Usability and User Experience Testing of “MyPal for adults” a Co-Designed Electronic Patient-Reported Outcomes (ePROs) app for Adults with Hematologic Malignancies: A Mixed Methods Study

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Abstract

Background: Mobile health (mHealth) technologies have the potential to enhance cancer patient management, communication, and overall quality of life. The MyPal project, employing a participatory design approach, aims to provide palliative care support for patients with hematological malignancies through an electronic patient-reported outcomes (ePROs) eHealth platform.

Objective: To evaluate the usability and user experience of "MyPal for adults," a co-designed palliative care mobile app intended to support adult patients affected by hematologic malignancies.

Methods: Representative users participated in a 4-step usability study employing a think-aloud protocol, complimented with feature satisfaction, difficulty perceived, and design impression surveys along with a short semi-structured interview. Participants were also asked to provide qualitative feedback via the post-use System Usability Scale (SUS), User Experience Questionnaire (UEQ), and Post-study System Usability Questionnaire (PSSUQ). The data were analyzed along the lines of the ISO 9241-210 framework.

Results: All participants found the intervention content useful, and they reported satisfactory usability, with a mean PSSUQ score of 2.458 and a SUS score of 68.9%. All aspects of the UEQ (Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, Novelty) surpassed usability quality benchmarks. Identified usability issues primarily related to effectiveness and efficiency as defined in ISO 9241-210.

Conclusions: In this study, we conducted a comprehensive usability evaluation of the MyPal for Adults app, a digital tool designed to enhance the palliative care experience. This approach identifies real-world usability issues, enabling iterative improvements in the eHealth platform's design. Our findings reveal a user-friendly interface and positive patient experiences. This study emphasizes the need to enhance palliative care mHealth platform usability, offering insights to improve palliative care for cancer patients.

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Original Paper

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Keywords: mHealth; usability evaluation; think-aloud test; palliative care; Patient Reported Outcomes.

Introduction

Haematological Malignancies (HMs) account for about 6.5% of global cancer cases, primarily affecting older individuals around 70 years old [1], [2,3]. Patients with HMs often suffer from distressing symptoms, leading to a lower Quality of Life (QoL) [4]. Consequently, palliative care has emerged as a vital healthcare practice to enhance the QoL of individuals facing serious, life-limiting illnesses, regardless of age or disease stage [5].

Effective palliative care relies on active patient-healthcare team communication, where electronic patient-reported outcome (ePRO) systems offer substantial promise. These systems enable patients to report their health status, including personal evaluations, symptoms, and adverse drug reactions via defined questionnaires. However, despite their potential to enhance patient care, the widespread integration of ePRO systems in routine healthcare and research remains limited [6].

The healthcare sector, spurred even before the COVID-19 pandemic [7], has seen a surge in smart device adoption, enabling direct health information dissemination. However, complex interfaces often lead to app abandonment, especially among older users. The Google and Apple app stores offer around one million health-related apps, with approximately 300,000 in the mobile health (mHealth) category [8]. Despite this, mHealth app downloads are declining [9,10], raising concerns about their usability and acceptance, influenced by factors like privacy and usability [11].

To address these challenges, co-design approaches have gained interest [12]. Co-design involves collaborative efforts among researchers, designers, and end-users who actively contribute to knowledge development, idea generation, and concept refinement [13]. This user-centered approach fosters a deeper understanding of user perspectives [12] and can optimize the development and usability of palliative care ePROs apps.

Usability and User Experience Evaluation

Usability, as per ISO (International Organization for Standardization) usability framework (ISO 9241-210), is "*the extent to which a product can be used by designated users to achieve specific goals with efficiency, effectiveness and satisfaction, in a specific context use*" [14]. The criteria of this framework are effectiveness, efficiency, satisfaction, and context of use. Typically, the concept of usability also covers comprehensibility, learnability, functionality (operability), attractiveness, appropriateness recognizability, accessibility, user error protection and interface aesthetics [15].

Effectiveness is the accuracy and completeness of user goal achievement, such as symptom reporting. *Efficiency* refers to resource usage, like the time needed to report a symptom. *Satisfaction* involves the user's physical, cognitive, and emotional responses, that result from the use of a system, meeting their needs and expectations.

User eXperience (UX), defined by ISO/IEC 9241 (ISO, 2010) as "*a consequence of the presentation, functionality, system performance, interactive behavior, and assistive capabilities of an interactive system, both hardware and software. It is also a consequence of the user's prior experiences, attitudes, skills, habits, and personality*." Good UX not only contributes to higher work motivation and performance but can also affect the well-being of users [16]. Achieving acceptable UX/usability requires systematic evaluation and iterative design adjustments as the application matures [17,18].

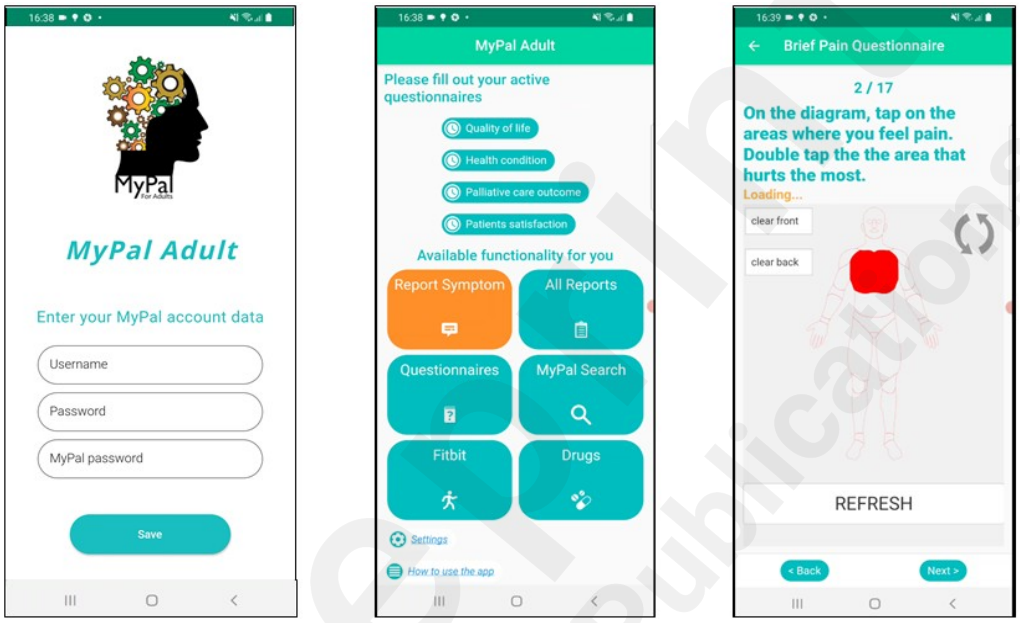
MyPal project

MyPal, a collaborative H2020 research project funded by the European Commission, employs eHealth technologies to support cancer patients and healthcare professionals (HCPs). Its primary aim is to develop and clinically assess two new ePRO-based interventions for both adults and children, along with their carers, to enhance the Quality of Life (QoL) of cancer patients [19]. MyPal uses a user-centered, iterative methodology involving end-users from the project's inception to design various platform components.

The main focus of this study is the MyPal for adult's app [20] with an end-goal to facilitate (1) better self-management of the HMs disease symptoms, and (2) timely assessment of the reported symptoms

or QoL deteriorations by the treating HCPs. Technical components are demonstrated in an openly available video [21]. The MyPal adult platform includes a mobile app (Figure 1) that supports periodic and spontaneous reporting of physical and psycho-emotional symptoms, utilizing standardized ePRO questionnaires for periodic reporting and custom electronic forms for spontaneous reporting. The app also offers features such as medication management, an HCP-tailored information search engine, personalized motivational messages, and tracking of lifestyle parameters like physical activity and sleep quality. Additionally, MyPal for adults provides secondary supportive features that are optional for use, including an app tutorial, tech support chat, and contact information for local MyPal liaisons.

Figure 1 The MyPal mobile app for adult patients (Login page, Home Screen, Question example in ePRO module)



Objective

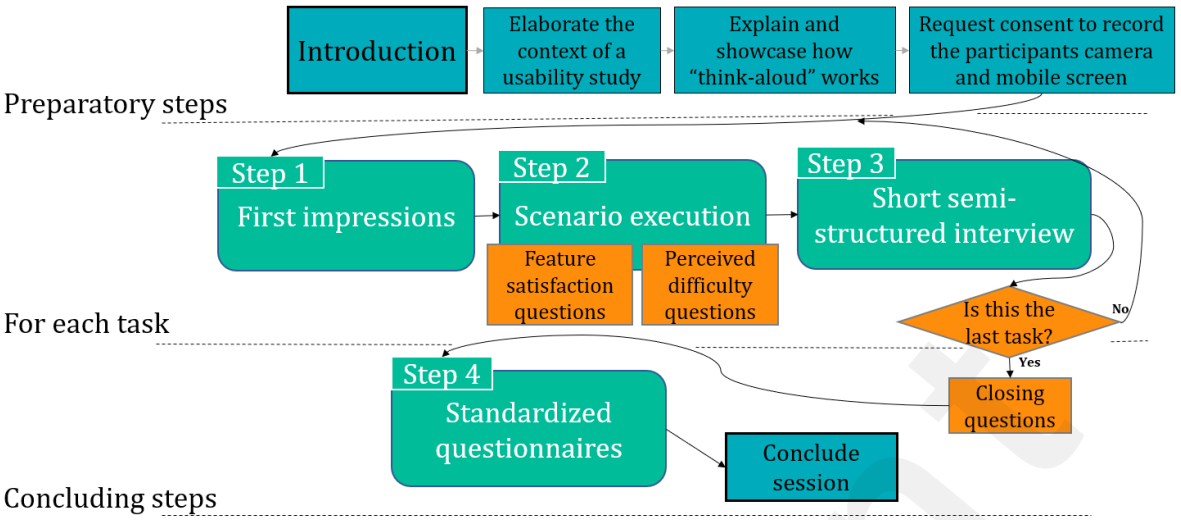
This study aims to evaluate a co-designed, mid-fidelity version of the "MyPal for adults" mobile app using a 4-step framework, including a coaching think-aloud protocol [22], semi-structured interviews, and follow-up questionnaires: PSSUQ [23], the SUS [24] and the UEQ [25] known for their established effectiveness in the literature. The research questions addressed are: Is "MyPal for adults" usable, comprehensible, satisfactory, and acceptable to end users? If not, what are the usability and satisfaction issues in terms of number, type, and severity as evaluated by patients? The study specifically focuses on assessing content, functionality, and barriers experienced by end users.

Methods

Study Design

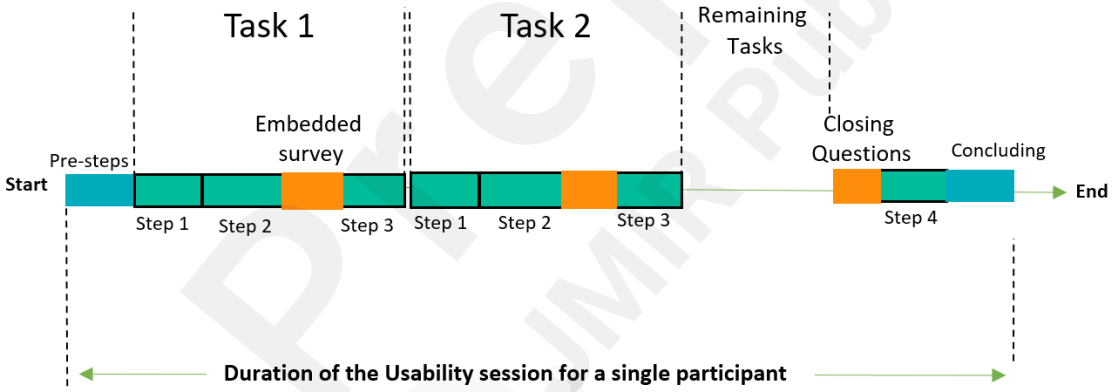
An exploratory study assessed usability through a 4-step process simulating a patient's journey in the MyPal Adult study ().

Figure 2 Study design



Participants conducted a single 55-70 minute teleconference session, following a specific task-based usage scenario (Figure 3). The moderator used a PC with a webcam and the Zoom platform to record facial expressions and mobile device screens. Participants were asked to install the Zoom application on their smartphone and laptop with an embedded camera beforehand. The study adhered to the American Psychological Association Code of Ethics and received ethical approval from the Bio-ethical committee of CERTH. Informed consent was obtained from each participant.

Figure 3 Step sequence in a single think-aloud session



Participant Recruitment

A total of 9 participants were successfully secured. They were recruited from 3 regions in Greece—Thessaloniki, Karditsa, and Heraklion—for feasibility reasons, based on predefined inclusion criteria in the project's Randomized Clinical Trial protocol. Eligible participants were potential users of the MyPal for adults' application, meaning CLL/MDS patients. To this end, members of ELL.O.K. (Greek Federation of Cancer Patients) were contacted via telephone and email. Despite the challenges posed by the COVID-19 pandemic, MyPal's clinical liaisons played a crucial role, ensuring the participation of four eligible CLL patients. To broaden participation, individuals with other chronic diseases sharing care needs similar to CLL/MDS (e.g., autoimmune skin conditions, chronic pulmonary diseases) and recent hospital visits in the last 6 months were also included.

Data Collection

Preparatory steps

At the beginning of each session, participants provided sociodemographic information, including age and sex. They also answered two multiple-choice questions about their smartphone skills and three questions on smartphone app usage (Multimedia Appendix 1). Following the introduction, the usability study's context, task completion logic (described in the task "scenario" in Multimedia Appendix 2), and the think-aloud process were explained in detail. An example task was presented to familiarize participants with the think-aloud method, a commonly used approach to assess digital system usability [26]. Think-aloud tests involve users interacting with the system while verbalizing their thoughts, revealing their inferences, intuitions, mental models, reasons, and decisions during tasks [22].

Step 1: First impressions

During the task "scenario" execution, participants navigated to various functionalities' screens. The moderator inquired about the screens' general eye-catching attributes and the users' initial impressions. For each screen, two questions were posed: (question 1.1) "*What is your initial impression of this screen?*", and (question 1.2) "*How do you rate the design and information organization?*". To gain more detailed insights, a third question was added for each screen (question 1.3): "*What actions do you think you can perform on this screen?*".

Step 2: Task "scenario" with an embedded survey for satisfaction and perceived difficulty

The second step involved executing tasks within the "scenario," where participants were encouraged to think aloud to identify usability issues, aligning with the think-aloud protocol. The "scenario" included in total 16 tasks (Multimedia Appendix 2). Some of the tasks included multiple-choice questions in the 5-Likert and 7-Likert scale[27], to gather quantitative data on perceived difficulty and satisfaction with specific functionalities. While the satisfaction questions were inquired for every feature in the application, (mainly focusing on modules and elements regarded as important early on in the design ideations), the perceived difficulty questions were more targeted. Difficulty perceived questions were only inquired during tasks that had performed poorly based on the results of prior assessment procedures (validation, rehearsal testing) within the MyPal project. In accordance with the think-aloud protocol, moderators worked with participants during task execution, meaning they would jump-in to encourage patients to think-aloud. When a participant struggled with a task, the moderator noted it down and provided guidance. If participants repeatedly encountered issues with a specific action leading to task failure, moderators inquired about the problem's nature to capture participant perceptions and experiences.
Participants' verbalizations about their preferences or dislikes regarding the PROs' content were not considered, as it was not the study's purpose. Nonetheless, participants were encouraged to voice their thoughts while going through the content to uncover potential UI inconsistencies.

Step 3: Short semi-structured interview

After completing the final task in the "scenario," participants were given the opportunity to add anything to their responses regarding feature satisfaction from step 2 and to address any follow-up questions related to the usability evaluation and overall UX. Additionally, three extra questions were posed as part of the semi-structured interview following the last task of the "scenario": (question 3.1) "*How do you perceive the secondary complimentary supportive features? Would you use them?*", (question 3.2) "What would be your first action with this app?" and (question 3.3) "Do you feel the app expects something from you?".

Step 4: Standardized questionnaires

Before concluding each session, quantitative feedback was gathered from participants using established questionnaires, namely the SUS, UEQ, and PSSUQ. Participants were then given the choice to submit either only the PSSUQ or all three questionnaires, and all participants opted to submit all three.

Data analysis

Steps 1 and 3 ("first impression" and "short semi-structured interviews") underwent inductive thematic analysis [28], involving transcription and translation of all participant responses into English, along with the calculation of standardized questionnaire scores. In step 2 (task "scenarios"), a deductive analysis aligned with the ISO framework criteria was performed [28].

Results

Participant Demographics

The participants recruited were comprised of four individuals diagnosed with Chronic Lymphocytic Leukemia (CLL), two senior citizens, and three adult representative users afflicted by a range of chronic ailments, with a predominant focus on dermatological conditions (). All users were acting as “naïve” users, i.e., users who have no training or experience with the app.

Table 1 Participants' sociodemographic data (N=9)

	n	%
Gender		
Women	4	44.4
Men	5	55.6
Age (years mean)	49.7	n/a
Smartphone Skills		
Poor skills	1	11.1
Low skills	2	22.2
Medium skills	2	22.2
High skills	1	11.1
Perfect skills	3	33.3
Prior Experience with similar apps		
Yes	2	22.2
No	7	77.8

Participants' feedback

Step 1: First impressions

This section presents the questions and translations of the transcripts during the first impression collection step, including answers to each question. Participants are identified as [P#].

Question 1.1- "*What is your initial impression of this screen?*"
Every functionality and screen received a positive first impression. No one expressed any major dislikes or was annoyed by something particular in the design. The only negative comment was about the app's icon:

> *I don't particularly like that the icon's portraying a human head that is black like it is burned. Also, the gears appearing like they are inside the head makes me cringe a little bit. [P4]*

Question 1.2 - "*How do you rate the design and information organization?"*
As Question 1.2 significantly overlapped with Question 1.1, participants had already developed an impression of each screen's design by the time Question 1.1 was posed. All participants neutrally accepted every screen in each functionality, with minor feedback primarily related to button placement and text entry field colors.
When analyzing participant responses, two distinct user groups emerged: young users (25-35) and senior users (45-70). While younger participants desired a more modern app design, they found the app's current design very user-friendly.

> *It would be very good if there was an additional UI with a more modern design, like with a side menu etc. but I guess this would be more helpful with older patients as well. I don't really mind it as long as it proves easy-to-use and useful. Which I guess it will… at least it seems that way. [P8]*

The colour palette of the app and the simplicity of the design was very much appreciated by the more senior users.

> *I really like the colours, they are quite soothing, and give me the "healthcare" vibe. Everything seems quite simple and straight forward. [P2]*

Question 1.3 – "*What actions do you think you can perform on this screen?"*
The main purpose of this question was to determine if the context of use for each functionality was evident from the screen's appearance and whether the action-probing screens were distinguishable from the informing and data viewing screens. Almost all participants correctly identified the main purpose of each screen, except for one participant [P9], who was a senior patient with limited technology experience.

> *I understand that the purpose of this screen is to help me manage my disease. I guess it will ask me somehow about my medication. Can I speak to it? I don't understand how to do this or what to do. [P9]*

Step 2: Task "scenario" with an embedded survey on satisfaction and perceived difficulty

We identified 43 problems in the task "scenarios," categorized according to ISO 9241-210 framework criteria. Some tasks couldn't be completed due to programming errors/bugs, leading to classification as N/A (not applicable) and task failure. Screenshots of the affected features were shown to enable the study's continuation in such cases. Most problems (10/43, 23.2%) occurred during questionnaire submission. Other tasks with notable problems were drug entry (5/43, 11.6%) and reminder setting in the drug module (8/43, 18.6%).

presents the problems mapped to the main categories defined by the ISO usability framework, an example for each, and the transcript or description of the observation. It also presents the task where the problems occurred and the type of the problem.

Table 2 Problems with the app, classified according to the International Organization for Standardization framework

	Problems, n (%)	"Scenario" Section and task number (example)	Verbalization or observation (example)	Problem detected (example)
Effectiveness				
	13/43 (30.2%)	App registration process (Task 2)	"So, I can see here the clinics communication information, so I guess I tap on next"	Setting up the notification timing choice was not clear to the eye and as a result the participant didn't notice it and moved on
Efficiency				
	10/43 (23.2%)	Custom personalization surveys and ePROs impression (Task 3)	"Why are the same texts repeated? Wouldn't it be better to have them all grouped so the texts wouldn't have to be repeated?"	There are a lot of seemingly repeated questions in a questionnaire, where only a small phrase would change, and all the other wordings would stay the same.
Satisfaction				
	9/43 (20.9%)	Login and initial settings (Task 1)	"Is this normal, or is it a bug? In any case it should not be like that."	Password needs to be protected, When the passwords are entered, they could be hiding with asterisks
Context of use				

	2/43 (4.6%)	Patient tailored disease-related information search engine (Task 14)	Participant is entering a question directed to his clinicians	The participant did not understand that this is a search engine.
N/A (n=34)				
	9/43 (20.9%)	Fitbit Module (Task 9)	“It doesn’t work. I am pressing the button but I cannot see my sleep data”	There is a technical issue with a specific button, the participant cannot watch his sleep data.

About 30.2% (13/43) were classified as “effectiveness” and took place mainly at the “add a drug” task. A total of 23.2% (10/43) were classified as “efficiency” and occurred mainly at the registration process during the filling-out questionnaire task. A smaller portion (9/43, 20.9%) related to "satisfaction. Two problems were classified as context of use. These problems were identified by a single participant, and both could be explained by the fact that this participant was a senior user, not experienced with mobile apps. The problems coded as context of use included the following: (1) the participant tried to use the MyPal patient tailored disease-related information search engine to “ask a question” (expecting a chat function) to the clinicians and (2) the size of some user interface elements, i.e., the module buttons, text displayed.
In Figure 4 and Figure 5 we present the results of the feature satisfaction and perceived difficulty questionnaires which complemented the usability task “scenario”.

Figure 4 Feature satisfaction

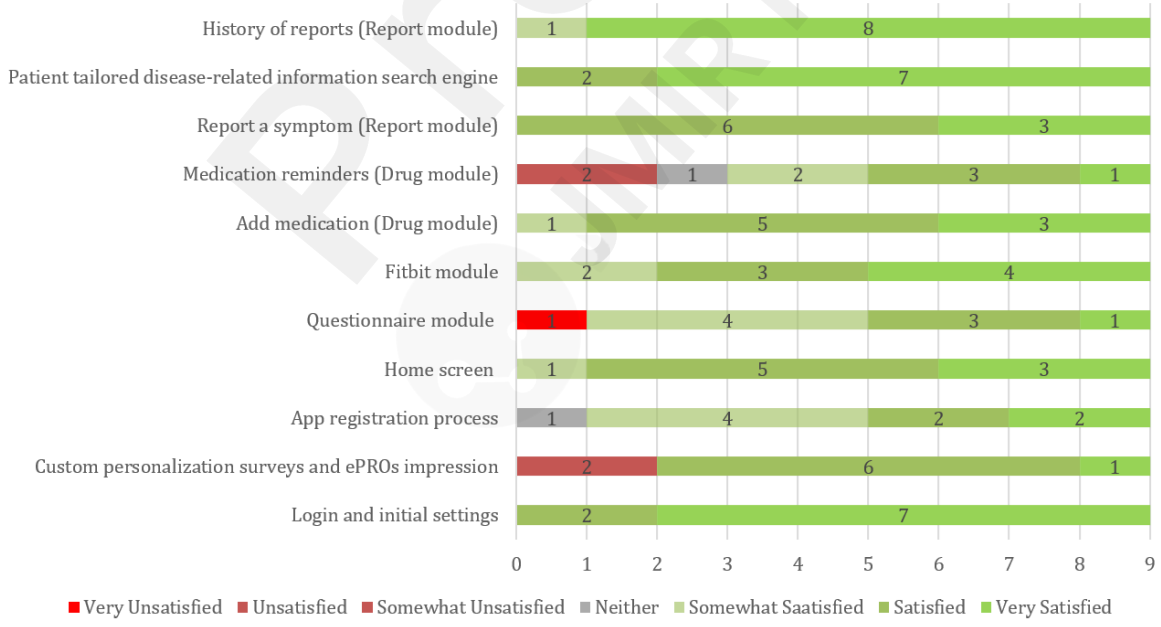
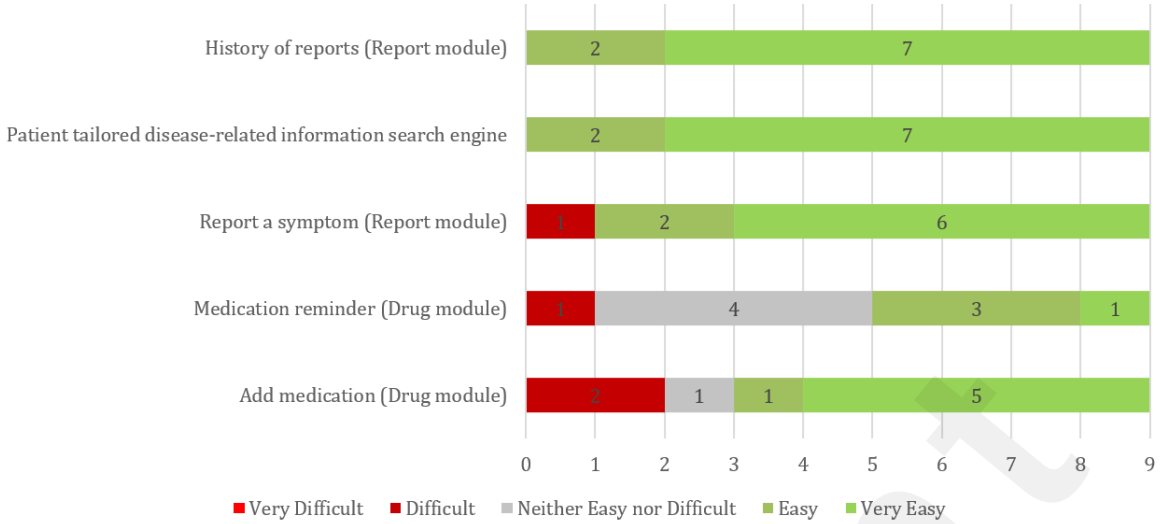


Figure 5 Task difficulty



Step 3: Short semi-structured interview

This section presents the questions and translations of the transcripts during the short semi-structured collection step following the task “scenario”, including answers to each question.

Question 3.1 – *“How do you perceive the secondary complimentary supportive features? Would you use them?”*
All participants expressed their willingness to use every complimentary supportive feature. The tech support chat was very appreciated, as well as the apps manual.

> *I really like the fact that the manual of the app is in the home screen and so easily accessed. [P3]*
> *I really appreciate the chatting service for technical support. I feel like I could do this. [P7]*

Question 3.2 – “*What would be your first action with this app?*”
This question aimed to determine if participants would prioritize pending questionnaires. However, participants' responses were inconclusive regarding this objective because all users, being new to the application, expressed a desire to explore and become familiar with it instead of immediately focusing on the active pending questionnaires.

> *I would like to familiarize myself with the app at first. I would just browse through everything and start playing with it, I guess. [P8]*
> *I would most likely first enter my medications and set reminders for them. Then I would probably report something retrospectively. [P2]*

Only two users expressed the desire to first navigate to the questionnaire module or the questionnaire pending list so they can make sure they have completed everything is expected from them:

> *I guess first step is to familiarize myself with the app and make sure that I have reported everything I must since I can see in the pending list that there are a few questionnaires available for me. [P4]*
> *Well, I am a gadget geek so I would want to explore the whole app. But first I would navigate to the questionnaire module to make sure everything is set. [P1]*

Question 3.3 – “*Do you feel the app expects something from you?*”
This was a follow-up to question 2, ensuring that pending questionnaires were clear to all users. All participants except one did not grasp the main purpose of the pending questionnaire list on the home screen. The participant who understood its purpose admitted it was not obvious and required guidance from the moderator.

Yes, of course it is expecting me to answer these pending questionnaires displayed in this list. But I have to say if you had not asked me before I would not notice it right away. I would eventually but not right away. [P5]

Step 4: Standardized questionnaires

Following every session, the participants were asked to submit a follow-up questionnaire that included the post-use SUS, the UEQ, and PSSUQ. All participants submitted every questionnaire.

Table 3 - Post-study questionnaire scores

	post-study questionnaire measures	value
PSSUQ	System Usefulness (SYSUSE) Score	2.14
	Information Quality (INFOQUAL) Score	2.70
	Interface Quality (INTERQUAL) Score	2.77
	Overall PSSUQ Score	2.46
SUS score		68.9
UEQ Scales (Mean)	Attractiveness	1.667
	Perspicuity	1.444
	Efficiency	1.500
	Dependability	1.361
	Stimulation	1.528
	Novelty	1.306

Discussion

Principal Results and Findings

This study assesses the usability and UX of the MyPal for adults' app in the early phases of the MyPal project. Results from the timeline usability test yielded a marginally positive SUS score of 68.9, as per Brooke [24]. UX results were favorable, as evidenced by UEQ means and user feedback. PSSUQ also showed a positive outcome (2.46), with higher ratings for usefulness compared to information quality and user interface. While all quantitative data indicated an acceptable score, a closer examination of participant responses revealed that the primary issues with the app were related to learnability, suggesting that users need time to understand and effectively use the application. Furthermore, while the presentation of information was comprehensible, there is room for improvement in tailoring it better.

Findings from step 1 confirm that all participants found the presented information comprehensible, with a clear organization of information. However, participants made numerous proposals, suggesting a potential need for a more personalized interface. These proposals mainly pertained to button placement, header wording, and contextual text. Nearly every module's screen had its purpose understood by all participants, except for one senior user who faced challenges with technology in general.

Findings from step 2 revealed more issues in the drug reminders and emergency contact number modules compared to the ePROs, which are the app's primary focus. Participants found the reminder function confusing and indicated they might not use it. Locating emergency contact information was challenging for all participants. Additionally, two modules faced technical problems: (1) the Search engine module and (2) the activity data display in the Fitbit module. Module (1) experienced unexpected bugs because the study was conducted on the development server, while module (2) had difficulties connecting to the Fitbit server during the project's early development phase. However, the ePRO-related modules were well-received by all participants, with only minor suggestions for header wording, as their functions were clear to everyone.

In general, participants enjoyed using the app, with age influencing their preferences. Older participants appreciated the app's simplicity, while younger ones desired a more modern design. All participants had suggestions for UI-related details and expressed concerns about module titles or text. For instance, "Questionnaires" could be improved to "My Questionnaires" to clarify its purpose. An interesting finding was the importance of translating paper-based PROs into digital "ePROs" successfully. Unlike paper-based PROs presented on a single sheet, ePROs in the MyPal for adults' app had individual screens for each question, leading to perceived information redundancy and concerns about falsely perceived technical issues. Participants also raised concerns about HCPs' ability to respond promptly to MyPal reports due to their busy schedules, aligning with previous research on chronic pain monitoring [29].

Findings from step 3 indicate a desirability to learn the application. Participants expressed their desire to “play around” with the app and start entering their medications and setting reminders, as well as report retrospectively symptoms they had in the past. Most of them mentioned they feel satisfied having access to the manual of the app but also some of the more senior participants expressed expectations of complex computations in the background, accompanied with a high reliability to the app.

Lastly the importance of iteration in the development cycle must be highlighted, since all participants had problems with the presentation of the ePROs and almost all participants but one missed the pending list of questionnaires, present in the home screen of the application. Although this could in part be attributed the actual question which was formulated in a way to not betray its purpose, the fact that it was missed completely by almost every participant (all but one) suggests that a redesign of the application following the principals of UX is needed.

Challenges and Limitations

Study limitations include programming errors that interrupted tasks and potentially led to the loss of usability information. These errors endured due to concurrent bug fixes conducted alongside the study. The scheduling challenges related to usability testing caused by COVID-19, compounded by the Greek National Health System's discouragement of hospital visits, resulted in significant delays. Consequently, participants faced programming errors that impeded their ability to complete tasks without issue.

Beyond these limitations, the main challenges were related to the study participants. First, the participants had a very diverse level of smartphone skills. The second limitation was the age gap between the participants. Age is a determining factor in the use of mobile application products. Other studies in palliative care [30] and the context of chronic pain [29] have yielded comparable results. To enhance user adoption, it is crucial to design monitoring systems that are user-friendly, especially considering the older generation's preferences and needs [31].

Furthermore, participant recruitment was arduous due to the constraints imposed by the COVID-19 pandemic. Initially targeting users with CLL or MDS, recruitment difficulties led to a shift towards enlisting senior patients coping with other chronic diseases that necessitate periodic hospital visits. While the original objective was to secure 10-15 participants, the study ultimately included 9. Faulkner et. al [32] have demonstrated that groups of 10 users can identify an average of 95% of usability problems, mitigating concerns regarding sample size. It is worth noting that the study's findings possess limited generalizability but can be partially applied to self-management mHealth systems employing ePROs within the context of palliative cancer care, with a focus on a dedicated mobile application tailored for cancer patients with hematologic malignancies.

Comparison with Prior Work & Future Directions

Our usability evaluation of the MyPal for Adults app highlights its potential to enhance the palliative care experience for patients. Comparing our findings with prior research in the field of eHealth applications for palliative care, several key insights emerge. Firstly, our study aligns with previous research that emphasizes the potential of eHealth applications to improve communication between patients and healthcare professionals in palliative care settings [33]. Through the MyPal app, participants in this study reported improved channels for information exchange, empowering them to actively participate in their care decisions. This echoes findings from related studies [34–37], which have also highlighted how eHealth applications can bridge the communication gap in palliative care, providing a convenient and accessible platform for patients to engage with their healthcare providers.

While our usability evaluation yielded positive outcomes, it's important to note that, similar to much of the prior work in this field [33], our study primarily involved testing, feasibility assessments, and acceptability studies on relatively small patient populations. A comprehensive evaluation that can impact patient outcomes, including symptom management, quality of life, and overall satisfaction with care, necessitates the execution of rigorous clinical trials [38]. This phase of assessment represents the final critical stage in establishing the app's effectiveness and suitability for integration into palliative care practices, as is the plan with the MyPal for Adults app.

Future research should aim to broaden the usage of the MyPal app to include a more diverse range of palliative care patients. Additionally, the integration of the app with existing healthcare systems is crucial to enhance its functionality, providing healthcare professionals with real-time patient data and enabling better care coordination. Lastly, ongoing development efforts should prioritize a user-centric design approach, incorporating input and feedback from both patients and healthcare providers to maintain the app's intuitiveness, accessibility, and alignment with evolving user needs.

Conclusions

This usability study assessed the MyPal for adults' application with a diverse user group, including chronic disease patients and seniors. Participants generally had positive initial impressions of the app's design and organization, though some preferred a more modern interface. While certain modules posed challenges, electronic patient-reported outcome (ePRO) modules received favorable feedback. However, enhancing learnability, personalization, and addressing technical issues in some tasks is essential. This study emphasizes the importance of iterative, user-centered development to improve the app's usability and user experience. Notably, older users favored simplicity, while younger users sought a contemporary design, indicating room for age-specific improvements. Given the app's role in palliative cancer care, effective ePRO implementation and thoughtful translation of paper-based PROs into digital formats are critical. Ensuring timely healthcare provider responses to patient reports is vital. These findings offer valuable insights for refining the MyPal application and are applicable to other self-management mHealth systems in palliative cancer care.

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Conflicts of Interest

none declared

Abbreviations

CLL: Chronic Lymphocytic Leukemia
ePROs: electronic patient-reported outcomes
ELL.O.K: Greek Federation of Cancer (Greek abbreviation)
HCP: Health Care Professional
HM: Haematological Malignancies
ISO: International Organizations for Standardization
mHealth: mobile health
PSSUQ: Post-study System Usability Questionnaire
QoL: Quality of Life
SUS: System Usability Scale
UEQ: User Experience Questionnaire

Multimedia Appendix 1

1. On a scale of 1(Poor) - 5 (Excellent) How would you rate your experience using applications?
2. What kind of things do you do regularly with your mobile phone?
3. Have you used an app to search for information about your health?
4. Tell me about the last time you used a health-related app. What was it and why?
5. Have you used an application similar to MyPal for adults in the past? (Yes, No, Not Sure)

Multimedia Appendix 2

Usage Scenario: You are a patient who has been diagnosed with CLL for which you are receiving medication. However, there are no serious health implications for you at this moment, but you need to monitor it closely. Your doctor has informed you about the MyPal application and the smartwatch device that accompanies it. You already know that it is primarily a questionnaire application designed to help organize health information for both you and your doctor. It also includes some additional features. The questionnaires used in MyPal are standardized, meaning they have been designed by professionals for the specific purposes we use them for and are activated based on predetermined schedules. Specifically, there are weekly and monthly questionnaires that are sent to you to be completed within specific timeframes to ensure their timeliness. Other features include the spontaneous reporting of symptoms, medication reminders, the personalized MyPal search engine, and the display of your activity in steps and sleep quality on a chart.

And now with that information in mind let's begin…

Login and initial settings

1. “You were given a username, a password and a MyPal password before our session. Have them available! Locate and open the application and tell us your opinion about the application icon.”
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate this task’s content in terms of experience/satisfaction?

App Registration Process

2. “You have started the registration process. Follow each step of the process and tell us what you think?”

Custom personalization surveys and ePROs impression

3. “You have reached a MyPal questionnaire. Enter your answer and let us know of your impressions?”
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate this task in terms of experience/satisfaction?
4. “Suppose you feel offended by a question and do not want to answer it. What would you do?”

Smartwatch pairing procedure

5. “You were also given a fitbit username and password. Use them to connect to the fitbit server.”
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate the app registration process in terms of experience/satisfaction?

Home Screen impressions

6. “Scroll up and down on this screen and let us know what you think of your first impression of the overall design?”
    - “What do you think is the purpose of this page?”
    - “Do you find this application reliable?”
        i. “If not, what would you expect to see from a trusted application?”
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate this task’s content in terms of experience/satisfaction?

Questionnaire Module

7. “You want to find and see your already answered questionnaires”
8. Now that you are in the questionnaire section, what are your impressions on this page? What can you do on this page?
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate this task’s content in terms of experience/satisfaction?

Fitbit Module

9. You want to find and view your fitbit data
10. Now that you are in the fitbit module, what are your impressions of this screen? What can you do here?
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate this task’s content in terms of experience/satisfaction?

Drug Module

11. You are about to start a new medication and your doctor advised you to register it in the MyPal application. Add your medication called ibuprofen with instructions for taking it: twice a day on a full stomach.
    - On a scale of 1(Very difficult) - 5 (Very easy) where would you rate this task in terms of difficulty?
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate this task’s content in terms of experience/satisfaction?
12. You tend to forget, so you'll want to set medication reminders.
    - On a scale of 1(Very difficult) - 5 (Very easy) where would you rate this task in terms of difficulty?
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate this task’s

content in terms of experience/satisfaction?

Symptom Report Module (1/2)

13. You noticed a strange rash on your hand a few days after the medicine and you want to report it.
    - On a scale of 1(Very difficult) - 5 (Very easy) where would you rate this task in terms of difficulty?
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate this task's content in terms of experience/satisfaction?

Patient tailored disease-related information search engine

14. You tend to worry a little about your rash. Your doctor has informed you that you can search for accurate information tailored to you through the MyPal search engine.
    - On a scale of 1(Very difficult) - 5 (Very easy) where would you rate this task in terms of difficulty?
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate this task's content in terms of experience/satisfaction?

Symptom Report Module (2/2)

15. You want to make sure the information you entered about the symptom you mentioned earlier is accurate?
    - On a scale of 1(Very difficult) - 5 (Very easy) where would you rate this task in terms of difficulty?
    - On a scale of 1(Very unsatisfied) - 7 (Very satisfied) where would you rate this task's content in terms of experience/satisfaction?

Emergency Communication details

16. You are curious to locate the contact details of the clinic
    - On a scale of 1(Very difficult) - 5 (Very easy) where would you rate this task in terms of difficulty

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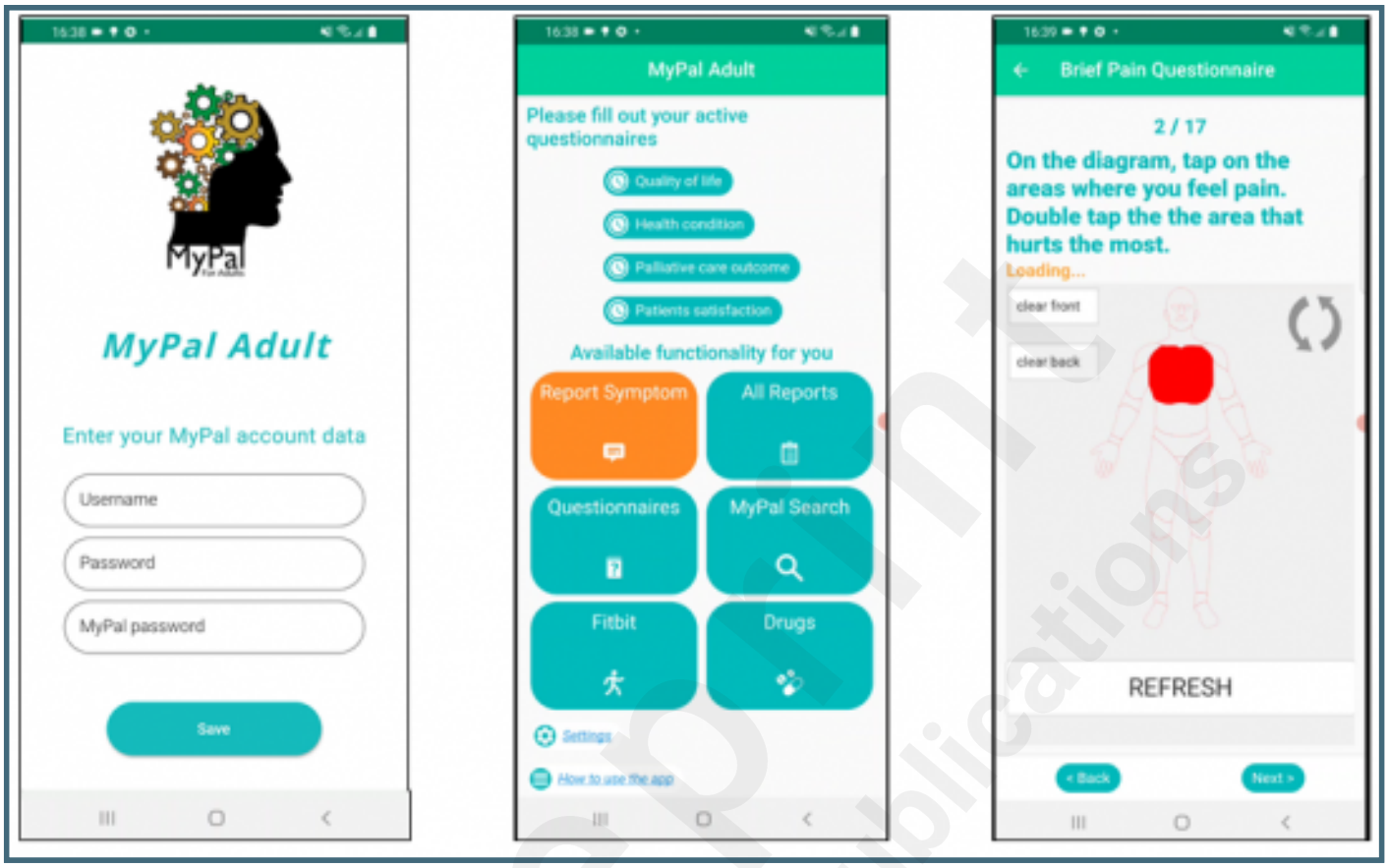
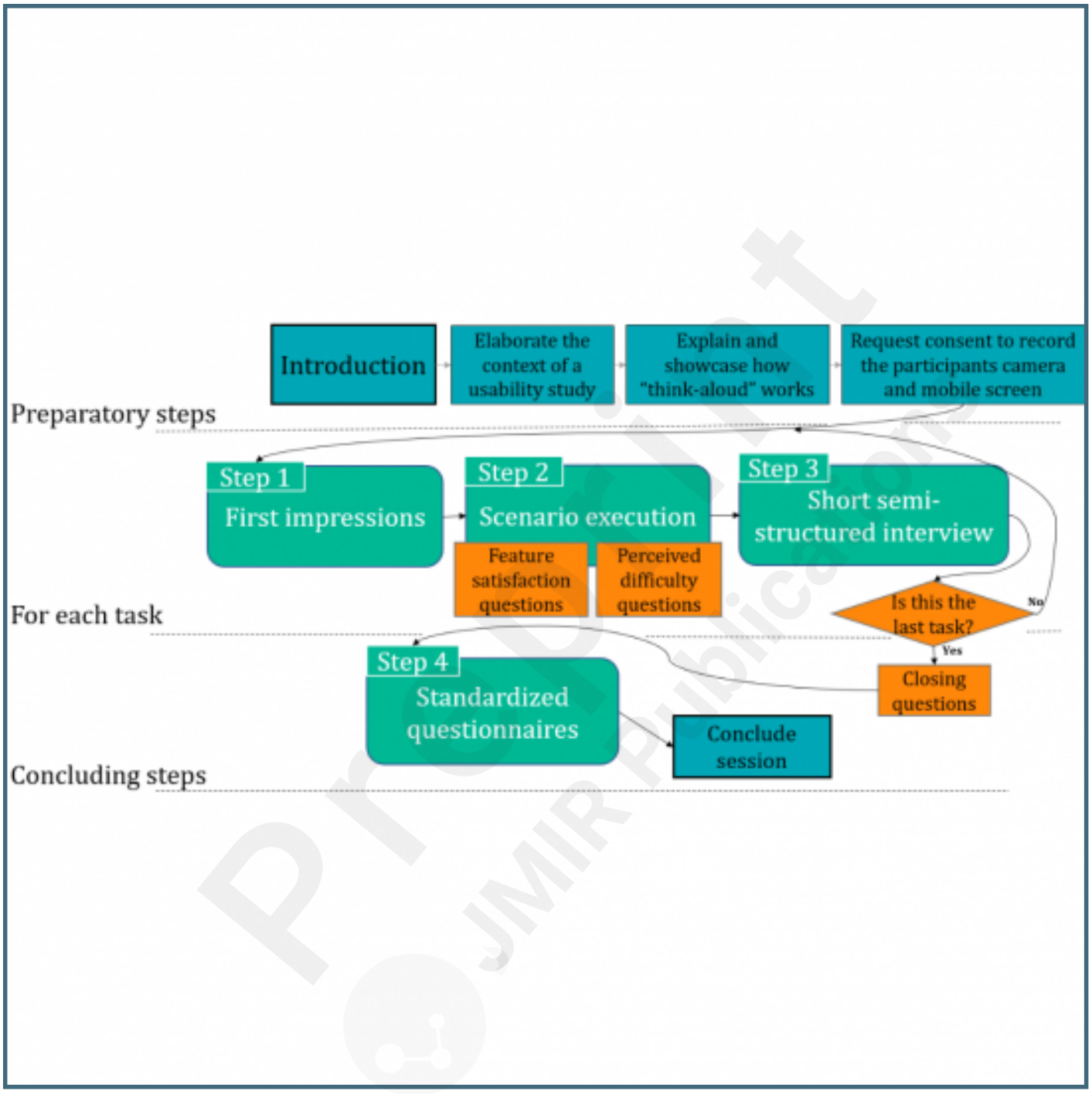
Supplementary Files

Figures

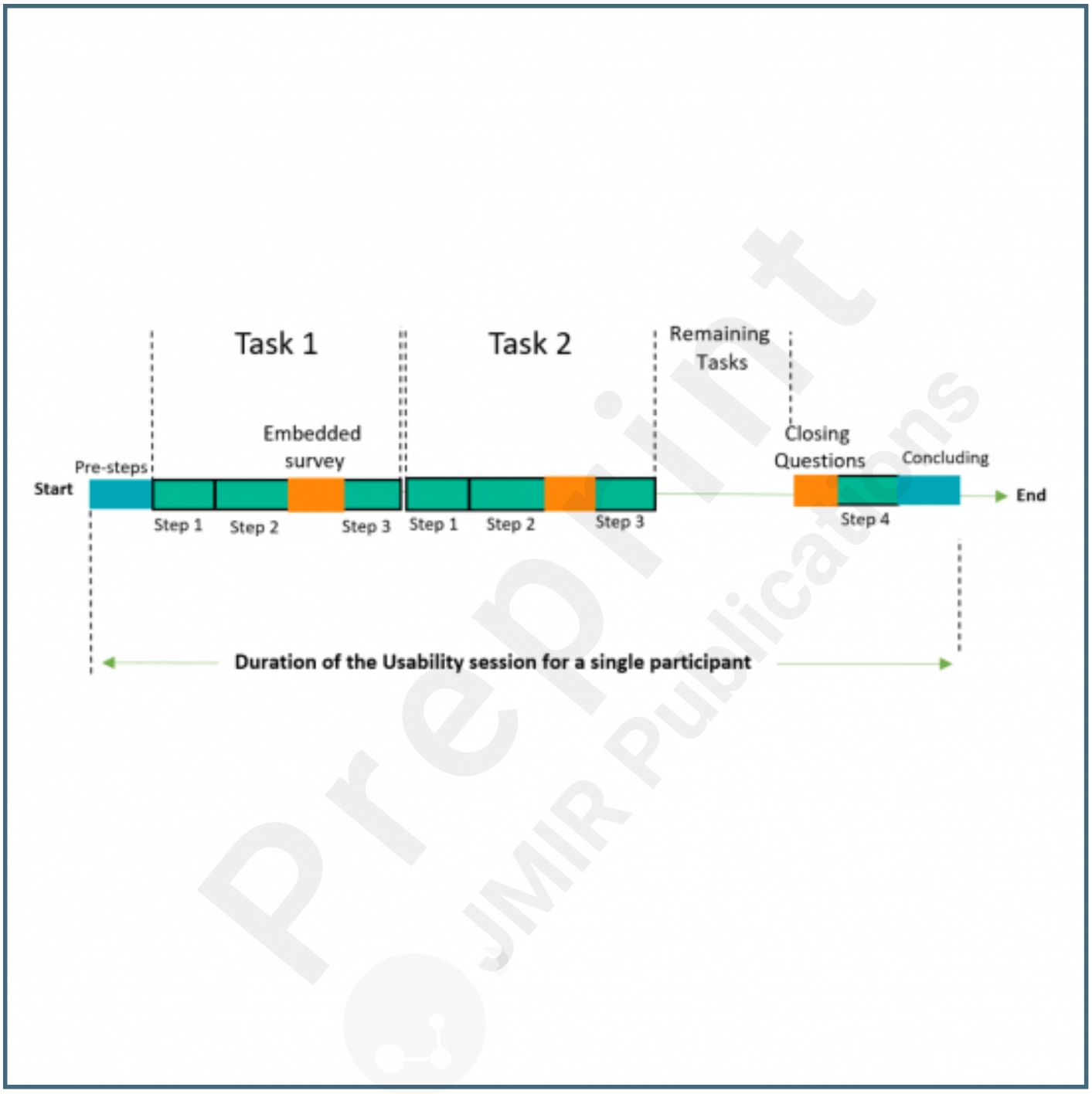
The MyPal mobile app for adult patients (Login page, Home Screen, Question example in ePRO module).



Study Design.



Step sequence in a single think-aloud session.



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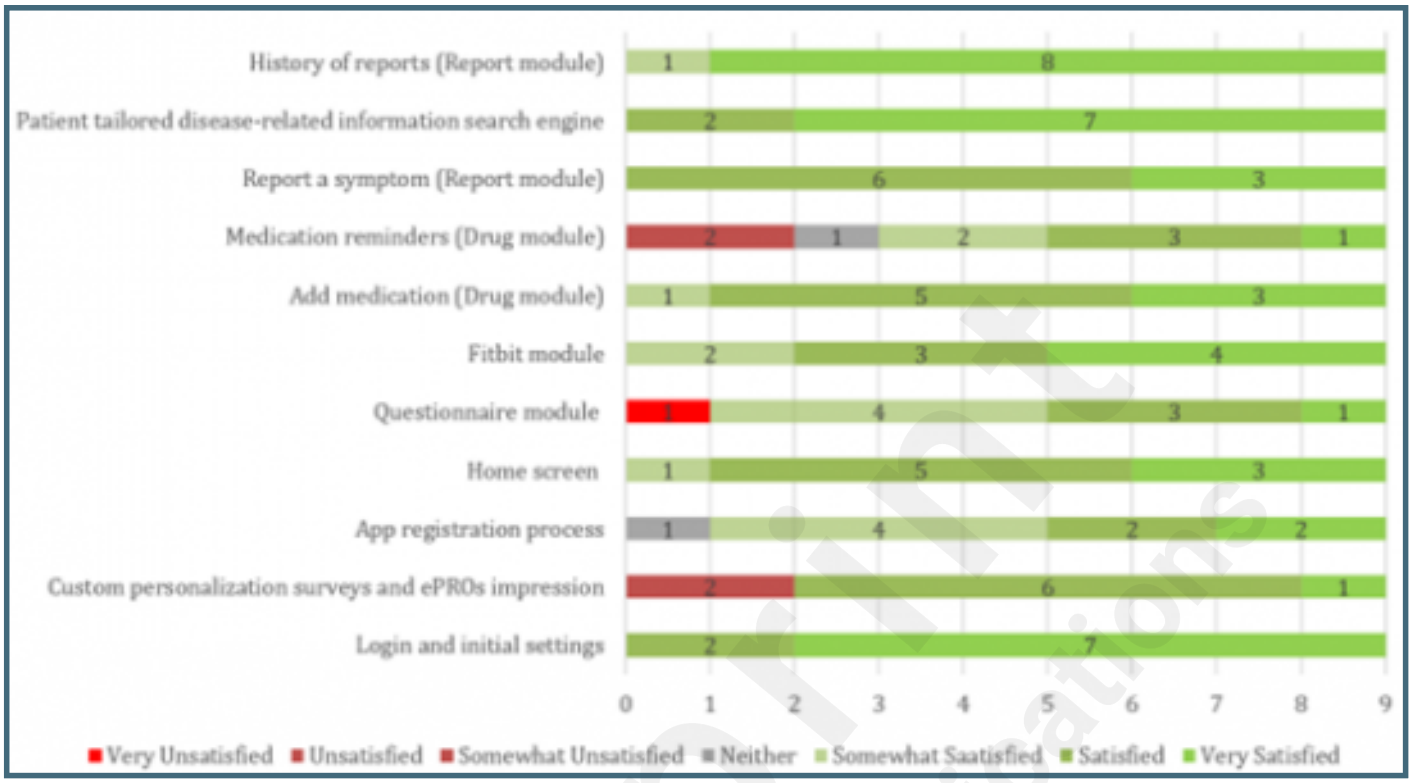
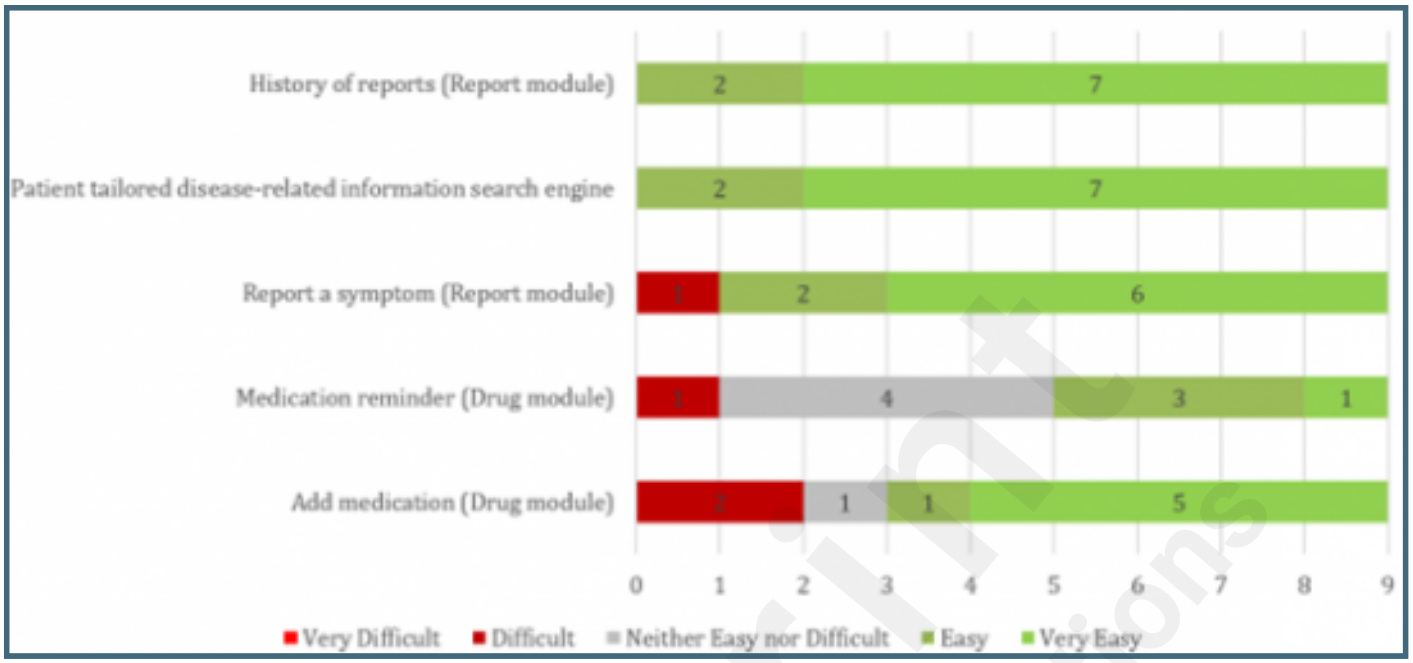


Task difficulty.



Multimedia Appendixes

Questions asked during the Preparatory Steps.
URL: http://asset.jmir.pub/assets/679a4c8e49cc8d503bb8d510c2495cc4.docx

Task Scenario, and Task list.
URL: http://asset.jmir.pub/assets/4a5a0c817d6963803655a5d7e3ab4139.docx