

The Influence of Mechanical Properties Associated with Exercise Equipment Padding on Maximizing Performance and Minimizing Potential Soft-Tissue Injury when Performing High-Intensity Weight Lifting Exercises

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Abstract

The intention of this study is the measurement of mechanical properties such as resilience and compressibility associated with exercise equipment padding in order to determine the ability to minimize potential soft-tissue injuries while performing high-intensity weight lifting exercises. ASTM standards were used to test the resilience and compressibility of five different exercise equipment padding specimens. The specimens consisted of standard bench press foam, composite foam, polyethylene foam, a single yoga mat foam, and double yoga mat foam. The resilience and compressibility are tested to determine the amount of deformation each sample can experience and the level of energy returned back to the user while performing high-intensity weight lifting exercises. To obtain the data for the resilience test a testing-rig was first designed and assembled for the specific needs of testing exercise equipment padding according to ASTM Standard D3574-17. Three tests were performed on each sample, noting the percentage of rebound, and the mean value for each specific specimen was calculated as the final value. A second round of testing occurred on the same specimens using a one-and-a-half-inch piece of plywood under the specimen. The testing revealed the standard bench press foam to have the highest resilience at 37.8%, and the polyethylene foam to have the lowest resilience at 8%. The second round of testing also showed the standard bench press foam to have the highest resilience at 33.2% and the polyethylene foam to have the lowest at 5.2%.