

# Group 3-43 “The Back Doctor” Written Report

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## #1 Problem Finding

After some research and asking around, we identified problems such as:

- Members of the elderly tend to experience trouble grabbing items from shelves.
- People tend to slouch in chairs.
- Elderly have trouble bending down to fetch items from a trolley.
- People hurt their eyes when looking at a screen too closely.

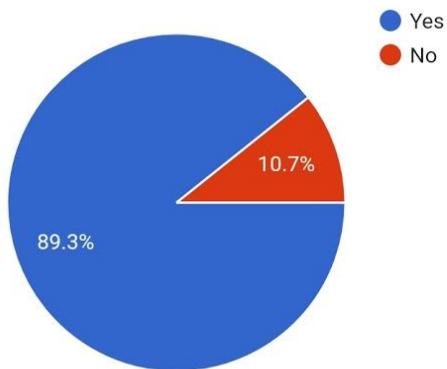
After some consideration, we decided to attempt to solve slouching in chairs as it would not be feasible to engineer an item that would help people grab high objects, or to manufacture an extendable trolley or to create a UV-protected screen. We also observed that too many people slouch when sitting in chairs and deemed it a problem, and as such we set out to engineer a feasible solution.

## #2 Define the Problem

People slouch very often, especially when sitting down on a chair, as the chair is usually not made to fit the user or to assist in adjusting their posture. As such, we conducted a survey among people of all ages, including students, adults and the elderly, to determine whether slouching is an actual problem. The results are shown below:

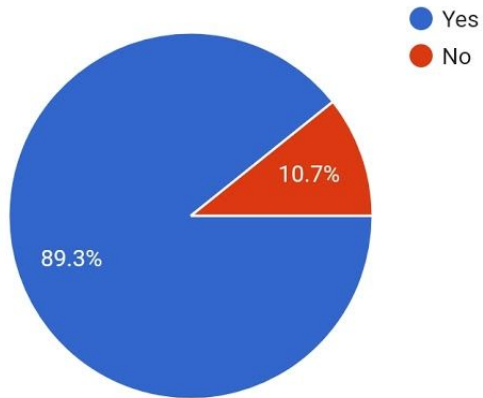
Do you think that we all slouch when we are sitting on chairs this days?

28 responses



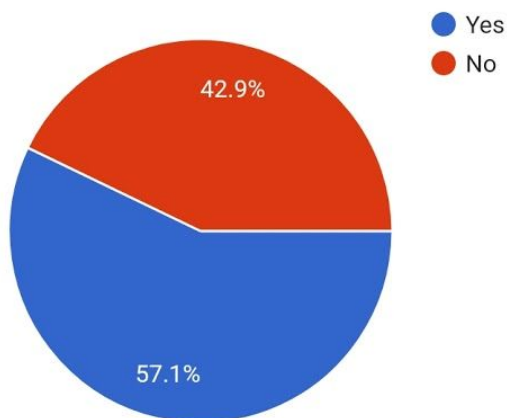
## Do you slouch forward when doing desk work?

28 responses



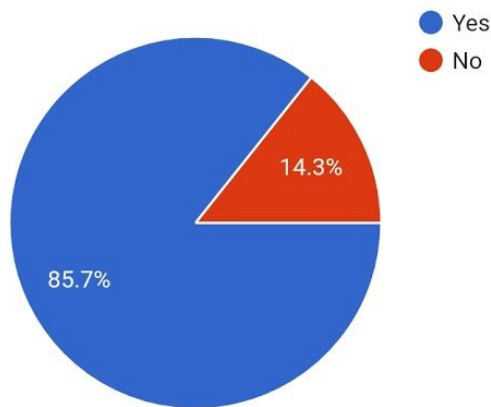
## Do you have a back pain after sitting in a chair for too long?

28 responses



# Do you want a product that will solve this problem?

28 responses



After confirming the existence of this problem, we did a comparison among many similar products currently available in the market. These products are meant to support the user's posture or make the user feel uncomfortable when their posture is incorrect. However, we found that most of these products tend to be heavy, bulky, and are costly (approx. \$50). Cheaper products also tend to be made of weak or uncomfortable materials. A list of some competing products is shown below:

Model Name: [LoveHome Memory Foam Lumbar support](#)

Advantages:

- Soft and cushioning
- Easy to install

Disadvantages:

- Prone to wear and tear
- Gets dirty easily due to design

Model Name: [SOFTaCARE Seat Cushion](#)

Advantages:

- Has good lumbar support
- Easily washed

Disadvantages:

- Rather small
- Not firm (cannot cater to many people)

In conclusion, we have determined that slouching is a prevalent issue, and that existing solutions are

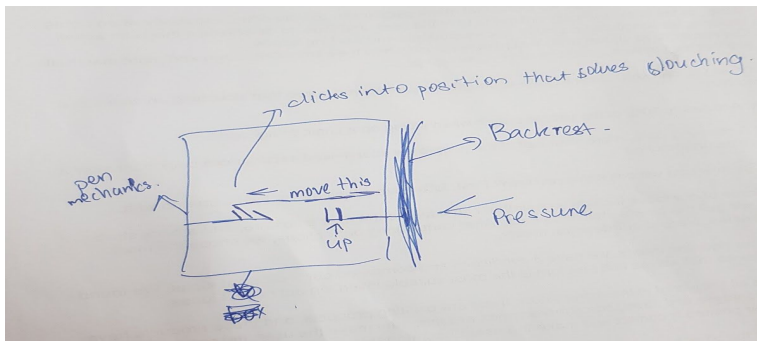
unable to cater to user needs satisfactorily.

### #3 Our proposal.

Our proposed invention should be able to:

- Solve slouching
- Fit on most chairs
- Be easily transportable
- Be adjusted by the user.

Our first design uses a spring mechanism, similar to that which is used in pens. Below is a rough sketch of that design:



Our product will be able to outshine existing products in the following areas:

1. The product will be made of durable materials (e.g. Plastic, Rubber)
2. This product will be lighter and easier to carry around
3. It is cheap

We expected many problems building our prototype, like difficulty finding the right materials and not being able to construct it due to the fragility of the mechanism.

### #4 Construction or Modelling Process

When building the prototype, we decided to scrap the idea of the click-spring mechanism as it was not feasible due to the fragility of the mechanism. Our second idea was to use measuring tapes as a mechanism to adjust the backrest. However, when we tested it out, the measuring tape snapped, proving that it was not durable, forcing us to think of another way to adjust the backrest.

We came to a final design, which we presented during the Mid Term Evaluation.



We used recycled plastic wiring tubes for our mechanism.  
We used bubble wrap and a simple cloth as a cushion.  
We used a cardboard box to provide mechanism support and foundation.

## #5 Modification or Evaluation

Suggested areas for improvement:

- Needs to test with more durable material
- Needs to have more testing with “target audience”

Areas of improvement:

- We changed the cardboard box to sheets of thick acrylic plastic, making it much stronger and resistant to crushing.
- We made the rails slightly easier to adjust.
- We performed some tests and surveys with people of an older age demographic.

## #6 References

Amazon.com, (2019).

*LoveHome Memory Foam lumbar support*. [online]

Available at: <https://www.amazon.com/LoveHome-Balanced-Firmness-Designed-Computer/dp/B00D5J6SSK?th=1>  
[Accessed 6 Aug. 2019].

Amazon.com. (2019).

*SoftACare Cushion Coccyx Orthopedic Support*. [online]

Available at: <https://www.amazon.com/SOFTaCARE-Cushion-Coccyx-Orthopedic-Support/dp/B01166ELYO>  
[Accessed 6 Aug. 2019].