Performing Arts Athletes & Injury Prevention

By Amy Lalime | July 8th, 2020 | Latest Articles

Customer Spotlight Feature: Lesley Parrish, DPT and James Boyd III

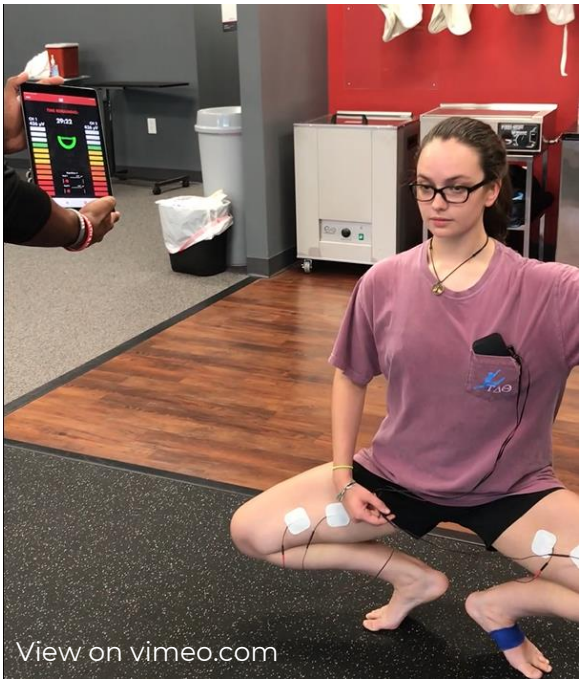
Dance, like all sports, has a language of its own – one in which therapist Lesley Parrish has become fluent. Parrish has experienced first-hand that performing arts athletes are "**underserved as an athletic population**," and her work seeks to treat and, more critically, give these athletes the tools and understanding to **prevent injury**. Her hands-on research and treatment of pre-professional and professional dancers has led her to develop some of her most effective training and injury prevention protocols with the **assistance of biofeedback**.

In many of her cases, the dancer doesn't know where or that there even is significant **weakness**. Often, athletes are cleared to perform when pain decreases, but Parrish knows that protecting their **long-term health** is critical – particularly as professional dancers perform at high levels for long activity durations.

Patellofemoral conditions are a common condition in this group. Pain and injury here can be indicative of issues **along the kinetic chain**. If proper muscle activation is not achieved, problems can worsen. The key here is avoiding inward collapse of the knee by **activating the musculature** on both sides of the hip joint to **stabilize** the kinetic chain. "Valgus collapse or internal rotation about the knee is correlated to lateral patella subluxation, which is common in dance. If you don't properly activate the proximal hip musculature, you will not have a stable platform to develop tension within the lower extremity. Oddly enough, dancers are taught to stay in "turn out," which is a position where the hips are externally rotated. If there is not co-contraction between the adductors and abductors to **create a pull/contract balance**, stabilization at the hip proximally will not occur at the extremes of motion that dancers are required to perform," Parrish says.

James Boyd, an instructor and professional dancer himself, notes that this kind of thinking opens up an opportunity for another dimension of education. He states, as an example, "It is correct to tell dancers to stay turned out, and this is also a direction easily followed. But we find that, in a nutshell, this simplicity causes the injury we are trying to avoid. A different dimension of teaching would share *how and why* the dancers would aim to remain turned out by constantly activating specific regions of the lower body. There are many layers [of awareness] to share with dancers – or anyone who can move! – of how to find the **full potential of their movement**. I think it is critical to bring this conversation to the main stage."

Monitoring the Fundamentals



To analyze dancers' natural activation patterns, Boyd and Parrish decided to monitor two fundamental exercises:

1. Single leg relevé and hold
2. First position grand plié *(video at left)*

In both, sEMG sensors are placed on the glute medius and adductor magnus; dancers are instructed to enter **posterior pelvic tilt** as well as lift with quads and adductors. The goal is set low and dancers are cued to activate both muscles to the same level. If they are unable to perform these fundamental movement patterns with **co-activation** of the targeted muscle groups, it indicates an **activation imbalance** that is likely happening consistently for that dancer. Long term activation imbalance and instability around critical joints have been correlated to injuries of the lower extremity.

"Showing the athletes' muscle activity with biofeedback visually changes alignment of the lower extremity in real time, and in some cases decreases pain in the overused joint," says Parrish.

Lower Chain Impacts

One example of lower chain injury resulting from activation imbalance and/or weakness is **sesamoiditis**, or the inflammation of tendons that attach to the small bones in the foot, particularly common at the base of the big toe. This condition is caused specifically by valgus collapse into the joint, causing medial weight bearing on the metatarsal and creating **pain, stress fractures**, and other maladies.

Katey Fleming, a professional dancer and former Troy University Dancer, under Parrish's care, assisted with the development and case study of an injury prevention protocol for sesamoiditis. Focusing on working from (actively engaging and monitoring) the **proximal hip girdle**, Fleming was able to relieve the pain in her toe by firing the appropriate muscles higher up the kinetic chain. This activation relieved **damaging pressure** by controlling and mitigating muscle forces throughout her lower extremities. On completing a 15-minute

contralateral monitoring session with mTrigger, Fleming remarked, "**it's like I danced for 3 hours.**"

Another issue of concern with activation imbalance is **symmetry** of bilateral activation. When taking a baseline sEMG measurement on the non-injured leg and setting the max voluntary contraction (MVC) threshold at the level of healthy MVC, Parrish reports that the majority of patients couldn't get their injured levels up to match the activation of the healthy muscle. Asymmetries in strength and neuromuscular control can lead to long term **avoidance, atrophy, and injury**. Catching asymmetries early and training to combat them can prevent such outcomes.

Breaking the Chain of Injury with Preventative Evaluation

Underlying much of the aforementioned is an all-too-common scenario plaguing collegiate and professional athletes: the lack of **reinforcement of fundamental movement patterns** as they progress to pre-professional and professional levels. While dance offers ample opportunity for technique practice (perhaps even more so than other sports) there is still the ever-present drive to perform, which can lead to infrequent critique and **evaluation of the basics**. If the only evaluation happens upon injury, athletes are predisposed to improper activation and potentially **harmful movement patterns**. Reinforcing proper technique and building the voluntary neuromuscular pathway is critical throughout the career of any athlete, and Parrish and Boyd are out to prove it. Through collaboration with Troy University Department of Theater and Dance, they are developing protocols to evaluate dancers and teach correct muscle activation preventatively – in the course of standard training – **before there is ever an injury**. Parrish almost always sees a deficit from dominant to non-dominant side, and notes that dancers in particular are very prone to fatigue and overuse injuries due to the lack of guidelines on how much they can practice. Furthermore, performing arts rarely fall under regulatory agencies that typically work with athletics. She asserts that in order to develop preventative and rehabilitative techniques specifically for this patient group, therapists and trainers must think about stability maintenance, and look at changes, deterioration, and force production over time and relative to fatigue.

To normalize the use of technology in assessment and get more continual measures for their preventative work, Parrish and Boyd will connect the *mTrigger* to a television (via iPad and HTML cord) in the studio so the dancers can see their muscle activation from a distance while they perform. This **real-time feedback** along with Parrish's unique knowledge around preventative injury muscle activation techniques (much of her research background involves wearable Inertial Measurement Units, or IMUs) enables her to provide **rich data** that helps her athletes learn and **reinforce healthy activation patterns** that will protect their bodies throughout their careers. *mTrigger*, Parrish says, lends

objectivity and protective measures to training, and empowers her athletes to sustain their studies and careers through injury prevention.

What do your athletes say about *mTrigger*?

According to Parrish, both dancers and instructors love the *mTrigger* system. Dancers **quickly learn** what muscles they are supposed to be activating, and "almost always" the instructor realizes that the dancer can in fact perform the problematic movement correctly once they are hooked up and receiving feedback. Recently, they have begun utilizing *mTrigger* with the fine arts department director, who loves that it gives the teachers a way to **quantify training and progress**.

Impact of Telehealth

While Lesley is currently out of the studio following national stay-at-home orders imposed on students and faculty alike, she notes that this kind of technology is the way that PT is headed. "I felt the wave of remote patient monitoring was coming back in 2019 – I contacted some ortho friends, and said we should start building online accessible rehab tracks." Therapists' hands have been forced awkwardly into this new reality, but there are opportunities for remote monitoring for injury prevention. With patients empowered to take care of their own health, being forced to treat themselves medically, we have an opportunity to connect with them on what their participation in rehabilitation can mean for **long term outcomes**.

"***mTrigger* extends my reach**," says Parrish, remarking on the value of a reduced need to see a therapist alongside an increase in the performance data available for evaluation. "Therapists' hands on skills are critical, but under certain circumstances, you have to have other options and still be able to provide care, so **devices are going to be critical moving forward**."

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Lesley Parrish is a licensed physical therapist that has dedicated 18 years of clinical practice to the art of caring for individuals with orthopedic and sports medicine injuries. Her focus has been in sports medicine with specialization in movement assessment, injury prevention, and rehabilitation of orthopedic injuries. She predominantly works with professional and collegiate athletes. She

has worked with athletes from the Tennessee Titans, the Lipscomb University Bison, the New York Giants, the Montreal Alouettes, and the New York Jets. She has worked alongside physicians from the Andrews Sports Medicine and Orthopedic Center and Tulane Institute of Sports Medicine. Dr. Parrish's research interest focuses on movement assessment and injury prevention utilizing wearable technology to assess movement strategy to prevent injury and the return to activity. More recently, she has had the privilege to work alongside the Troy University Department of Theater and Dance to develop strengthening strategies with dancers at the pre-professional level. In collaboration with James Boyd, Troy University Dance Faculty, she has been able to assist in creating programs that identify and prevent injury by promoting proper movement strategies. She currently serves as adjunct faculty for the Troy University Athletic Training Program. She received her Bachelor's degree from The University of Alabama and was awarded a Doctorate Degree in Physical Therapy from Belmont University.

James L. Boyd III is an artist born and raised in Jacksonville, Florida. James is a Douglas Anderson School of the Arts graduate and received his B.F.A from SUNY Purchase College in 2010 in Dance and Choreography. He has performed with Elton John, Lady Gaga, Mary J. Blige, and Bruce Springsteen, and was a guest artist with the hit dance show, "So You Think You Can Dance" and a semi-finalist on the well-known show, "America's Got Talent". While performing around the world, entertaining in 30 countries and over 80 cities with the Bad Boys of Dance and Bad Boys of Ballet, he shared the stage with greats such as Misty Copeland, Joseph Gatti and Rasta Thomas. He recently incorporated a not-for-profit endeavor known as Art In Flight Inc. whose mission is to enhance the development and sustainability of arts organizations in Northeast Florida. James is currently obtaining his Masters of Fine Arts degree (MFA) with Jacksonville University, and is an international faculty member for the Manhattan Dance Project, a former Artist In Residence at Jacksonville University, a Trustee level member of the JAX Chamber, a new faculty member for Troy University, and currently serves two local arts boards.

References:

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