The Yoyo Schedule: a biomechanical analysis of a graded rehabilitation program for dancers

Catherine Haber, BA [1], Boni Rietveld, MD, PhD [2], Andrea Schärli, PhD [1]
[1] *University of Bern, Bern, Switzerland*
[2] *Medical Centre for Dancers and Musicians, The Hague Medical Centre, Den Haag, Netherlands*

Objectives: The present study biomechanically examines the Yoyo Schedule, a graded rehabilitation program proposed by Air and Rietveld(2008) that provides parallel stages of a "back-to-dance" for the recovering dancer. Used for reconditioning and monitoring rehabilitation, the program comprises of dance-specific, graded activities with varying leg support and impact (two feet and one foot relevés and sauté jumps) as well as external support (barre support with one or two hands, or no support). This study analyses the impact, weight bearing, and joint moments in the ankle and knee in each progressive stage.

Methods: The six steps of the first phase (demi-plié to relevé), the "explosive" performance of the six steps of the first phase (demi-plié to relevé with the intention, but not actually jumping), and the five steps of the second phase (demi-plié to sauté jumps) sum to 17 stages with varying external support, single or double leg support, and impact. After shortly warming up, 10 participants with dance experience performed five consecutive movements of each stage in a randomized order with breaks in-between. The resulting forces were collected with each foot on one AMTI force plate, while full body kinematics were recorded with an Optitrack motion capture system.

Analysis: Impact was examined in terms of: the force of take-off (F_T), the maximum force after reaching the deepest demi-plie, or bend in the knee, before rising; the force of landing (F_L), the maximum force from lowering down to the deepest demi-plie; and the Impact Ratio (IR), the ratio of landing to take-off force (F_L/F_T). To determine the proportion of weight bearing during each stage, the maximum vertical forces on each leg during the take-off and landing phases were divided by the total vertical force of full weight bearing. Joint moments in the ankle and knee were additionally calculated. Analysis is underway.

Conclusion: This study biomechanically validates the Yoyo Schedule progression, revealing the impact, weight-bearing, and joint loading during each stage. Findings informing correct sequencing will strengthen the Yoyo schedule as a valuable tool for dancers to rehab efficiently, to track recovery progression, and to return to dance safely.