HCI Project 5
Cuiling and Grace

Summary

In this project, we developed a website that displays key sleep-related data. The site features information on sleep phases, sleep duration, and sleep quality, which are the aspects of sleep most important to users.

Pick an area

Our focus area is health care.

Pick a paper

We drew inspiration from the paper "Preferences and Effectiveness of Sleep Data Visualizations for Smartwatches and Fitness Bands."
https://programs.sigchi.org/chi/2022/program/content/68780

What we're going to do

The paper aims to understand users' preferences regarding the types of data they wish to be informed about for sleep data, as well as evaluate the effectiveness of various sleep data visualizations.

Firstly, they utilized surveys and visualized the data obtained to examine the types of sleep data individuals collect and utilize, including their favored styles of visualization. Additionally, they conducted an initial in-person pilot study followed by two crowdsourced studies. These studies were designed to investigate how different display characteristics, such as size and orientation, affect individuals' abilities to understand and answer questions about sleep data effectively.

The designers integrate sleep visualizations into fitness trackers, considering Tall orientation charts for wristbands, horizontal bars for social comparison data on Wide form factors, and for weekly overview data. They avoid vertical hypnograms in situations where wearers may need to comprehend sleep stage transitions.

For this project, we aim to develop a web page that allows users to access a broad range of sleep data, including the top three aspects people find most essential: sleep phases, sleep duration, and sleep quality. This design builds upon findings from the research paper that studied user preferences for sleep data visualization in fitness trackers, which are often limited by small display sizes. The paper utilized online surveys to explore which types of sleep data

were preferred by users based on the current capabilities of their devices. We add the sleep quality parameter in addition to the current sleep phase and sleep duration.

In response to these findings, our web design will not only accommodate these preferred data types but will also enhance user experience by offering access to historical sleep data, providing a deeper and more comprehensive view than typically available on fitness trackers. The website will feature detailed nightly patterns, as well as weekly and monthly summaries, enabling users to compare their sleep habits with others and track their progress over time. This approach leverages the research insights to meet user needs for detailed and actionable sleep information, allowing for a more effective and satisfying user experience.

Table 1: Sleep data that respondents would like to see on their tracker. The color-coding represents the different categories, and is a visual encoding of the percentage of answers (the higher the opacity the higher the percentage of responses).

|	Last Night	Weekly Overview	Monthly Overview	Social Comparison	Not Interested
Phases	88 (81%)	41 (38%)	27 (25%)		10 (9%)
Duration	87 (80%)	60 (56%)	40 (37%)	19 (18%)	4 (4%)
Schedule	44 (41%)	53 (49%)	32 (30%)	9 (8%)	30 (28%)
Quality	87 (80%)	57 (53%)	39 (36%)	18 (17%)	9 (8%)
Metadata	88 (81%)	47 (46%)	28 (26%)	15 (14%)	13 (12%)

*Table one is the data we referenced for selecting parameters and contents for our web pages.

Sketching ideas
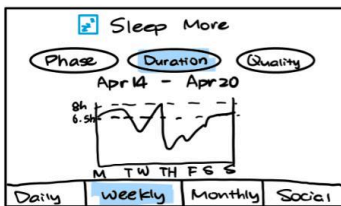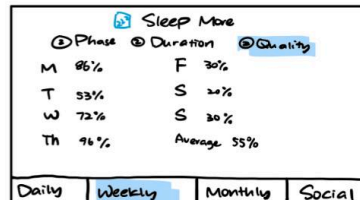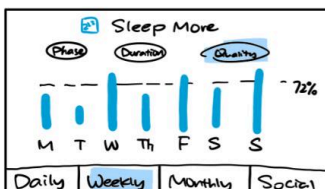
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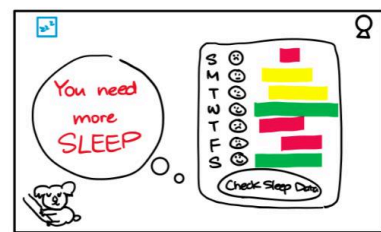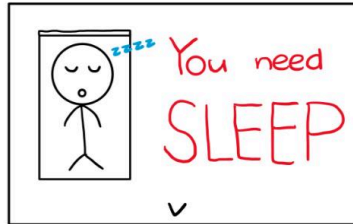
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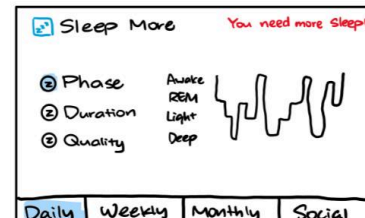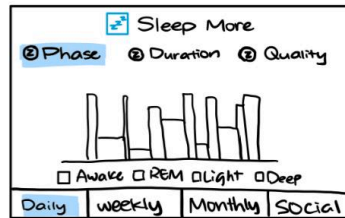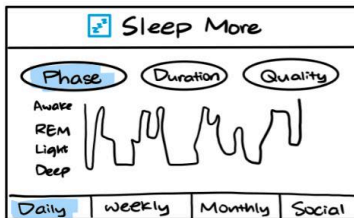
Sleep Duration

Sleep Quality

<u>Home page</u>

We believe that when users first visit our website, they should be greeted with a general overview of their sleep rather than directly diving into detailed data visualization graphs. To provide a snapshot of their sleep health, we plan to feature an overview of their overall sleep quality for the week. We chose weekly data as it strikes a balance between providing recent insights without overwhelming users, unlike daily or monthly data, which may be too granular or too broad for an initial overview. Users curious about more specific or long-term trends can easily navigate to our data visualization page for deeper analysis.

Although survey results indicate a limited interest in sleep schedules, we recognize their significance in understanding sleep health. As many smartwatches track sleep schedules, we plan to utilize this data subtly. Rather than displaying complex graphs, we'll present users with indirect insights about their sleep patterns. For instance, if a user frequently stays up late, we'll offer a gentle reminder on the homepage about the health risks associated with late nights.

To ensure the website is welcoming and intuitive, we'll design the homepage with a warm atmosphere and include a prominently displayed "check sleep data" button in a distinct color. This button will guide users directly to the detailed sleep data visualization page, making it easy for them to find more comprehensive information.

Data visualization pages
We aim to include three key types of data: sleep phase, sleep duration, and sleep quality, each available in daily, weekly, monthly, and social comparison formats. We plan to implement buttons for these categories to simplify navigation and allow users to easily access all data types on the same page. We'll organize the types of data into one group placed at the top of the screen and the time ranges into another group at the bottom of the screen. By default, the screen will display sleep phases with daily data.

This layout enables users to select their desired data type and time range by simply clicking the corresponding buttons. The relevant graphs will then appear in the middle part of the screen. This approach eliminates the need for users to backtrack to a previous page to switch data views, thus reducing the effort required to access different aspects of their sleep data. This streamlined and intuitive interface ensures that users can quickly and effortlessly explore their sleep data in various contexts.

For specific pages, we tried different types of graphs/charts.

1. Sleep Phase

The default view in the sleep phase section displays sketches of daily sleep patterns, showing data from the previous day. Here, users can see at different time intervals whether they are awake, in REM, light, or deep sleep. The sleep phases are differentiated by the color and height of the bars on the graph. We will include annotations next to the graph to help users easily identify what each color represents. Additionally, the width of each bar indicates the duration of each specific sleep phase.

2. Sleep Duration

The default view for the sleep duration section features weekly sketches, displaying data from the current week. The graph is designed to illustrate the total sleep duration for each day of the week, with a focus on allowing users to compare their sleep against the recommended 8 hours. To facilitate this comparison, we include a dashed line at the 8-hour mark on some of the graphs. We believe that using a dashed line is the simplest and most direct method to help users assess whether they are getting sufficient sleep.

3. Sleep Quality

The default display in the sleep quality section in the sketches shows weekly sketches, featuring this week's data. The aim is to inform users about their sleep quality, which is categorized into three levels: good, okay, and bad. Rather than using descriptive labels, we are considering expressing sleep quality in terms of percentages. We plan to calculate the average sleep quality percentage for the week and depict this average with a dashed line on the graph. This allows users to compare their daily sleep quality against their average weekly sleep quality, providing a clear visual representation of fluctuations and trends.

Build a prototype

On the very top of our web pages, we put the logo and name of the website "Sleep More." Nowadays, people are engaging in more activities and consequently getting less sleep than they used to. It's a common warning for everyone to ensure they are getting enough sleep, serving the purpose of the whole design.

On the right side, there is a profile button, which contains user information that they enter when they first sign in, but they are always welcome to update any details.

Homepage:

Our homepage is structured into two main parts. The right part features a vertical bar chart that provides a weekly summary of the user's total sleep time, sleep schedule, and sleep quality. In the settings, users can define their typical sleep and wake times, which are then used as benchmarks on the vertical bar chart to help users see if they are going to bed earlier or later than planned. The total sleep time for each day is displayed on the chart.

Adjacent to the bar chart on the left is a face icon that visually represents sleep quality: a green smiley face indicates good sleep quality, a yellow neutral face signifies okay sleep quality, and a red sad face denotes poor sleep quality. Below the bar chart, there's a button that leads users to the data visualization page for a more in-depth analysis of their sleep patterns.

The left part provides a summary of the user's sleep data. For instance, if the user frequently stays up late, it will display a gentle reminder saying, "You need more sleep." This serves as a considerate warning to encourage better sleep habits. If the user has an overall great sleep quality and sleep schedule, it will display encouragement saying, "Good job! Keep it going!"

A koala is featured in the left corner of the screen to enhance the aesthetic appeal of the design. As koalas are known for their extensive sleeping habits, using this animal symbolizes our wish for users to get more sleep and rest well.
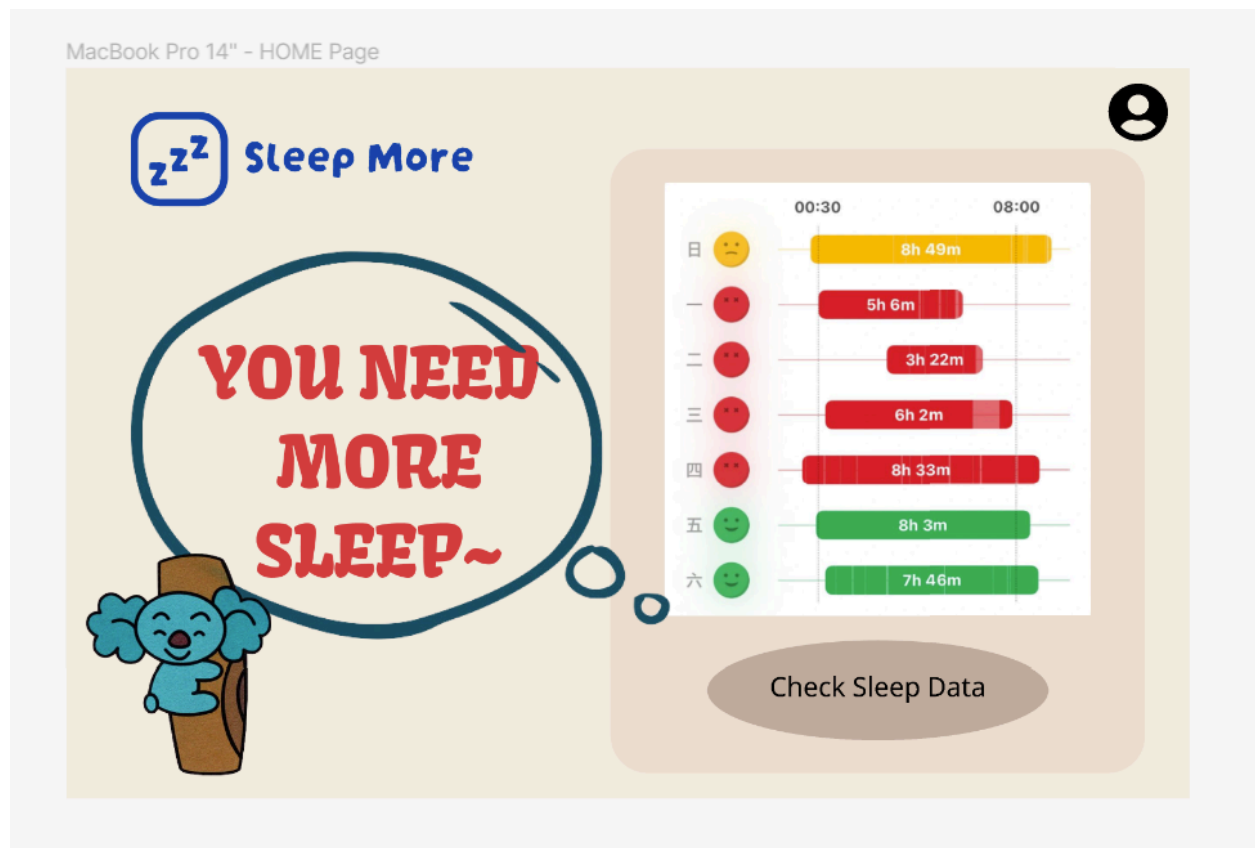

Data Visualization Pages:

On the right side of each page, we use a graph to show the corresponding data. On the left side, we put a summary, which can help users save time in looking at and understanding the whole graph. This hybrid design meets the needs of users seeking both simplified and detailed data views.

For the Sleep Phase and Sleep Duration pages, we adopted the graphical format that the majority of people preferred, as identified in the research paper we are referencing. For the

Sleep Quality pages, we opted for smiley and crying faces to create a charming and animated feel for users.
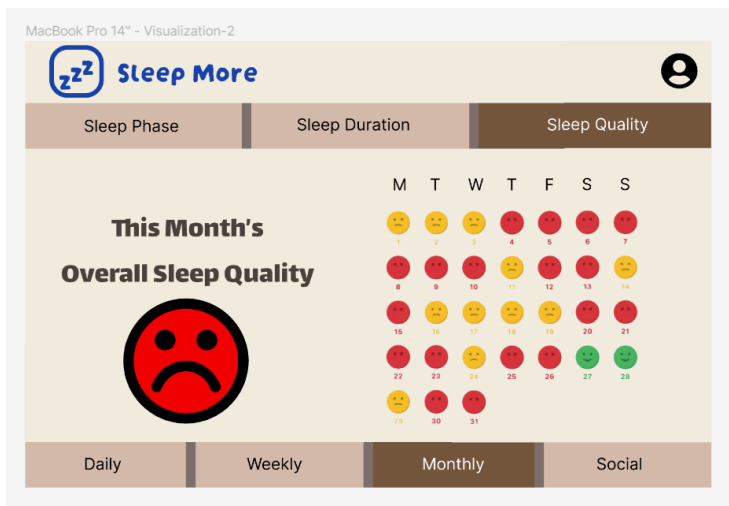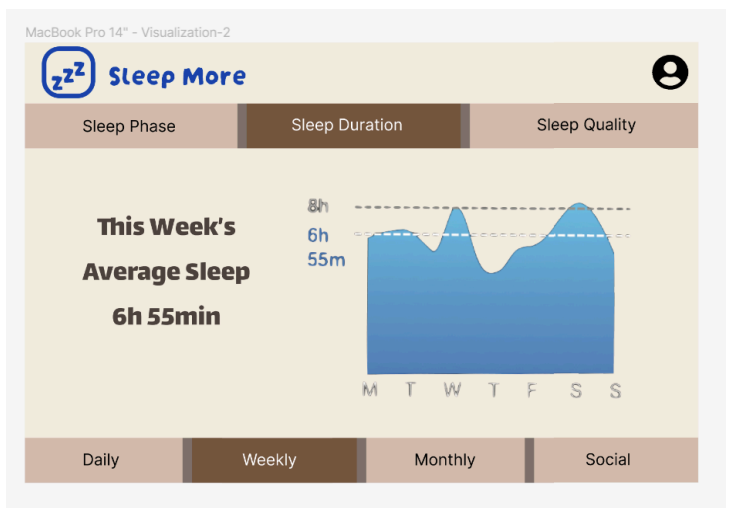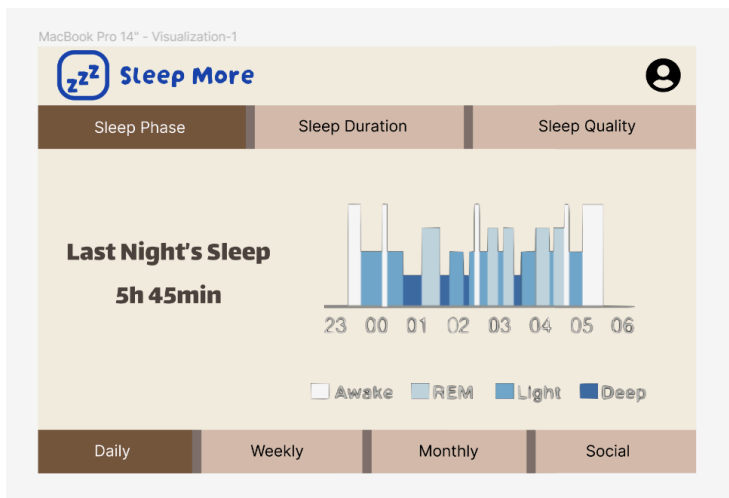
Color:

1. Overall tone:

We choose this color palette as our main colors. For the background color, we use the beige color because compared with normal white color, we think beige can make people feel cozier and warmer. In our design, there are some boxes and buttons, we use brown colors. And when people click on a certain button, we highlight the button by setting them to be even darker.

EDEDE9   D6CCC2   F5EBE0   E3D5CA   D5BDAF
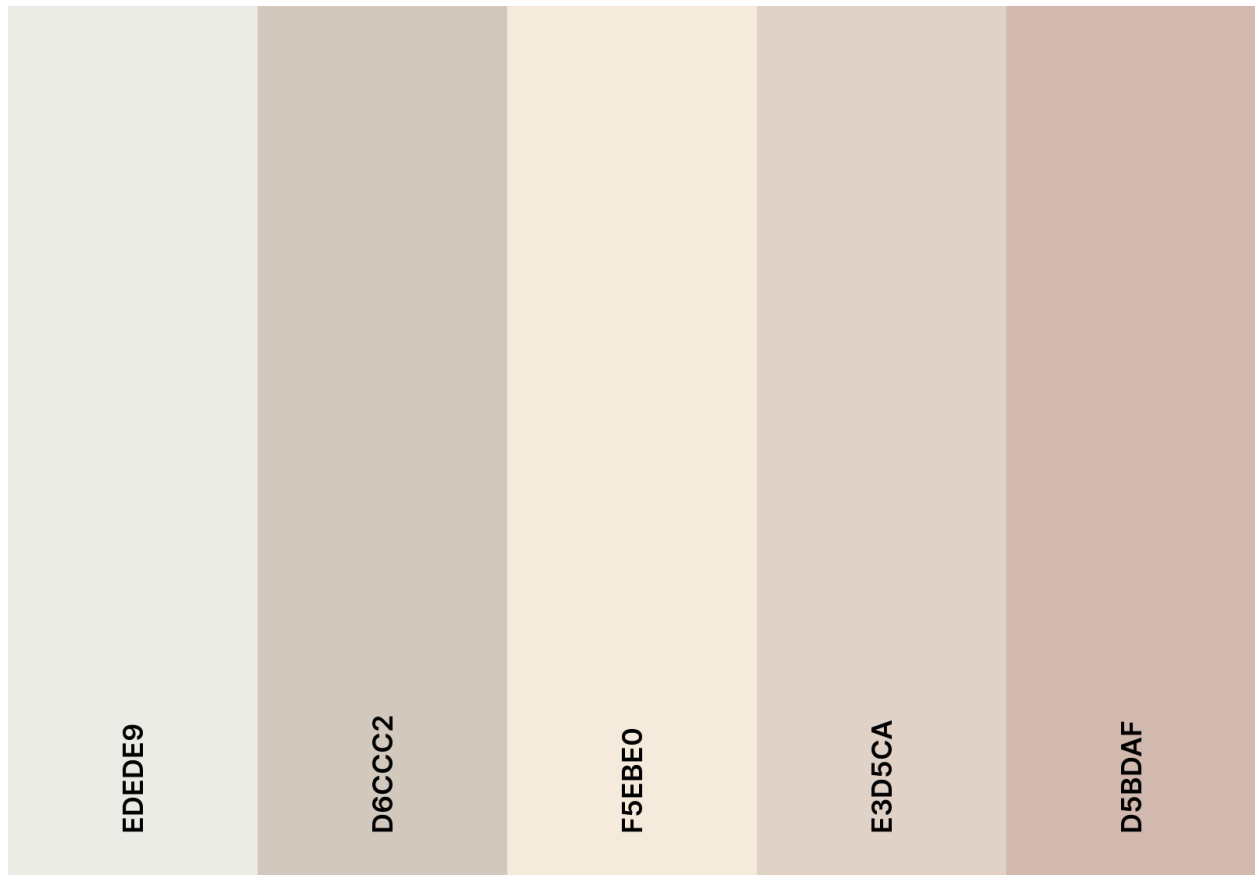
color_palette   COOLOLS

2. Graphs:

Since the paper uses different shades of blue in graphs, the first thing that we considered when we were working on the data visualization part was whether we should use another color as the main color of graphs, or just keep blue as the main color. At first, we thought about using red because it can represent the color of blood, which is sort of related to health. However, red usually means dangerous, if people see the graph based on red color, they may assume their sleep data indicates some big problems, and they become worried about their health. This

situation is not what we want to see, so to avoid this misunderstanding, we decided to keep blue.

Improvement:

One of the things that we want to improve on our web if we have more time is to have a filter in data visualization pages that allows users to select a certain date or period and check sleep data during that time. It would be more convenient and it would be an advantage of the web application.

Another aspect that we can improve is that when users are looking at a graph, and if they put their mouse on a bar for more than one or two seconds, there will be a little box that appears written with the exact value of the bar. For example, if a user is viewing their weekly sleep duration, and their mouse stopped near the area represented for Monday, there is a little pop-up box next to the mouse showing the total time they sleep on Monday.

Conclusion

Our project is focused on enhancing healthcare through a specialized web application that targets sleep monitoring and improvement. Drawing inspiration from the paper "Preferences and Effectiveness of Sleep Data Visualizations for Smartwatches and Fitness Bands," we have tailored our website to cater to user preferences and effective data representation for sleep tracking.