Investigating the Effects of Visual Feedback on Muscle Activity, Heart Rate, RPE, and Qualitative Performance in Classically Trained Ballet Dancers

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Abstract

Background: Contorted bodily positions and imbalances in neuromuscular activity may place classical ballet dancers at higher risk of injury. The mirror provides beneficial feedback, but may negatively impact kinesthetic abilities, and decrease performance capabilities. Purpose: Investigate the effects of a mirror on muscle activity, heart rate (HR), rating of perceived exertion (RPE), and qualitative performance. Hypotheses: A lack of visual feedback would increase muscle activity, HR, and RPE, and decrease self-reported perception of technical quality. Methods: 12 female participants completed a single leg balance, an adagio, and a jump task twice – once in each condition. Muscle activity of the vastus lateralis (VL) and vastus medialis oblique (VMO), as well as HR and RPE were assessed during each combination. Qualitative performance was assessed with an exit survey. Results: No significant differences were found between conditions for RPE or HR in all three tasks (RPE: Balance $p=0.468$, Adagio $p=0.191$, Jumps $p=0.769$; HR: Balance $p=0.409$, Adagio $p=0.424$, Jumps $p=0.244$). No significant differences were found between conditions/tasks for peak, mean, and RMS EMG. Dancers significantly ranked their artistic expression lower in a non-mirror condition ($p=0.018$, Cohen's $d=0.775$). Conclusion: While no differences in muscle activity or vital signs of fatigue were found, the study could be replicated on beginner students who lack training to perform without a mirror. Results can be further utilized to investigate current methods of instruction and the benefits of somatic-based practices in dance education. Psychological implications of visual feedback may also be explored.