Teaching the Hypermobile Dancer

Moira McCormack, M.Sc., Head of Physiotherapy, The Royal Ballet Company, London, UK

Today we are bombarded with photos of dancers in extreme positions (see for example the advertisements in *Dance Magazine*). Legs are required to be high and spines must bend in every direction. Accomplished dancers themselves admire extremes of flexibility and strive for it. All of this rubs off on the young dance student, who struggles to emulate the seasoned professional. Teachers too can be seduced by the drive for flexibility, without due respect for how it is achieved, or how too much natural hypermobility requires understanding and very careful training.

There is a whole spectrum of inherited flexibility to consider. There is the tightly bound, limited physique (short muscles and bony limitation of joints), which is unsuited to dance and especially ballet, through to the extreme flexibility of the dancer who is weak and uncoordinated but "full of potential." Those dancers with a natural (inherited) global hypermobility are believed to have an abnormality of their connective tissue that allows for joint laxity, with its associated advantages and disadvantages. Many of these physiques are drawn to dance because of the ease with which they achieve extreme positions, the encouragement they are given, and the aesthetic appeal of the hyperextended (swayback) knee and hypermobile ankle. They have connective tissue stretchiness in the joints of the fingers and elbows as well as knees, spine, ankles and feet, indicating how uniquely this physique is held together.

Connective tissue is the living material that binds the body together: ligament, tendon, capsule, cartilage, labra, fat pads, disc, bone and even skin. Generally, connective tissue is composed of cells and fibers suspended in a matrix. In ligaments the fibroblast cells produce dense, parallel-arranged masses of collagen and elastin fibers. These proteins, aligned along the lines of stress, give ligaments and tendons their powerful resistance to axially loaded tension forces, but allow some stretch.

In inherited joint laxity there is a problem with how collagen is made. This is a genetic disorder affecting those genes that encode the various connective tissue proteins, including collagen and elastin. Genetic defects distort the biochemical structure of these proteins and impair their tensile properties, resulting in tissue laxity, or hypermobility. Unfortunately, this is accompanied by tissue fragility, weakness, and a tendency to mechanical failure. Some dancers may present with abnormal flexibility but develop strength early on and do not injure easily. Others fall into the Joint Hypermobility Syndrome: they have generalized flexibility but accumulate joint pain and injury that results in deselection.[1]

In 1973 Beighton et al. devised a quick 5-maneuver test to score hypermobility (see photos 1-5). The 9-point score is not an accurate measure, but it does provide an interesting initial observation and means of recognition.

As another indicator, the skin in hypermobile tissues tends to be stretchy, especially on the back of the hands and elbows and on the front of the knees. Further evidence of skin involvement is the presence of stretch marks over the lumbar spine and thighs in adolescents. When scars heal they tend to be thickened and white.[2]

Testing the "untrained joints" – wrist, fingers and elbows – gives an indication of the stretchiness of the ligaments involved, reflecting a general type. However, the hip and spine are tested uni-directionally with foot and ankle not included, whereas these are very much the teacher's concern (see photos 6, 7 and 8).

A hypermobile joint has a lax capsule and ligaments guarding its range. It is less stable, weaker, and more susceptible to injury than a normal joint. Knees and elbows can hyperextend more than 15°. The foot and ankle can plantar flex (point) far more than the norm (photo 7). The spine flexes and extends significantly more than normal, indicating that the ligaments stabilizing the spine allow increased motion between vertebrae. Therefore, joint stability is reliant on muscular support and neural control for its integrity.

Hypermobile individuals have decreased proprioception;[3] hence, posture, balance and coordination are affected. Embedded in joint capsules and ligament are sensory nerve endings that constantly inform the Central Nervous Sys-

Figure 1 Thumb touches forearm.

Figure 2 Hyperextension of fifth finger.

Figure 3 Hyperextension of the elbow.

Figure 4 Hyperextension of the knees.

Figure 5 Hands flat on floor.

Figure 6 Pronating foot.

Figure 7 Hypermobile legs and feet.

Figure 8 Hypermobile spine.

tem of position, movement, and rate of movement. The stretchiness of hypermobile tissue is thought to render this proprioceptive feedback system less efficient. Young dancers tend to need more training that is paced slowly, to instil good posture and alignment throughout the body. Attention needs to be paid to the deeper stabilizing muscles that support the joints of the spine, shoulders, hips and feet. They need longer warm ups too, indicative of a slower proprioceptive system.

It is the sensory part of the nervous system that allows us to appreciate acutely the position of our limbs in space, be it joint position or muscular activity. The motor part of the nervous system then responds to received information, and the result is fine control throughout the range of movement and coordination of complex moves. However, it is here, as already noted, that the hypermobile physique

has a deficit.

At the Royal Ballet Company and School we investigated the incidence of hypermobility and the incidence of Joint Hypermobility Syndrome, using the Brighton Criteria in both cases. The Brighton Criteria for inclusion in the syndrome takes into account the 9-point Beighton test and history of injury. We found that 74% of girls and 82% of boys in the lower school (11–16 yrs) were hypermobile. The incidence in the 16–18 year olds was 94% of females and 83% of males. In the professional company the incidence was 95% of females and 82% of males. These figures suggest that a physical type is most definitely selected. Interestingly, the incidence of Joint Hypermobility Syndrome in the Lower School was 47% in girls and 45% in boys. In the 16–18 yrs it was 46% in females and 35% in males. However, in the professionals it was 26% in females and 36% in males. The decrease in numbers in the company suggests that hypermobile dancers who have also been injured are less likely to progress into the profession. We also found that none of the principals had the syndrome, implying that professional development is jeopardized by it. These observations suggest that a clear understanding of the vulnerable physique is required of dancers and those who train them, with prevention strategies in place.

The principles of teaching do not change with the hypermobile dancer, but they are harder to instil. Stability and placement emanate from the core to the periphery. When the placement of the pelvis is correct and well understood, turnout at the hip can be trained, hyperextended knee controlled, and good biomechanics of the foot applied. In the upper body, the lumbar spine can be stabilized in neutral, guiding the rest of the spine and shoulder girdle into alignment over the pelvis and legs.

The "swayback knee" is always a challenge. Although attractive, if the joint extends 15° or more past neutral it is hard to teach and strengthen. If allowed to lock back into its full extension when weight bearing, the muscles that control it relax, the control of turnout is lost, and the student "sinks into the hip." This is often accompanied by a tucking under (posterior tilt) of the pelvis and loss of the neutral lumbar spine. End of range extension of the knee can be curbed by activating the adductor muscles, the hamstrings, and the vastus medialis part of the quadriceps, just above the patella. This in turn allows better use of the calf muscles and brings the weight further forward over the center of the foot. Students should be discouraged from resting in extreme positions – relaxing in the sway back posture, which overstretches the front of the hips and the backs of the knees.

The foot in all dancers bears the stress of incorrect alignment above it. In the excessively flexible foot and ankle the many small joints of the midfoot, composing longitudinal and transverse arches, are easily compromised. Each joint is bound by ligament and capsule, and further supported by intrinsic muscles of the foot. If the arches are stressed in the "rolling" pronated foot, the medial longitudinal arch flattens and the foot may never recover. Working the foot in alignment is all important; strengthening the intrinsic muscles with a regimen of exercises should start as early as seven years of age. Outdoor footwear should be inspected; supportive and carefully fitted shoes ensure a good foot position outside of the studio too.

The hip is different in its makeup. The flexibility of this ball-and-socket joint relies not only on the extensibility of soft tissues but also on bone shape. The bony architecture of acetabulum and femur can restrict the range of external rotation in the hip joint. If this type of restriction is present, use of knee and foot in turnout should correspond accordingly. Having said that, the amount of turnout used in all physiques should correspond to maintenance of balance in one-legged stance with no postural compensation.

Hypermobile dancers appear to need and want to stretch constantly, often relaxing into extreme positions for long periods of time. They do appear to have an altered kinaesthetic sense; therefore, this is not something to ban, as long as they are not sitting in box splits instead of warming up and going through their stability exercises before class. Ballistic movements into end of range should be choreographed with care. Control of each part of the range is more important in the young dancer. Weird positions and party tricks should be discouraged.

While the hypermobile physique is drawn to dance, the vulnerable skeleton is easily injured. This is the down side of having extra flexibility. A child who complains of joint pain and suffers transient joint swelling should be referred to a specialist for further diagnosis. Hypermobile tissues bruise easily (fragile blood vessels) and heal at a slower than normal rate.[4] Allowance needs to be made for this after acute injuries, such as an ankle sprain. It is important, however, not to label a dancer, with all things negative blamed on his or her hypermobility. Microtrauma to tissues from misuse of lax joints is managed by strengthening around them to improve function and prevent injury; thus we find that dance training can also be protective of the hypermobile physique, improving fitness and stability.

Hypermobile children are initially attractive in the audition process of vocational dance schools. However, they frequently struggle to keep up with the rest of the class. Often the pace of learning is set with no allowance for those who need more time and whose physiques take longer to adapt. They have to work harder throughout a dance career to hold on to technique, and without an understanding of their physiques and the drive to work hard, they rarely succeed. It is the teacher's knowledge and understanding that recognizes artistic talent and physical hurdles. Through determination, encouragement, patience and demand for meticulous work, this type of physique can be equipped with the stability and strength required for a professional career.

Acknowledgment

A portion of this article was generated from McCormack M, Briggs J, Hakim A, Grahame R. Joint Laxity and the Benign Joint Hypermobility Syndrome in Student and

Professional Ballet Dancers. The Journal of Rheumatology. 2004;31(1):173-178.

References

1. Grahame R. Hypermobility and the heritable disorders of connective tissue. *In* Keer R, Grahame R (eds): *Hypermobility Syndrome.* London UK. Butterworth Heinemann, 2003, pp.15–25.
2. McCormack M, Briggs J, Hakim A, Grahame R. Joint laxity and the benign joint hypermobility syndrome in student and professional ballet dancers. J Rheumatol. 2004;31(1):173-8.
3. Simmonds J. Rehabilitation, fitness, sport and performance for individuals with joint hypermobility. *In* Keer R, Grahame R (eds): *Hypermobility Syndrome.* London UK. Butterworth Heinemann, 2003, pp. 107–25.
4. Keer R. Edwards-Fowler A. Mansi E. Managing the hypermobile adult. *In* Keer R, Grahame R (eds): *Hypermobility Syndrome.* London UK. Butterworth Heinemann, 2003, pp. 87-105.