

Peaceful Knees in Warrior 1

I like to joke that hell hath no fury like an injured knee. Just like a scorned woman, the knees can be pretty unforgiving. When I injured my own knee in an accident, this little joke came immediately to mind. I still think it's true. Once you hurt your knee, you may spend the rest of your life trying to make up with. Or get a new one.

As a major weight-bearing joint that only likes to flex and extend, even that movement in the sagittal plane can be taken too far. The YESS results for warrior 1 showed that in the front leg (with the bent knee), students had a tendency to over straighten the knee when coming out of the pose. Although, they did **not** hyper extend the knee in the measurements, a full quarter of them started with the knee slightly bent (more than 5 degree angle) and then after being in the pose, straightened the front knee more (so that the front leg had a less than 5 degree angle). This happened despite specific instructions one on one while students knew they were being recorded. Just imagine how often it happens when no one is looking or paying close attention.

Why does almost everyone lock her knees? It's efficient! It takes way less energy and it has the perception of stability in the same way that anything that's locked into place seems stable; that is, until you need to move it, and then it takes that much more energy and time to move. Not so great when your balance isn't great or if you have arthritis in the hips or knees.

It's one thing to lock your knees on purpose. But the real challenge comes when you do it unconsciously. Or worse, you can't tell when the knees are beyond straight. This is a proprioceptive lapse, meaning you truly cannot tell where you are in space. You think your leg is straight but the knee is bent OR the knee is extended past straight, which is what we found in warrior 1 in the study. This is especially troubling with OA, osteoarthritis, as over-extending the knee creates compression in the front of the knee and over stretching of the ligaments and muscles at the back of the knee. This aggravates OA and can lead to inflammation and further destruction of the knee joint, which can lead to bone spurs and osteoporosis, among other things.

Any time you have an injury or condition such as OA, proprioception diminishes. And proprioception is generally diminished in older adults, just as all of the senses fade as the years go by. (Hearing and eyesight are obvious examples.) But just like building strength, flexibility or attention span, you can improve proprioception with focused attention and practice. It's a good time to remember that where there is movement, there is life... and possibility for positive change!

It's tempting to "just bend your knees a little" rather than fully straightening the leg. But the result of that posture tends to be a tucked pelvis, pooched belly and flat

lumbar spine, which creates its own problems. (You will see this postural predicament a lot in older adults, which can be the cause or result of tight hamstrings. Then the low back is not supported with its natural curve. This tends to lead to rounded shoulders and forward head, creating even more problems up the kinetic chain.)

Instead, choose curiosity. Play with straightening the legs to find a true neutral while supine, lying on the back. Try a *supta tadasana*, lying down with the feet pressing a wall. In this non-weight-bearing position, it's safe to explore and sense into the connection of the knees and the feet, as well as the knees and the hips. Feel how pressing weight evenly into the feet, emphasizing pressing into the balls of the feet, activates the calves and prevents the knees from over straightening. Feel how tucking the pelvis and flattening the lower back tends to externally rotate the hips and bend the knees. Notice what happens to the feet. Feel how over arching the lumbar spine invites the legs to roll in and the knees to over straighten. Take these lessons learned to *tadasana* at the wall. Keep playing with it in more challenging poses. And know that this is one of those life-long lessons that most of us never get to check off the list as "totally got it forever and always." Smile at this and know that we are all so very much alike.

Take heart as you read the article published in *Medicine & Science in Sports & Exercise*, "Lower-extremity Joint Kinematics in Older Adults Performing the Warrior I Pose of Hatha Yoga." Now you have solutions for this pervasive problem.

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G-41 Free Communication/Poster - Older Adults: JUNE 4, 2011 7:30 AM - 11:00 AM: ROOM: Hall B

Lower-extremity Joint Kinematics in Older Adults Performing the Warrior I Pose of Hatha Yoga: 3224: Board #187 June 4 9:30 AM - 11:00 AM

Yu, Shin-Yuan¹; Wang, Man-Ying¹; Haines, Michelle¹; Mulwitz, Lauren¹; Hashish, Rami¹; Samarawickrame, Sachithra¹; Kazadi, Leslie²; Greendale, Gail³; Salem, George FACSM¹

Author Information

¹University of Southern California, Los Angeles, CA. ²Westside Yoga Therapy Clinic, Los Angeles, CA. ³University of California, Los Angeles, CA.

Email: shinyuan.yu@usc.edu

(No relationships reported)

In older adults, yoga is attracting more attention and participation. **PURPOSE:** To determine the difference in ankle, knee, and hip joint During yoga, participants move into and out of pose positions using position when seniors perform the Warrior I pose and then return to cues from the instructor and their own proprioceptive feedback - which the starting position.

is compromised in older adults. In this study we sought to better understand proper pose positioning in seniors by examining the changes in joint position that occurred when seniors performed Hatha yoga. Here, we examined the Warrior I pose, which is widely used in senior center yoga programs.

METHODS: 20 healthy older adults (71.1 ± 4.5 yr.), with limited exposure to Yoga, participated in this study. After 4 Yoga sessions, the participants were instrumented for biomechanical analysis and performed the Warrior I pose with 2 repetitions while an experienced yoga instructor provided standard positioning and movement cues. Initiated in the correct starting position by the yoga instructor, the participants were then instructed to complete the pose and return to the starting position Paired t-tests were used to examine the difference in the average joint angles of the leading limb, between starting and ending positions.

RESULTS: Angular displacement of the knee and hip during movement into the Warrior I pose was significantly smaller than the angle was observed at the return to the starting position. This could displacement during the return to the starting position (knee: -6.38° , potentially increase the risk of injury and osteoarthritis in this $p=0.015$; hip: -6.15° , $p<0.01$). As a consequence, the final joint flexion angles at the knee and hip ($9.1^\circ \pm 6.0^\circ$ and $35.7^\circ \pm 9.9^\circ$) were significantly less following return to starting position ($19.6^\circ \pm 9.9^\circ$ and $43.0^\circ \pm 10.8^\circ$). Whereas only one subject began with a knee angle less than 5° , 5 out of the 20 subjects demonstrated a knee angle of less than 5° after returning to starting position.

CONCLUSION: In the context of this study, a more extended knee exposure to Yoga, participated in this study. After 4 Yoga sessions, the participants were instrumented for biomechanical analysis and performed the Warrior I pose with 2 repetitions while an experienced yoga instructor provided standard positioning and movement cues. Initiated in the correct starting position by the yoga instructor, the participants were then instructed to complete the pose and return to the starting position Paired t-tests were used to examine the difference in the average joint angles of the leading limb, between starting and ending positions.

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