

Appendix 1: “Relieve My Back” Application

Basic Layout

Both versions had the same layout. The user would register using the name, mobile number, email, and invitation code. Each version had its unique invitation code. The user then has access to the home page, which includes 3 icons: educational posts, at the office, and at home.

A- Placebo version

The placebo was adopted from Albaladejo et al., 2010 study, the control group were given a booklet about proper nutrition for their low back pain ¹. The placebo version of the application only had 5 posts on the educational posts section regarding proper nutrition, that were collected from the internet. Four notifications would pop-up for the participants that included different nutritional advices.

B- Experimental version

The icons of the experimental version were as listed below:

- I. Educational Posts icon:** based on Albaladejo et al., 2010 study, the experimental group was given Back Book ¹, which encourages active management of low back pain. The Back Book was recommended by European clinical guidelines, which are low back pain evidence-based management guidelines ². The experimental version of the application included educational short posts modified from the Back Book, it included 10 posts in total about the proper management of low back pain: 1. Facts about your back. 2. Staying active/ active rest. 3. How to manage low back pain when having severe pain. 4. Managing pain medically. 5. Things you do that increase/decrease your low back pain. 6. When to seek a physician (Red flags). 7 The importance of exercise. 8. Improper body mechanics: wrong lifting (includes a picture). 9. Proper body mechanics: correct lifting (includes a picture). 10. Ergonomic workstation: correct body posture while working on a desk (includes a picture).
- II. At the office icon:** A set of stretching exercises were provided with pictures and detailed instructions for each exercise. The purpose was to help decrease the load on the back from sustaining a posture for a long duration. A general post included instructions to repeat the exercises every 30 minutes, and it is advised to not stay in one position more than 30 minutes².

| Stretching Exercise | Description |
|-------------------------|--|
| 1. Spine extension | Sustain this position for 20 seconds |
| 2. Spine rotation | Sustain this position for 20 seconds for each side |
| 3. Spine side flexion | Sustain this position for 20 seconds for each side |
| 4. Spine side extension | Sustain this position for 20 seconds for each side |
| 5. Spine flexion | Sustain this position for 20 seconds |

- III. At home icon:** a set of evidence-based strengthening exercises for back and abdominal muscles were included with pictures and detailed instructions for each exercise. A general post included instructions for having about 3-4 sessions weekly, each session is about 20 minutes. ^{1,2,3,4}

| Exercise | Set | Repetition | Description |
|---------------------------------|---------------------|------------|--|
| 1. Knee rolling | 1 set for each knee | 10 | <ul style="list-style-type: none"> - While lying on the back, put a small pillow or a book under your head, bend knees with keeping no space between your legs. - Roll your knees to one side, while keeping your shoulders on the floor. Stay still for one deep breath, go back to start position. |
| 2. Both knees to chest | 1 | 15 | <ul style="list-style-type: none"> - While lying on back, bend knees. - Hold them with your hand, pull them toward your shoulders, while keeping your shoulders on the ground. Stay still for 5-10 seconds, go back to start position. |
| 3. Deep abdominal strengthening | 1 | 30 | <ul style="list-style-type: none"> - While lying on the back, put a small pillow or a book under your head, bend knees with aligning knees with your hips. - Contract your pelvis and lower abdominal muscles toward your back. Stay still for 5-10 seconds, then relax. |
| 4. Arm and leg raise | 1 set for each side | 10 | <ul style="list-style-type: none"> - Go to all four positions, knees in alignment with hips, hands in alignment with shoulders. - Raise your arm in front of you with the opposite leg up behind you. |
| 5. Cat camel | 1 | 10 | <ul style="list-style-type: none"> - While all on four position, knees in alignment with hips, hands in alignment with shoulders. - Slowly, lower your head into flexion, while raising your back to the upward arch. - Slowly, raise your head into extension, while dropping your back into a downward arch. |
| 6. Back extension | 1 | 10 | <ul style="list-style-type: none"> - Lay on your stomach while bearing on your forearms, your elbows bend beside you. Keep your neck in a neutral position. - By keeping your head in a neutral position, raise your back by pushing your forearms down. You need to feel the tension in your abdominal muscles. Take a breath and hold it for 5 to 10 seconds. Go back to start position. |

IV. Application Notifications: The application had four daily notifications/reminders that would pop up to give different reminders including: take a walking break for at least 10 minutes, a reminder of the right posture during sitting, a reminder of stretching exercises, and a late-day reminder of strengthening exercises.

References

- 1) Albaladejo, C., Kovacs, F. M., Royuela, A., del Pino, R., Zamora, J., & Spanish Back Pain Research Network. (2010). The efficacy of a short education program and a short physiotherapy program for treating low back pain in primary care: a cluster randomized trial. *Spine*, 35(5), 483-496.
- 2) Airaksinen, O., Brox, J. I., Cedraschi, C., Hildebrandt, J., Klaber-Moffett, J., Kovacs, F., ... & Zanoli, G. (2006). European guidelines for the management of chronic nonspecific low back pain. *European spine journal*, 15(Suppl 2), s192.
- 3) Searle, A., Spink, M., Ho, A., & Chuter, V. (2015). Exercise interventions for the treatment of chronic low back pain: a systematic review and meta-analysis of randomised controlled trials. *Clinical rehabilitation*, 29(12), 1155-1167.
- 4) Shirado, O., Doi, T., Akai, M., Hoshino, Y., Fujino, K., Hayashi, K., ... & Iwaya, T. (2010). Multicenter randomized controlled trial to evaluate the effect of home-based exercise on patients with chronic low back pain: the Japan low back pain exercise therapy study. *Spine*, 35(17), E811-E819.