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Why trampolines are so much 😊



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Introduction and background

- Most people know that trampolines are exciting and fun 😊
- There has been little published research into the physical and emotional benefits of trampolining
- A common example linking acceleration and excitement is the roller-coaster ride where people may experience in excess of 4 G-force

Aim

- Aim of this project was to characterise the effects of trampoline acceleration (G) on the human body
- This was achieved by:
 - Developing an experimental method for measuring the cyclical acceleration the human body experiences whilst using a trampoline
 - Correlating the trampoline characteristics such as acceleration with human emotion



Extrinsic factors of acceleration

- Trampoline bouncing experiments were conducted at UTS to obtain the change in acceleration experienced by a trampolinist over a specified time period
- Extrinsic factors of acceleration investigated in experiments:
 - Magnitude: peak acceleration (G)
 - Direction: vertical displacement (mm)
 - Duration: cycle-time (s), air-time (s)
 - Rate of onset: change in rate of acceleration, jerk (G/s)
 - Position: location of bounce on trampoline bed



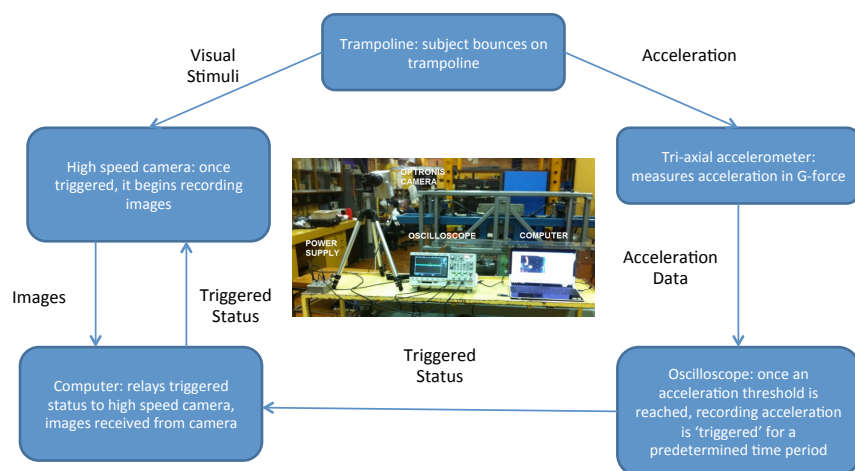
Intrinsic factors of acceleration

- A survey was conducted with 39 participants to obtain subjective feedback on the motion and emotion felt in conditions that mirrored the trampoline experiments
- Intrinsic factors of acceleration were investigated to see what personal attributes influence the trampoline experience
 - Age
 - Health
 - Gender
 - Physical conditioning
 - Other factors



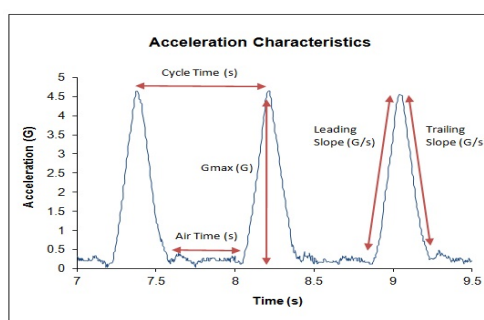
Experimental setup

A tri-axial accelerometer and high speed image capturing device were synced to record simultaneously



Acceleration data

- The accelerometers provided acceleration v time graphs
- The acceleration characteristics were derived from these graphs
- The camera captured images of the trampolinist to compare a person's movement to acceleration characteristics



Variables experimentally tested

- Biomechanics: compared images that were synced to acceleration graphs to determine what movements influenced trampoline acceleration characteristics
- Trampoline type: compared acceleration characteristics of trampolines with three different spring systems
- Weight: the influence of weight on acceleration characteristics
- Location: the influence of bouncing location on acceleration characteristics

