



Ergonomics in Dance

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Ergonomics can generally be defined as the study of people in their working environment. The goal with ergonomics is to design or modify the work to fit the worker, and therefore eliminate discomfort and decrease risk of injury due to work. In the world of dance, where the work is creating art and the tool of the craft is the dancer's body, we often think of this in terms of biomechanics. Biomechanics can be defined as the science of movement of a living body, including how muscles, bones, tendons, and ligaments work together to produce movement.

Injury rates in dancers are high. One study found that 86% of dancers sustained one or more injuries during the study period, with 59% of all injuries being time-loss injuries. These numbers

are consistent with other similar studies. The majority of injuries in dance, up to 75% of all injuries, are repetitive overuse injuries. One of the main etiologic factors leading to overuse injuries is the alteration of the biomechanical conditions of the exercise, often referred to as technique. Technique is the basis of all fundamental movements of dance, from holding your body or posture correctly, to executing skills and steps in a proper fashion. Insufficient or inadequate technique has been linked to the occurrence of overuse injuries.

If incorrect technique is a risk factor for injury, what exactly is proper technique? The answer to this may vary depending on the genre of dance as well as the skill level of the dancer. However, there are some commonalities that are generally accepted to be best practice when it comes to ideal biomechanics, or technique. For example, when performing movements that involve knee bending, such as a plié, lunge, or squat, the ideal biomechanics would have the knee tracking in line with the foot (roughly over the second toe). If the knee falls inwards (valgus position) or outwards (varus position) this may leave the dancer susceptible to injury at the foot/ankle, knee or hip joints.

In many dance forms, technique has developed over centuries and is based solely on tradition rather than any research-based or scientific rationale. For example, in classical ballet dancers utilize turnout, or lateral rotation of the legs so the feet are facing outwards rather than forward. This developed when ballet moved from the royal courts to the proscenium stage, where the audience was now primarily in front rather than surrounding the dancers. Dancers spent more time moving side to side which necessitated a degree of turnout. Since then, this turnout has been exaggerated, where 180 degrees is now accepted as the ideal and primary aesthetic in ballet. Sideways locomotion does not require this degree of rotation, and although some lateral rotation facilitates lifting the leg above 90 degrees (another desired aesthetic in dance), 180 degrees of rotation is not required.

As the field of dance medicine and science has emerged and evolved, this notion of technique based in tradition is being challenged. One could argue that 'good' technique is technique that is adapted to the dancer's biomechanical condition, or more simply put, adapted for their

individual anatomy. When it comes to turnout, most dancers will anatomically not be able to achieve 180 degrees of rotation safely. In this case, development of proper technique, where a dancer is utilizing their own personal limit of rotation – not striving for an unrealistic 180 degrees – may be one of the most effective ways of preventing overuse injuries.

One of the central tenets of ergonomics is to design or modify the work to fit the worker, and not the other way around. In dance, the choreographer is generally the one who designs and sets the work based on their artistic vision. Choreographic process varies greatly person to person, but oftentimes the work will be envisioned long before the choreographer ever knows which dancer or company will be performing the work. When the work is ready to be set for a specific dancer or company, the choreographer may adapt the work to fit certain physical characteristics or abilities to reduce the risk of injury. We can truly embrace the ethos of ergonomics and its application to the dance world if we are ready to respect a dancer's unique biomechanics and anatomy and adapt choreography accordingly.

