



Sleep Innovations for Preschoolers with Arthritis

**Web-Based Intervention
Usability Testing**

Team Lullaby

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Executive Summary

Overview

The Sleep Innovations for Preschoolers with Arthritis (SIPA) Sleep Study System is a web-based intervention designed to help parents of children with arthritis better manage their child's sleep. Parents in the SIPA Sleep Study will receive a new learning module weekly. The purpose of this study is to develop a comprehensive assessment of the usability of the first SIPA learning module.

Participants

For the usability testing We recruited five participants and one pilot tester who met the following criteria:

- Fluent English-speaker ahd between the ages of 25-50 years old
- The parent of a preschooler who lived with them >50% of the time
- Comfortable using email and the web

Results

Participants were asked to complete four tasks within the SIPA Sleep Study System. 3 of the 4 participants completed the tasks successfully. Post-task ease-of-use scores averaged between 4.25 and 5 on a 5-point scale, where 5 is Very Easy. The post-test SUS score was 80.6.

Findings and Recommendations

FINDINGS	RECOMMENDATION	SEVERITY ¹
1. Unclear Instructions throughout System	Provide context to help participants understand what to expect. Use clear and consistent language.	1
2. Discoverability of Instructions on SIPA Site	Increase visual cues and reduce reliance on active memory by using familiar terms	1
3. Visual Hierarchy on on Instructional Site Impedes Understanding	Remove any non-essential visual elements or written content to help emphasize the visibility of important links.	2
4. Visual Conventions Violated on Instructional Site	Implement web design best practices on the Instructional Site; for example adjust button functionality and link styling.	2
5. Confusing Navigation Flow	Provide participants with a clear mental model of navigation flow, outlining the flow using familiar terms and then use the terms consistently.	3

Table 1: Summary of Findings

¹Dumas and Redish, 1999

Level 1: Prevents Task Completion

Level 2: Creates significant delay and frustration

Level 3: Problems have a minor effect on usability

Level 4: Subtle and possible enhancements/suggestions

Study Overview

The Sleep Innovations for Preschoolers with Arthritis (SIPA) Sleep Study System is a web-based intervention designed to help parents of children with arthritis better manage their child's sleep.

The purpose of this study is to develop a comprehensive assessment of the usability of the first SIPA learning module. The intervention design calls for weekly learning modules with which the parents will interact. This first module introduces parents to the SIPA Sleep Study System and the basics of Healthy Sleep. To successfully complete the first module, the parent must navigate back-and-forth between email and two websites. We refer to the two websites as: the Instructional Site (Redcap); and the SIPA Learning Module.

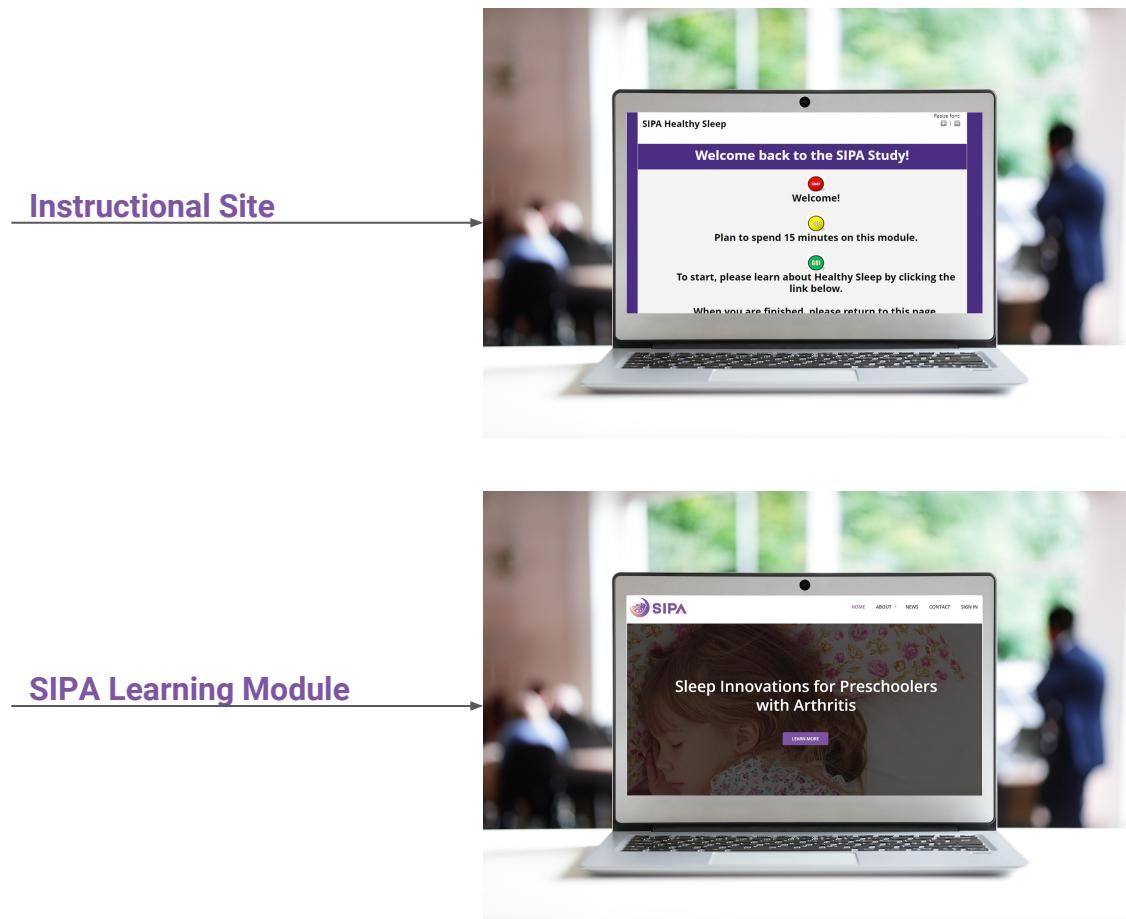


Figure 1: Instructional Site and SIPA Learning Module

Study Objective

The objective of this study is to evaluate the overall usability of the SIPA Sleep Study System. This study does not consider whether participants understand the content or achieve learning goals. Instead, this study's focus is on these four areas: Comprehension of the System, Obstacles to Task Completion, Ease of Navigation, and User Experience.

Goals

The goals of this study are to:

1. Assess the overall usability of each of the three platforms that the user must navigate in the learning module process (email, the Instructional Site, and the SIPA Learning Module)
2. Assess the overall usability of navigating between the three platforms
3. Assess task comprehension of the first learning module
4. Determine the level of ease in completing the core tasks required by each platform
5. Identify obstacles to completing key tasks

Research Questions

We consider the following research questions across each of our four focus areas:

Comprehension of the System

- How clearly do participants understand the steps they need to take to complete their first learning module in the SIPA study?

Obstacles to Task Completion

- What obstacles do participants encounter when:
 - Navigating from the email they receive to the Instructional site
 - Navigating from the Redcap site to the learning module on the SIPA website
 - Navigating from the SIPA website back to the Instructional site
 - Submitting their "completion" on the Instructional site?

Ease of Navigation

- How easily and successfully do participants navigate through their first learning module in the SIPA study?

User Experience

- How do participants feel about the overall experience of going through the learning module?
- What do participants like about the experience?
- What did participants find frustrating or unpleasant about the experience?
- What would participants have appreciated having as part of their experience?

System Navigation Flow

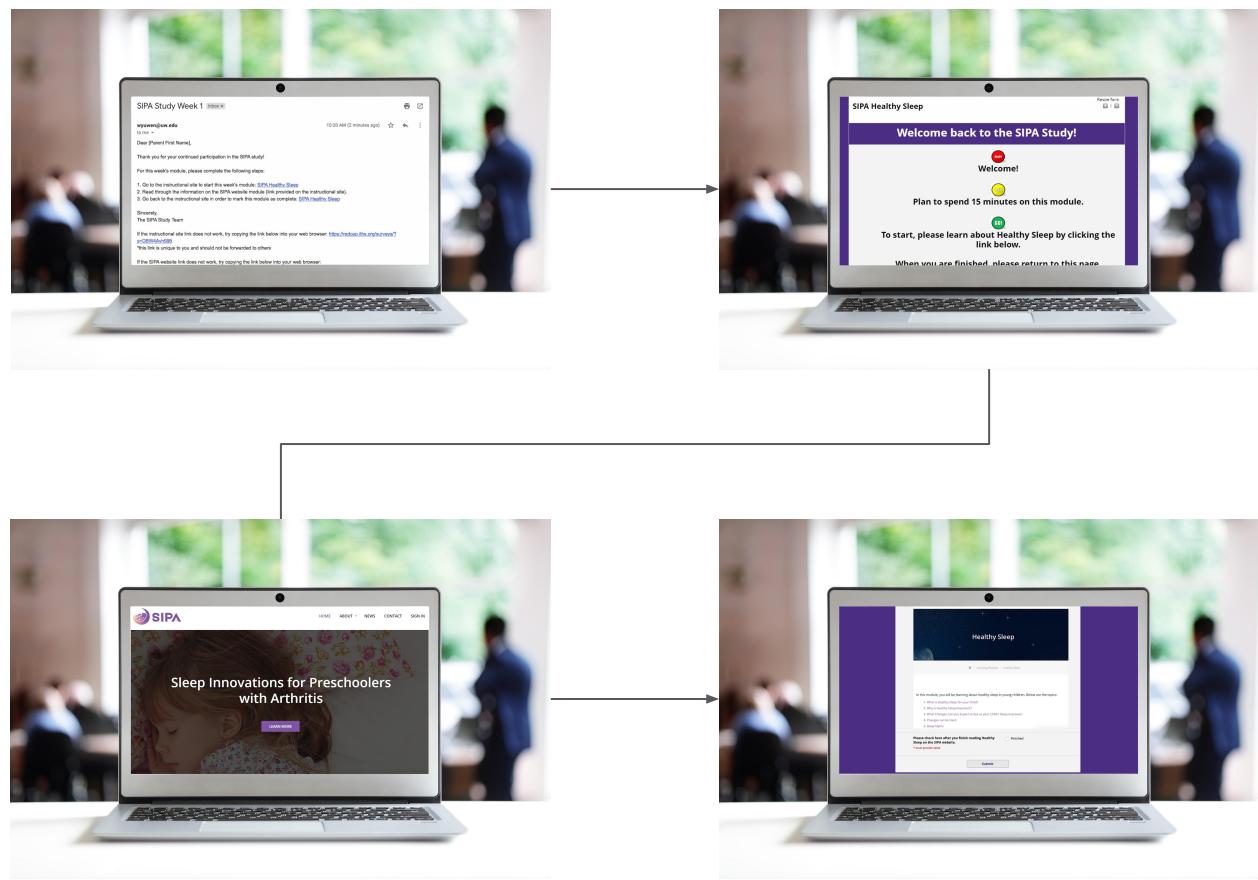


Figure 2: Overview of the navigation flow

Method

We tested five participants in five 45-minute sessions across the span of one day. Testing took place at the Mobile Usability Lab in the UW Health Sciences Building. We used the Think-Aloud Protocol along with standardized questions to gather specific qualitative and quantitative data.

After signing a consent form and completing a pre-test questionnaire, the participant was given a scenario and four tasks to complete. After each task, the participant answered two likert-scale questions to measure ease-of-use. The moderator then followed up with qualitative post-task questions to understand more about the user experience. The post-task questions probed what the user liked, disliked, and any points of confusion. After completing all four tasks, participants completed a System Usability Scale (SUS) and post-test questions.

Testing Logistics

For the purposes of the initial research study, we used a laptop equipped with a camera at the Mobile Usability Lab in the UW Health Sciences Building. Participants were equipped with a laptop computer (PC) that had a Trackpad and mouse, and was equipped with a video camera and screen capture, enabling us to record voice and facial expressions simultaneous to observing what the participant was viewing and clicking on the screen. During each session there was one moderator and one notetaker in the room with the participant. The session was streamed into a nearby observation room where remaining researchers and the client team captured additional concepts on sticky notes.

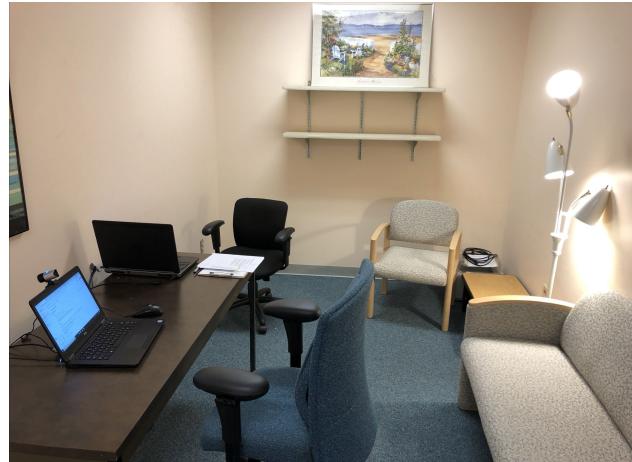


Figure 3: Study Room and Mobile Usability Lab Setup

After completing all sessions we debriefed by arranging our sticky notes into an affinity diagram. A full testing schedule can be found in Appendix C and a copy of our participant scenario and tasks can be found in Appendix A.

Data Collection Process

Each participant was prompted to complete each of following four tasks.

After each task, the participant responded to two likert-scale questions:

1. How easy or difficult was it to identify the next step to take?
2. How easy or difficult was it to complete the next step?

The questions used a 5-point scale, where 1 was 'Very Difficult' and 5 was 'Very Easy'. The moderator then followed up with additional probing questions where appropriate.

At the end of each task, the moderator asked the following questions:

1. Tell me about the ratings that you gave. What made you select these ratings?
2. Was there anything in particular that you liked about this task?
3. Was there anything in particular that you disliked about this task?
4. Was there anything that was confusing to you about this task?

After all four tasks were completed, the participants completed the SUS and answered the following qualitative questions:

1. How easy or difficult was it to navigate through the SIPA sleep study system?
2. What was the most difficult part of navigating through the SIPA sleep study system?
3. What features or attributes should we add to make it VERY easy for you to use?
4. What did you like the most about the SIPA sleep study system?
5. If you were to complete the next lesson in the SIPA sleep study, how confident or unconfident do you feel about navigating the system?
 - a. (If they answer negatively) What would help you feel more confident?

While the participant was completing the tasks and answering the moderator's questions, the notetaker captured notes and observations about the participant's words and actions. These notes can be found in Appendix O.

#	TASK	STARTING STATE	SUCCESS
1	Read Welcome email and move on to the next step.	Open email browser	User comprehends email and launches Redcap website via provided link
2	Read through Instructional Website (Redcap) and proceed to next step	Instructional Website (Redcap)	User opens SIPA learning module website
3	Read SIPA learning module and proceed to next step	SIPA Learning Module Website	User navigates back to Redcap site
4	Complete survey on Instructional Website (Redcap)	Instructional Website (Redcap)	User checks the box indicating that they read the SIPA learning module

Table 2: List of tasks

Participants

Recruitment

We recruited five participants who met the following criteria:

- 1) Between the ages of 25-50 years old
- 2) The parent of a preschooler who lived with them >50% of the time
- 3) Comfortable using email and the web
- 4) Fluent English-speaker

We recruited our participants from a local daycare (see recruitment flyer in Appendix B). Before the study, each participant was given a Pre-Test Questionnaire and their eligibility was confirmed (see Appendix E for Pre-Test Questionnaire). All participants earned a \$50 gift card at the end of the usability test.

Participant Demographics

	AGE	GENDER	EDUCATION	CHILD'S AGE
P1	40	Female	Bachelor's	4
P2	41	Female	Bachelor's	3
P4	38	Male	Master's	2
P5	31	Female	Master's	3

Table 3: Participant's Demographics

Findings and Recommendations: Positive Findings

Our research found three areas where the SIPA Sleep Study System performed well.

Email

- Users liked how easy it is to access email
- It was easy to click a link to launch the module

Visual Design of the SIPA Learning Website

- The design of the SIPA website got universal acclaim (4/4) for being modern, warm, and fun to look at

Quantitative Data

- 3 out of 4 participants completed all the tasks with ease
- Post-task ease-of-use scores averaged between 4.25 and 5 on a 5-point scale, where 5 is Very Easy.
- The post-test SUS score was 80.6.

Recommendations

1. Future iterations of the SIPA Sleep Study System should continue to include an email component to kick off each weekly learning module.
2. The warmth and fun sentiment of the SIPA Learning site brand should be carried over to the other platforms within the System.

Usability Issues Summary

We identified five key issues that should be addressed to enhance usability of this system, and ranked them by severity using the Dumas and Redish¹ scale, where 1 is the most severe and 4 is the least severe. We describe each of these five issues, and related examples, and propose recommendations for each.

#	ISSUE	DETAIL	FREQUENCY	SEVERITY ¹	RECOMMENDATION
1	Unclear instructions lead to confusion while navigating system	The email and subsequent pages do not provide context to help the participant understand steps.	4/4	1	<ul style="list-style-type: none">1. Provide more context2. Use differentiated titles across websites & email3. Make important information easy to see
2	Instructions to return to instructional site not easily discoverable	Instruction is hidden at bottom of page and participants must rely on active memory to remember what the 'Instructional Site' is.	3/4	1	<ul style="list-style-type: none">1. Increase visual cues2. Reduce reliance on active memory by using familiar terms
3	Visual hierarchy on Instructional Site impedes understanding	The participant must scroll to find the link, and it's not immediately obvious what to do on the site.	3/4	2	<ul style="list-style-type: none">1. Increase visibility of link in relation to instructions2. Make full set of instructions viewable on one page without scrolling
4	Visual conventions violated on Instructional Site	Visual/UX conventions are violated, such as images that look like buttons and hyperlinks but don't function as such.	4/4	2	<ul style="list-style-type: none">1. Remove buttons and screenshot2. Leverage visual conventions and web design best practices to enhance understanding
5	Navigation flow is confusing	Participants felt that navigation should be linear.	4/4	3	<ul style="list-style-type: none">1. Use email as source of truth2. Provide participants with a clear mental model of navigation flow3. Adopt a linear navigation flow

¹Dumas and Redish, 1999

Level 1: Prevents Task Completion

Level 2: Creates significant delay and frustration

Level 3: Problems have a minor effect on usability

Level 4: Subtle and possible enhancements/suggestions

Table 4: Usability Issues Summary

1. Unclear Instructions Lead to Confusion while Navigating System

Platform: Email, Instructional Site

Severity: 1

Frequency: 4/4

Issue Overview

All four participants were confused by the written instructions throughout the SIPA Sleep Learning System. One user was unable to complete the module due to this issue.

Email

Within the email, participants were confused by the lack of context provided in the email. Participants made a quick assumption that their first step should be to click on the first link in the enumerated list of 3 steps, which was the correct thing to do. However, in the proceeding steps, participants expressed uncertainty about being in the right place, and about understanding the system overall.

"I clicked on [the first link] and it opened. Looking at it now, though, I'm not actually sure I'm in the right spot. ... The link doesn't take you all the way to where you need to go. I intuitively expect this link to open the module [instead of the Instructional Site]."

- P5

[After reading through the SIPA website and trying to identify next step, participant returns to email and reads through the steps again]

"All of this content [in the email] about what to do next should be placed within [the SIPA site], because after reading I expect to see the actionable things I should do next."

- P3

Participants noticed the instructions below the signature line, but weren't sure whether the instructions mattered or if they should focus on them. The length of the instructions caused one participant to express anxiety.

"A lot of alternative options if it fails, which makes me think that it doesn't work all the time. I think it's nice to have them but it seems like an awful lot of alternative options."

- P1

"I stopped reading once my eyes hit the 'Sincerely'."

- P2

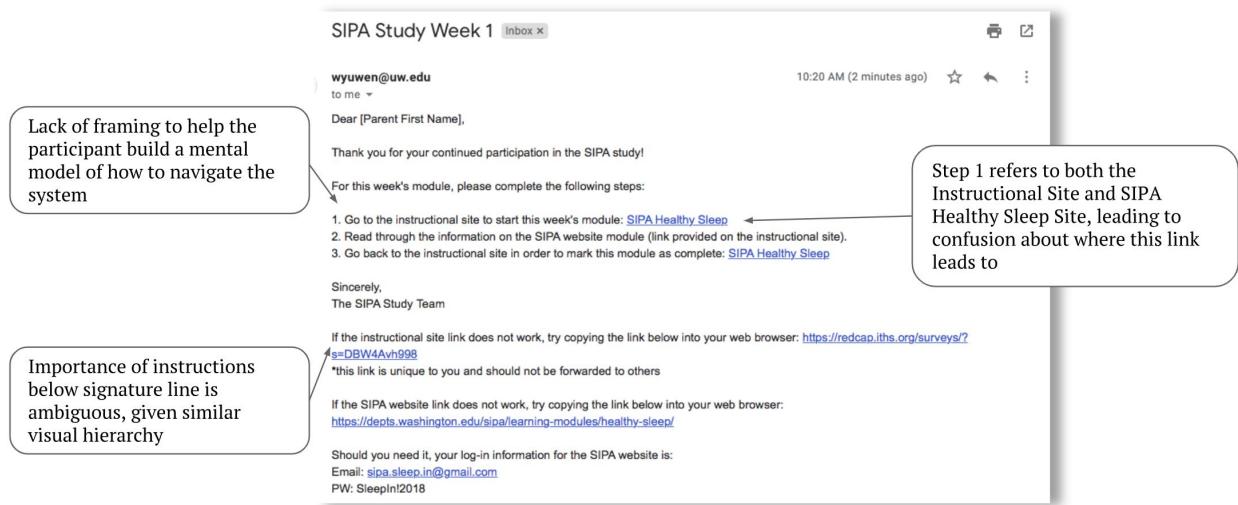


Figure 4: Email with Annotations

Instructional Site (Redcap)

On the Instructional Site, participants were thrown off by the lack of clear, concise instructions. Participants expected new or additional information upon returning to the site for a second time, and had to read carefully to find the survey instructions. Finally, the survey instructions didn't ask for the participant to click 'Submit' after checking 'Finished', causing one participant to fail the task by not understanding how to finish the module.

[First time on Redcap, Before SIPA Learning Module]

"So then it tells me to go to the link below but then there's quite a lot more information on the page below the link ... so am I supposed to read through the whole page first before clicking on the link?"

- P1

[After Returning to Redcap the 2nd time]

"So there isn't anything other than what I already read so I'm assuming I need to scroll down further. And then it's a little confusing because the first thing I see it say is 'You will be learning' and I believe I should have already learned about this stuff based on the flow."

- P1

[This participant failed the task and overlooked the instructions to submit the survey]

"I've already read everything on this page. So now I would expect something to download or an application I could download to start practicing the module."

- P4

The screenshot shows two pages of the SIPA Healthy Sleep study. The top page is titled 'Welcome back to the SIPA Study!' and contains instructions for the participant. The bottom page is a module titled 'Healthy Sleep' with a list of topics and a submission section.

- No information about how to navigate this page, leaving participants to wonder if the bottom of the page matters**
- Participants were confused when they returned to this page and saw the same content as before**
- Lack of context about what the instruction is referring to. Website names are also very similar.**
- One participant thought this was an instruction**
- Instructions do not tell participant to click 'Submit'**

Figure 5: Instructional site with annotations

Recommendations

- 1. Instructions should be consistent throughout the system, using consistent wording for page names and links.**
- 2. Providing context through an overview of the system within the email or on the first website that participants interact with may help users build a mental model that will help them understand instructions in context.**
- 3. Important information should be visually distinctive and easy to read.**

2. Instructions to Return to Instructional Site Not Easily Discoverable

Platform: SIPA Website

Severity: 1

Frequency: 3/4

Issue Overview

One of the four participants, P4, failed at successfully navigating from the SIPA website to the “next step” of returning to the Instructional/Redcap site. 3 out of 4 participants were able to successfully navigate back to the Instructional site (and rated the task as either easy or very easy)

Even after multiple scans through the “Healthy Sleep” page of the SIPA website, this participant did not discover the instructions at the bottom of the site directing them to return to the instructional site. This participant also did not recall the previous instructions directing them to return to the Instructional Site once they had finished reading the learning module.

“After reading, it wasn’t clear what I should do next; would like to see it telling me what to do next.”

-P4

Two other participants, P1 and P2, were able to successfully navigate from the SIPA website back to the Instructional site, but both provided the feedback that it had been difficult to notice the instructions to do so at first.

“The instruction could have been clearer or more intuitive.”

-P1

“I would bold it or make it a different color or do something to make this [instruction] stand out.”

- P2

Recommendations

1. Consider Increasing the visual cues to improve discoverability of the text on the SIPA website that instructs the user to return to the instructional site.
2. Clarify wording, relate visual cues and create consistency across the websites, to reduce reliance on memory.

Sleep Myth 2: Children Grow Out of Their Sleep Problems

Down the road

Just as children don't grow out of using diapers without being potty trained, children don't grow out of their sleep problems without their parents teaching them how to fall asleep and stay asleep all night long. When childhood sleeping problems go unsolved, they can turn into long-term sleeping problems in later childhood, adolescence, and adulthood. Fortunately, fixing sleep problems at this age is much easier than trying to fix them later on in life.

Your role in your child's sleep

Children need their parent's help to learn healthy sleep habits. Teaching your child how to sleep better doesn't necessarily mean making huge changes. Small changes can go a long way in improving your child's sleep. By taking an active role in your child's sleep, you can prevent these sleeping problems from turning into life-long problems.

After reviewing this module, please return to the instructional site to complete this week's activities.

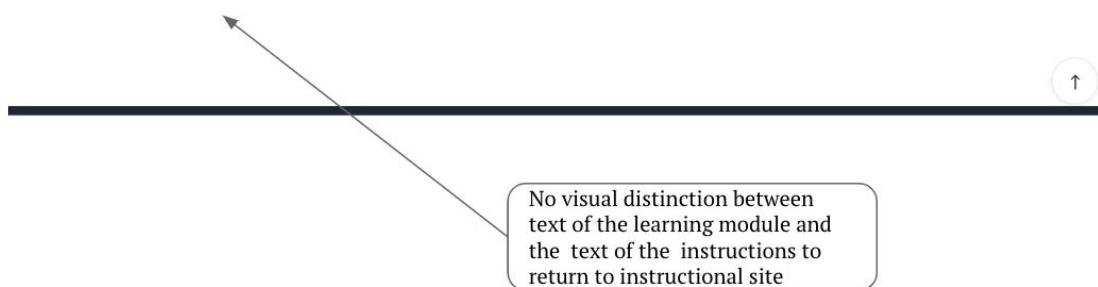


Figure 6: SIPA site with annotations

3. Visual Hierarchy on Instructional Site Impedes Understanding

Platform: Instructional Site

Severity: 2

Frequency: 3/4

Issue Overview

It was difficult for most participants to identify the correct next steps when moving from the instructional web site to the SIPA web site due to a lack of a clear hierarchy of content elements on the page.

3/4 participants were confused about identifying which information on the page was the most important and necessary for them to get to the next step.

Reasons for this confusion were identified as being due to:

1. The small size of the link relative to the instructions being given
2. The non-essential information being given prominent placement on the site (i.e. the welcome and the amount of time that they will be spending on the module)
3. The distraction of the visuals (colorful red/yellow/green buttons, the screenshot) away from the link

[Response to the question “Once I was on the Instructional Website, identifying the next step to take was...”]

“Rate 3 neutral. To me the link is just a little bit like it's something that's less important. I think the button should be more prominent and call attention for them to click on it. Since you lose a lot of bold size there at the top, compared to the link it makes it feel like that's more important. The link is a little visually weak, I prefer something that's more strong. I think the content is okay, but the visual needs improvement.”

-P4

“It would be nice if the link were in a different color. ...It didn't really stand out as a link.”

-P1

Participants also noted being confused by the need to scroll down to find the link to proceed to the next step.

"Maybe it's just this computer but you can't even see the link in the browser without scrolling down. Maybe a button at the top that says 'Start' would be just a quick way [to proceed] instead of scrolling down [to find the link]."

- P2

"Because the page doesn't display the link, It's not immediately obvious that you have to click again. It might be easier if the link were up higher. ... It's not obvious that you're not all the way there yet."

- P5

The layout of the Instructional (Redcap) site also led to difficulty understanding that additional instructions were included at the bottom of the site as well as at the top. 3/4 participants said they were unlikely to notice that at the bottom of the page was included additional instructions on another step that would need to be taken.

Reasons for this difficulty included:

1. **The amount of scrolling necessary to see all of the content contained on the instructional site**
2. **The small size of the directions at the bottom relative to the visuals and other text in the areas above it**

"I felt like the fact that you went to the page and the same exact instructions is odd. I would have preferred that all that information had been presented on the ready set go before I went into the module instead of telling me after I had completed it"

-P1

"I think that if the information below the link was relevant and important ... then I would suggest putting it before the link so that people's eyes pass over it."

-P1

"I think the SIPA website is well designed and elegant, and at some point I would have forgotten to go to the survey because it's more attractive on the SIPA site. We should emphasize at some point that this is the survey and that they need to go back and complete it."

-P4

Recommendations

1. Increase the visibility of the link in relation to the instructions of the site.
2. Have the link to the SIPA website immediately follow the instructions relating to going to the SIPA website.
3. Make the full set of instructions included on the site viewable on the page, without any scrolling needed.
4. Remove any non-essential information or visuals from the site.

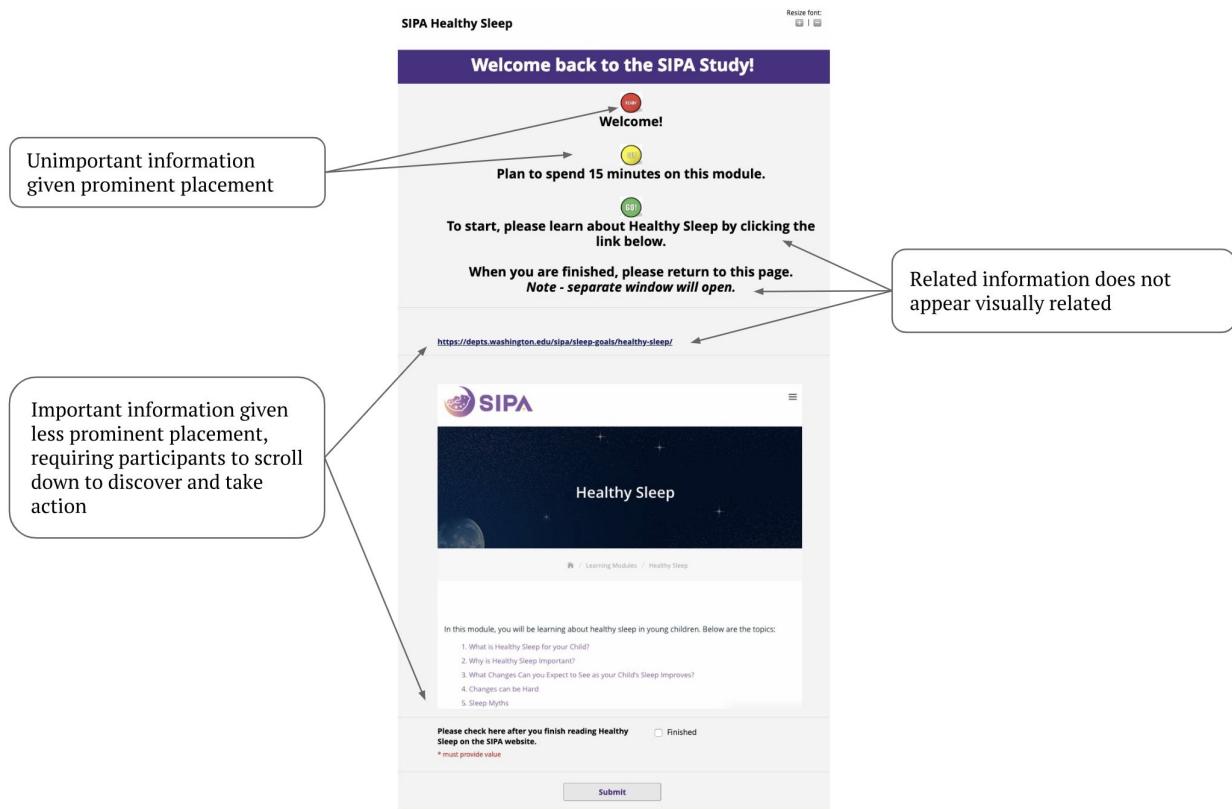


Figure 7: Instructional site with annotations

4. Visual Conventions Violated on Instructional Site

Platform: Instructional Site

Severity: 2

Frequency: 4/4

Issue Overview

All four participants were confused by the visual elements on the Instructional Website. The participants mentioned the “Ready”, “Set”, “Go” images looked like clickable buttons and distracted them from the link they needed to click in order to complete the task.

“I probably would have clicked “Go” without reading”

-P2

“Instead of using the stop sign maybe use 1,2,3. That was confusing because it made me think they were buttons.”

-P2

“Not loving the ready set go buttons. They’re confusing more than helpful. And not aesthetically pleasing.”

-P5

Participants also mentioned the screenshot of the SIPA Site looked like a functional element as well as the hamburger menu. Another source of confusion was the font resize tool on top of the page, since it only works for the header.

“Usually the hamburger menu opens something, but the embedded image is not functional.”

-P2

“I couldn’t at first understand that it was a screenshot, thought that it was something I might need to click through, need to click on the hamburger icon.”

-P4

Another source of confusion was the name on the browser tab not matching the webpage. One participant mentioned the navigation would be easier if they could be reminded which page was the Instructional Site by having the name on the tab.

"Naming the tabs with the same name so if you were visually scanning the screen that would be more of an assist."

-P1

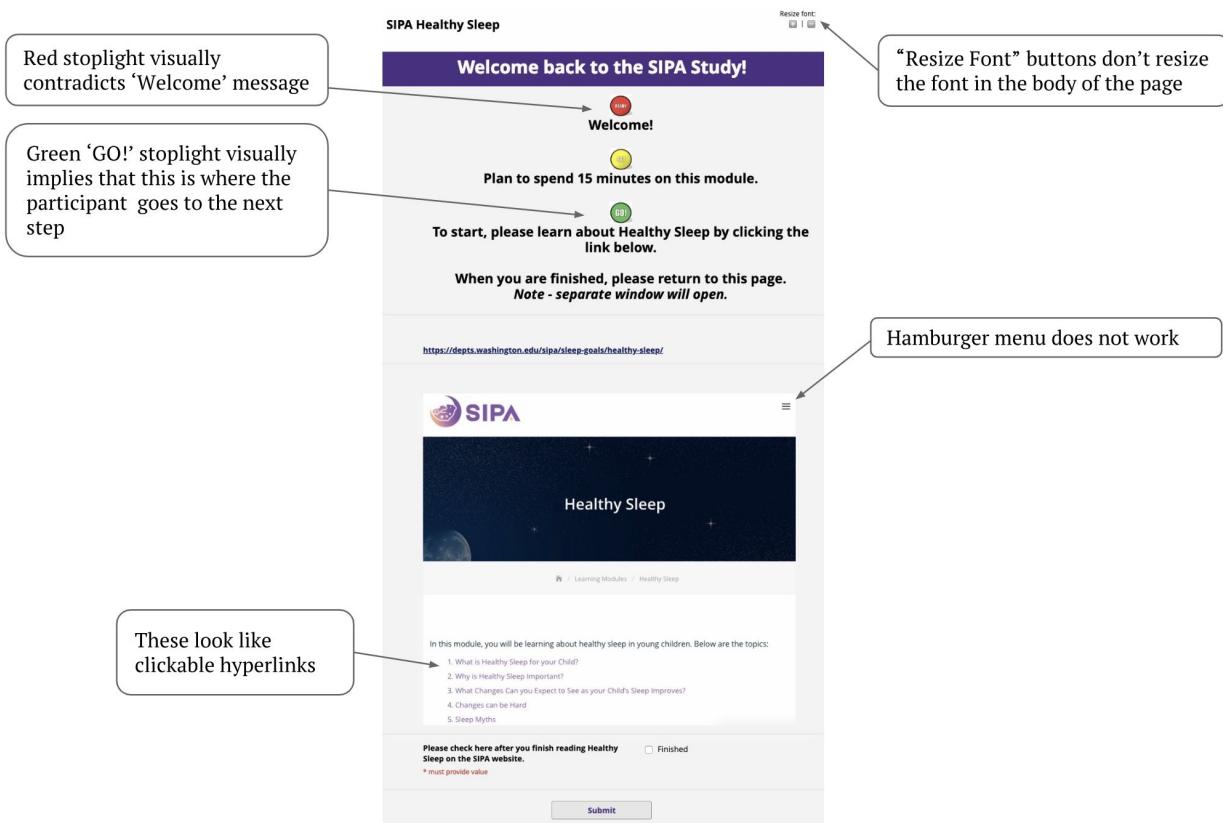


Figure 8: Instructional site with annotations

Recommendations

1. Remove the images that look like clickable buttons or switch them for elements that don't have intrinsic expected behaviors.
2. Since the SIPA Site screenshot was confusing to the user, reduce its size to a clickable thumbnail that links to the actual website or remove it entirely.
3. The font resizer working for either the full site or be removed.
4. Implement web design best practices, such as a "Progress Tracker Design."

5. Navigation Flow is Confusing

Platform: All three platforms

Severity: 3

Frequency: 4/4

Issue Overview

All four participants found the navigation flow confusing. Several participants mentioned feeling uncertain and confused while relying on their memories to navigate from the SIPA Site back to the Instructional Site.

"I feel like it relied on me remembering the name that was given to the page before it. ...Had I read this quickly, I would have expected there to be something to click to take me back to the last page instead of me having to go 'oh what was the name of that other thing?'"

-P1

"It just seems weird that I have to go back to click and submit. I'm not sure why it can't just have a 'click here' or a link that goes straight there."

-P2

"Difficulty happened when I first came to the instructional site because it took me some effort to understand how to get to SIPA website and how to get back."

-P4

Recommendations

1. Leverage the initial email as primary navigation key and source of instructions,
2. Provide participants with a clear mental model of the navigation flow, outlining it with familiar terms (e.g. Step 1: link, Step 2: link, etc).
3. Use key terms and page titles consistently throughout the system.
4. Adopt a linear navigation flow across platforms to avoid errors.

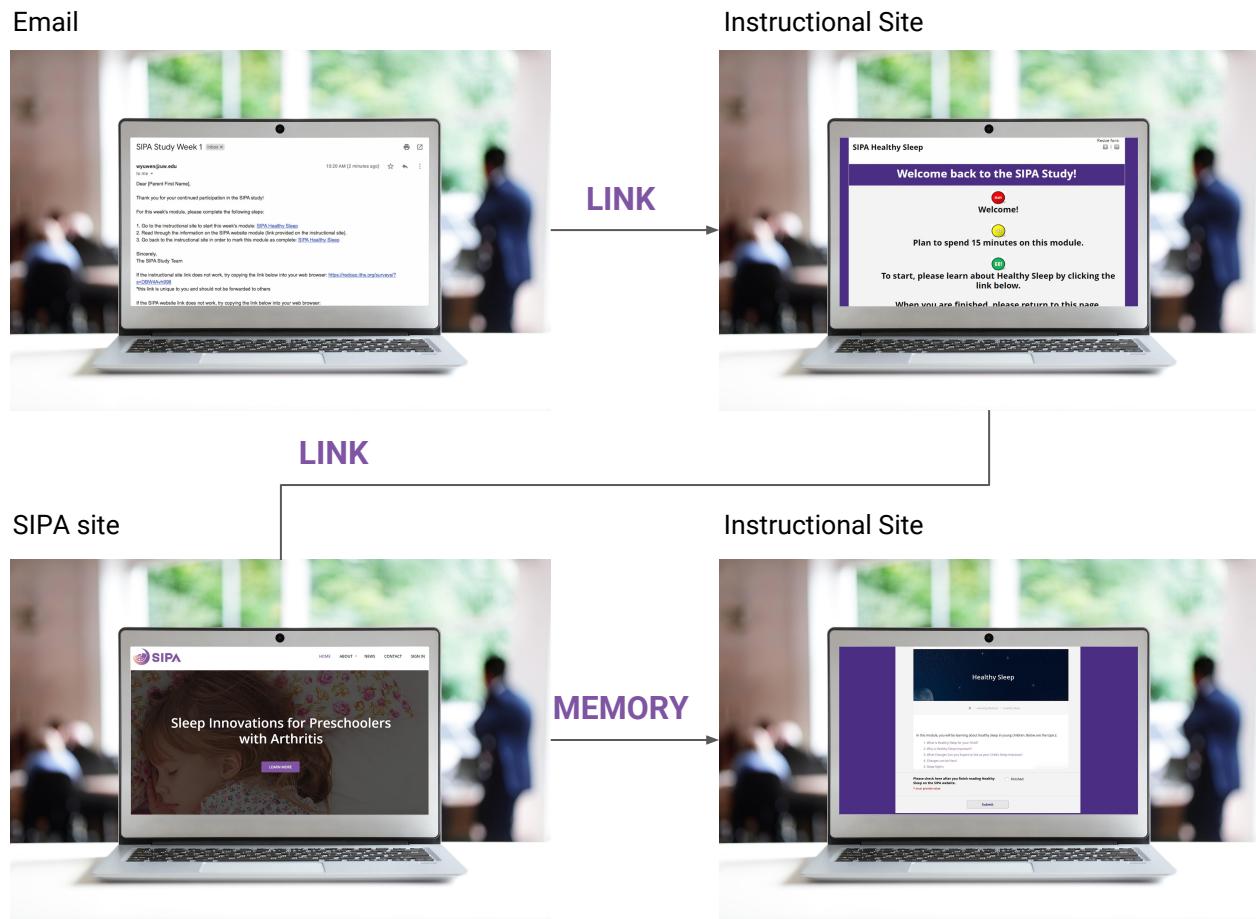


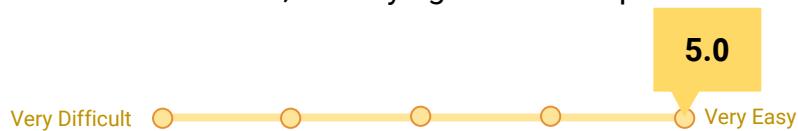
Figure 9: Navigation Flow Issues

Quantitative Findings

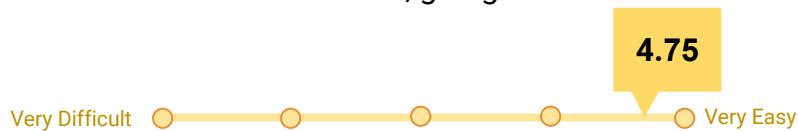
TASK 1: Read Welcome email and move on to the next step.

SUCCESS RATE: 4 / 4

1. After I read the email, identifying the next step to take was:



2. Once I understood what to do, going to the Instructional Website was:



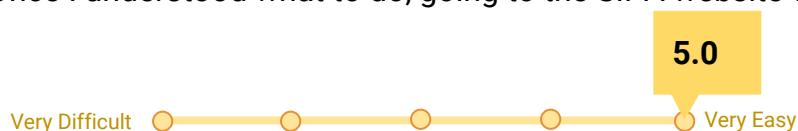
TASK 2: Read through Instructional Website (Redcap) and proceed to next step.

SUCCESS RATE: 3 / 4

1. Once I was on the instructional site, identifying the next step to take was:



2. Once I understood what to do, going to the SIPA website was:

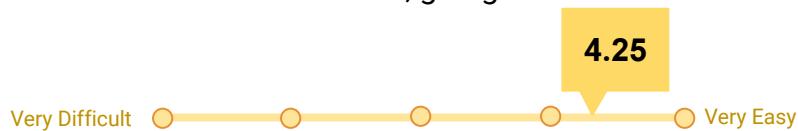


TASK 3: Read SIPA learning module and navigate back to the Instructional Website.
SUCCESS RATE: 3 / 4

1. Once I was on the SIPA site, identifying the next step to take was:



2. Once I understood what to do, going back to the Instructional Website was:



TASK 4: Complete survey on Instructional Website.
SUCCESS RATE: 3 / 4

1. Once I returned to the Instructional Website, identifying the next step to take was:



2. Once I understood what to do, completing the survey was:



POST-TEST QUESTIONNAIRE: System Usability Scale (SUS)

Score: 80.6 / 100

1. I think that I would like to use this system frequently



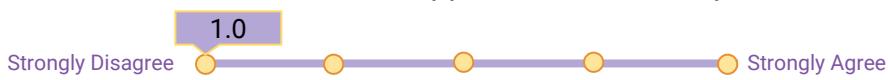
2. I found the system unnecessarily complex



3. I thought the system was easy to use



4. I think that I would need the support of a technical person to use this



5. I found the various functions in the system were well integrated



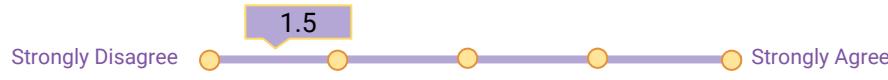
6. I thought there was too much inconsistency in this system



7. I would imagine that most people would learn to use this system very quickly



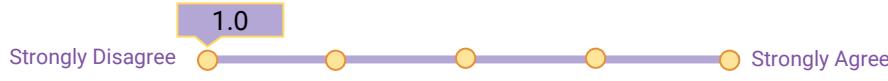
8. I found the system cumbersome to use



9. I felt very confident using the system



10. I needed to learn a lot of things before I could get going with this system



Next Steps

During the usability sessions, participants raised a few issues that we would recommend for future modifications and testing:

1. The requirement to go from the email → Redcap → SIPA site → return to the Redcap site, feels disjointed and confusing.
 - We recommend considering options that will allow for a linear (rather than a cyclical) workflow. Should an option be possible, we highly recommend additional usability testing of that flow.

This initial usability test was only focused on the navigation through the system on a laptop computer.

For future usability tests we recommend taking the following into consideration:

1. Participants should represent a range of educational backgrounds
 - In our usability study, all participants had bachelor's or master's degrees; in order to ensure that the system is usable and accessible to those without post-secondary educations, it will be important to include participants who are representative of that group.
2. If testing the content of the learning modules, participants should meet the full criteria of your target audience for who will be using the system.
3. Usability testing should be done on other devices in addition to a computer (i.e. on an ipad, on a smartphone).
4. The naming of the different platforms in relation to what is meant to happen on them can feel confusing.
 - We recommend considering discussion and testing of alternative names to "SIPA website" and "Instructional website".

Appendix

Sources

Dumas, J. & Redish, G. (1999). Tabulating and Analyzing Data. A Practical Guide to Usability

Sauro, J. (2011). Measuring Usability with the System Usability Scale (SUS). MeasuringU.

Supplementary Materials

<u>APPENDIX A:</u>	<u>Participant Scenario and Task</u>
<u>APPENDIX B:</u>	<u>Recruitment Flyer</u>
<u>APPENDIX C:</u>	<u>Testing Schedule</u>
<u>APPENDIX D:</u>	<u>Consent Form</u>
<u>APPENDIX E:</u>	<u>Pre-Test Questionnaire</u>
<u>APPENDIX F:</u>	<u>Participant Reference Sheet</u>
<u>APPENDIX G:</u>	<u>Test Day Checklist and Debrief Guide</u>
<u>APPENDIX H:</u>	<u>Moderator Script</u>
<u>APPENDIX I:</u>	<u>Post--Task Questionnaire</u>
<u>APPENDIX J:</u>	<u>Post-Task Quantitative Data</u>
<u>APPENDIX K:</u>	<u>System Usability Scale Questionnaire</u>
<u>APPENDIX L:</u>	<u>System Usability Scale Results</u>
<u>APPENDIX M:</u>	<u>Usability Analysis</u>
<u>APPENDIX N:</u>	<u>Qualitative Data Summary</u>
<u>APPENDIX O:</u>	<u>Qualitative Raw Data</u>
<u>APPENDIX P:</u>	<u>Tables</u>

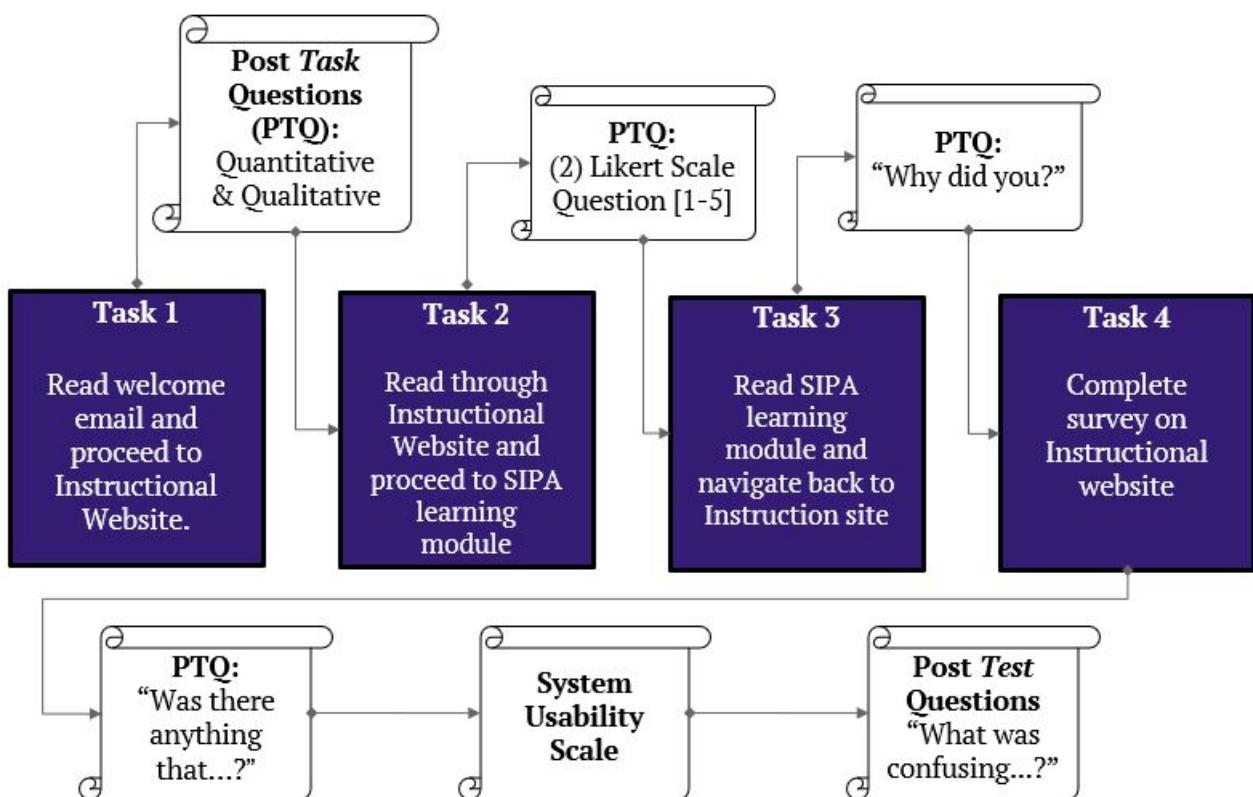
APPENDIX A: Participant Scenario and Tasks

Reference Sheet

Scenario

As we go through the different steps today, please imagine that you are a parent of a preschool age child.

1. This child, unfortunately, has arthritis, and - as a result of this, they face issues with poor sleep.
2. You have signed up to be a part of a program through a research study called SIPA, where you will be going through a “sleep study system” that includes weekly learning modules that will teach you about what you can do to help improve your child’s sleep.
3. As part of this program, you will also be submitting surveys regarding each module, to help the researchers that are a part of the program better understand its effectiveness.
4. For the steps we go through today, I want you to imagine that you are in your very first week of the program and are going through the sleep study system for the very first time.



APPENDIX B: Recruitment Flyer



Researchers at the University of Washington School of Nursing and Seattle Children's are developing a web-based intervention for young children with arthritis to sleep better. We are seeking your help in participating in testing the usability of the intervention prototype.

Research is always voluntary!

Would the study be a good fit for me?

This study might be a good fit for you if:

- Have a child, 2-5 years of age
- > 18 years of age
- Able to read and speak English

What would happen if I took part in the study?

If you decide to take part in the search study, you will:

- Attend a usability testing session at the University of Washington School of Nursing (45 minutes);
- Complete a survey (15 minutes).

You will receive a \$50 gift card to thank you for your time and effort.

There may be possible benefits if you take part in the study.

- learn more about promoting healthy sleep in your child.

To take part in the research study or for more information, please contact Dr. Yuwen at 206-201-1751 or sipa@uw.edu before March 1st, 2019.

The principal researcher for this study is Weichao Yuwen, PhD, RN at the University of Washington Tacoma, Nursing & Healthcare Leadership.



APPENDIX C: Testing Schedule

TEST DAY SCHEDULE - March 1

Start Time	End Time	Activity	Moderator	Primary Note Taker	Research Participant
8:00 AM	10:00 AM	Set-up			
10:00 AM	10:45 AM	Session 1	Christina	Isabel	MJ 121
10:45 AM	11:30 AM	Debrief			
11:30 AM	12:15 PM	Session 2	Megan	Isabel	RS 122
12:15 PM	1:00 PM	Debrief / Lunch			
1:00 PM	1:45 PM	Session 3	Isabel	Megan	YL 123
1:45 PM	2:30 PM	Debrief			
2:30 PM	3:15 PM	Session 4	Lukas	Christina	RY 124
3:15 PM	4:00 PM	Debrief			
4:00 PM	4:45 PM	Session 5			SD 125
4:45 PM	6:00 PM	Debrief & Wrap-Up			

NOTES

APPENDIX D: Consent Form (1/4)

Approved
2/20/2019
UW IRB

UNIVERSITY OF WASHINGTON CONSENT FORM

Sleep Innovations in Preschoolers with Arthritis (SIPA): Developing and Testing the Usability of a Self-Management Intervention

Name/Degree	Title	Department	E-mail
Weichao Yuwen, PhD, RN	Assistant Professor	UW Tacoma Nursing & Healthcare Leadership	wyuwen@uw.edu
Uba Backonja, PhD, RN	Assistant Professor	UW Tacoma Nursing & Healthcare Leadership	backonja@uw.edu

Researchers' statement

We are asking you to be in a research study. The purpose of this consent form is to give you the information you will need to help you decide whether to be in the study or not. Please read the form carefully. You may ask questions about the purpose of the research, what we would ask you to do, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions, you can decide if you want to be in the study or not. This process is called "informed consent." We will give you a copy of this form for your records.

PURPOSE OF THE STUDY

We are developing a web-based intervention to provide parents with the knowledge and tools to help their young children with arthritis sleep better. Arthritis is a problem with joints. Arthritis can disrupt sleep. In our prior study, we found that some young children with arthritis had sleep problems. Some children have arthritis. Some children do not.

We want to test the usability of and refine the web-based intervention prototype.

STUDY PROCEDURES

Usability testing session: The session will be held at the University of Washington School of Nursing. During the study session, you would interact with a mobile usability laboratory including a laptop loaded with the web-based sleep intervention for young children with arthritis. An example intervention component would be how to prepare for a bedtime routine. You will be asked to follow a "think-aloud protocol" whereby you verbally describe your actions and choices as you interact with the system and perform a set of specified tasks (such as setting goals and accessing graphs and educational resources). You will also be interviewed by a research team member about the intervention. An example question includes "What would you suggest to improve the intervention?" The session will be video and audio recorded.

Surveys: We would ask you to complete a survey about demographics information and questions regarding the usability of the intervention. An example question includes "What is the highest grade or year of school you completed?"

How long would I be in the study?

If you choose to take part in the study, the entire study session would take approximately 1 hour.

APPENDIX D: Consent Form (2/4)

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The research study doctor could also decide to take you out of this study. This might happen if you cannot participate in the study procedures. If we ask you to leave the study, we would always explain why.

RISKS, STRESS, OR DISCOMFORT

What are the potential harms or risks if I join this study?

The risks in this study include emotional distress and potential loss of confidentiality.

Emotional Distress. Emotional distress or anxiety is a potential risk. You may experience some mild anxiety or discomfort related to participating in the study session. In the event of this occurrence, the study doctor would refer you to your medical provider, provide crisis line information, or provide a list of community counseling resources.

Confidentiality. We have several safeguards planned to protect against the loss of confidentiality. All data will be coded with a study specific identifying number and all data will be de-identified. The identifying number will be kept on a password-protected, secure server through the Information Technology (IT) department at the UW School of Nursing. Data will be collected during the usability testing session in the form of surveys, collective notes taken by the researchers, and the video and audio recording. Your contact information will also be stored separate from study data and identifying numbers in a file on a password-protected server. All data will be stored on password-protected servers. Information will be compiled from all the participants in the study and, when published, data will be reported in aggregate form. As a result of aggregation, no individual participants will be identifiable from the written materials.

BENEFITS OF THE STUDY

Potential Benefits for You:

There may be no direct benefits to participants in the study; however, being in this study might benefit you in the following way:

- Discussion of sleep intervention materials may help you know better about better sleep in children.

Potential Benefits for Others:

We hope to use information we get from this study to refine an intervention to improve sleep in 2-5 year-old children with arthritis.

SOURCE OF FUNDING

The study team is receiving funding support from National Institute of Health/National Institute of Nursing Research.

CONFIDENTIALITY OF RESEARCH INFORMATION

How would you keep my information confidential?

The information that you provide is important. A unique study code number will identify you. This code number will be attached to your information. The key to the study code will be kept in a locked file in the University of Washington School of Nursing, and Dr. Yuwen will have access to it. Identifying information will be kept indefinitely. The information we collect will be used only for research purposes, and will be kept in a locked file indefinitely. No names or other identifying information will be used in any publications or presentations that may result from this

APPENDIX D: Consent Form (3/4)

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2/20/2019
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study. All of the information you provide will be confidential. However, if we learn that you intend to harm yourself or others, we must report that to the authorities

We have a Certificate of Confidentiality from the federal National Institutes of Health. This helps us protect your privacy. The Certificate means that we do not have to give out identifying information about you even if we are asked to by a court of law. We will use the Certificate to resist any demands for identifying information.

We can't use the Certificate to withhold your research information if you give your written consent to give it to an insurer, employer, or other person. Also, you or a member of your family can share information about yourself or your part in this research if you wish.

There are some limits to this protection. We will voluntarily provide the information to:

- a member of the federal government who needs it in order to audit or evaluate the research;
- individuals at the University of Washington, the funding agency, and other groups involved in the research, if they need the information to make sure the research is being done correctly;
- the federal Food and Drug Administration (FDA), if required by the FDA;
- state or local authorities, if we learn of child abuse, elder abuse, or the intent to harm yourself or others.

OTHER INFORMATION

You may refuse to participate and you are free to withdraw from this study at any time without penalty or loss of benefits to which you are otherwise entitled.

Taking part in research is always a choice. If you decide to be in the study, you can change your mind at any time. We ask that you tell the principal investigator of this study, **Dr. Yuwen**. You can contact Dr. Yuwen by phone at 253-692-4478.

Address: University of Washington Tacoma
Nursing and Healthcare Leadership
Box 358421
Tacoma, WA 98402

After the study completion, you will be given a gift card for \$50. Participant payment is made as soon as possible after you complete participation.

RESEARCH-RELATED INJURY

If you think you have been harmed from being in this research, contact Dr. Yuwen at wyuwen@uw.edu or 253-692-4478.

FUTURE RESEARH STUDIES

Would you like to know about future research studies? Dr. Yuwen would like to contact you in the future to tell you about other research studies you might want to take part in. Research is always a choice. We are only asking you, if you would like to hear about other studies.

APPENDIX D: Consent Form (4/4)

Approved
2/20/2019
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What happens if I check “YES”? If you check the “YES” box, you’re allowing us to contact you if a study that you could take part in comes up. You can decide to stop allowing us to contact you at any time. You would need to let Dr. Yuwen know if you did not want to be contacted in the future.

What happens if I check “NO”? Deciding not to take part will NOT affect your care. There will be no penalty or loss of benefits to you for deciding that you do not want to be contacted in the future.

Your contact information will not be shared with anyone outside this research team.

- Yes, it is ok for you to contact me about future research studies.
- No, please do not contact me about future research studies.

Please tell us what would be the best way to contact you:

- Phone: _____
- E-mail: _____
- Mailing Address: _____

Subject's statement

This study has been explained to me. I volunteer to take part in this research. I have had a chance to ask questions. If I have questions later about the research, or if I have been harmed by participating in this study, I can contact one of the researchers listed on the first page of this consent form. If I have questions about my rights as a research subject, I can call the Human Subjects Division at (206) 543-0098 or call collect at (206) 221-5940. I will receive a copy of this consent form.

Printed name of subject	Signature of subject	Date
-------------------------	----------------------	------

Printed name of study staff obtaining consent	Signature	Date
---	-----------	------

OPTIONAL: Permission to release video tapes for public presentations

I agree to release my video taped during the usability session to be used for public presentations by this research team.

Printed name of subject	Signature of subject	Date
-------------------------	----------------------	------

Copies to:	Researcher Subject
------------	-----------------------

APPENDIX E: Pre-Test Questionnaire (1/3)

1. Your age in years

2. Your gender

Mark only one oval.

- Female
 Male
 Prefer not to say
 Other: _____

3. If you answered 'other' above, please describe here

4. Your race or ethnicity

Mark only one oval.

- American Indian or Alaska Native
 Asian
 Asian-American
 Black or African American
 Native Hawaiian or Other Pacific Islander
 White/not Hispanic
 Other: _____

5. If you answered 'other' above, please describe here

APPENDIX E: Pre-Test Questionnaire (2/3)

6. Education level USA type

Mark only one oval.

- Less than a high school diploma
- High school degree or equivalent (e.g. GED)
- Some college, no degree
- Associate degree (e.g. AA, AS)
- Bachelor's degree (e.g. BA, BS)
- Master's degree (e.g. MA, MS, MEd)
- Professional degree (e.g. MD, DDS, DVM)
- Doctorate (e.g. PhD, EdD)
- Master's degree (e.g., MA, MS, MEng, MEd, MBA)

7. Your employment status

Mark only one oval.

- Working Now
- Looking for work, unemployed
- Other: _____

8. Your marital or partner status *

Mark only one oval.

- Single
- Married
- Partnered
- Cohabiting
- Separated
- Divorced

9. Which category represents your total household income for the past 12 months?

Mark only one oval.

- \$20,000 to \$39,999
- \$40,000 to \$ 59,999
- \$80,000 to \$99,999
- \$100,000 to \$ 119,999

10. Your child's birth date

11. Your child's age (in years) *

APPENDIX E: Pre-Test Questionnaire (3/3)

12. Child gender

Mark only one oval.

- Female
 Male
 Prefer not to say
 Other: _____

13. How long have you been taking care of your child in this study? *

Check all that apply.

- All of the child's life
 Less than half of the child's life, but longer than 6 months
 Other: _____

14. How would you rate your level of confidence in using the internet to follow alongside a tutorial article explaining how to complete a Do it Yourself (DIY) project? *

Mark only one oval.



15. How would you rate your level of confidence in looking up information about health and wellness online? *

Mark only one oval.



16. Thank you for your participation. Is there anything else that you would like to share with us? (Optional)

APPENDIX F: Participant Reference Sheet

Reference Sheet

SIPA Study Email

SIPA Study Week 1 [Inbox](#)



10:20 AM (2 minutes ago)



wyuwen@uw.edu

to me +

Dear [Parent First Name],

Thank you for your continued participation in the SIPA study!

For this week's module, please complete the following steps:

1. Go to the instructional site to start this week's module: [SIPA Healthy Sleep](#)
2. Read through the information on the SIPA website module (link provided on the instructional site).
3. Go back to the instructional site in order to mark this module as complete: [SIPA Healthy Sleep](#)

Sincerely,
The SIPA Study Team

If the instructional site link does not work, try copying the link below into your web browser: <https://redcap.ihs.org/surveys2?c=DEW4AwG9B>

*this link is unique to you and should not be forwarded to others

If the SIPA website link does not work, try copying the link below into your web browser:
<https://deeps.washington.edu/openlearning-modules/healthy-sleep/>

Should you need it, your log-in information for the SIPA website is:
Email: sipa.sleep.in@gmail.com
PW: SleepIn2018

Instructional Website

The screenshot shows a web page titled "SIPA Healthy Sleep". A purple header bar contains the text "Welcome back to the SIPA Study!". Below the header, there is a red circular button with the word "Start" and a yellow circular button with the number "15". The main content area features the text "Welcome!" and "Plan to spend 15 minutes on this module.". At the bottom, there is a green circular button with the letters "BBE" and the text "To start, please learn about Healthy Sleep by clicking the link below." and "When you are finished, please return to this page. Note - separate window will open."

APPENDIX G: Test Day Checklist and Debrief Guide

TEST DAY CHECKLIST & DEBRIEF GUIDE

SETUP TASKS + SESSION REMINDERS

- Establish a beginner's mindset
- Drinks available for session participants
- MUL operational and ready for first session
- Questionnaires for participants are printed and ready
- Incentives and parking reimbursements for each participant

NOTES

SESSION DEBRIEFS WITH PARTICIPANTS

- Identify areas where the customer displayed high emotion or ambiguity in motivation or thought process
- Review research questions to identify any additional areas of follow-up
- Ask how they would improve the learning module system

NOTES

Do this while the participant is finishing their post-test questionnaire

See below for Research Questions and Study Goals

SESSION DEBRIEFS WITH OBSERVERS

- Each observer writes down the 3 most important things that happened in the session on Post-It notes
- Team collectively reviews data collection notes / commentary
- Team re-caps key observations verbally in group
- Discuss any areas of opportunity for improvement in subsequent sessions

NOTES

Watch for points where the user gets emotional. Focus on what user SAYS and DOES.

File specific to session

END-OF-DAY WRAP-UP

- Collaboratively sketch through the user journey (create a journey map) based on what we've observed from user research
- Reflect upon: 1) What stood out and what was surprising; 2) What were the big-picture takeaways and main themes; 3) What challenged your assumptions
 - Align on top 5 insights across observers
 - Discuss what was the most UNexpected Insight and what was the most expected finding
 - Review research questions & study goals and identify where/how research addressed questions

NOTES

See below for Research Questions and Study Goals

RESEARCH QUESTIONS

- 1 How clearly do users understand the steps they need to take to complete their first learning module in the SIPA study?
- 2 How easily and successfully do users navigate through their first learning module in the SIPA study?
- 3 What obstacles do users encounter when:
 - Navigating from the email they receive to the Redcap site?
 - Navigating from the Redcap site to the learning module on the SIPA website?
 - Navigating from the SIPA website back to the Redcap site?
 - Submitting their "completion" on the Redcap site?
- 4 How do users feel about the overall experience of going through the learning module?
- 5 What do users like about the experience?
- 6 What did users find frustrating or unpleasant about the experience?
- 7 What would users have appreciated having as part of their experience?

STUDY GOALS

- 1 To assess the overall usability of each of three platforms (email, Redcap, SIPA website)
- 2 To assess the overall usability of navigating between the three platforms
- 3 To assess task comprehension of the first learning module
- 4 To determine the level of ease in completing the core tasks required by each platform
- 5 To identify obstacles to completing key tasks

APPENDIX H: Moderator Script (1/4)

MODERATOR SCRIPT - SIPA SLEEP STUDY SYSTEM

Introduction

The following bulleted items are reminders of the information to discuss with the participant (it should not be read verbatim). Instructions for moderator are in italics.

Greetings and confidentiality:

- Thank you for being here today.
- *Introduce moderator and the note-taker (and any other observers)*
- I will be using a script today - this is just so that everyone who participates in the study gets the same information
- Your participation is voluntary and you can take a break or stop at any time
- If we ask you any questions you are uncomfortable answering, just let me know and we will move on to the next topic.
- All of the information we collect today will be kept confidential and only used by our internal team to help improve the product. You are assigned a participant identification number and we use that number, not your name, on all the data we collect.

The purpose of the study:

- Evaluate the process of going through the steps in a system that is part of a study meant to help parents with preschool children who have issues with sleep.
- Will be using information and websites that are still in the early phases of being developed, and your feedback will help guide the decisions that are being made
- We are evaluating the usability and intuitiveness of the information and design of the different steps of completing the sleep study system, not evaluating you in any way. All feedback is good, and we want to hear your honest opinion, both positive and negative. We are not the designers of the system, just impartial researchers, so nothing you say can offend us.

Think Aloud Protocol:

- While you are interacting with the different steps that make up the sleep study system, I would like you to think aloud, which means telling me what you are thinking, and feeling, and expecting. I know this isn't how you normally do things, but it really helps us to understand your experience.
- *Demonstrate think aloud protocol by talking through choosing a playlist in Spotify (or similar)*

Recording Consent:

- With your permission, we would like to record this session. This recording will only be used by the internal team to help us improve the system. Do we have your permission.

Start recording

Scenario

Introduce the scenario and provide a printout of the scenario:

APPENDIX H: Moderator Script (2/4)

MODERATOR SCRIPT - SIPA SLEEP STUDY SYSTEM

As we go through the different steps today, I want you to imagine that you are a parent of a preschool age child.

1. This child, unfortunately, has arthritis, and - as a result of this - they also face issues with poor sleep.
2. You have signed up to be a part of a program through a research study called SIPA, where you will be going through a "sleep study system" that includes weekly learning modules that will teach you about what you can do to help improve your child's sleep.
3. As part of this program, you will also be submitting surveys regarding each module, to help the researchers that are a part of the program better understand its effectiveness.
4. For the steps we go through today, I want you to imagine that you are in your very first week of the program and are going through the sleep study system for the very first time.

Ask if the participant has any questions.

Our session today will involve four separate tasks, after each task we will pause for you to answer a few questions. The first task is...

Email

give participant printout of task description

Task 1: You have just received this email from the SIPA team. Read through it and then take the action you think should be your next step.

Please remember to be sharing your thoughts and impressions.

Post-task: You've now completed the first step of the sleep study system. Please provide your feedback by answering the questions on the tablet for Step 1.

Have participant answer, on the ipad, the post-task survey questions:

- After I read the email, identifying the next step to take was _____
- Once I understood what to do, going to the Instructional website was _____

After the user completes the Post-Task Questionnaire, ask the following questions:

- Tell me about the rating that you gave for question 1. Why did you select that rating? What would have improved that rating (if lower than 5)?
- Tell me about the rating that you gave for question 2. Why did you select that rating? What would have improved that rating (if lower than 5)?
- Was there anything in particular that you liked about the email?
- Was there anything in particular that you disliked about the email?
- Was there anything that was confusing to you about the email?

Instructional Website (Redcap)

give participant printout of task description

Task 2: Now that you are on this site, read through the information included and then take the action you think should be your next step.

APPENDIX H: Moderator Script (3/4)

MODERATOR SCRIPT - SIPA SLEEP STUDY SYSTEM

Please remember to be sharing your thoughts and impressions.

Post-task: You've now completed the second step of the sleep study system. Please provide your feedback by answering the questions on the tablet for Step 2.

Have participant answer, on the tablet, the post-task survey questions:

- Once I was on the instructional website, identifying the next step to take was: _____
- Once I understood the next step to take, going to the SIPA website was: _____

After the user completes the Post-Task Questionnaire, ask the following questions:

- Tell me about the rating that you gave for question 1. Why did you select that rating? What would have improved that rating (if lower than 5)?
- Tell me about the rating that you gave for question 2. Why did you select that rating? What would have improved that rating (if lower than 5)?
- We call this website the Instructional Website. Was there anything in particular that you liked about the Instructional Website?
- Was there anything in particular that you disliked about the Instructional site?
- Was there anything that was confusing to you about the Instructional site?

SIPA Website

Task 3: Imagine that you have read through all of the information on this page. Take the action you think should be your next step.

Please remember to share your thoughts and impressions.

Post-task: You've now completed the third step of the sleep study system. Please provide your feedback by answering the questions on the tablet for Step 3.

Have participant answer, on the tablet, the post-task survey questions:

- Once I was on the SIPA website, identifying the next step to take was: _____
- Once I understood the next step to take, going back to the instructional site was: _____

After the user completes the Post-Task Questionnaire, ask the following questions:

- Tell me about the rating that you gave for question 1. Why did you select that rating? What would have improved that rating (if lower than 5)?
- Tell me about the rating that you gave for question 2. Why did you select that rating? What would have improved that rating (if lower than 5)?
- We call this site the SIPA website. Was there anything in particular that you liked about the SIPA website?
- Was there anything in particular that you disliked about the SIPA website?
- Was there anything that was confusing to you about the SIPA site?

Instructional Website (Redcap)

Task 4: Now that you are back to the Instructional Website, take the action you think should be your next step.

APPENDIX H: Moderator Script (4/4)

MODERATOR SCRIPT - SIPA SLEEP STUDY SYSTEM

Post-task: You've now completed the fourth and final step of the sleep study system. Please provide your feedback by answering the questions on the tablet for Step 4.

Have participant answer, on the tablet, the post-task survey questions:

- Once I returned to the instructional website, identifying the next step to take was: _____
- Once I understood the next step to take, completing the survey on the instructional website was: _____

After the user completes the Post-Task Questionnaire, ask the following questions:

- Tell me about the rating that you gave for question 1. Why did you select that rating? What would have improved that rating (if lower than 5)?
- Tell me about the rating that you gave for question 2. Why did you select that rating? What would have improved that rating (if lower than 5)?
- Was there anything in particular that you liked about the survey aspect of the Instructional website?
- Was there anything in particular that you disliked about the survey aspect of the Instructional website?
- Was there anything that was confusing to you about the survey aspect of the Instructional website?

Post-test Questions and Discussion

Post-Test: You've now completed what we'll refer to as the "sleep study system", which consisted of the welcome email, the instructional website, and the SIPA website (*give printouts of screenshots of each*). We are now going to ask you to complete a survey on the tablet reflecting upon your experience with the sleep study system as a whole. And just to clarify, in the survey, when we refer to the Instructional Website we are referring to this site here (*moderator points to the printed screen shot of the instructional site*) and when we refer to the SIPA website we are referring to this site (*moderator points to the printed screen shot of the SIPA website*).

After the user completes the Post-Test Questionnaire, ask the following questions:

- What was easy or difficult about navigating through the sleep study system?
- What was the most difficult part of navigating the sleep study system?
- What features or attributes should we add to make it VERY easy for you to use the system?
- What did you like the most about the sleep study system?
- If you were to complete the next lesson in the sleep study, assuming it was the same format as this one, describe what your confidence level would be navigating the system?
 - (*If they answer negatively*) What would help you feel more confident?
- If you were to be going through this sleep study system on a weekly basis, what device do you think you would usually be using (e.g. laptop, tablet, phone...)

APPENDIX I: Post--Task Questionnaire (1/2)

Step 1

We are interested in your honest feedback for each step that we ask you to take. After each task or step, we will pause and give you time to rank how usable the system was for performing the task. These questions refer to the Welcome Email and the next step you took. The site you visited after the Welcome Email is called the Instructional Website.

1. After I read the email, identifying the next step to take was:

Mark only one oval.

1 2 3 4 5

Very Difficult

<input type="radio"/>				
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Very Easy

2. Once I understood what to do, going to the Instructional Website was:

Mark only one oval.

1 2 3 4 5

Very Difficult

<input type="radio"/>				
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Very Easy

Step 2

We are interested in your honest feedback for each step that we ask you to take. After each task or step, we will pause and give you time to rank how usable the system was for performing the task. These questions refer to the Instructional Website, and the next step you took after reading through the Instructional Website.

1. Once I was on the Instructional Website, identifying the next step to take was:

Mark only one oval.

1 2 3 4 5

Very Difficult

<input type="radio"/>				
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Very Easy

2. Once I understood the next step to take, going to the SIPA website was:

Mark only one oval.

1 2 3 4 5

Very Easy

<input type="radio"/>				
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Very Difficult

APPENDIX I: Post--Task Questionnaire (2/2)

Step 3

We are interested in your honest feedback for each step that we ask you to take. After each task or step, we will pause and give you time to rank how usable the system was for performing the task. These questions refer to the SIPA website and determining the next step after reading the SIPA website.

1. Once I was on the SIPA website, identifying the next step to take was:

Mark only one oval.

1 2 3 4 5

Very Difficult

Very Easy

2. Once I understood the next step to take, going back to the Instructional site was:

Mark only one oval.

1 2 3 4 5

Very Difficult

Very Easy

Step 4

We are interested in your honest feedback for each step that we ask you to take. After each task or step, we will pause and give you time to rank how usable the system was for performing the task. These questions refer to the survey completion process

1. Once I returned to the Instructional site, identifying the next step to take was:

Mark only one oval.

1 2 3 4 5

Very Difficult

Very Easy

2. Once I understood the next step to take, completing the survey on the Instructional Website was:

Mark only one oval.

1 2 3 4 5

Very Difficult

Very Easy

APPENDIX J: Post-Task Quantitative Data

Post-Task		Task 1: Read welcome email and proceed to Instructional Website.				Task 2: Read through Instructional Website and proceed to SIPA learning module			
Participant	Success (Y/N)	# of Prompts	After I read the email, identifying the next step to take was:	Once I understood what to do, going to the Instructional Website was:	Success (Y/N)	# of Prompts	Once I was on the instructional website, identifying the next step to take was:	Once I understood the next step to take, going to the SIPA website was:	
121	Y	0	5	5	Y	0	5	5	
122	Y	0	5	5	Y	0	5	5	
124	Y	0	5	5	Partial		3	5	
125	Y	0	5	4	Y	0	4	5	
Average			5	4.75		0	4.25	5	
Median			5	5		0	4.5	5	
Max			5	5		0	5	5	
Min			5	4		0	3	5	

Post-Task		Task 3: Read SIPA learning module and navigate back to Instructional site				Task 4: Complete survey on Instructional site			
Participant	Success (Y/N)	# of Prompts	Once I was on the SIPA website, identifying the next step to take was:	Once I understood the next step to take, going back to the instructional site was:	Success (Y/N)	# of Prompts	Once I returned to the instructional website, identifying the next step to take was:	Once I understood the next step to take, completing the survey on the instructional website was:	
121	Y	0	4	5	Y	0	4	4	
122	Y	0	5	5	Y	0	5	5	
124	N		3	3	Partial	1	4	4	
125	Y	0	5	4	Y	0	5	5	
Average		0	4.25	4.25		0.25	4.5	4.5	
Median		0	4.5	4.5		0	4.5	4.5	
Max		0	5	5		1	5	5	
Min		0	3	3		0	4	4	

APPENDIX K: System Usability Scale Questionnaire (1/2)

SUS Questionnaire

Please rate the usability of the system for the previous scenario.

We welcome all feedback, whether positive or negative, regarding your experience

* Required

1. I think that I would like to use this system frequently.*

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

2. I found the system unnecessarily complex.*

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

3. I thought the system was easy to use.*

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

4. I think that I would need the support of a technical person to be able to use this system.*

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

5. I found the various functions in this system were well integrated.*

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

6. I thought there was too much inconsistency in this system.*

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

APPENDIX K: System Usability Scale Questionnaire (2/2)

7. I would imagine that most people would learn to use this system very quickly. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

8. I found the system very cumbersome to use. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

9. I felt very confident using the system. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

10. I needed to learn a lot of things before I could get going with this system. *

Mark only one oval.

1 2 3 4 5

Strongly Disagree Strongly Agree

APPENDIX L: System Usability Scale

System Usability Scale	P1	P2	P4	P5
I think that I would like to use this system frequently	4	4	5	4
I found the system unnecessarily complex	4	2	1	4
I thought the system was easy to use	4	4	4	5
I think that I would need the support of a technical person to be able to use this system	1	1	1	1
I found the various functions in this system were well integrated	4	2	5	4
I thought there was too much inconsistency in this system	3	3	4	1
I would imagine that most people would learn to use this system very quickly	4	5	4	5
I found the system cumbersome to use	1	2	1	2
I felt very confident using the system	4	5	4	5
I needed to learn a lot of things before I could get going with this system	1	1	1	1
SUS RAW SCORE	30	31	34	34
SUS FINAL SCORE	75	77.5	85	85
AVERAGE SCORE	80.625			

FINDINGS:

- 2 out of 4 participants found the system unnecessarily complex.
- 3 out of 4 participants found the functions in the system well integrated.
- 1 out of 4 participants found too much inconsistency in the system.

The average SUS score was above average (80.625)

APPENDIX M: Usability Analysis (1/4)

Post Test Questionnaire

What was easy about navigating through SIPA sleep study system?	
P1	Easy to navigate and well documented.
P2	Very easy to scroll or click.
P3	I like starting with the email, it's comfortable.
P4	-
P5	I like that the email has different options in case the system doesn't work.

What was the most difficult part of navigating through the SIPA sleep study system?	
P1	At the end of the module, the instruction was not intuitive, and it was not clear to me that I had to go back to the website. The submit button feels awkward.
P2	The hard part was that I had to read.
P3	Because of my reading ability, the third interface is boring, a lot of text.
P4	Difficulty happened when I when I first came to the instructional site because it took me some effort to understand how to get to the SIPA website and how to get back.
P5	Just realizing that I needed to scroll down on the Informational Site to find the link. The three buttons looked like something that should be clicked.

What features or attributes should we add to make it VERY easy for you to use?	
P1	Three linear steps instead of three separate tabs. This would be more intuitive and it would keep me to search for that submit without scrolling through stuff that I've already looked at.
P2	Have the link appear higher up on the Instructional Site. Instead of using the stop sign maybe use 1,2,3. That was confusing because it made me think they were buttons.

APPENDIX M: Usability Analysis (2/4)

P3	It looks like this is for a web browser so for that purpose I think it's easy. If it's adapted for phone use I think it should be easy.
P4	I think if we could integrate the instructional site into the SIPA website. I think if something happened with my son and I'd want to find useful information, I'd have to go into my email to go to the link to then go to the site. I'd want to go into the browser history to find this link.
P5	Make the green button into the link to click or move the link up higher on the page.

How do users feel about the overall experience of going through the learning module?

1. What do users like about the experience?
 - a. P1, P2, P3 liked the instructions and layout of the email. "Easy to follow, nicely and simply written", P1. "Very easy - because it was 1, 2, 3 steps and the hyperlink is right there so it just seemed very easy and natural to click and that's the first step. I like that its short and sweet and to the point and that's nice.", P2. "I think the 1, 2, 3, steps it was very clear to know what I needed to do. The link was very clear to get me to the site.", P3.
 - b. P1 found the link on the email easy to locate. "The steps were well outlined. A short concise link that made sense and was the same name as the instructions. Even if I didn't read the email it was the first option the correct one."

APPENDIX M: Usability Analysis (3/4)

- c. P2 liked the visual queues on the Instructional Site. "I like the stop visual queue helps to stop me trying to click green.", P2.
 - d. P1 found the system overall easy to navigate. "Overall all very easy to navigate, well documented, a lot of spaces to help you follow through."
2. What did users find frustrating or unpleasant about the experience?
- a. P1, P2, and P5 found having to manually go back to Instructional site cumbersome. "It seems like that could be combined with the system. As a parent, I would not want to do an extra step.", P1. "It seems really weird that I have to go back to click and submit. I'm not sure why it just can't have a "click here" at the end of the module or at least a link is that takes you back to the Instructional Site.", P2. "I would organize the links differently. I would put a link here rather than have to go back to the tab. It's an unusual way to do things.", P5.
 - b. P1 found the Instructional Site had too much information after the link. "There is a lot of information after the link.", P1.
 - c. P5 found the ready, set, go buttons distracting. "Not loving the ready set go buttons. They're confusing more than helpful. And not aesthetically pleasing.", P5.
 - d. P4 found the screenshot in the Instructional Site very distracting. "One thing I'd like to add is maybe instead of the screenshot, just print the logo along the link, or make it so that you can click the screenshot to take you to the site.", P4.

APPENDIX M: Usability Analysis (4/4)

- e. P1 was confused regarding the name of the Instructional site. "I feel like it relied on me remembering the name of the page before it. I might not have known that was the page was called since I did not develop it.", P1.
- f. P1 did not think the instruction to go back to the Instructional Site was clear. "The instruction could have been clearer or more intuitive.", P1.

3. What would users have appreciated having as part of their experience?

- a. P1 would have liked a linear structure in the navigation. "Three linear steps instead of three separate tabs. This would be more intuitive and it would keep me to search for that submit without scrolling through stuff that I've already looked at.", P1.
- b. P2 and P5 would have liked the link on the Instructional Site to be higher up in the visual hierarchy of the page. "Have the link appear higher up on the Instructional Site. Instead of using the stop sign maybe use 1,2,3. That was confusing because it made me think they were buttons.", P2. "Make the green button into the link to click, or move the link up higher on the page.", P5.
- c. P1, P2, P4, and P5 would have liked to have a link to the Instructional Site after the module ends.

APPENDIX N: Qualitative Data Summary

[Supplementary Materials Link](#)

In order to access the raw data click the link, the image below is a preview.

TAP: Positive Comments	Questions	Notetaker Observations	Tell me about the rating that you gave for question 1. Why did you select that rating? What would have improved that rating (if lower than 5?)	Tell me about the rating that you gave for question 2. Why did you select that rating? What would have improved that rating (if lower than 5?)	We call this the Instructional Website. Was there anything in particular that you liked about the instructional site?	Was there anything in particular that you disliked about the instructional site?
I like that it tells me a separate window will open in case my computer blocks them, so its good to know I need to expect that.	There is a lot of information after the link, should I click on the link?	Participant chose to read instructions silently. "It would be nice if the link was a different color, and I know it's a link, maybe another color."	I'm anonymous, single. A little overdone with the colors. I don't dislike it but I think it's a bit off. It would have helped to have something to differentiate the link.	Like I said, if the information below the link is relevant to the task, then I would click on it before I click on the link. If that part was relevant I would suggest to put it before the link.		
Stop visual cue helps to stop me trying to click green.	Very easy - Even though I was explaining, it didn't deter me from what I thought was the correct thing to do.	I think its nice that it has the resize font option, only the top part. Seemed like a nice option for accessibility. I like purple. I can't say there's anything that I like.	Looks a little off school. It had to be picky the resize font doesn't work other than header and the embedded image or whatever it seems confusing cause you can't click on these.	The bottom part shows hyperlinks that don't work so I'm assuming those come after.		
Participants keep scrolling down to read all the information. There are helpful links after I'm done. Participant is confused about the navigation. They are confused about clicking the hamburger menu. Instead of saying "Please return and come back to the instructional site" have a linear structure.						

APPENDIX O: Qualitative Raw Data (P1 - P5)

[Supplementary Materials Link](#)

In order to access the raw data click the link, the image below is a preview.

TASK	Success: Y/N	# Prompts	TAP: Negative Comments	TAP: Neutral Comments	TAP: Positive Comments	Questions					
3) Read SIPA learning module and navigate back to Instructional site	N		After reading, it wasn't clear what I should do next, would like to see it telling me what to do next.	I think this would be a jump link that would take me to another section. I would click to the one I would find the most interesting.	When I arrive at this page it's quite elegant and clear. The top banner and text is explanatory to me. I appreciate the bold font and the different colors. Content of the site --> appreciate having solution that can try.						
POST-TASK QUESTIONS											
TASK 3 (SIPA Website)		ANSWER									
Tell me about the rating that you gave for question 1. Why did you select that rating? What would have improved that rating (if lower than 5?)?		rate 3, neutral. When I scan all the information quickly it just told me why and what, I think it should be telling me how.									
Tell me about the rating that you gave for question 2. Why did you select that rating? What would have improved that rating (if lower than 5?)?		rate 2, . I think you should always need to have the links on the side.									
We call this site the SIPA website. Was there anything in particular that you liked about the SIPA website?		Like the visual decoration, it's warm and cozy and evokes my emotion. I do like the color. The banner looks very cool! I think the jump links are quite useful, especially as this site is very long, it will help me jump into a different section; when I'm reading the information I'd expect to have the jump links always there.									
Was there anything in particular that you disliked about the SIPA website?		I don't have anything I dislike about the interaction perspective. It would just be handy when I scroll down that I can still have some option to go back.									
Was there anything that was confusing to you about the SIPA website?		No.									
Notetaker Observations											
was there any way that I can go back to the instructional site from here, or do I need to switch tabs											

APPENDIX P: Tables (1 & 2)

ISSUE	RECOMMENDATION
Unclear Instructions throughout system	Provide context to help participants understand what to expect. Use clear and consistent language.
Discoverability of Instructions on SIPA Site	Increase visual cues and reduce reliance on active memory by using familiar terms
Adjust Instructional Site's Visual Hierarchy and Conventions	Increase visibility of link in relation to instructions. Leverage visual conventions and web design best practices.
Confusing Navigation Flow	Provide participants with a clear mental model of navigation flow, outlining the flow using familiar terms and then use the terms consistently.

Table 1: Summary of Findings

#	TASK	STARTING STATE	SUCCESS
1	Read Welcome email and move on to the next step.	Open email browser	User comprehends email and launches Redcap website via provided link
2	Read through Instructional Website (Redcap) and proceed to next step	Instructional Website (Redcap)	User opens SIPA learning module website
3	Read SIPA learning module and proceed to next step	SIPA Learning Module Website	User navigates back to Redcap site
4	Complete survey on Instructional Website (Redcap)	Instructional Website (Redcap)	User checks the box indicating that they read the SIPA learning module

Table 2: List of tasks

APPENDIX P: Tables (3 & 4)

	AGE	GENDER	EDUCATION	CHILD'S AGE
P1	40	Female	Bachelor's	4
P2	41	Female	Bachelor's	3
P4	38	Male	Master's	2
P5	31	Female	Master's	3

Table 3: Participant's Demographics

#	ISSUE	DETAIL	FREQUENCY	SEVERITY ¹	RECOMMENDATION
1	Unclear instructions lead to confusion while navigating system	The email and subsequent pages do not provide context to help the participant understand steps.	4/4	1	<ul style="list-style-type: none"> 1. Provide more context 2. Use differentiated titles across websites & email 3. Make important information easy to see
2	Instructions to return to instructional site not easily discoverable	Instruction is hidden at bottom of page and participants must rely on active memory to remember what the 'Instructional Site' is.	3/4	1	<ul style="list-style-type: none"> 1. Increase visual cues 2. Reduce reliance on active memory by using familiar terms
3	Visual hierarchy on Instructional Site impedes understanding	The participant must scroll to find the link, and it's not immediately obvious what to do on the site.	3/4	2	<ul style="list-style-type: none"> 1. Increase visibility of link in relation to instructions 2. Make full set of instructions viewable on one page without scrolling
4	Visual conventions violated on Instructional Site	Visual/UX conventions are violated, such as images that look like buttons and hyperlinks but don't function as such.	4/4	2	<ul style="list-style-type: none"> 1. Remove buttons and screenshot 2. Leverage visual conventions and web design best practices to enhance understanding
5	Navigation flow is confusing	Participants felt that navigation should be linear.	4/4	3	<ul style="list-style-type: none"> 1. Use email as source of truth 2. Provide participants with a clear mental model of navigation flow 3. Adopt a linear navigation flow

¹Dumas and Redish, 1999

Level 1: Prevents Task Completion

Level 2: Creates significant delay and frustration

Level 3: Problems have a minor effect on usability

Level 4: Subtle and possible enhancements/suggestions

Table 4: Usability Issues Summary