

RightUp

EDUCATING AND ENGAGING CHILDREN AND GUARDIANS ON THE BENEFITS OF GOOD POSTURE

CSE: Introduction to HCI

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Table of Contents

The Team	3
Rui Wu	3
Siyu Pan	3
Nathan Lee	3
Problem and Solution Overview	4
Problem Statement	4
Solution Overview	4
Design Research Goals, Stakeholders, and Participants	4
Research Goals	4
Research Methods	4
Research Participants	5
Design Research Results and Themes	6
Themes and practices	6
Monkey See, Monkey Do	6
Let's Play!	6
Posture is to Self Esteem as Children are to Parents	6
Ow, My Neck!	6
Issues in research	6
Answers to Task Analysis Questions	7
Proposed Design Sketches	9
Design 1: Virtual Reality Game	9
Design 2: Web Application	10
Design 3: Wearable Necklace	11
Written Scenarios and Storyboards	13
Engage children	13
Educate guardians on posture and child development	13

The Team

Rui Wu

Lead Designer (33%)

Rui oversaw designing, storyboarding, and drafting the prototype of the design solution. She played a very integral role in the story of the solution, as well as creating the motivation as to why posture is such an important issue.

SIYU PAN

Creative Director (33%)

Siyu primarily identified and documented the use cases of the product. She played a large part in identifying who our design stakeholders and participants are, and how we should design our solution for them. She was also crucial to defining both the tasks this product addresses, as well as how it addresses them

NATHAN LEE

Product Manager (33%)

Nathan was primarily in charge of envisioning the solution, then describing its functionality and affordances. He also was the lead reporter for this paper and wrote the majority of the content.

Problem and Solution Overview

PROBLEM STATEMENT

With the increased usage of technology, there is a steady rise of back and neck pain due to poor posture from technology use compounded over time. Given this increasing trend, our problem statement is thus: **“how can we address the issue of chronic back and neck pain due to compounded poor posture by focusing on improving posture as early on as possible?”** To do this, we are designing for children ages 6-11 in the effort to correct and educate them, as well as their guardians, on the importance of good posture.

SOLUTION OVERVIEW

We are designing a virtual reality (VR) game, RightUp, that educates and engages children and their guardians on the benefits of good posture, helps children develop a habit of good posture, and protects them from spine pain. Our design will contain information about the importance and need for good posture, instructions on how to properly model good posture, and in-game activities. The VR technology functions by positioning the user’s height, depth, and width in a 3D space with two cameras. In said activity, participants will be given different level of abilities (ex. attack power, health point) and different perspectives about the in-game world, as they stand taller or bend down lower, as monitored by the two cameras. Players standing and modeling good posture will be allowed greater abilities and greater interaction with the virtual world around them, incentivizing and teaching them to stand in good posture.

Design Research Goals, Stakeholders, and Participants

RESEARCH GOALS

Our research was directed to identify both the issues of back/neck pain in children, as well as typical behaviors of children. Addressing a problem of a very mobile demographic (ages 6-11), we desired to first learn about their lives and how posture plays a role in their development. We conducted our research through the following two methods:

Interviews: We interviewed two medical professionals who know about childhood development. The types of questions we asked include “common problems in childhood development”, “effects of good posture on childhood development”, and “how posture has been taught”. We chose this method for medical professionals because they are likely to have a large amount of knowledge, experience and opinions about child development, and using this method can maximize the amount of information we get.

Observational study (fly-on-the-wall): We observed children at home unobtrusively, both in play and when given a responsibility or chore by their parents. We chose this method

because children usually can't accurately account for their experience and opinions, so it would be more effective to observe them rather than interview them. Also, children's behaviors can be easily affected by the environment, we can get more realistic knowledge about children's daily behaviors using this method.

STAKEHOLDERS

We aim to address the issue of chronic back and neck pain by helping individual develop the habit of good posture as early on in life as possible, so we chose to target school children ages 6-11. Other notable stakeholders in this design are parents of said children, school teachers/guardians, that have a personal burdening and responsibility for the healthy emotional, physical, and mental development of these children, and pediatricians who contribute to spinal development of children.

RESEARCH PARTICIPANTS

Medical Professionals (Pediatrics): Pediatricians have professional knowledge and years of experience about children development. They plays an essential role in children development by engaging with parents/guardians in education of how to best have their children develop. We interviewed two medical professionals over the phone: a medical doctor specializing in mental health, as well as a nurse practitioner with 30+ years in the pediatrics field. This gave us a better idea of the effect of posture directly related to children, as well as over time. In addition, both medical professionals were able to share details on the most important factors of a child's development.

Children: Children are the primary user of our design and subject of the problem we want to address for this design. It's important for our design to fit the needs and behaviors of children. In our observational research, we observed a 10-year-old girl in her home environment, interacting with her younger sibling and mother. This observation was to gain insight as to how children behave in relation to family, their environment, and authority figures, as well as how to best incentivize a certain desired behavior.

Design Research Results and Themes

THEMES AND PRACTICES

Monkey See, Monkey Do

Children learn largely through observation and imitation. They learn from role models like their parents and teachers and imitate behaviors of their role models. This leads to suggest that any behavior we want to exhibit can be taught to them effectively through having others model the desired behavior, and them following suit.

Let's Play!

Children desire things that are fun and associated with positive rewards. Using incentives and positive rewards is an effective way to motivate positive behaviors such as keeping a good posture in children. This suggests that our solution should include a reward for a child, rather than simply a reminder which may work for older demographics.

Posture is to Self-Esteem as Children are to Parents

Spinal posture is more directly correlated to self-esteem than to development. Spinal posture is an indicator of a child's mental health and gives signs of depression or other mental health illnesses. This suggests that any design we create that has the ability to monitor children's posture would benefit from having a built-in diagnostic system, alerting others to any signs of mental health issues (depression, anxiety, etc.) in a child. This is a subject we would like to pursue given more time, but regardless, it is important to inform parents on the mental health of their children.

Ow, My Neck!

We found that neck posture is a rising concern due to increased use of cell phones and electronics. This symptom is titled "Text Neck," and is primarily caused by users bending down to view their electronics. This issue is of concern for children as we found they spend large amounts of time seated in poor posture in front of devices. Whatever design we create should address this, as Text Neck does ultimately result in neck pain and poor development for children and adolescents alike.

ISSUES IN RESEARCH

Beside home, children also spend long time in school. While we desired to observe children in school environments, we were unable to due to the slow bureaucratic process of the school (to access the school, we had to wait until the principle responded). If given more time, we would have gone in to observe children in their school environment and interviewed teachers. This would have given us a more holistic view of the children in their environment, and how our design solution could be better integrated into the classroom scenario.

Answers to Task Analysis Questions

1. Who is going to use the system?

Children will be the primary users of the system. However, we will support the use for their guardians as well. The purpose of allowing them to play alongside of children is to educate them on the importance of posture, help them identify and address problems in children postures and allow them to provide guidance to children when needed.

2. What tasks do they now perform?

Currently, children ages 6-11 are tasked with many different items, from completing schoolwork, to following hobbies and/or recreational activities such as sports, to even doing chores around the house. Children also use/play/watch a lot of technology and interact with parents and other children alike.

3. What tasks are desired?

Children desire to play and have fun! They are indulgent on things such as sweets, games, and entertainment, and the majority have little to no self-control to stop themselves from pursuing such treats.

4. How are the tasks learned?

Through our research, we found that one of the primary ways that children learn certain behaviors is through visual observation and role models. Even after being explained a topic, children often decide not to accept/exhibit a certain behavior until after seeing others model it. Children primarily look to their guardians/authority figures or their peers in learning new tasks.

5. Where are the tasks performed?

There are a number of locations where children perform their tasks, broken up into three main locations:

- Classroom: Children spend a large majority of their time in school. This includes their classroom, their desks, recess time on the playground, the cafeteria, the gymnasium, and more. The school environment as a whole promotes a more sedentary behavior for children.
- Playgrounds: Children often spend time either on playgrounds or fields (soccer, football, etc.) that allow for increased mobility. Typically, these areas promote increased activity and movement for children.
- Home: Children spend the rest of their waking hours at home. This includes the dinner table, on couches or chairs, lying on the floor, sleeping, and throughout the house. The home environment promotes both movement and sedentary behavior.

6. What is the relationship between people and data?

Though children are often using electronic devices, they rarely are actively searching up information. Rather, children spend the majority of their electronic time consuming different media channels (such as TV or videos), playing games, and/or communicating with others online.

7. What other tools do people have?

Children have wide access to their parents as information sources and rely on their parents heavily to both learn and perform tasks. By extension, children have access to their parents' network, their resources (income), and their devices to use. Children also have school, both teachers and peers to rely on.

8. How do people communicate with each other?

The majority of children communicate verbally and nonverbally, through speech and behavior. As children's speech skills are still developing, early on in life children look at parents' nonverbal behavior to learn. However, further on in adolescence, children begin to heavily use different electronic mediums to communicate with their peers and the world around them.

9. How often are the tasks performed?

Tasks are performed on a daily basis, as kids go to school, engage with people and things in their world, and are guided by their parents. Research indicates that the frequency of the tasks plays a large part in the healthy development of children.

10. What are the time constraints on the tasks?

Children often are not given a lot of time to accomplish the tasks set before them, typically given a few minutes to a maximum of a couple days (for school assignments). This is mainly due to the nature of children having a very limited attention span, but also due to the nature of the tasks—often these are assignments or chores given by parents, as we found in our research.

11. What happens when things go wrong?

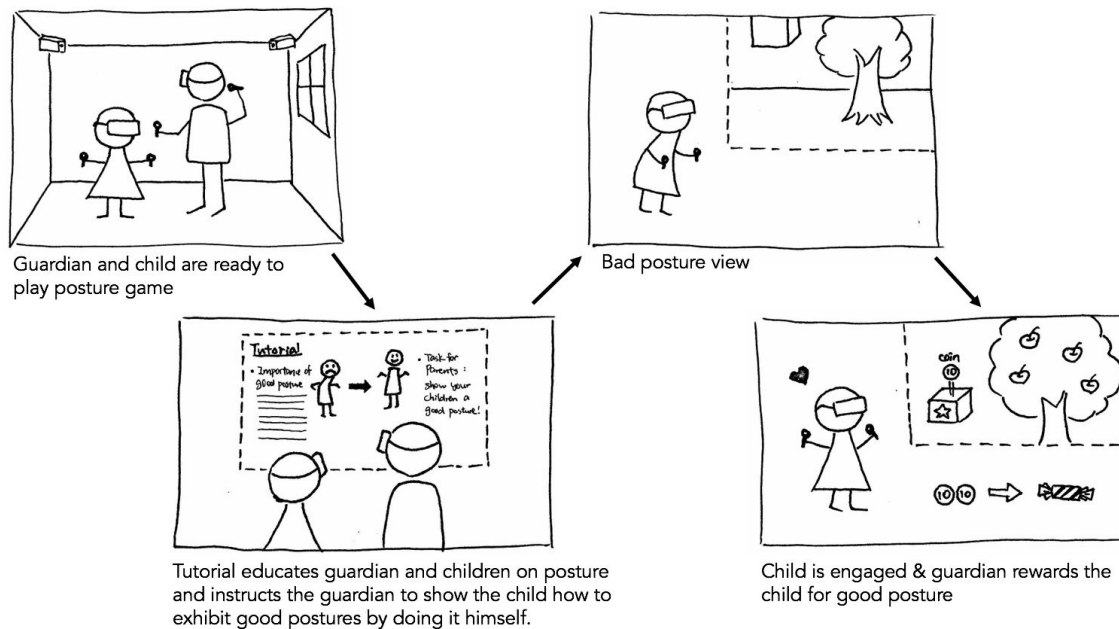
When things go wrong, children will often be reprimanded by an authority figure or punished. Typically, this punishment comes in the form of negative reinforcement, or giving a negative reward (e.g., a spanking), through their parents or direct authority figures. In the worst case, health or mental issues can also arise when things go wrong. For example, children's spiral development can be negatively affected when they do their tasks with improper postures.

Proposed Design Sketches

DESIGN 1: VIRTUAL REALITY GAME

The first design is a virtual reality game for both children and their guardians. By having two cameras to judge height, depth, and position of the user, the game can track user's posture as they play. In-game, the users' visual perspective on an environment and their

level of abilities would change based on their postures, and thus giving them the feeling of being like a giant and empowered when having good postures.



Educate guardians on posture and child development: Parents would see extra informations and video tutorials that would help them identify and correctly address children’s posture problems.

Prompt guardians to reward children for their good posture: Not only would the game itself be a reward for children, but the game would track the “achievements” of the children in game based on the amount of “coins” they get. The system would notify the guardians and would suggest certain rewards for the children based on the child’s accomplishments.

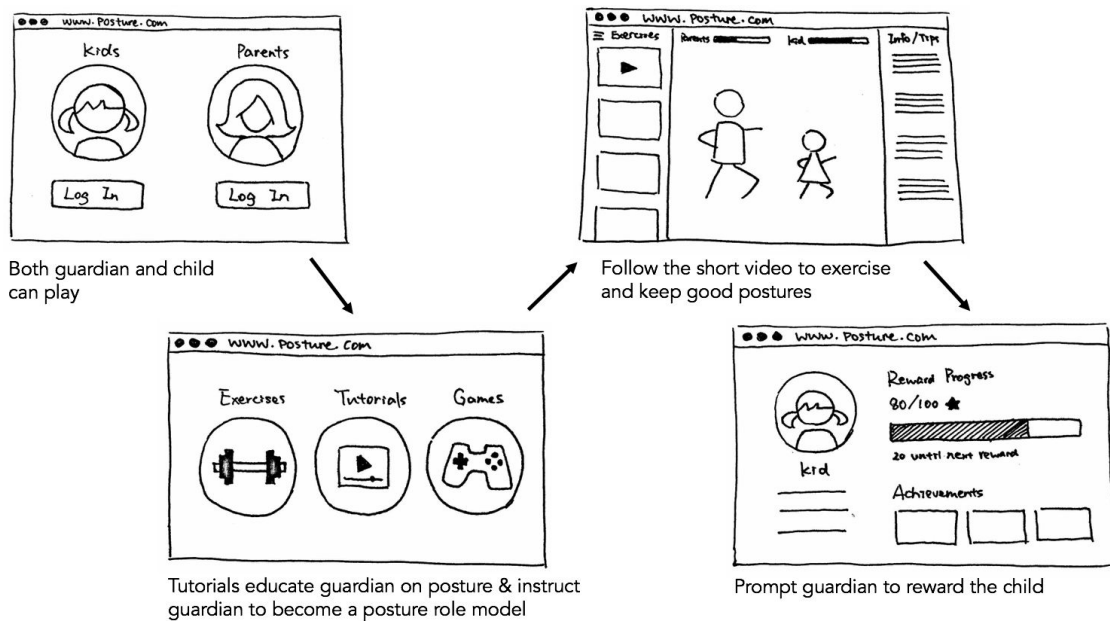
Instruct guardians on how to exhibit better posture to be “posture role models”: This game would be for both guardians and children! The game would give the same promptings to exhibit good postures. Guardians can show their children why and how to exhibit good postures by doing it themselves.

Engage children: The game itself would be built with fun in mind. It would be an educational game, but build around the core idea of allowing children to explore, be creative, achieve and level up, and “go wild” in the world around them.

DESIGN 2: WEB APPLICATION

The second design is a website that would feature various information, videos, activities, and games for both children and adults to explore, together or separate. Adults and

children alike would be educated on the importance of posture, and perform various exercises or activities together. They would learn together, and grow!



Educate guardians on posture and child development: We would have small courses and readings from experts to educate guardians on child development, posture, and the long term effects of both.

Prompt guardians to reward children for their good posture: The web application would track children’s “level” or “achievements” as they go through various modules and activities. The system would notify the guardian and suggest certain rewards for the children based on the child’s accomplishments.

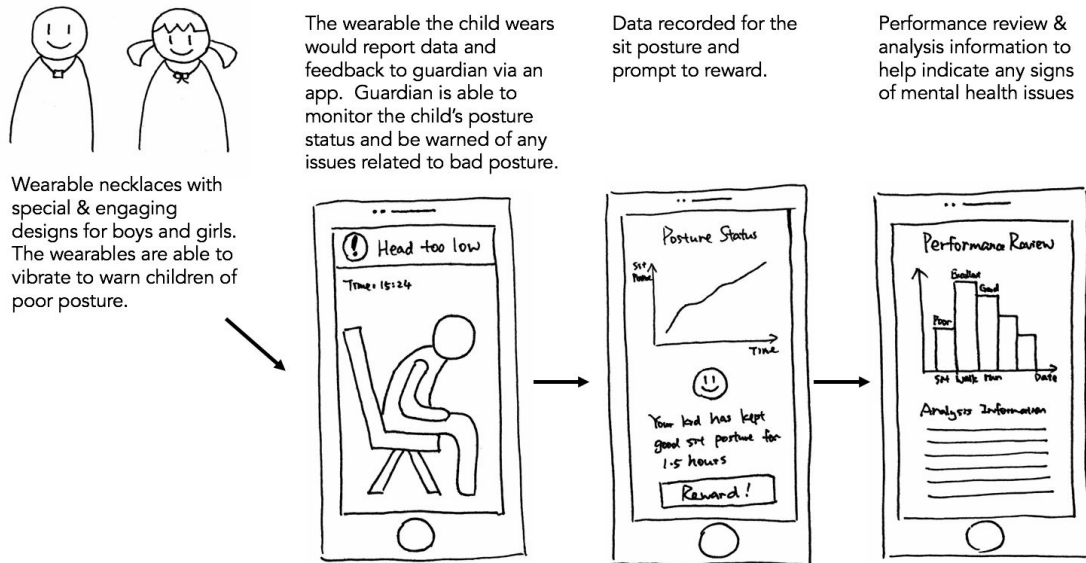
Instruct guardians on how to exhibit better posture to be “posture role models”: The site would instruct guardians on 1) how to exhibit better posture and 2) emphasize the importance of being a “posture role model” for their children by videos, readings and even exercises.

Engage children: The site itself would be built with fun in mind. It would allow children to learn through activities and fun videos to watch, and also to learn alongside their parents.

DESIGN 3: WEARABLE NECKLACE

The third design is a necklace for kids (with separate designs for girls and boys) that would track posture and send feedback to an app. Guardians or parents with access to this app would be able to see the amount of time spent in posture, and the necklace would support all ranges of motion, whether running or walking or sitting. As posture is an indicator of mental health, the app would analyze the data and report any issues or spikes

in poor posture. A portion of the app would be dedicated to allowing guardians to 1) learn more about the importance of posture and 2) diagnose their child's mental health through data analytics.



Educate guardians on posture and child development: We would have small courses and videos that users could play to learn more, and when analyzing usage data, parents would be informed on the importance of posture for healthy mental development.

Monitor child posture and any signs of mental health issues: The wearable would report data and feedback to an app. Users with the app would see a chart with the total amount of time the child wearing it. The app would be able to diagnose the data, and if there is a significant spike in poor posture, would alert the guardian that something may be wrong (depression, excessive electronic time, etc.).

Prompt guardians to reward children for their good posture: The necklace would track the amount of time children held in good posture. The system would notify the guardian and would suggest certain rewards for the children based on the child's performance.

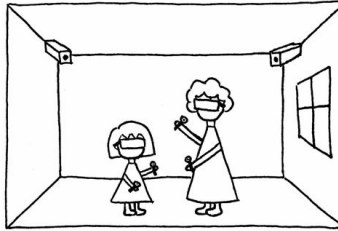
Engage children: The necklace itself would be colorful and pretty for girls, or stylish and rough for boys. These accessories would be comfortable and not impede their daily use, and add more flair to their outfit. Children would love the design and would want to wear them regularly.

Written Scenarios and Storyboards

ENGAGE CHILDREN



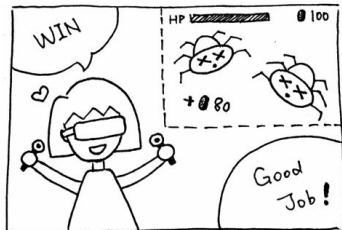
1. Emma doesn't understand why she needs to sit straight up, and she doesn't like being told to sit in the way her mom requires.



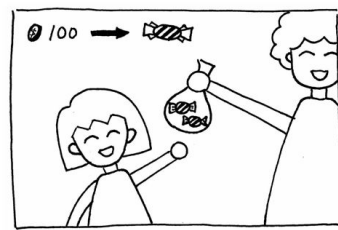
2. Emma's mom brings her a virtual reality game and tries to play the game with her together.



3. Emma can't beat monsters, but she sees her mom kills a monster. She asks her mom for help and her mom tells her to stand up straight so she can be more powerful in the game to kill the monsters.



4. Emma listens to her mom, stands up straight and keeps a good posture. She wins the game and receives 80 gaming coins.



5. Emma trades the gaming coins she earned for her favorite candies.

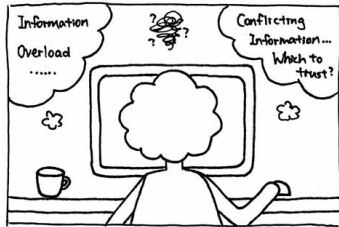


6. Emma learned that good posture is able to help her gain more gaming time and good rewards, so she voluntarily keeps good posture.

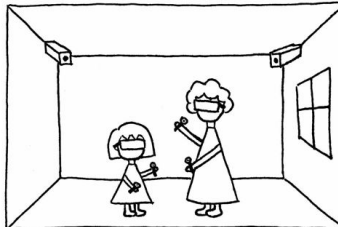
Emma is a third grade elementary school student. Her mom used to repeatedly remind her to keep good posture whenever she is working on her homework or watching TV on the couch. She doesn't like to be told to sit in a way that's not comfortable and doesn't understand why her mom wants her to sit that way (Figure 1). Emma's mom brings home a new VR game RightUp and tells Emma that they can play it together. They sets up the oculus rift that they have, with two camera sensors in the corners of the room (Figure 2). Emma is really excited about the game. When she is running around to discover new places in the game with her mom, she unintentionally triggers a battle with some spider monsters. She finds herself being too weak to defeat the monsters. As her health points rapidly decreasing, she turns to her mom for help. Her mom kills a monster easily with a good posture and reminds Emma that she can also be this powerful when she stands up straight and keeps good posture (Figure 3). When Emma listens to her mom and stands up straight, the RightUp detects Emma's posture through the camera sensors, and then grants Emma stronger attack and more health points. She soon defeats the monsters and is given 80 coins as reward. (Figure 4). She is able to trade the coins she earned from the game for a bag of her favorite candies (Figure 5). After playing the game, Emma changes her mind about posture and is willing to maintain a good posture. She now thinks that

keeping a good posture is cool because it makes her more powerful and gets her more rewards (Figure 6).

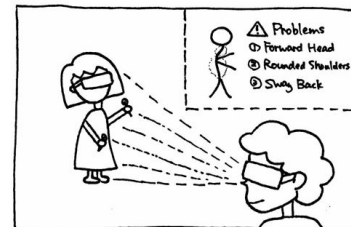
EDUCATE GUARDIANS ON POSTURE AND CHILD DEVELOPMENT



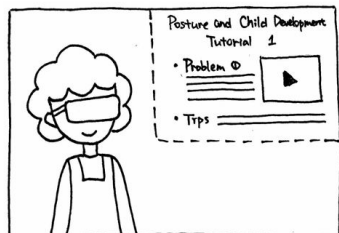
1. Tanya has been consulting the Internet to learn more on spinal development of her daughter Emma but finds many conflicting information and feels unsure which to trust.



2. Tanya's friend recommends her an educative virtual reality game on spinal development, and she plays the game with her daughter together.



3. The game helps Tanya identify her daughter's posture problems while her daughter is playing the game.



4. The game also provides Tanya with interactive tutorials on posture and child development. One of the tips provided by tutorial is that parents should show their children how to exhibit good postures by doing it themselves.



5. Tanya learned effective ways to help her daughter keep good posture.



6. Tanya learned a lot from the game and feels very happy to be able to help her daughter keep good posture.

Tanya is a 28 year old mother. With a fulltime job and a 8-year-old daughter to take care of, she barely has any leisure time. Recently, Tanya has been concerned on the spinal development of her daughter and has been struggling to find credible and reliable information on the Internet (Figure 1). Her friend recommends her RightUp, which is a VR game on spinal development that she and her daughter can play together (Figure 2). During the game, she is able to identify the posture problems that her daughter has based on real-time posture tracking by the camera sensors placed in her room (Figure 3). She can also watch video tutorials and get more information about each problem that her daughter has and learn effective ways to fix the problems (Figure 4). With the knowledge she gets from the game, she is able to provide better advice and be a better role model for her daughter.