Self-calibrated position for sitting upright

UpRight Go vibratory feedback reminding me that I am collapsing

Corrected position while working

"Don't Slouch!" Improve Health with Posture Feedback[1]

by Erik Peper, PhD, BCB[2,3]; Richard Harvey, PhD; and Lauren Mason

Institute for Holistic Health, San Francisco State University

"Although I knew I slouched and often corrected myself, I never realized how often and how long I slouched until the vibratory posture feedback from the UpRight Go 2™ cued me to sit up (see Figure 1)."

– Erik Peper

For thousands of years we sat and stood erect. In those earlier times, we looked down to identify specific plants or animal track and then looked up and around to search for possible food sources, identify friends, and avoid predators. The upright, not slouched posture body posture, is innate and optimizes body movement as illustrated in Figure 2 (for more information, see Gokhale, 2013).

1. The article was adapted from the blog, "Don't slouch!" Improve health with posture feedback, www.peperperspective.com.
2. Correspondence should be addressed to: Erik Peper, PhD, Institute for Holistic Healing Studies, San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132. Tel: 510-681-6301; Email: epeper@sfsu.edu; web: www.biofeedbackhealth.org; blog: www.peperperspective.com
3. The article is based upon the collaborative research with Richard Harvey, Lauren Mason, I-Mei Lin, Monica Joy, Annette Booiman, and Shane Colombo.

Figure 1 (above). Wearing an UpRight Go 2™ to increase awareness of slouching and as a reminder to change position.

Being tall and erect allows the head to rotate freely. Head rotation is reduced when we look down at our cell phones, tablets or laptops (Harvey, et al. 2018). Our digital world captures us as illustrated in Figure 3.

Looking down and focusing on the screen for long periods of time is the opposite of what supported us to survive and thrive when we lived as hunters and gatherers. When we look down, we become more oblivious to our surroundings and unaware of the possible predators that would have been hunting us for food.

This slouched position increases back, neck, head and eye tension as well as affecting respiration and digestion (Devi, et al, 2018; Peper, Lin, & Harvey, 2017). After looking at the screens for a long time, we may feel tired or exhausted and lack initiative to do something else. Our mood may turn more negative since it is easier to evoke hopeless, helpless and powerless thoughts and memories when looking down than when looking up (Wilson, & Peper, 2004; Peper, Lin, et al, 2017). In the down position, our brain has to work harder to evoke positive thoughts and memories or perform cognitive tasks as compared to when the head is erect (Tsai, Peper, & Lin, 2016; Peper, Harvey, et al, 2018). By looking down and focusing at the screen, our eyes may begin to strain. To be able to see objects near us, the extraocular muscles of the eyes contract to converge the eyes and the cilia muscles around the lens contract to increase the curvature of the lens so that the reading material is in focus.

Eye Strain

Become aware how nearby vision increases eye strain**.** Hold your arm straight ahead of you at eye level with your thumb up. While focusing on your thumb, slowly bring your thumb closer and closer to your nose. Observe the increase in eyestrain as you bring your thumb closer to your nose.

Eyestrain tends to develop when we do not relax the eyes by periodically looking away from the screen. When we look at the horizon or trees in the

far distance the ciliary muscles and the extraocular muscles relax (Schneider, 2016).

Neck and Back Tension

Head forward posture increases neck and back tension. When we look down and concentrate, our head moves significantly forward. The neck and back muscles have to work much harder to hold the head up when the neck is in this flexed position. As Dr. Kenneth Hansraj, chief of spine surgery, New York Spine Surgery & Rehabilitation Medicine, reported: *"The weight seen by the spine dramatically increases when flexing the head forward at varying degrees. An adult head weighs 10-12 pounds in the neutral position. As the head tilts forward the forces seen by the neck surges to 27 pounds at 15 degrees, 40 pounds at 30 degrees, 49 pounds at 45 degrees and 60 pounds at 60 degrees"* (Hansraj, 2014). The head tends to tilt down when we look at the text, videos, emails, photos, or games and stay in this position for long time periods. We are captured by the digital display and are unaware of our tight overused neck and back muscles. Straightening up so that the back of the head is repositioned over the spine and looking into the distance may help relax those muscles.

To reduce discomfort caused by slouching, we need to reintegrate our prehistoric life style pattern of alternating between looking down to being tall and looking at the distant scenery or across the room. The first step is awareness of knowing when slouching begins. Yet, we tend to be unaware until we experience discomfort or are reminded by others (e.g, "Don't slouch! Sit up straight!"). If we could have immediate posture feedback when we begin to slouch, our awareness would increase and remind us to change our posture.

Posture Feedback with UpRight Go

A simple posture feedback device such as an UpRight Go 2 can provide vibratory feedback each time slouching starts as the neck and head go forward. The wearable feedback device consists of a small sensor that is attached to the back of the neck or back (see Figure 1). After being paired with a cellphone and calibrated for the upright position, the software algorithm detects changes in tilt and provides vibratory feedback each time the neck/back tilts forward.

In our initial exploration, employees, students, and clients used the UpRight feedback devices at work, at school, at home, while driving, walking, and other activities to identify situations that caused them to slouch. The most common triggers were the following:

1. Ergonomic-caused movement such as bringing the head closer to the screen or looking down at their cell phone (for suggestions to improve ergonomics see recommendations at the end of the article);
2. Tiredness;
3. Negative self-critical/depressive thoughts;

➤

Figure 2. The normal aligned spine of a toddler and the aligned posture of a man carrying a heavy load.

Figure 3. Captured by the screen with a head forward positions.

➤

4. Crossing the legs protectively, shallow breathing, and other factors.

After having identified some of the factors that were associated with slouching, we compared the health outcome of students who used the device for a minimum of 15 minutes a day for four weeks as compared to a control group who did not use the device. The students who received the UpRight feedback were also encouraged to use the feedback to change their posture and behavior and implemented some of the following strategies.

- Head down when looking at their laptop, tablet, or cellphone.
  - Change the ergonomics such as using a laptop stand and an external keyboard so that they could be upright while looking at the screen.
  - Take many movement breaks to interrupt the static tension.
- Feeling tired.
  - Take a break or nap to regenerate.
  - Do fun physical activity, especially activities where you look upward to re-energize.
- Negative self-critical, powerless, and depressive thoughts and feelings.
  - Reframe internal language to empowering thoughts.
  - Change posture by wiggling and looking up to have a different point of view.
- Crossing the legs.
  - Sit in power position and breathe diaphragmatically.
  - Get up and do a few movements such as shoulder rolls, skipping, or arm swings.
- Other causes.
  - Identify the trigger and explore strategies so that you can sit erect without effort.
  - Wiggle, move and get up to interrupt static muscle tension.
  - Stand up and look out of the window and the far distance while breathing slowly.

Posture Feedback Improves Health

After four weeks of using the feedback device and changing behavior, the treatment group reported significant improvements in physical and mental health as shown in Figure 4 and 5.

Summary

Slouched posture and head forward and down position usually occur without awareness and often result in long-term discomfort. We recommend that practitioners integrate wearable biofeedback devices to facilitate home practice especially for people with neck, shoulder, back and eye discomfort as well as for those with low energy and depression (Mason et al., 2018). Wearable devices that monitor spinal posture are very promising since they are capable of assessing spinal posture with

Figure 4. Using the posture feedback significantly improved the Physical Health and Mental Health Composite Scores for the treatment group as compared to the control group (reproduced from Mason, L., Joy, Peper, & Harvey, 2018).

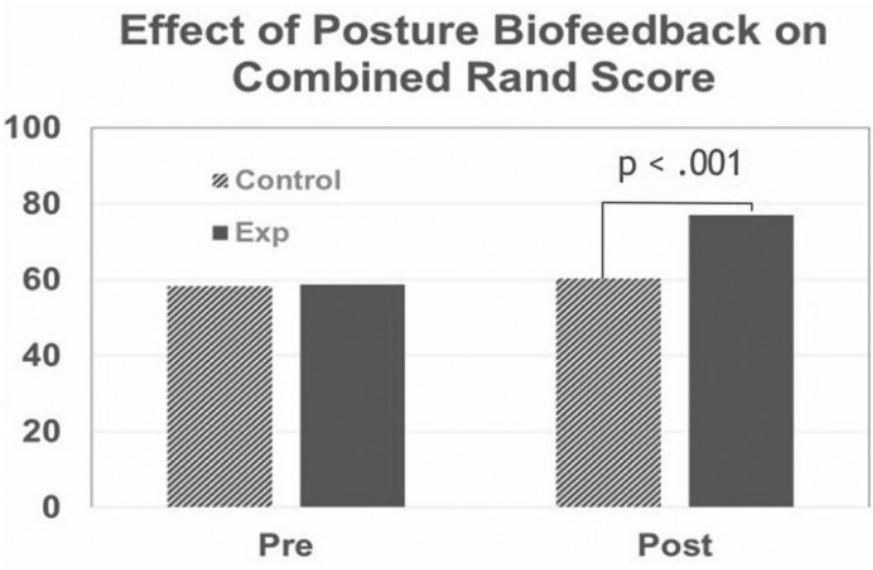
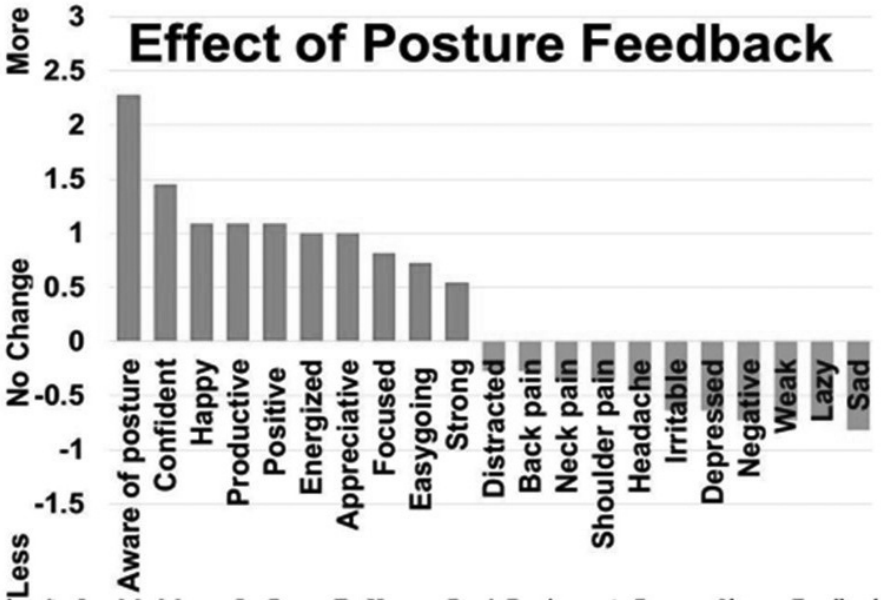


Figure 5. Pre to post changes after using posture feedback (reproduced from Colombo, Joy, Mason, L., Peper, Harvey, & Booiman, 2017).



good accuracy and can be used clinically (Simpson, et al, 2019). We observed that a small wearable posture feedback device helped participants improve posture and decreased symptoms**.** The vibratory posture feedback provided the person with the opportunity to identify the triggers associated with slouching and the option to change their posture, behavior, and environment.

As one participant reported,

> I have been using the Upright device for a few weeks now. I mostly use the device while studying at my desk and during class. I have found that it helps me stay focused at my desk for longer time. Knowing there is something monitoring my posture helps to keep me sitting longer because I want to see how long I can keep an upright posture. While studying, I have found whenever I become frustrated, tired, or when my mind begins to wander I slouch. The Upright then vibrates and I become aware of these feelings and thoughts, and can quickly correct them. This device has improved my posture, created awareness, and increased my overall study time.

Resources to Reduce Slouching and Improve Ergonomics

How to arrange your computer and laptop: https://peperperspective.com/2014/09/30/cartoon-ergonomics-for-working-at-the-computer-and-laptop/

Relieve neck and shoulder stiffness: https://peperperspective.com/2019/05/21/relieve-and-prevent-neck-stiffness-and-pain/

Cellphone health: https://peperperspective.com/2014/11/20/cellphone-harm-cervical-spine-stress-and-increase-risk-of-brain-cancer/

References

Colombo S, Joy M, Mason L, Peper E, Harvey R, Booiman A. (2017). Posture Change Feedback Training and its Effect on Health. Poster presented at the 48th Annual Meeting of the Association for Applied Psychophysiology and Biofeedback, Chicago, IL March, 2017. Abstract published in *Applied Psychophysiology and Biofeedback.42*(2), 147.

Devi RR, Lakshmi VV, Devi MG. (2018). Prevalence of discomfort and visual strain due to the use of laptops among college going students in Hyderabad. *Journal of Scientific Research & Reports,* 20(4), 1-5.

Gokhale E. (2013). *8 Steps to a Pain-Free Back*. Pendo Press.

Hansraj KK. (2014). Assessment of stresses in the cervical spine caused by posture and position of the head. *Surgical Technology International*, 25, 277–279.

Harvey R, Peper E, Booiman A, Heredia Cedillo A, Villagomez E. (2018). The effect of head and neck position on head rotation, cervical muscle tension and symptoms. *Biofeedback. 46*(3), 65–71.

Mason L, Joy M, Peper E, Harvey,R. (2018). Wearable Posture Feedback Training: Effects on Health. Poster presented at the 2018 meeting of the 49th Annual Meeting of the Association for Applied Psychophysiology and Biofeedback, Orlando, FL. April 11-14.

Mason L, Joy M, Colombo S, Peper E, Harvey R. (2017). Biofeedback Strategies to Increase Social Justice and Health Equity: A wearable device to teach awareness of posture and improve self-care. Presented at the 19th Annual meeting of the Biofeedback Federation of Europe, Aveiro, Portugal, April 24-29th, 2017. Abstract in *Applied Psychophysiology and Biofeedback,*43(1), 93

Peper E, Harvey R, Mason L, Lin I-M. (2018). Do better in math: How your body posture may change stereotype threat response. *NeuroRegulation, 5*(2), 67-74

Peper E, Lin I-M, Harvey R., Perez J. (2017). How posture affects memory recall and mood. *Biofeedback.45* (2), 36-41.

Peper E, Lin I-M, Harvey R. (2017). Posture and mood: Implications and applications to therapy. *Biofeedback, 35*(2), 42-48.

Schneider M. (2016). *Vision for Life.* Berkeley, CA: North Atlantic.

Simpson L, Maharaj MM, Mobbs RJ. (2019). The role of wearables in spinal posture analysis: a systematic review. *BMC Musculoskeletal Disorders,20:55.*

Tsai HY, Peper E, Lin IM. (2016). EEG patterns under positive/negative body postures and emotion recall tasks. *NeuroRegulation*, 3(1), 23-27.

Wilson VE, Peper E. (2004). The Effects of Upright and Slumped Postures on the Recall of Positive and Negative Thoughts. *Applied Psychophysiology and Biofeedback,* 29(3), 189- 95.

◆

Improved posture brings significant physical and mental health benefits.

Erik Peper, PhD, BCB, is an international authority on biofeedback and professor of holistic health studies / Department of Health Education at San Francisco State University. He is President of the Biofeedback Federation of Europe and past president of the Association for Applied Psychophysiology and Biofeedback (AAPB). He has received numerous awards such as 2013 Biofeedback Distinguished Scientist Award in recognition of outstanding career and scientific contributions from the Association for Applied Psychophysiology. He has a biofeedback practice in Berkeley, California, at BiofeedbackHealth (www.biofeedbackhealth.org). He is an author of numerous scientific articles and books such as *Make Health Happen, Fighting Cancer-A Nontoxic Approach to Treatment,* and *Biofeedback Mastery*. He publishes the blog, *the Peper perspective-ideas on illness, health and well-being* (www.peperperspective.com). He is a recognized expert on holistic health, stress management and workplace health. His research interests focus on self-healing strategies to optimize health, illness prevention, the effects of respiration and posture, and self-mastery with biofeedback.