
Encouraging Dancers to Train for Upper Body Fitness

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Dancing is a physically demanding activity with a high risk of injury.¹ Several dance genres have high upper body demands.¹⁻³ Dancing often includes falls, handstands, partner lifts, and extreme angular movements in which the upper body, head, and neck are often out of line with the lower body¹⁻³ (Fig. 1). Accordingly, 3% to 14 % of all dancers' injuries are to the upper body.³

Muscular power, strength, and endurance have an influence on the risk of injury.⁴ Muscle function can be thought of as a continuum from power to strength to endurance. In this continuum, power refers to a greater force production over a shorter time period, endurance refers to a lesser force production over a longer period of time and strength refers to a moderate force production over an intermediate period of time. Increasing evidence in dance medicine and science points to the fact that muscle strength influences injury risk, and that dancers with lower muscle torque require more time off due to injury.⁵

The push-up test is an accepted measure of upper body fitness. In a recent study examining associations among physical fitness measures (including aerobic capacity, core and upper and lower body power and endurance, and joint mobility and muscular flexibility) and aesthetic competence (as measured by the Aesthetic Competence Scale), the researchers noted that push-up performance was one of the best indicators of a dancer's aesthetic competence.² So, we compared upper body endurance between 17 female university-level dancers and 15 active non-dancers, using the modified push-up test for females.

Participants performed the modified push-up test for females as per the American College of Sports Medicine's *Guidelines for Exercise Testing and Prescription* (Fig. 2). The maximum number of push-ups performed consecutively without rest while maintaining form was counted as the score. We found that both groups had similar upper body endurance (dancers = 22 vs. non-dancers = 20 push-ups). We also compared our findings with university-level females, and female athletes participating in sports with high upper body muscular demands.⁶ The first comparison sug-

gested that our dance participants possessed "good" upper body muscular endurance, scoring above the 90th percentile. However as compared to athletes who use their upper extremity during participation in their activity, dancers had less upper body endurance. Both lacrosse players (47)⁶ and female cheerleaders performed more push-ups (24) than the dancers in our study.⁵

What does this mean for dance educators? We believe that these findings support previous observations that dance alone does not provide enough stimulus to induce physical fitness gains in dancers. Specifically, dancers often view their bodies as instruments of expression.⁴ Additionally, some dancers also view physical fitness as simply the 'absence of injury', and any fitness improvements are considered 'by-products' of dance skill acquisition.⁷ Some dancers and educators also have an unfounded fear that exercise program participation will make dancers 'muscle bound' and negatively affect aesthetics, despite evidence to the contrary.⁸

Participation in strength and conditioning programs outside of dance is not common among dancers.⁸ We saw this in our dancers too. Specifically, for 15 out of our 17 dancers, dancing was their primary physical activity (i.e., the activity that they mostly performed when physically active). Only two dancers engaged in activity other than dancing. Furthermore, this other activity was running, which has lower body demands but does not improve upper body fitness. While dancers frequently participate in exercise programs like Pilates, these often do not adhere to the overload principles emphasized in strength and conditioning programs.⁹ So, participation in exercise programs such as these may not specifically improve upper body fitness, a factor that some researchers suggest may help enhance dance performance.

The benefits of strength and conditioning programs in combination with skill acquisition training are commonly acknowledged in athletics. Such training may improve upper body muscular fitness and possibly reduce upper-body injury risk. Combined with our findings, the evidence^{2,5}



Figure 1 An example of upper body demand in dance.

suggests that several fitness components (e.g., strength, power, balance, agility) may improve performance aesthetics and decrease the risk of injury among dancers. Overall, our work suggests that dance alone may not produce upper body muscle endurance gains. So educators may want to encourage their dancers to perform upper body fitness and cross training outside of their dance practices and performances.

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Figure 2 Positioning for the modified push-up test for females. **A**, Up position and **B**, Down position.