
Abstracts from the Current Literature

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Bronner S, Ojofeitimi S, Lora JB, Southwick H, Kulak MC, Gamboa J, Rooney M, Gilman G, Gibbs R. A preseason cardiorespiratory profile of dancers in nine professional ballet and modern companies. J Dance Med Sci. 2014;18(2):74-85.

In recent years, there has been an increasing interest in evaluating the cardiovascular demands of dance performance in the different styles of dance, measuring the physiological capacities of dancers both in the lab and the studio as part of screening, and the development of supplementary and dance-appropriate fitness training to prepare the dancers for these demands. This study compared the cardiovascular fitness of professional modern and ballet dancers by measuring the difference in peak and recovery heart rate. They also looked at a number of company and work variables that could affect cardiorespiratory profiles. The demands of modern dance are quite different from ballet in terms of overall length of a typical piece of choreography, the amount of long continuous or high intensity short movements, and the amount of rest. Two hundred and eleven dancers from two modern and seven ballet companies were evaluated on a three minute step test as part of a more comprehensive post-hire health screen. This test was chosen as a convenient practical assessment of cardiorespiratory fitness given the time and space constraints of testing large numbers of professional dancers. The results showed that a higher percentage of modern dancers were “fit,” as demonstrated by lower blood pressure, lower resting heart rate and heart rate recovery. There were also differences in fitness levels between the different companies. The authors discuss a number of factors that may affect the cardiorespiratory fitness levels such as the repertory, rehearsal and performance seasons, size of the company and amount of actual time dancing, and individual off-season or cross training. Reviewing a number of studies that report technique classes are generally not physiologically challenging enough to prepare for performance, the authors support

the need for supplementary training and suggest that the step test is a simple tool to include in screening to identify dancers who could benefit from additional aerobic conditioning.

Rodrigues-Krause J, Cunha GDS, Alberton CL, Follmer B, Krause M, Reischak-Oliveira A. Oxygen consumption and heart rate responses to isolated ballet exercise sets. J Dance Med Sci. 2014;18(3):99-10.

In order to prescribe supplementary training for dancers, it is important to evaluate their individual cardiovascular capabilities as well as evaluate the demands of the dance movements they typically perform. Maximum heart rate and oxygen consumption were measured on twelve female ballet dancers during an incremental treadmill test. In order to determine the aerobic intensity at which ballet dancers work in class, the authors also evaluated their heart rate and oxygen consumption during isolated sets of ballet movements (pliés, tendus, jetés, rond de jamps, fondus, grand adagio, grand battements, temps levés and sautés). The sets consisted of repetition of one movement at the required speed, lasting approximately one to three minutes with rest periods in between. Results showed that workloads varied between low and moderate aerobic intensity, pliés and tendus being the lowest, and sautés, levés and grand battements being the highest. However these latter center-floor exercises that require higher oxygen consumption take up only a relatively small percentage of class time with long rest periods. The intermittent nature of class means that typically dancers do not reach the moderate to high aerobic intensities found in rehearsals and performances. Volume of training, intensity and rest periods however can be manipulated to increase cardiorespiratory demands both in class and in choreography. The authors suggest that isolated ballet sets adapted to the dancer’s role as corps de ballet or soloist could be supplementary to their normal routine to enhance their aerobic fitness.

Hopper DM, Grisbrook TL, Newnham RJ, Edwards DJ. The effects of vestibular stimulation and fatigue on postural control in classical ballet dancers. *J Dance Med Sci.* 2014;18(2):67-73.

Classical ballet demands excellent postural control in achieving, maintaining, and restoring balance. One of many challenges to balance in dance is acceleration, e.g. spinning movements such as pirouettes that challenge the vestibular system. Balance is controlled by visual and somatosensory systems, and previous research suggests that dance training shifts feedback use from the former to the latter. It has also been shown that fatigue alters postural control and balance. This study explored whether dance experience affects the ability to control static posture in response to vestibular stimulation and fatigue. Twenty-three classical ballet dancers, classified as professional, pre-professional, and recreational dancers had their baseline static balance assessed using measures of postural sway while standing on one leg on a force platform. They then performed the vestibular stimulation task, five continuous pirouettes, and were reassessed in the one leg static stance. They then performed the fatigue-inducing task, 30 seconds of unilateral ballet jumps (*temps levés*) and retested on the force platform. An interesting result was that there were no differences between the groups in baseline static balance. However, the professional dancers had significantly smaller sway than the other two groups following the turning task; that is, they adapted better to the vestibular stimulation. The authors attribute this to their hours of task-specific motor training and their spotting ability. There was no significant effect of the fatigue task in any group but there was a different pattern of recovery. While the amount of sway was similar at the 60-second recovery measure, the pre-professionals and recreational dancers had significantly greater sway immediately and at 30 seconds of recovery. The explanation given for both results suggests that the professional dancers developed adaptive strategies to cope with both vestibular and fatigue challenges due to more extensive hours of dance specific training. They suggest that training for amateur dancers should include more vestibular-stimulating and fatigue-inducing tasks to help to develop balance recovery abilities.

Hutt K, Redding E. The effect of an eyes-closed dance-specific training program on dynamic balance in elite pre-professional ballet dancers: a randomized controlled pilot study. *J Dance Med Sci.* 2014;18(1):3-11.

This study explores visual and proprioceptive control of balance in a dynamic balance task. The background for this study is that in brightly lit ballet studios filled with mirrors, dancers receive a lot of visual feedback to guide their movements, while during performance on stage under unpredictable lighting, that feedback is not available. The dancer has to rely much more on proprioceptive feedback to adapt to the many balance challenges in a piece of choreography. This raises the question of whether specific training can bring about a shift from the use of visual to proprioceptive feedback. That is the focus of this intervention study where vision was removed during the learning of dance sequences. Five variations of the Star Excursion Balance Test (SEBT) were used as a pre and post indirect measure of dynamic balance. This required the dancer to stand on one leg, while the gesturing leg reached in eight directions on the floor or in the air. Distance reached and time to complete the pattern were measured. Nineteen female pre-professional ballet dancers were divided into a control and an experimental group for a training intervention. An important component was that the “training” was incorporated into the dancers’ daily ballet classes. The researcher and ballet teacher together developed dance specific sequences at center that progressed over the four week training period from stationary to travelling and turning sequences, double leg to single leg stance exercises, and working with the leg on the ground or in the air. The control group practiced these sequences normally while the experimental group practiced them with eyes closed. Both groups made some improvements in distance and time, but the eyes-closed group made greater improvements, and these were significantly better than their pre-test scores in four of the five tasks. The authors suggest that eyes-closed training can improve dynamic balance abilities, and that this training can stimulate a shift from visual to proprioceptive dependence for balance control. Further research may encourage dance educators to consider incorporating eyes-closed training into their dance classes.