

ChiroProktor

A spinal misalignment simulator to aid chiropractic adjustments

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Executive Summary

Spinal misalignments occur when vertebrae move out of their natural position. These misalignments can lead to:

- back pain
- high blood pressure
- localized swelling
- muscle spasms

Chiropractic and osteopathic students spend years practicing and refining techniques to properly identify and correct these misalignments.

However, their methods of practice are limited to volunteers, which can be both dangerous and inconvenient.

ChiroProktor mimics spinal misalignments, which provides students, interns, and beginner chiropractors with a dynamic model to practice both identification and realignment of various misalignments.

Product Design

ChiroProktor consists of a spring-tower mechanism to misalign individual vertebrae and a system to relocate this mechanism to a selected location.

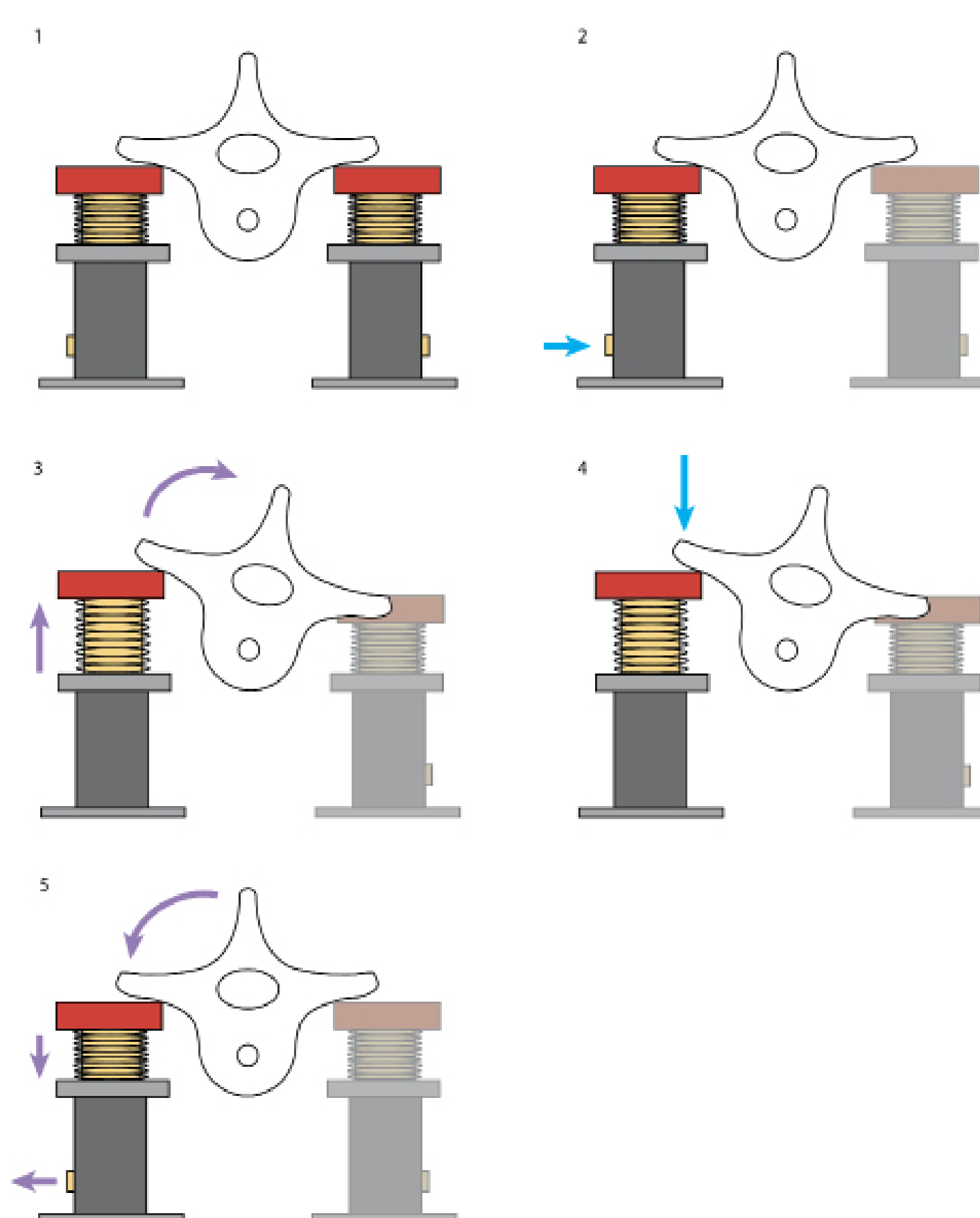


Figure 2: Schematic of mechanism used to create misalignment and to perform adjustment

(1) Device is in its resting state, where both spring towers are held in place with button clips.

(2) The button clip is pressed in using a linear actuator.

(3) The tensioned spring is released and extends upward, rotating a vertebra and simulating a misalignment.

(4) The spring also provides realistic resistive force. The vertebra is realigned by pushing down at the site of the misalignment.

(5) When the vertebra is pushed down to its natural position, the spring is compressed and button clip extends to return the tower to its resting state.

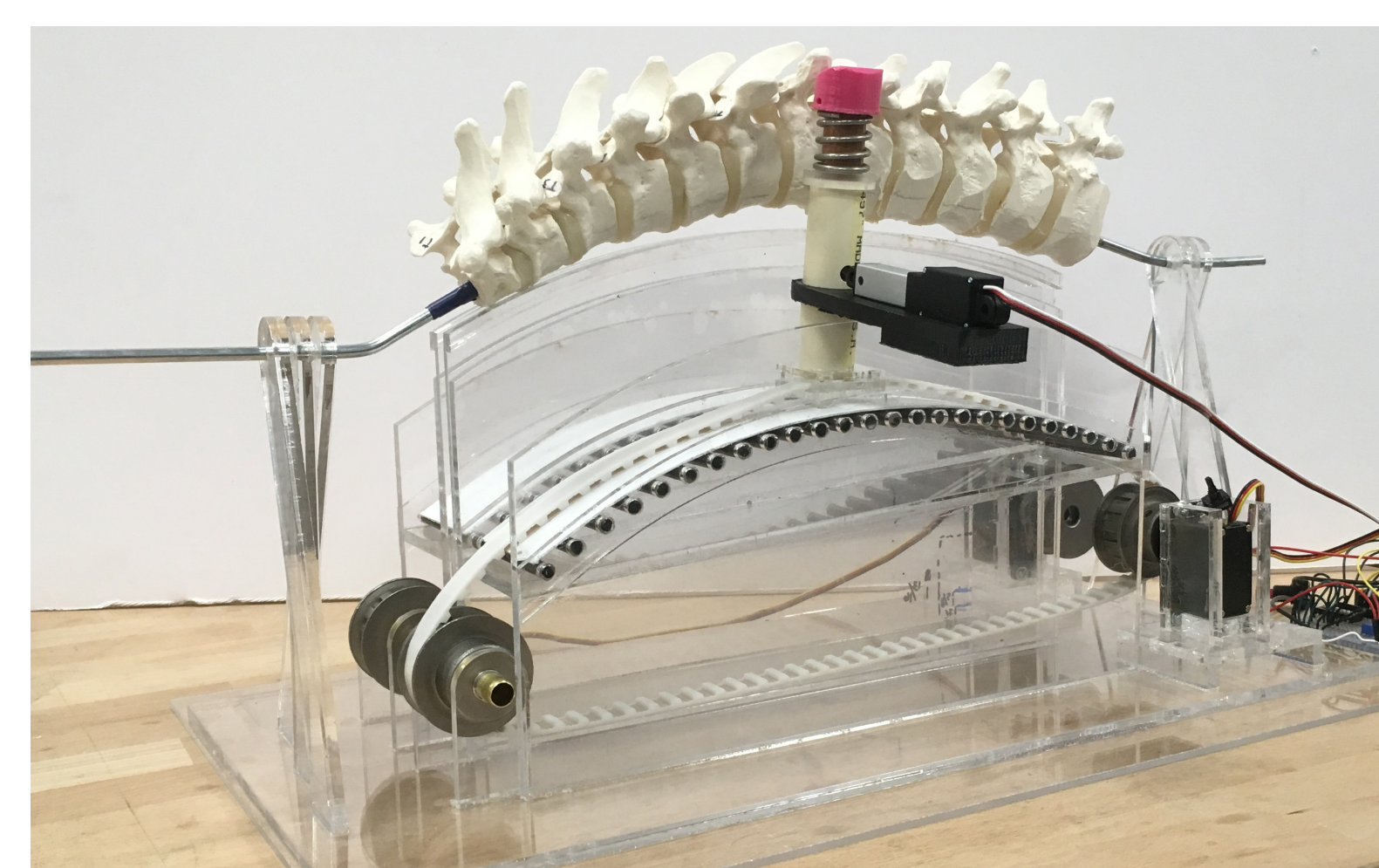


Figure 3: Picture of current spinal manipulation device

The misalignment system is programmed to be able to move to any selected vertebra by way of a timing belt.

Our model has been tested and verified by practicing doctors and current chiropractic students.

Clinical Need

There are about 20 million chiropractic visits in the US per year, with an average of 12 visits per patient.

Currently, there exists no simulation model or effective practicing tool for chiropractic students.

A survey given to chiropractic students confirmed that they depend on others for their practice. ChiroProktor, will make students less dependent on family and friends to practice and decrease risk of injury.

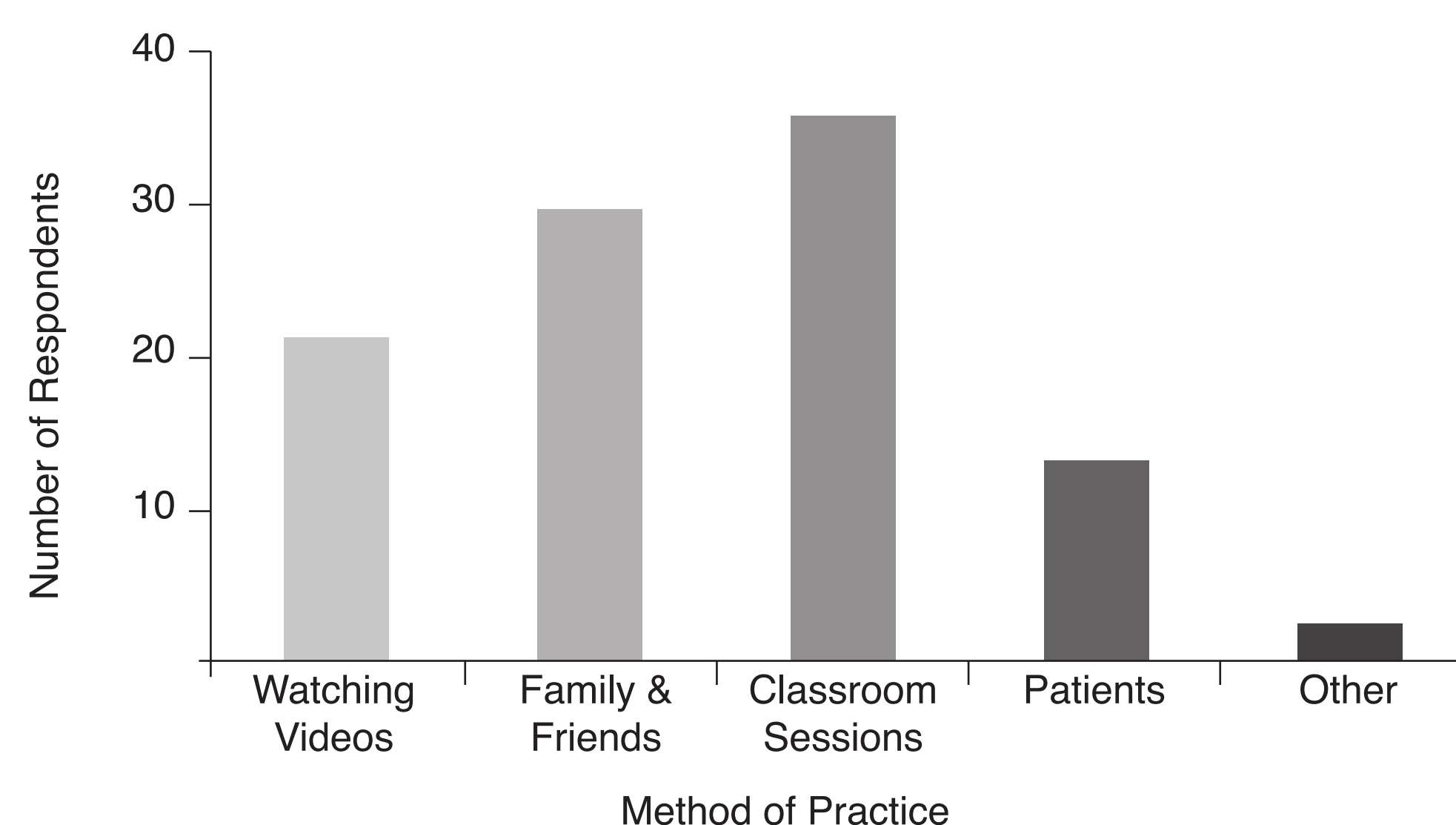


Figure 1: Survey of common techniques for practicing spinal manipulation

Market Analysis & Cost

- 18 chiropractic programs exist with 10,000 students enrolled
- 77,000 licensed chiropractors
- Number of chiropractors predicted to increase by 15% by 2022
- 19 states prohibit interns from performing on patients

Predicted cost < \$1000 per unit

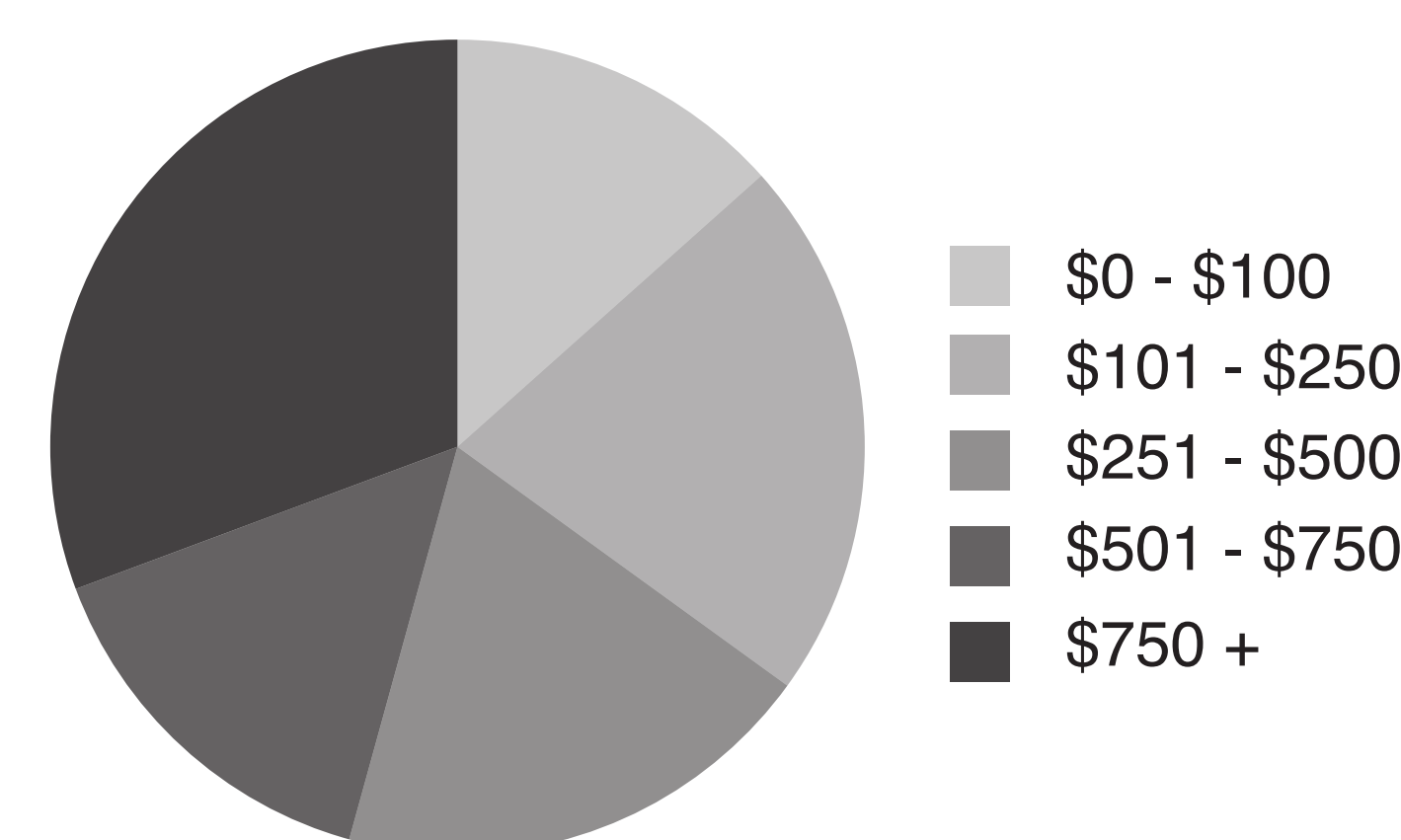


Figure 4: Survey of the cost that chiropractic students are willing to spend on equipment

Existing Solutions

- Dynadjust is a tool for chiropractic students to hone technique by displaying force, speed, and angle of adjustments
- Speeder board provides variable resistance for realignments

Neither option provides any realistic context for use on an actual human spine.

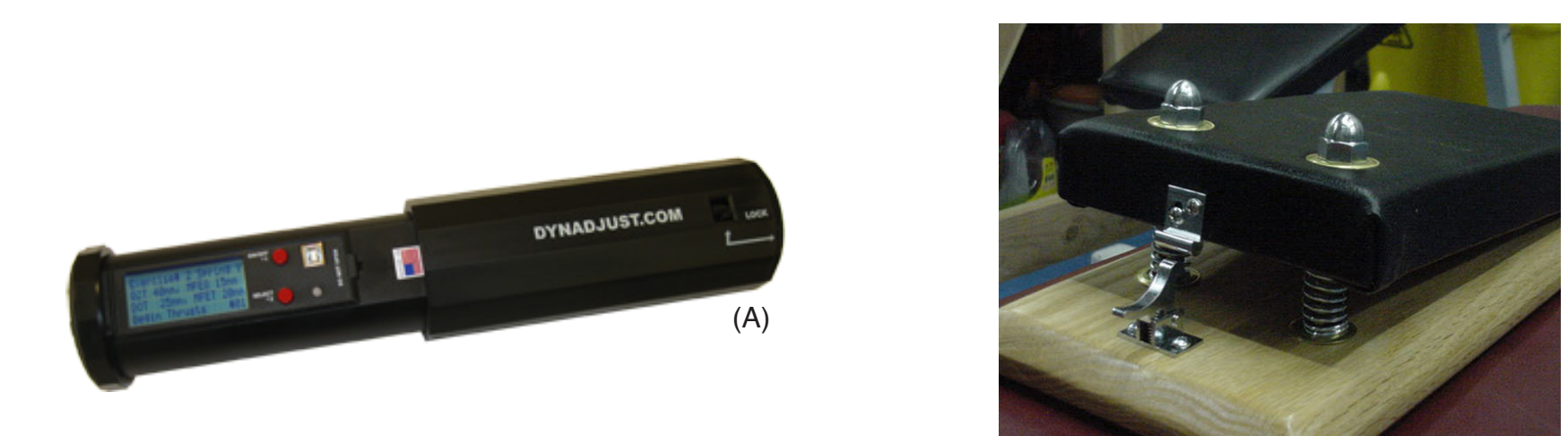


Figure 5: Current models used to practice spinal adjustments: (A) Dynadjust (B) Speeder board

Future Work

- Refine construction to improve manufacturability
- Expand to a full size spine by incorporating springs of differing spring constants to mimic cervical and lumbar misalignments
- Include inferior to superior translation
- Include a working graphic user interface

Our work will ultimately be incorporated into a model of a human torso, similar to a CPR dummy. This part of the project will be carried out by Life University in Georgia.

References & Acknowledgment

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