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Rhythm and moves for balance and cognition

by Sue Scott, MS

Rhythm and moves, gestures and sound, music and dance . . . toe tapping and the evolution of language? How did the rhythms and music of our ancient ancestors help humans understand each other? And what does that have to do with exercise class, balance or cognition? Evidence from anthropology and neuroscience indicate that language, rhythms, music and movement are deeply rooted in the evolution of our past and still play key roles in our brains.

This article sets the stage for using rhythm and music to enhance balance and cognition in older adults. Weaving together intriguing insights in neuroscience regarding human expression, movement and rhythm can inspire and enhance our practices as exercise professionals.

Let's begin with the origins of language. The prevailing theory is that language evolved from primitive communications that arose from gestures (1,2). Over time, humans learned to interpret the movements of others as meaningful actions with an intelligent purpose. By observing, interpreting and imitating the body language in others, we developed our capability to deal with abstract ideas.

Eventually, sound was added to gestures. Sound, especially percussive sounds (tap, clap, stomp, drums, seed pods, castanets) became rhythmic. Brown and Parsons



istock/Dean Mitchell

suggest a "body percussion" hypothesis: Early dancers made noises with their feet and hands or attached noise makers to their feet and hands, to create sounds that would help maintain rhythm (3). Noise-making rhythmic moves became dance and music.

Dancing was able to spread culture and information because it has a strong capacity to represent complex ideas and is easily imitated. Hence dancing, an early language of gestures, evolved as a fundamental form of human expression to generate rhythm, communicate abstract and complicated ideas, and preserve and spread culture.

As far back as we study, music, rhythm and their accompanying movements have played key roles in all cultures. Rhythm and moves, music and dance are used to inspire, connect, communicate and preserve

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Glossary

Cerebellum

Area of brain controls motor function, equilibrium and balance

Cerebral cortex

Brain's gray matter responsible for language and processing

Dance

Rhythmic and patterned body movements

Music

Science and art of ordering sounds with rhythm, melody and harmony

Rhythm

Regular, repeated pattern of strong and weak elements in sound; the beat in music

Continued from page 1

culture and history (4). These are a type of language—body language. And our brains reflect that, still.

Today, we know the “motor center for the production of speech” in the brain is called Broca’s area. It sits in the left frontal cortex, where it assembles and interprets units of speech and facilitates how fluently and perfectly we string together words and phrases. Broca’s area also includes a representation of our hands and arms that translates certain hand and arm gestures into meaningful words and/or abstract ideas (1,3). Broca’s left-side area enables our fluency and order of words while its right-side counterpart enables fluency of movement (3). Music and dance bring together right and left sides of the brain in rhythm and movement.

Now, on to toe tapping. How’s that work? And what makes it so automatic? Technically, it’s called unconscious “entrainment.” Entraining is moderated by two parts of the brain that act as a type of neural metronome. We react unconsciously (automatically) because the region connects to the cerebellum, communicating information about rhythm without “speaking” to “higher” auditory areas in the cortex (3).

Music aids movement

In his book *Musicophilia* (4), Oliver Sacks, a clinical neurologist, shares that the area in our brains that “perceives, processes and responds to music occupies more terrain than language.” Building on that fact, Levitin explains that virtually every part of our brain is responsive to music we enjoy (5). Listening to music and playing music, and watching music played or someone dancing involves us in memory, recall, learning, joy, relaxation, inspiration, motion and emotion. Music and the brain make sweet music together.

All this is to say, rhythm and music and our capacity to react to it is hard-wired into our beings from long ago. Our bodies are indeed, very music and rhythm friendly.

Enjoyable music is a sleek and powerful addition for almost any kind of physical activity. It’s as if the rhythm, cycles and symmetry of music effortlessly orchestrate our movements. Music helps individuals anticipate each next move with their whole body and it can build lasting mind/body connections (6,7). For example, who doesn’t find herself nodding and bobbing her head, shoulders and arms to favorite music or music with a strong beat? Many of us, almost innately, add lip synching or make those little “da da da da” sounds. Older adults in my group classes have fun playing “air instruments” (drums, violins, guitars) to “Don’t Bring Me Down” (Electric Light Orchestra). It’s true!

The cognitive tasks of remembering words and/or steps are always easier when the melody is playing. Melody and beat helps us fill in the blanks, so to speak, to order and connect both movement and words; a mind and body connection. Rhythm can tell us when to move. And the whole body (feet, arms, trunks and head) tends to respond, not just the feet.

There are other pleasurable connections. Many times music brings back fond memories—people may mentally rehearse the moves or memories from that time gone by. Adding enjoyable musical rhythms to almost any kind of physical activity assists sequential coordination. More specifically, music helps an individual anticipate, select, initiate, coordinate and maintain movement (8). It reduces perceived rate of exertion and effort, and increases psychological arousal—all while making the time fly (4,9).

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This quality of rhythm and melody can be of great benefit to older adults with balance or cognitive challenges, or who suffer from neurological deficits, such as Parkinson's Disease. Music choices may help individuals coordinate and maintain movement.

The power of aerobic exercise

There is strong consensus in literature that aerobic exercise bolsters cognition. Even relatively short exercise interventions reliably increase brain volume, neural connections and chemical activity. Overall, the brain is more efficient (neuro-protective); it has a higher capacity while using less energy; and is more productive and flexible (10-16). In a 2003 study that used structural MRI scans of brain tissue, Colcombe reported the regions of the brain that normally exhibit the greatest age-related degenerations are the regions most spared by aerobic exercise (13). These are important findings for older adults.

There continues to be strong research from animal studies, and emerging research with human subjects, that aerobic exercise can be even more productive for both motor skills and cognition if it also is:

- engaging
- fun
- challenging
- complex
- novel, and
- holds our interest,
- requires planning and sequences of moves, and
- is sensory/motor (enriched environments) (17-20).

The items on that list get us thinking: How can we make activities richer and more complex? More fun with the right amount of challenge? Maybe exercise can go better with dances, games, hikes through the wondrous woodlands or neighborhood parks? Maybe we can adapt our program

“...the regions of the brain that normally exhibit the greatest age-related degenerations are the regions most spared by aerobic exercise.”

to be more like fitness boot camps. Knowing physical activity should be fun is good news, even if it requires us to be more creative.

From science to the gym

The magic we share as leaders lies in what we know and how we use it.

Coordination, balance and cognition can be trained together in fun, engaging, rich and complex ways by encouraging sustained (aerobic) movements to rhythm or music. It can be dance, of course. But there are many ways to dance. Find what is appropriate for your groups.

Chair dancing would be suitable for frailer groups (see the Head Nods and Toe Taps exercise on page 5). More able groups can do work on their feet (try ABCs) and perform a wider variety of moves. Should the music be Oldies but Goodies? Should you use only music of their era? I say mix it up some. Choose whatever you think you and your class both would enjoy.

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More creative ideas

Sue Scott is presenting
“Concepts and
equipment to bolster
balance and cognition”
at the ICAA
Conference
Saturday, Dec. 3
8:30 am

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When people move their bodies into joyful or confident positions, they feel more joyful and confident. Behaviors and intentions influence attitudes. For example, Inten-Sati is a high-intensity aerobics classes for young adults that uses whole body moves done with cadence to positive affirmations. There are movements for Power, Confidence, Balance, Gratitude and such. I've adapted the poses for older adults, and many are performed seated. Expressions done with the body, like the earliest communicators. Very empowering! This program is now being studied by a neuroscientist at New York University (19).

Developing engaging, challenging aerobic activities that combine agility and whole-body expressive moves with rhythm or music is an achievable goal, even with older or frail adults. Consider using rhythm or music more with agility and functional kinds of training. It's my belief the next horizon in fitness will be merging brain fitness with physical fitness in fun, engaging and functional ways. Adding music to movement is a very good start.

Sue Scott, MS, created a comprehensive, multi-modal balance training program, ABLE BODIES® (published by Human Kinetics, 2008). Sue worked with a team at Oregon Health and Science University to develop HELP PD, a sensori-motor agility program for people with Parkinson's disease and is currently working on a multi-faceted program providing exercises that enhance cognition in adults over 75. Sue has a masters in exercise science; is an IDEA Master Trainer and an ACSM certified Health and Fitness Specialist. Sue has presented for ICAA, IAHS, ASCM APHA, and IDEA. She lives, rides bikes, skis and gardens with her husband and family in Happy Valley, Oregon.

Appropriate for



Active
now

Getting
started

Needs a
little help

Exercises to blend movement and rhythm

The exercises beginning on page 5 are part of the ABLE Bodies program. Connecting almost any group of exercises, seated or standing, can make your programming more aerobic. The spacing between songs allows for brief rests.

Consider performing the exercises in order:

Toe Taps and Head Nods

Level: Easy

ABCs

Level: Easy to moderate

Teeter Totter Chair Stands

Level: Moderate to difficult

Waltzing Matildas

Level: Moderate

Rock and Walk

Level: More difficult

The first exercise, Toe Taps and Head Nods, is easy for most everyone; and it is a very participatory way for participants to feel how music naturally moves us, rhythmically. Picking something easy means you can expect everyone to participate.

Based on your observations, progress to standing activities and those involving more complexity. It would be a fun class!

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Toe Taps and Head Nods

Level: Easy

Goal: Acquaint participants with music's ability to guide and direct the rhythm for movement.

Music: Select some toe-tapping music, such as "Do You Believe in Magic" by the Loving Spoonfuls or "Dixieland" by the Wolfe Tones

Model each move first, carefully and deliberately. Keep an eye on your participants—the pace and physical demands build up quickly. By song's end, they'll be breathing harder.

Start with everyone seated. For greater difficulty, challenge them to do some of the activities with their eyes closed. Progress those who are willing by asking them to stand for some activities.

Toe (foot) taps

- With one foot to the beat.
- With the other foot to the beat.
- Each foot lifts up and moves out to side and down.
- Alternate.

Head nods

- Add slow head turns.
- Add toe taps.

Arm swings with alternating arms (incorporate a little "body bounce")

- Bent arms swing forward and back to beat.
- Bigger arms swings.
- Arms reach up and across body.
- Arms reach to sides.

Marching in place

- Regular, wide, to sides.
- Add arm swings.

Heel-toe stepping

- Regular, wide, to sides.
- Add arm swings.

ABCs

Level: Easy to moderate

Goal: Improve the transitional skill of shifting weight from one foot to the other.

Music: No music, rhythm only

This activity can be a difficult balance challenge for some, so please provide plenty of balance support. Participants stand in front of their chairs so that if they lose their balance, they can simply sit down. For surer balance support, they can touch the backs of their legs to the front of their chairs, and/or lightly touch the chair's arm with their fingers.

Select a stepping pattern. I frequently use:

- Side touch to right with Right foot
- Side touch to left with Left foot
- Forward toe tap with Right foot
- Forward toe tap with Left foot

Have them practice this simple pattern a few times.

Next, ask participants to say their ABCs out loud and rhythmically while executing the same pattern. It's really fun to see in their faces how much easier rhythm makes the transitions.

As they improve, you can progress to using bigger side touches and/or heel touches forward (they'll need to bend their knees). Next progression would be to add arm movements.

Other applications: Any simple, well-known rhyme can help with transitional activities. For example, the rhythm of the verses can make a remarkable difference in the smoothness of how participants move through an obstacle course set up for the Parkinson's disease agility program, HELP PD (18).

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Teeter Totter Chair Stands

Level: Moderate to difficult

Goal: Build strength in the whole leg, use balance and practice one of the most fundamental tasks for mobility: getting out of a chair.

Music: "Que Sera, Sera" by Doris Day

Teeter Totter Chair Stands are a mainstay of my strength training routines. The movement, which requires leaning backwards and then forward, is not unlike the playground move to pump a swing. Leaning forward brings the center of gravity forward, more over the feet, making it easier to get up. This is the physics we learned on the teeter totter at school; the bigger kid moves closer to the fulcrum (middle) to be more easily lifted. Demonstrate each version first.

All versions start with participant sitting at edge of chair.

Two Legged

- Start with both feet shoulder-width apart, pulled back so that heels are just behind knees, with feet on floor.
- In one move, lean back, lean forward, stand up.
- Start with 4-6 repetitions and build up to 6-12.

One Legged – more difficult

- One foot is placed forward, the other is pulled back like above. From this position, the back leg does most of the work.
- Start with 4-6 repetitions, build up to doing 6-12.
- Repeat with other leg.

Cueing:

- Lean back
- Lean forward
- Stand up!

Side Step and Up – similar in difficulty to One Legged, but requires a little more lateral balance and agility

- Start with both feet on floor, shoulder-width apart, heels just behind knees.
- Lift one knee up and step out to the side; encourage a BIG side step. (Foot may turn out a bit.)
- Participant leans over that leg, places hands on thigh, and then "pushes!" up to standing. Once up, they'll be at an angle in front of the chair, with the trailing leg still by the chair.
- Bring the trailing foot alongside (cue: "side-step together"), then balance in this standing position.
- Side-step back in front of chair. Touch the chair with fingertips to be sure it's where it should be before sitting. Sit.
- Repeat with other leg.

Cueing:

- Knee lift, side step (think wheelie)
- Lean forward over leg, place hands on thigh
- Push! to stand
- Step together
- Side-step back, touch the chair
- Sit



Lean back...



Lean forward...



...Stand up

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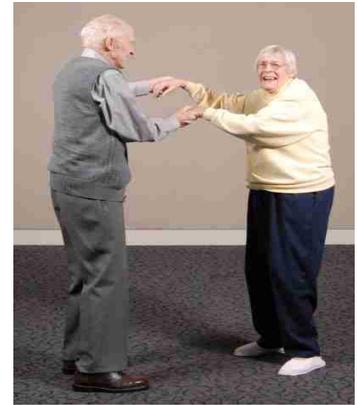
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Waltzing Matildas

Level: Moderate

Goal: Strengthens hip abductors to reduce fall risks, especially for those severe injury-producing falls to the side.

Music: A waltz works well, or the instrumental “Theme from a Summer Place” by Percy Faith or “Tennessee Waltz” by Patti Page. It’s beautiful and lilting.



Waltzing Matilda is a side-stepping activity.

- Participants stand, and they could have partners.
- Without music, take 6-8 side steps to the right, then the same to the left.
- Cue them to try big steps if they can.

To cue more attention to mind/body connections, ask participants if they can tell what muscles are getting used. What body parts were they moving?

- Start the music. Begin with the side steps.

After a few passes back and forth, ask how the movement feels. Is it easier, more fun? What body parts do they notice moving? You should see and they should feel that these side steps are getting done with the whole body! Trunks, arms, legs and heads, all moving with a rhythm and flow, as beautiful as the music. I bet you’ll see smiles and even a few twirls.

Teach them how to twirl (step together step turns). A partner can stabilize a twirler with a hand around the back or hip.

Rock and Walk

Level: More difficult

Goal: Reinforces many components of balance.

Music: “My Girl” by the Rolling Stones. It seems to help when participants know the words.

For this activity, participants should have partners or take turns walking with you to hold their hands.



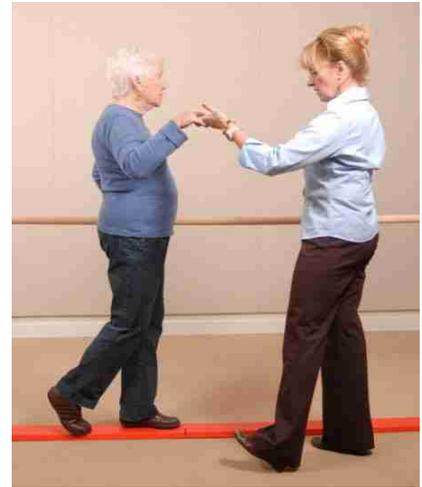
Rock and Walk is one of my favorites for building balance confidence. Participants will do well if they use their best postures and core strength (abs in and lightly braced, ribs lifted, shoulder blades back and down), visual targets (ie: eyes on the horizon), somatic awareness (of where they are situated in space). Do they feel that

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they are keeping their bellies (center of gravity) between their feet as they move; and do they notice how it feels to move their centers from one foot to the next as they rock or walk? Are participants mindful of pace; can they use the music to time their moves?

On the floor, use tape to form long, parallel lines, in sets of two or three. As a progression, participants can choose to tandem Rock and Walk along the lines with one foot in front of the other, comfortably spaced while holding hands or fingertips with another participant(s) on an adjacent line (as shown in the photo on the previous page). The next progression would be to Rock and Walk on a poly balance beam.



Warm up

- Perform heel-toe rocking with feet shoulder-width apart.

Practice, no music

- Heel touch and roll up: Place heel down first, then roll across that foot until you're up on all toes.
- Rock forward, knee lift: As weight shifts to forward foot, brace abdominals and swing knee up to lifted position.
- Rock back, knee lift: Shift weight to rear foot and lift front knee (remember to cue "Abs in, knee lift").
- Roll from one step to the next using a heel-toe rocking movement.

Rock and Walk

Cue your participants to hold themselves in good tall posture (abs in, ribs lifted, shoulder blades back and down), and to keep their eyes on the horizon (visual target). Encourage them to relax and let the music guide them. Tell them to imagine themselves doing this well.

- Cue up the music. First, demonstrate by yourself, then with a partner.
- As the music dictates, rock back and forth a few times until comfortable.
- When the music leads you, take a step along the line or beam. Stop and rock a few times.
- When ready, take the next step. Keep your moves timed to the music.

As participants improve their skills and balance, keep the music playing longer; do more Rock and Walking. Perform longer episodes of exercise to build endurance and/or add new sequences to any of these challenges. Build up to doing different moves to different songs. Try the tandem line progression or the poly beam.

The goal for endurance is simply to keep participants busy and jiving for longer and longer times. Making it social, adding endurance and learning new sequences are all tactics that improve brain health and cognitive skills. Have some fun with this one!

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Resources

ABLE Bodies Balance Training
Sue Scott (book, 2008)
Human Kinetics Publishing
www.humankinetics.com

ABLE bodies book and DVD
World Instructor Training Schools (WITS)
www.witsexducation.com/store/Store.htm#Specialty

Aerobeat
Ken Alan Associates
Music, choreography for older adults
<http://www.aerobeat.com/>

Brain World magazine
International Brain Education Association
<http://brainworldmagazine.com/>

Inten-Sati
Cardiovascular workout with affirmations
<http://www.satilife.com/index.html>

Musicophilia
Website with Oliver Sacks
http://musicophilia.com/music_video.htm

This is your brain on music
Daniel Levitin (book, 2008)
<http://us.penguin.com>

SilverSneakers music
Muscle Mixes
www.musclemixes.com

Sit and Be Fit
Mary Ann Wilson
DVD, VHS and CDs; airs on Public
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