

## **Posture: Design Research Review**

### **Summary of Key Findings and Takeaways**

To learn more about how people develop bad posture, we conducted mixed methods design research with approximately 30 participants using “fly on the wall” observations, 5 using experience sampling, and 2 using contextual inquiries. We observed that bad posture is developed unconsciously and over time while performing sedentary work, such as reading on a computer screen. Thinking intently about something tended to cause a shift in posture, such as leaning an arm on a desk or shifting feet under a chair. The range between good posture and bad posture narrows when standing, and doing stressful work seems to have a negative impact on posture. Finally, although the position of participants’ necks and backs are the most noticeable elements of poor posture, poor posture in the lower body might contribute indirectly to bad posture habits over time.

### **Design Research Participants**

#### **A. Fly on the Wall**

We utilized three different techniques in conducting research. For the first, “Fly on the Wall,” we went to five different locations in the Seattle area: the University District branch of the Seattle Public Library, Odegaard Library (4th floor), Kaiser Permanente (formerly Group Health), the Husky Union Building, and the Northgate Mall Food Court. In total, we observed approximately 30 participants, ranging in duration from a few minutes to several hours. Most of the observations took place while people were seated at tables and desks. Because we didn’t interview the participants, we don’t know their exact ages, but we estimate they ranged from early 20s to late 40s.

#### **B. Experience Sampling**

We performed experience sampling to learn if certain temporal, spatial, or social contexts influence posture. We will ask participants 4 times per day where they are, who they’re with, what they’re doing, and how they would rate their posture on a 3-point scale (1=bad, 2=neutral, 3=good). For our experience sampling we had 5 participants:

1. Female, 26, Medical School Student at Saint Louis University
2. Female, 24, American Studies Student at UW
3. Male, 21, American Studies Student at UW
4. Male, 18, Computer Science & Engineering Student at UW
5. Male, 18, Computer Science & Engineering Student at UW

#### **C. Contextual Inquiry**

For our contextual inquiry, We covertly videotaped participants working at a desk for as long as it takes for them to adjust their posture in a negative way. We then showed them the videotape and ask them why they made that adjustment, what they were doing, and how they were feeling in that moment. We had 2 participants:

1. Male, 29, Software Engineer from Seattle, WA
2. Female, 23, Bioengineering Student at UW

## **Design Research Themes**

Several high-level themes emerged when reviewing our data. Most interestingly, none of our participants were really conscious of their posture or why they were changing positions. People don't know they have poor posture until it's too late.

We learned that our participants' posture was generally worse when they were working in front of their computers (often on school work). When people were thinking intently about something, they often leaned their arms on the desk, twisting their body forward in their chair. On the other hand, posture was best when participants were more relaxed and doing casual activities, such as watching TV or shopping. In general, people actively using a device with a screen (smartphone, laptop) had much worse posture.

Also, postures help people to do what they want. One participant had some patterns of posture, which corresponds to what she is doing. She rest her chin in her hand when she was thinking and used both of hand when she needs deeper thinking. She changed the posture to refresh when she was stacked to the problems. Besides, she made good posture to wake herself up.

We also noticed that a person's lower body, in particular the position of their legs and feet, had a large influence on overall posture. Those who sat cross-legged or tucked their feet under their chair would often have bad back posture as well. Finally, there was a decreased range between poor posture and good posture while people were standing.

These themes suggest that our design should be intended for people who do mostly sedentary work sitting down, and because posture is mainly subconscious, we should try to avoid designs where users have to actively remember to log themselves. It might be fruitful to focus on designs that improve a person's lower body posture, which could have an indirect corrective effect on their overall posture.

## **Task Analysis Questions**

### **1. Who is going to use the design?**

People who spend a lot of time seated and working in front of a screen (college students and office workers) are probably going to be the main users of the design. We noticed that this seems to be where the worst posture tends to occur. We also plan on narrowing our focus to young adults, who we observed having consistently poor posture. In school and at work, young adults spend an increasing amount of time in front of a computer screen, which puts them at risk for back pain and other health issues (Canadian Chiropractic Association, 2016).

### **2. What tasks do they now perform?**

Our participants tended to start with good posture and acquiesce into poor posture over time. This is mostly an unconscious choice but stems from discomfort while sitting and working with objects whose usability depends on bodily position (e.g. looking at a computer screen). Their bad posture occurs within the context of other more pressing tasks they are accomplishing, such as studying or programming, which takes up their attention.

### **3. What tasks are desired?**

We aim to inspire awareness of our participants' posture. Rather than constantly reminding people to improve bad posture, we hope to incentivize good posture through mindfulness about their bodily position while working. Our participants had tasks that needed to be accomplished (studying, programming, reading), and so they need to not have to consciously focus on posture because that would distract them from these higher prioritized tasks.

### **4. How are the tasks learned?**

The tasks are learned by "muscle memory" and the subjective comfort of their bodily position. Bad posture can be comfortable in the short term, but it has difficult-to-notice, long-term consequences on cognitive performance and energy expenditure.

### **5. Where are the tasks performed?**

We found that generally the people we observed (aged 20s to 30s) had much worse posture when working in front of their screen at their desks. They typically did express interest in improving their posture when asked, but we found that posture is generally something that's not consciously learned or controlled.

### **6. What is the relationship between the person and data?**

Right now people are typically not aware of what posture they have, or when they shift positions. So there is effectively no real relationship between people and their "posture data." One type of information that might indicate to individuals that they have poor posture would be back or neck pain. Some specific postures may have relationship with what they are doing and what they are feeling now. Also, participants should have feedback about how long they stay in a certain position.

### **7. What other tools does the person have?**

Typically the people we observed and interviewed were working with their laptops, pen and paper or looking at their phones, putting laptops on the desk and sitting on the chair. The type of chair that they are sitting in seems to make a difference in their posture- for example, a chair that leans back is better for back posture but worse for neck posture, and a chair that is very deep forces the sitter to posture themselves on the edge, where they seem more likely to lean forwards towards their work. Other tools, such as a computer keyboard also seem to make a difference, for example, one handed typing leads to worse posture than two handed typing.

### **8. How do people communicate with each other?**

It's a bit difficult to answer this question in the context of posture as a "task", but being with friends and other people definitely did affect posture. We found that people walking around and chatting with friends typically had good posture, but it varied more for people chatting with friends while sitting down. For example, people using large gesture tends to have good posture because they need to open up.

### **9. How often are the tasks performed?**

Our design would need to be able to be used on a daily basis, as the work we observed our participants doing was typically their regular work (homework, programming, etc.). By "performing" good posture everyday, people would be able to use and develop the muscles that are required.

### **10. What are the time constraints on the tasks?**

One constraint is that because posture is typically at its worst while people are working, our design would need to be relatively unobstructive and not distracting, so consciously interacting with our design would need to not take more than a few minutes per day.

### **11. What happens when things go wrong?**

We found that typically posture worsens significantly when people look down at their phones, or lean on something (e.g. while thinking hard about things) while looking at their laptop screens. In addition, we saw people also have worse posture while sitting in different positions (cross legged, tucking feet under chair, etc.). This can lead to, "imbalanced body alignment, strain on ligaments and muscles, chronic pain, injuries, impingement, low back pain, neck pain, hip pain, joint stiffness and muscle tightness (Ogaldez, 2015)."

## **References**

Canadian Chiropractic Association Staff Team. (2016). Looking Ahead: Millennials and Long-Term Health. Retrieved from <https://www.chiropractic.ca/blog/looking-ahead-millennials-and-long-term-health/>.

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