Double Bounce Vibration On Trampolines And Associated Injuries

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

Hazard
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 between users.

Method
Medicine balls of various weights, heights and impact location were released from above a trampoline mat to simulate a multi-user impact. The quick release mechanisms were triggered electronically to eliminate any undesired variances in impact timing between tests, allowing for reliable, repeatable testing. Calibrated video analysis is the primary means of data collection.

Results
The greatest effect was observed when the ratio of the ball’s masses was 3:1 with the heavy one released 130ms before the lighter one, and the horizontal separation was 792mm, or 25% of the trampoline diameter. This resulted in an increase of 65% in rebound energy for the second ball.

Conclusion
The double bouncing manoeuvre is real and dangerous and should be discouraged for children and adolescents using trampolines.