

# Impact the Force: Effects of Insoles on Impact Force for Gymnasts

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Gymnasts (floor tumblers) experience a high number of injuries due to the vertical impact force of landing. Landing forces can range from 3.9 to 14.4 times the gymnast's body weight (Panzer, 1987). Back tucks require gymnasts to use as much power as possible at the beginning of the maneuver, which is absorbed at landing. How much impact force affects the body during a back tuck, and can shoe inserts reduce the impact force? The study's aim was to determine if shoe inserts could lessen the impact force of back tucks. Forty-five participants volunteered for the study. Gender, age, height, and weight were recorded. Two force platforms were secured to a gym floor, and each participant performed back tucks onto the platforms. The results were transmitted to a computer for collection and analysis. The back tucks were performed in four ways: barefoot, wearing athletic shoes, inserting low-impact cushioned insoles, and inserting high-impact performance insoles. A total of 180 impact events were used for analysis. A control drop was also performed, and 150 impact events were used for analysis. Results revealed impact force can be decreased with the selected insoles: 22 percent with athletic shoes, 41 percent with cushioned insoles, and 58 percent with high-impact performance insoles. Average G-forces were 2.35 g barefoot, 1.79 g athletic shoes, 1.31 g cushioned insoles, and .9 g high-impact insoles. Gender comparison findings were consistent with overall results. By understanding repetitive impact force, gymnasts will be able to reduce the impact force that affects their bodies.

## Awards Won:

Acoustical Society of America: Honorable Mention