notes:

_____

_____

Follow the Leader

Session Form 2

Instructions: Fill in item(s) that you would like the client to remember throughout the session, and record the client's ability to recall them after 5 minutes, 10 minutes, 15 minutes, and at the end of the session. At the start of the session, inform the client that you would like him/her to remember the desired information (i.e. "We're going to do an activity, and I'd like you to remember the name of it. It's called 'Follow the Leader'.").

Client Name:_____ **Date:**_____ **Session #:**___

Item to Remember (i.e. Name of the game, specific instrument, first sequence, etc.)	5 Min.	10 Min.	15 Min.	End

Item to Remember (i.e. Name of the game, specific instrument, first sequence, etc.)	5 Min.	10 Min.	15 Min.	End

Item to Remember (i.e. Name of the game, specific instrument, first sequence, etc.)	5 Min.	10 Min.	15 Min.	End

Additional Notes:

_____

_____

Hand Choreography

Possible Goals:

Cognitive	Physical	Social/Emotional
Concentration	Endurance	
Memory	Fine Motor	
Reading Comprehension	Gross Motor	
Sequencing		

Staff Requirement: 1 therapist

Group Size: 1:1

Setting: Private area with limited distractions.

Duration: 15-20 minutes

Music Suggestions: Allow client to choose music of interest, using music appendix for guidance.

Procedure:

1. Set up the Beamz unit in a private area with limited distractions, and sit either next to client or across from client.

2. Explain to the client that they will be creating a hand choreography (or hand dance) to go along with the Beamz music that they enjoy, but that you will begin by introducing some basic hand choreography moves. Explain that they are not limited to the movements that you show them.

3. Allow client to choose music of interest.

4. Incorporate a combination of hand choreography moves (described on following page). For the first session, or when client is first learning the different moves, have them complete 5-10 repetitions of each movement so that they can gain comfort and familiarity.

5. As client develops competence and confidence with different movements, the therapist should play the background rhythm and model a choreography "hand dance", shifting fluidly from move to move.

6. For more advanced clients, allow them to create their own hand choreography, and make notes on the different movements incorporated in the choreography. At a later date, see if client can replicate their hand choreography.

Hand Choreography Adaptations

- After different clients have composed their own hand choreography and have practiced their moves, structure a group activity where multiple clients can showcase their individual choreographed hand dances.

- Tell clients the name of each move as you demonstrate it. Next, either call out the name of specific movements and have the clients demonstrate the moves, or demonstrate different moves, and ask clients to call out the correct name for that movement. (Additional goal: memory/cognition)

- Without first demonstrating the moves, give the client the sheet describing each of the different moves, and see if they can demonstrate the move based on the instructions. (Additional goals: written/verbal comprehension, problem solving).

- If clients do not have use of their hands, ask them to replicate some of the moves using a different part of the body.

- Have clients create hand choreography routines to perform at the DJ Dance Party or Beamz Concert.

- Have clients work together to create a hand choreography routine.

Hand Choreography

Movements

These movements can be done simultaneously not only by the individual playing the Beamz, but also by other group members.

Hand choreography movements could include, but are not limited to:

The Wave	Move hands in a wave-like manner, hitting one or both lasers on each side.
The Flip	Start with the palm facing down, and the back of the hand facing upward. Turn the hand 180 degrees so that the palm is facing upward and the back of the hand is down.
The Chop	Place one straight hand perpendicular to the lasers, and bring it up and down to hit both lasers on one side.
The Robot	Place both hands perpendicular to the lasers, and alternate bringing them up and down to hit both lasers on both sides.
Fists	Make hands into fists, then open them, interrupting the beam of the laser with the fingertips.
Spirit Fingers	Wiggle fingers hitting at least one laser at a time.
Plucking	Create a plucking movement with the fingers, as if plucking on a guitar string, curling one finger at a time and bringing it in toward the palm.
DJ Scratch	Move hand as if pulling a record back and forth similar to what a DJ would do.
Knocking	Make a fist with the hand and do a knocking motion into a laser by bending the wrist.
Drumming	Flatten and straighten hand and move up and down similarly to beating on a drum. Move hands through one or both lasers on each side in rhythm with the background rhythm.
Finger touches	Place thumb directly below a laser and touch each finger to the thumb, one at a time, intercepting the laser each time.
Pointing	Make a pointing motion with the index finger, and move it through the laser.
Pushing	Hold hand out in front of the body (palm out, back of hand parallel with body), and make a pushing motion through the lasers, hitting both lasers on one or both sides.
Swimming	Hold hands out, perpendicular to the lasers with pinky fingers on top and their thumbs on the bottom (palms should be facing away from each other), and make a movement similar to the breast stroke through the lasers on each side of the unit.

Next Steps

- Strengthen evidence base through additional research studies utilizing protocols
- Ongoing feedback from therapists
  - Protocols
  - Adaptations and assistive technology
  - Music and song needs
  - Web community for idea sharing
- Develop additional content

Contact Information/Resources

Rhonda Nelson
Temple University
Rhonda.nelson@temple.edu

Beamz Website
www.thebeamz.com
Therapy & Rehab section has info on Beamz Therapy Guide

Usage Profile with 5th-6th Grade Teacher Catherine Hawkins
Summary Observations of Beamz Over 5-Year Period

Catherine Hawkins is a 5th and 6th grade teacher at the Innovations Public Charter School, a K-8 school of 285 students in Kona, HI. She is a pioneer when it comes to using Beamz technology, and was one of the first to witness the evolution of the Beamz' first life-size prototype into its current portable model. Hawkins worked with inventor Jerry Riopelle's wife years ago when she was introduced to the musical device. She immediately got hooked on the idea of using it in her classroom. An educational grant made this dream come true five years ago.

Classroom Use

"When I first acquired the Beamz in my classroom, I was a 1st and 2nd grade teacher. I set up the Beamz in the corner of my classroom and used it as a station for different activities – mostly with counting, skip counting, rhyming, poetry and language arts. We also use it for fun, an incentive, so when my kids are doing well, they can earn the privilege of using the Beamz as a reward." Mrs. Hawkins never received formal training on the Beamz technology, but rather used her teaching instincts to incorporate it into her regular academic lessons.

"When I moved to 5 and 6 grade a year ago, I continued to use it as a station in the classroom allowing students to use it to rap poetry, make music, and also reward them use of the Beamz if they completed other required work. We also pulled it out for the whole school a few times to use in our play pavilion. Kids could create and use the basic musical backgrounds to make their own songs. This was a big motivator for our students and they continue to ask for it."

Easy to Use

When asked about the overall ease of use, Mrs. Hawkins was quick to say, "It is very easy for kids to navigate! They totally get it. I'm not technical so it's been great to watch them connect to this innovative technology. It's a great thinking tool." Mrs. Hawkins continued, "I had a 5 year old who did not need any direction. She knew how to find the songs, how to add beats and other instruments, where to go... She just got it like within 10 minutes. Then that child was able to go on and teach other peers. I'm amazed at how when children immerse themselves in the technology world how advanced they are in their thinking and their ability to navigate."

Motivation and Engagement

Mrs. Hawkin's class uses technology all the time for research and writing. "We have Tech Tuesday every week. For the younger kids, the Beamz is such a motivator for them to get their other academic work done. For instance, poetry units are hard for little kids. They have a rubric of what they need to include in their work, and they work so hard to achieve it when they know they are going to be able to use the Beamz to recite the poem to background music."

Over the past five years, Mrs. Hawkins has found the greatest impact of the Beamz is its ability to increase engagement, one of the biggest challenges for most teachers. "It's great for engagement, coupling it to use as a carrot. When kids don't know what to do, they work extra hard to try to figure it out if they can earn Beamz time. Beamz has a domino effect of increasing confidence, and always increasing engagement for the next time we have a lesson."

Mrs. Hawkins added, "Kids that are checked out need something extra to engage them. There is always a group of them in every class. Beamz allows you to add multimedia to teach concepts, timing, patterns, and use as a way to enhance what you are already teaching. Kids are drawn to it. It's an amazing tool!

Recreational Music Making Using the Beamz Interactive Music System

Rhonda Nelson, Ph.D., CTRS, MT-BC
Temple University

Music Overview

- **Benefits of using music with older adults are well documented**
  - Music is often a great tool to invoke response and a motivator for engagement and participation in social activities
  - Music connects us with friends and family, memories, places, emotions
  - Listening to music can improve mood and invoke recall of memories; providing a framework for better communication and ongoing alertness

- **Music is uniquely processed by the brain; making music is great for cognitive stimulation and brain fitness**
  - Music memories are stored in varying locations in both brain hemispheres
  - “Processing” (listening) music is also done by both hemispheres
  - Making music uses even more cognitive processing skills

Technology

- Technological advances have created new opportunities for recreational activities
- Technology can often assist older adults to engage in recreation/leisure activities in new ways.

Beamz Technology

- Combination of **Beamz Interactive Music** and the **Beamz Laser Controller** provide opportunity for people of varying ages and abilities to recreationally make music
  - Interactive music is purposely constructed to provide framework for a range of music making experiences.
  - Laser beams provide a novel and inviting means to make music by “playing” light
    - Red, class 2 laser beams are safe to touch and are not harmful to eyes with recommended use

Introduction to the Beamz

- **The Idea – Musician Jerry Riopelle**
  - Vision for combining laser beams and music technology into a music experience product that ANYONE can play
    - Loved the idea of using “light” as the interface; setting up laser beams in a means that precision play and developed skills would not be required to make great sounding music
    - Provided a range of interactive songs for “beginner” to “advanced” play
    - Wanted to expand recreational music making opportunities – getting more people experiencing the joy and benefits of making music .

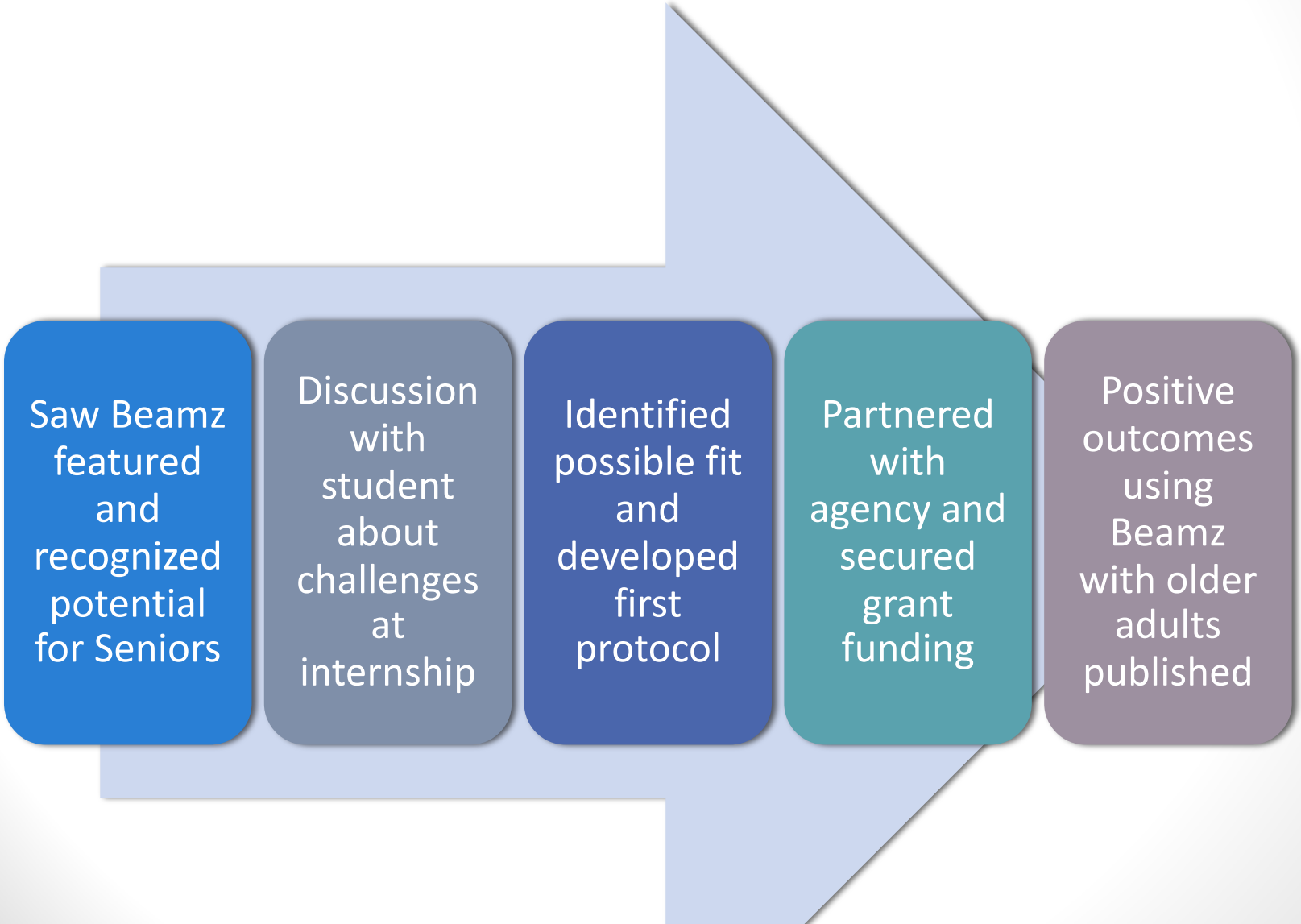
- **Product Launch and Evolution**
  - Consumer Launch – 1st Generation Product
    - Goal: Get EVERYONE into music making; However, therapists and special needs educators also purchased – recognizing the accessibility benefits
  - Evolution -2nd generation product broadened the music library and interactive music features
    - Company Identified need for structured content for educators and therapists
  - Current product – 3rd generation
    - Broadened compatibility beyond PC to MAC and iOS for use with iPads/iPhones
    - Design improvements for storage, travel use with diverse populations
      - Carrying and transport cases
      - Laser beam adjustment
      - Sample Activities Guide for educators, therapists and professionals to lead activities

Beamz Features

- **Universal Design**
  - Everyone can play; non-tactile orientation provides opportunity for anyone to participate
  - Anyone (including non-musicians) may use as a tool for leading activities using interactive songs
- **Great Sounding Music**
  - Interactive music is built with rich, authentic digital samples to replicate/emulate natural sounding instruments and sounds
- **Diverse & Complex Music Library**
  - All music styles & genres; hundreds of instruments
  - “Beginner” songs – very easy to make great sounding music without any specific sequence of interaction with laser beams
  - “Complex” songs – multi-section songs with instrument variation providing wide opportunities for personal creativity

Using the Beamz with Older Adults

The First Evidence-Based Activity Protocol



Study Overview

- Residents of a SNF participated in two 10-minute sessions of "Continuous Play" using the Beamz.
  - One 10-minute session was at a fast tempo.
  - The second 10-minute session at a slow tempo.
  - Between 10-minute sessions, there was a 10-minute resting period.
  - Counter-balanced research design utilized.

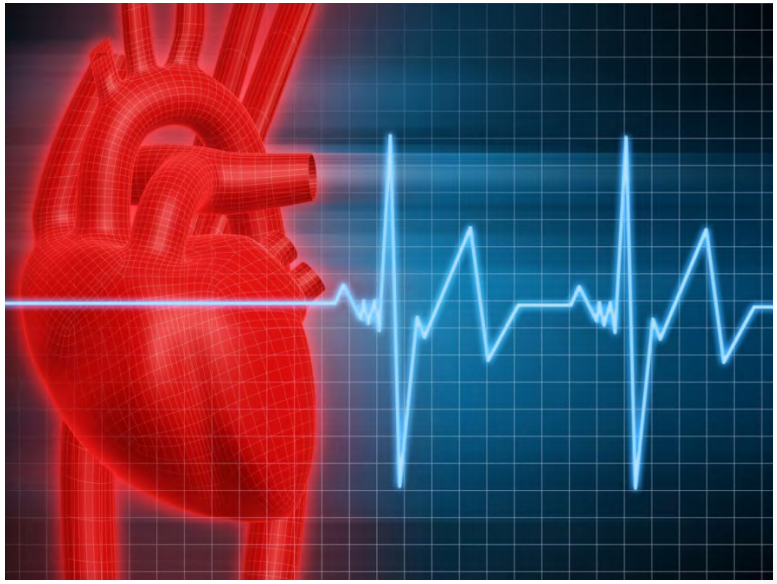
- At the beginning and end of each 10-minute session, heart rate and blood pressure recorded. During slow tempo sessions, also asked how relaxed they felt using the Visual Analog Scale – Anxiety (VAS-A).

- Individuals were also asked to rank their enjoyment of the activity on a 10-point scale after both the slow and fast tempo sessions.

- Participants were encouraged to play continuously during each 10 minute session, but were permitted to stop at any point.

Results

- Fast Tempo Session
  - Heart rate significantly increased ($z = 2.52$, $p = 0.01$).
  - Systolic blood pressure increased significantly ($t = -2.93$, $p = 0.01$)
- Slow Tempo Session
  - Systolic and diastolic blood pressure readings were not significantly different between two time points.
  - There was a statistically significant difference in heart rate ($t = -2.241$, $p < .04$).
  - Participants experienced an increased heart rate at time 2.



Conclusions From Study

- Participation in this intervention was effective in elevating heart rate in skilled nursing residents during both fast and slow tempo sessions
- Elevation in heart rate occurred after over a very short period of participation (10 minutes or less).
- Brief interventions can be very easy for staff to provide
- Individuals with both cognitive and physical limitations could benefit from physical activity that elevates heart rate.
- This particular intervention was a new activity for participants in the study. However, the majority indicated that they found it enjoyable.
- While it was not a primary focus of this study, it was noted that the introduction of a novel activity intervention in this setting resulted in interesting responses from staff in the facility.

Beamz & Temple University Connection

- Shared findings and thoughts for future possibilities
- Identified desire to work collaboratively to best serve older adults and professionals providing activity services to these individuals
- Explored ways to enhance use of Beamz

Beamz Therapy Guide

- Creation of “Beamz Therapy Guide”
  - Developed 15 activity protocols designed for diverse populations
  - Some very appropriate for older adults
  - Provides “suggested adaptations” for activities to be structured in a variety of ways by clinicians with different backgrounds.

Field-based Trials

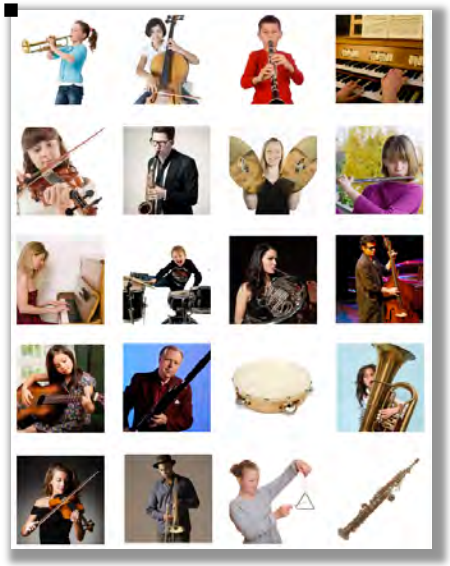
- Recruited agencies to partner with us, try activities in their setting and provide feedback/evaluations.
- Activities implemented by individuals with either ADC, CTRS or MT-BC credentials

Activity Information Provided

- Possible goals
  - Cognitive
  - Physical
  - Social/Emotional
- Staff requirements
- Group Size
- Setting
- Duration
- Music Suggestions
- Procedure (Step by Step)
- Adaptations

Additional Resources

- Song List and Music Recommendations
- Notations on Karaoke options for sing along groups
- Supplemental Materials for some activities (Musical instrument matching cards)
- Opportunity to join community for idea sharing



Demonstration of Sample Activities

- Beamz Intro
- Follow the Leader
- Hand Choreography

Hand Choreography Movements

Hand choreography movements could include, but are not limited to:	
The Wave	Move hands in a wave-like manner, hitting one or both lasers on each side.
The Flip	**Start with the palm facing down, and the back of the hand facing upward. Turn the hand 180 degrees so that the palm is facing upward and the back of the hand is down.**
The Chop	**Place one straight hand perpendicular to the lasers, and bring up and down to hit both lasers on one side.**
The Robot	**Place both hands perpendicular to the lasers, and bring up and down to hit both lasers on both sides.**
Fists	**Make hands into fists, then open them, interrupting the beam of the laser with the fingertips.**
Spirit Fingers	**Wiggle fingers hitting at least one laser at a time.**
Plucking	**Create a plucking movement with the fingers, as if plucking on a guitar string, curling one finger at a time and bringing it in toward the palm.**
DJ Scratch	**Move hand as if pulling a record back and forth similar to what a DJ would do.**
Knocking	**Make a fist with the hand and do a knocking motion into a laser by bending the wrist.**
Drumming	**Flatten and straighten hand and move up and down similarly to beating on a drum. Move hands through one or both lasers on each side in rhythm with the background rhythm.**
Finger touches	**Place thumb directly below a laser and touch each finger to the thumb, one at a time, intercepting the laser each time.**
Pointing	**Make a pointing motion with the index finger, and move it through the laser.**
Pushing	**Hold hand out in front of the body (palm out, back of hand parallel with body), and make a pushing motion through the lasers, hitting both lasers on one or both sides.**
Swimming	**Hold hands out, perpendicular to the lasers with pinky fingers on top and their thumbs on the bottom (palms should be facing away from each other), and make a movement similar to the breast stroke through the lasers on each side of the unit.**

Senior Care Activities

- Creation of resources for Activity Professionals
- Focus on actively engaging seniors in music making
- Aim to introduce new activities that promote physical, cognitive and social stimulation
- Designed to assist Activity Directors in quick planning of programs
- Enable the addition of music to activities in a new way.
- Just released for NAAP Conference – see Exhibit Hall and Beamz Website!

Beamz Resources

http://www.thebeamz.com/

Special section of “Senior Care” information

Activity and product resources.

Video clips and photos.

Questions

Nebo School District—Beamz Inspires Pre-Schooler to Overcome Movement Disability

Katrina Davenport, Hearing Specialist for the Nebo School District, fell in love with the Beamz at first sight. She was attending the Closing the Gap tradeshow in Minnesota more than a year ago and passed by the Beamz exhibit. “I couldn’t get over this assistive technology device and immediately ran to get our district physical therapist to check it out. Beamz Interactive was running a contest and I encouraged our physical therapist to enter. We were at the airport heading back to Utah when she got the call that she was the winner of a Beamz Professional System.”

As part of a seven-person Assistive Technology Team for the Nebo School District, Davenport and her colleagues work with individual students to help them with communication, writing, reading, speech and physical therapy or any thing they may need to build their skills and meet their IEP goals. Upon receiving a referral by a pre-school teacher, the team set out to assess a 3-year old girl with multiple disabilities.

This young pre-schooler was restricted in using only half of her body and she also has an aversion to touch. Davenport and the physical therapist collaborated on a plan to test her abilities. “We thought, let’s try the Beamz. Interrupting the laser lights would allow her to receive a cause and effect prompting without having to touch or feel anything when interacting with the device,” Davenport added.

The team hooked up the Beamz to an iPad and began to show her how it worked. Once the pre-schooler realized she was activating something to make a sound, she started using her right hand to reach out. She would get really excited and started reaching out more. Davenport added, “Over 20 minutes, we showed her lots of different positions. Then within a moment we noticed her mother’s face light up as the young girl reached for the Beamz with her left hand. This was the first time her mother had ever seen her reach out for anything with her left hand!”

Because of this incredible breakthrough, The Assistive Technology Team has allowed this pre-school class to temporarily use the Beamz in their classroom setting. “The very

first thing that stood out to me about the Beamz was the immediate feedback with cause and effect," said Davenport. "It allows students to realize or understand that they can really manipulate their environment and interact with music. If I was a classroom teacher, I wouldn't wait for one to make its way to my classroom, I'd purchase one with my own money!"