

Double bounce vibration on trampolines and associated injuries

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ABSTRACT

By observing usage and reviewing accident data it is clear that multiple-user trampoline double-bouncing creates highly dangerous situations.

An understanding of this phenomenon's characteristics has not been fully researched. Observation indicate that under certain circumstances there is the potential for a high transfer of energy from one user to another, leading to surprisingly higher launch heights, which result in landing and compression injuries.

Medicine balls of various weights, heights and impact location were released from above a trampoline mat to simulate user impact. The quick release mechanisms were controlled by electronic triggers to eliminate any undesired variances in impact timing between tests, allowing for reliable, repeatable testing. A calibrated video analysis is the primary means of data collection.

Due to the unpredictable nature of double-bouncing, users are often unable to anticipate the occurrence of a double-bounce, meaning they are physically unprepared or braced for the immense acceleration forces generated by the transfer of energy.

This paper presents the experimental findings of trampoline double-bouncing and quantifies the conditions which allow the high energy-transfer rates that lead to multi-user injuries.