User experience of a smartphone-delivered sexual health promotion programme for older adults: Outcomes of a pilot study in the Netherlands

Ana Correia de Barros, Mariëtte Bergmans, Kreshnik Hasanaj, Drianë Krasniqi, Catarina Nóbrega, Bruna Carneiro, Priscila Vasconcelos, Ana Luísa Quinta-Gomes, Pedro J Nobre, Joana Couto da Silva, Cristina Mendes-Santos

Submitted to: JMIR Human Factors
on: January 11, 2024

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Abstract

Background: Sexual health is an important component of quality of life among older adults. However, older adults often face barriers in attaining a fulfilling sexual life due to issues such as stigma, lack of information, or difficult access to adequate support.

Objective: To evaluate the user experience of a self-guided, smartphone-delivered programme to promote sexual health among older adults.

Methods: The mobile application was made available to community-dwelling older adults in the Netherlands, who freely used the application for a total of eight weeks. User experience and respective components were assessed using bespoke questionnaires, the System Usability Scale, and semi-structured interviews. Quantitative and qualitative data were descriptively and thematically analysed, respectively.

Results: Fifteen participants, aged 71.7 ± 9.5 (mean ± SD), completed the trial. Participants showed a neutral to positive stance regarding the mobile application's usefulness and ease of use. Usability was assessed as 'Ok/Fair'. Participants felt confident using the mobile application. To increase user experience, participants offered suggestions to improve content and interaction, including access to specialised sexual health services.

Conclusions: The sexual health promotion programme delivered through a smartphone in self-guided mode was usable. Participants' perception is that improvements to user experience, namely in content and interaction, as well as connection to external services, will likely improve usefulness and acceptance.

(JMIR Preprints 11/01/2024:56206)
DOI: https://doi.org/10.2196/preprints.56206

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Conclusion: The sexual health promotion programme delivered through a smartphone in self-guided mode was usable. Participants' perception is that improvements to user experience, namely in content and interaction, as well as connection to external services, will likely improve usefulness and acceptance.

Keywords: Internet Interventions; mHealth; Older adults; Sexual health; Smartphone; User experience; Pilot study.

Introduction

Sexual health is a component of general health [1] and quality of life in older age [2]. However, older age is also associated with barriers to a fulfilling sexual life [3–5].

Many older adults are sexually active [6] but are at a higher risk than the general population to present sexual difficulties and dysfunctions. Older women often report decreased libido or lack of vaginal lubrication, while erection issues, reduced sexual desire, or being unable to reach orgasm are difficulties regularly reported by men [7]. In healthcare services, sexual difficulties are often untreated [8] and aggravated by poor communication related to lack of appropriate and case-specific information, lack of training among clinicians, or negative social beliefs and societal stigma, which causes the topic to be difficult to bring about by both patients and clinicians [9]. Therefore, identifying means of circumventing societal stigma and providing timely and adequate support are two important courses of action towards promoting sexual health among older adults.

As the prevalence of smartphone ownership and access to the Internet increase [10], there is an opportunity to use these technologies to deliver ubiquitous sexual health support in an inconspicuous manner, i.e., one which does not overly expose support seekers to fears of social judgement. Smartphones, since they are intimate technologies, which accompany their owners at virtually all times, seem to be an adequate means for the delivery of sexual health promotion programmes. Although there is evidence of the efficacy of Internet-based sexual health interventions on sexual dysfunction [11] or sexual health education [12], literature is non-existent on smartphone-based sexual health interventions targeting older adults [13].

Critical to the acceptance and adoption of such technologies is the user experience they provide [14,15]. Coined by Don Norman, the term “user experience” was used by the author to characterise all the set of experiences a user has with a product throughout a user journey, from intention to use until post-use reflections [16]. Therefore, the concept goes beyond usability, defined by ISO as “the extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” [17]. Designing positive user experiences with mobile digital technologies for older adult users has been a focus of many studies since levels of engagement have been low, thus hampering the potential health benefits of such technologies [18]. Research has found that older adults’ user experience with mobile digital health could be improved if the technology considered potential user sensorimotor and cognitive issues, users’ motivation, social support [18], as well as if it promoted more personalised experiences and trust [19]. While there are general guidelines on designing for accessibility and inclusive design [20,21], best practices on designing digital technologies for sensitive topics such as sexuality and intimacy are lacking [22]. Understanding older adults’ experiences with such technologies in the topic of sexual health is critical to improve their acceptability, usability, and adoption, so that they can deliver positive outcomes. However, no study has reported yet on older adults’ user experience with smartphone-delivered delivered sexual health promotion programmes.

To address the aforementioned gaps, we have designed a smartphone-based sexual health promotion programme [23] under a European project called Anathema (ref. AAL-2020-7-133-CP). This programme was made available to older adults in a longitudinal study during which we assessed participants’ user experience with the software. The findings contribute to the body of knowledge on older adults’ preferences, use and appropriation of digital technologies for sexual health and the design of smartphone-based sexual health promotion programmes targeting this population.

Aim

The aim of this study was to evaluate the user experience of Anathema, a self-guided, smartphone-delivered programme to promote sexual health among older adults.

Anathema mobile application overview

The mobile application used in this study was developed using a participatory design approach [24], which involved users from three European countries using the following methods: questionnaires, interviews, focus groups, usability tests and co-design workshops [22,25].

The application is available for Android and iOS operating systems and contains a sexual health promotion programme tailored to older adults. The programme, which has an 8-week duration, is organised into five modules (which include chapters and sub-chapters)::

- *Module 1 - Let's talk about sexuality (week 1)* - features information on male and female anatomies, sexual response, the importance of sexual pleasure, and sexual rights.
- *Module 2 - When age and illness come in the way (week 2)* - addresses successful ageing, the physiological, cognitive, and emotional changes in older age, and the main sexual problems and sexual dysfunction in older age.
- *Module 3 - Emotional and physical intimacy (weeks 3-6)* - covers psychoeducation on the cognitive-behavioural therapy model and the impact of sexual beliefs, thoughts, and emotions on sexuality. Includes exercises of cognitive restructuring, mindfulness, and communication skills training.
- *Module 4 - Exploring one's sexuality (week 7)* - delivers information on sex aids and strategies to enhance sexual pleasure and satisfaction. Includes sexual skills training and Mindfulness exercises.
- *Module 5 - Planning for a long-term fulfilling sex life (week 8)* - targets on relapse prevention with a focus on strategies to maintain progress and prevent setbacks. It also shares strategies to promote a healthy lifestyle and sexual health.

Each module is unlocked upon the completion of the previous one to ensure knowledge and skills acquisition. The chapters and subchapters are made of content in the form of text, images, and videos. The programme also includes exercises, such as written reflections or answers to multiple-choice questions using radio buttons (Figure 1). The application is available in English, European Portuguese, German and Dutch.

The mobile application does passive data collection through timestamp logs of interactions (e.g., module completion date), as well as active data collection through logs of users' inputs on exercises. Another tool, Trial Monitor [26], fetches data from the database and shows visualisations thereof to the research or therapist teams.

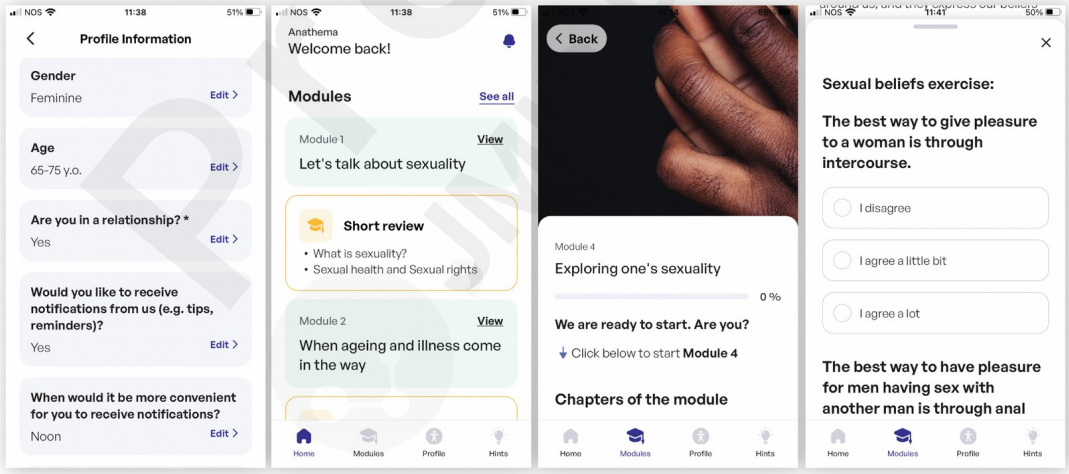

Figure 1 Sample screens from the Anathema app (left to right): Personal information; Overview of modules; Introduction to module; Exercise.

Methods

Study design

The study design was a single-arm pilot study with older adults (55 years of age or older) testing the self-guided format of the sexual health promotion programme in its Dutch version. The pilot was

conducted to assess user experience of the programme. The content, structure and format were also preliminarily evaluated towards the identification of improvements to the programme and technological means of its delivery.

Inclusion and exclusion criteria

The inclusion criteria to participate in this trial were: a) the ability to give informed consent; b) being 55 years old or older; and c) having digital skills and internet access. Exclusion criteria were the following: a) having a severe psychiatric disorder, alcohol or substance abuse; b) taking medication that could interfere with sexual response; c) having an uncontrolled medical condition that could interfere with sexual health; d) and currently being on psychotherapy for sexual or intimate problems or for other psychological problems, and/or current participation in another intervention study or clinical trial.

Study procedures

In a previous phase of this research, a total of 1119 older adults, recruited through the contact list of the Dutch senior organisation KBO-PCOB, answered a questionnaire on unmet sexual needs [25]. In this questionnaire, respondents were asked to indicate whether they would be available for future research within the same research project. The respondents who gave a positive reply were regularly invited to take part in user research activities throughout research project [22], including for the pilot study which we describe in this paper. The majority in this subsample (N=346) were men (69.4%), with a high education level (53.2%), and retired (89.9%). For the pilot study, further potential participants were contacted via other KBO-PCOB channels, including KBO-PCOB's employees. All potential participants were informed about the objectives and procedures of the study. Participants who agreed to participate signed the informed consent form.

Upon signing the informed consent form, participants were asked to fill in an online screening questionnaire. If deemed eligible to take part in the study, participants were asked to answer an online sociodemographic questionnaire. After filling in the questionnaire, participants were given access to the Anathema app and prompted to complete the program in 8 weeks.

Once they had completed the five modules in the app, participants were asked to fill in an online self-developed user experience questionnaire, which also included the System Usability Scale (SUS). Participants were then invited to take part in a semi-structured debrief interview about their experience with the programme.

Metrics and data analyses

The main outcome of the study was user experience, which included dimensions of usefulness and usability. User experience was assessed post-intervention (Appendix I – Post-test questionnaire) with a self-developed multiple-choice list of characteristics (answer options: *accessible, arousing curiosity, attractive, boring, elegant, fascinating, helpful, instructive, meets expectations, strenuous*), a question on free grading of the app from 1 to 10, with 10 being the highest grade, a Net Promoter Score question (answer options: *Yes / No / Don't know*), and a semi-structured debrief interview with questions addressing usefulness, usability, feasibility, clinical aspects and implementation (Appendix II – Semi-structured interview script). Perceived usefulness was assessed with a self-developed 5-point Likert scale assessing the programme in general, each module, and exercises. Usability was assessed via a self-developed 5-point Likert scale on perceived ease of use and perceived readability, as well as with the Dutch version of the System Usability Scale (SUS) [27]. Assessment of self-perceived contribution of the programme to changes in satisfaction and pleasure in sex life was also done post-intervention with a single-item question (4-item descriptive rating scale).

To characterize the study sample, socio-demographic variables were collected using a self-developed questionnaire assessing: age, education, professional status, gender, sexual orientation, marital status,

current sexual partnership status, satisfaction with current sex life (5-point Likert scale), and self-rated quality of life and degree of satisfaction with own health (based on items 1 and 2 from WHOQOL-BREF [28]).
The interviews were audio recorded and partially transcribed for relevant content. The transcriptions, written in Dutch, were then translated into English by a native Dutch speaker (MB) for analysis by a non-Dutch speaker (ACB). The questionnaire and the interview data were descriptively and thematically analysed, respectively.

Ethics approval

The study was approved by the ethics committee of Faculty of Psychology and Educational Sciences, University of Porto (ref. 2022/01-05b).

Results

Participants

A total of 400 participants were approached to take part in the study. Most did not provide a reason for declining or not answering the invitation. From those who did (n=47), the reasons given were that participants: were no longer interested (n=15), considered the pilot required too much commitment/effort (n=12), felt uncomfortable with the topic (n=9), considered they did not meet the criteria (n=5), or had a malfunctioning email (n=5). We also received the information that one person had passed away.
Twenty-three agreed to participate and filled the online screening questionnaire to confirm eligibility criteria. All participants were deemed eligible and were given access to Anathema after answering in a sociodemographic questionnaire.
Eight participants dropped out of the study. Four participants did not provide a reason for abandoning the study. Those who did, shared the following: discontinued access to the Internet (n=1), dissatisfaction with the fact that future content modules were locked (n=1), inability to install and open the app (n=1), lost motivation to use the app (n=1). Fifteen participants used the Anathema app having completed all the modules and filled in the final questionnaire on user experience and usability. Eight participants agreed to take part in a debrief interview.
The 15 participants who used the app and answered the final questionnaire were seven cis-women and eight cis-men between 56 to 85 years of age (*M*=68.3, *SD*=9.5). Most (n=12) were retired and most (n=10) had completed higher professional education. Six participants were married, four were single, three were cohabiting and two were widowed (Table 1).

Table 1 Sociodemographic characteristics of the sample (N=15)

	n (%)
Gender	
Female	7 (47%)
Male	8 (53%)
Marital Status	
Single	4 (27%)
Cohabiting	3 (20%)
Married	6 (40%)
Widowed	2 (13%)
Professional Status	
Employed	3 (20%)
Retired	12 (80%)

Education	
Secondary professional education	2 (13%)
Higher professional education	10 (67%)
University/scientific training	3 (20%)
Age (in years)	
Mean (SD)	71.7 (9.5)
Range	56-85

Most of the 15 participants were exclusively heterosexual (n=12), most had sex with a partner in the context of an exclusive relation with that person (n=11), and level of sexual satisfaction was heterogeneously distributed, as shown, together with complete sexual characteristics in Table 2. The sample was made of participants who tended to positively rate their quality of life as well as their health (Table 3).

Table 2 Sexual characteristics of the sample (N=15).

	Baseline n (%)
Sexual orientation or preference	
Exclusively heterosexual	12 (80%)
Mainly heterosexual	2 (13%)
Exclusively homosexual	1 (7%)
Current sexual partners	
Sex with a partner, in the context of my exclusive relationship with him/her	11 (73%)
Casual sex with a partner	1 (7%)
No sexual partner	3 (20%)
Satisfaction with current sex life	
Very satisfied	3 (20%)
Satisfied	5 (33%)
Neither satisfied nor dissatisfied	4 (27%)
Dissatisfied	3 (20%)

Table 3. Perceived quality of life and health satisfaction (N=15).

	Baseline n (%)	Post-test N (%)
Rating of quality of life[a]		
Very good	8 (53%)	9 (60%)
Fairly good	7 (47%)	5 (33%)
Neither good nor bad		1 (7%)
Satisfaction with health[b]		
Very satisfied	8 (53%)	7 (47%)
Satisfied	7 (47%)	7 (47%)
Neither satisfied nor dissatisfied	--	1 (7%)

[a] Original wording: How would you rate your quality of life? Rated on a 5-point Likert scale: 1=very bad to 5=very good.

[b] Original wording: How satisfied are you with your health? Rated on a 5-point Likert scale: 1=very dissatisfied to 5 very satisfied.

User experience

In this section, we present the quantitative and qualitative results about participants' user experience (Table 4). As we do so, we will be providing interpretations to the results, mostly due to the interpretation that is required by the analysis to the interview data. Therefore, we will necessarily discuss some of the results as we present them.

Table 4. Results of the user experience questionnaire (N=15)

	n (%)
Would recommend Anathema to friends or family (Net Promoter Score)[a]	
Yes	6 (40%)
No	6 (40%)
Doesn't know	3 (20%)
Perceived usefulness of app[b]	
Very useful	2 (13%)
Useful	6 (40%)
Neither useful nor useless	6 (40%)
Useless	0 (0%)
Extremely useless	1 (7%)
Perceived usefulness of exercises[c]	
Very useful	0 (0%)
Useful	7 (47%)
Neither useful nor useless	3 (20%)
Useless	3 (20%)
Extremely useless	2 (13%)
Perceived ease of use[d]	
Very easy	1 (7%)
Easy	7 (47%)
Neither easy nor difficult	5 (33%)
Difficult	2 (13%)
Readability[e]	
Very easy	1 (7%)
Easy	7 (47%)
Neither easy nor difficult	5 (33%)
Difficult	2 (13%)
SUS score	
Mean (SD)	56.3 (19.1)
Range	20-85
Score (1-10) given to Anathema app	
Mean (SD)	6.5 (1.8)

Range	2-9
Perceived impact of Anathema app in satisfaction and pleasure[f]	
Positive impact	4 (27%)
No change	7 (47%)
Negative impact	1 (7%)
Doesn't know	3 (20%)

Abbreviations: SUS (System Usability Scale)

[a] Original wording: Would you recommend the Anathema app to friends and/or family members?

[b] Original wording: How useful do you think the Anathema app is for older adults? Rated on a 5-point Likert scale: 1=extremely useless to 5=very useful.

[c] Original wording: How useful did you find the (writing) exercises you were offered? Rated on a 5-point Likert scale: 1=extremely useless to 5=very useful.

[d] Original wording: How easy was it for you to use the Anathema app without any help from others? Rated on a 5-point Likert scale: 1=extremely difficult to 5=very easy.

[e] Original wording: How readable did you find the content of the Anathema app? Rated on a 5-point Likert scale: 1=extremely difficult to 5=very easy.

[f] Original wording: Do you have the impression that the Anathema app can help you change satisfaction and pleasure in your sex life? Rated using descriptive scale: Don't know; No, no change; Yes, namely less satisfying and fun; Yes, namely more satisfying and fun.

Most participants showed a neutral to positive stance towards the app regarding its *usefulness*. There is some nuance when analysing perceived usefulness per module, illustrated in Figure 2. Modules 2 and 3 have slightly more polarised responses. Modules 1 and 2 are found to be 'very useful' for more participants, likely due to the reasons given in the interviews: participants learned new concepts, learned to understand what is normal in ageing ("I end up thinking about the part about body ageing. That's reliable information that I can't easily get anywhere else today" (P03)), were made to rethink the way in which they faced sexuality, and also learned about the other sex's genitalia:

"Nice to read some details about genitals (…) also from the opposite sex, how something works" (P11)

"Enlightening. I did benefit from seeing what a prostate looked like" (P04)

Other highlighted learning points from the programme in general are the importance of communication and the fact that sexuality does not need to be equated with penetration. Something some participants missed was the possibility to ask the app questions about their specific problems, ask questions anonymously, or to be able to search for certain themes that could be of more interest to them.

Seven participants evaluated the *exercises* as useful, while the other eight found them neutral (n=3), useless (n=3) or extremely useless (n=2). Crossing these results with the information provided in the interviews, one can infer that there were two aspects which hindered the experience with the exercises: on the one hand, participants struggled with long text input on their smartphone keyboards, on the other hand, for this group, the feeling of being 'schooled' by the app was not equated with positive emotions, thus negatively impacting the experience. Finally, in the interviews, participants revealed that some exercises helped them think of sexuality in a different way, which they experienced as being positive.

Module 1	Module 2	Module 3	Module 4	Module 5
Extremely useless	Extremely useless	Extremely useless	Extremely useless	Extremely useless
Useless	Useless	Useless	Neither useful nor useless	Neither useful nor useless
Neither useful nor useless	Useless	Useless	Neither useful nor useless	Neither useful nor useless
Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless
Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless
Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless
Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Useful	Useful
Neither useful nor useless	Useful	Neither useful nor useless	Useful	Useful
Useful	Useful	Useful	Useful	Useful
Useful	Useful	Useful	Useful	Useful
Useful	Useful	Useful	Useful	Useful
Very useful	Very useful	Useful	Useful	Useful
Very useful	Very useful	Very useful	Very useful	Useful
Very useful	Very useful	Very useful	Very useful	Useful
Very useful	Very useful	Very useful	Very useful	Very useful

Figure 2. Visualisation of perceived usefulness by module.

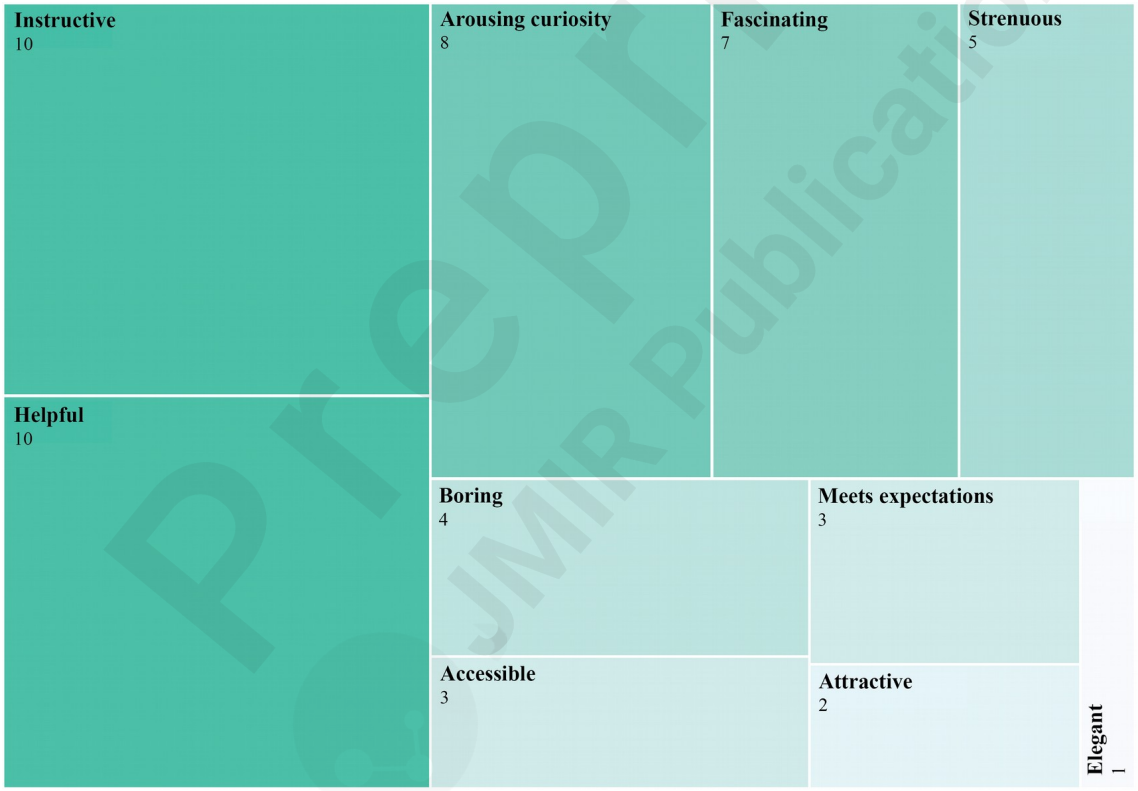

Figure 3. Visualisation of qualifiers attributed to the Anathema app and how often they were attributed.

When asked to attribute *characteristics* to the *Anathema app*, most participants selected a set of descriptors displayed in Figure 3, but the number of choices varied from a single adjective to six. Most of the qualifiers have positive valence, with the exception of ‘boring’ and ‘strenuous’, with four and five mentions, respectively. In line with the data collected through the interviews, participants perceive that they have learned from the app. However, only five participants assessed the app as having the potential to help change participants’ sexual satisfaction and pleasure (Table 4).

The interviews also reveal that participants appreciated the app aesthetically, which connects to the descriptors that were chosen, as well as the tone of voice that was adopted for the content, which in

some cases helped them deal with a sensitive topic:

> *"I admire that this can be done in an app. Good looking and doesn't scare someone. I managed to deal with such a sensitive topic. [It's] friendly and nicely constructed" (P22)*

For two participants, the communication style options were not the most appropriate, for example, when showing an animated video of an anthropomorphised clitoris. Although the photographs were selected based on a survey ran by the research team about characteristics of photos that were appreciated by Dutch older adults, two interviewees did not find them totally appropriate, e.g. some having a comical or childish tone, representing too young people, or not representing enough diversity.

Taking the *net promoter score* (NPS), as an indicator of satisfaction, we can see that the opinions were divided. Three participants did not know whether they would recommend the app to friends or family, while the remaining 12 were equally divided between wanting to recommend and not wanting to do so. In the debrief section of the interviews, participants who were not certain whether to recommend Anathema expanded on this. They explained that they think the app has potential, but that it needs certain improvements, as described above, for them to confidently recommend it to others.

The average SUS score, which measures *usability*, stood at 56,3, which, according to the scoring standards, corresponds to an assessment of 'OK/Fair' [29]. Looking at averages per item, we can see that participants tend to think that they do not need help in using the system, even though usability is not perceived to be at excellent level. The level of confidence felt by the participants while operating the app was high. Participants generally show a neutral to positive stance towards the app regarding its *ease of use* and its *readability*. Although most people did not experience trouble reading due to font size or contrast, this was an issue for one of the participants who dropped out:

> *"I also found the fine print difficult. They are clear but with deteriorating eyes good reading requires more effort" (P04)*

The interviews reveal that the app worked well on participants' phones and that they found it very convenient. However, participants often wished the app was also as easy to use on a tablet device or desktop.

> *"Excellent [the experience of using the app on the phone]. Preferably on an iPad, because of the larger screen. On the phone it worked. The smaller keyboard asked more caution, but [it] went fine." (P11)*

With the exception of two participants, who suggested direct speech, easier wording and shorter sentences, interviewees found the wording to be easy to understand. Two participants reflected on whether the scientific explanation should be highlighted as is (Figure 4), for instance on starting the first module with the definition of sexuality, or whether it should be made more digestible to engage readers.

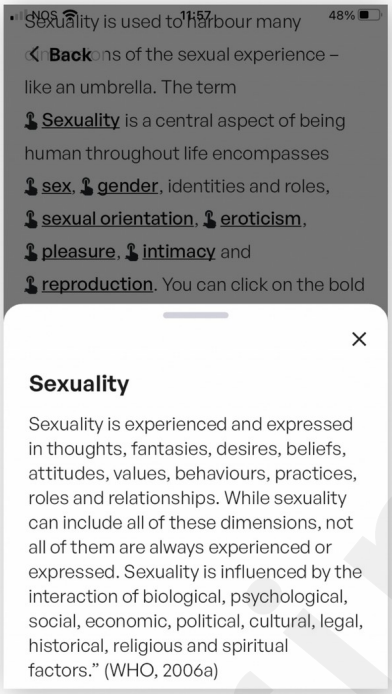

Figure 4. Screenshot from the definition of sexuality which appears in a slide-up pop-up when the user taps the word "Sexuality" shown in the grey-faded part of the image.

Another aspect of readability that was touched upon was finding one's place in the content structure. For two participants, it was hard to understand at which stage they were in navigating the app, originating the feeling of being lost: "In a book you can browse through that and then you see where you are. In the app this overview is not so clear" (P06). For those who felt lost, as well as for one participant who would like to revisit specific parts of the content, a possible solution was provided by one participant who said that they missed a way to bookmark 'Favourites'.

Participants *appropriated* the app in different ways. There were reports of people using the app only randomly when they found the time, defining a fixed schedule (e.g., evening, late at night), or defining a place to use the app (e.g., kitchen, home). Common to the participants was the need to use the app alone and undisturbed.

One participant asked the partner to also go through the app, but they did not want to because it was a taboo topic. Three mentioned how they talked to friends or their partners later about the app and what they had learned, e.g.:

> *"Through the app I can easily talk with my partner about sexuality. The participation, together with my partner, in the previous workshops for Anathema, also contributed to this. The openness of other participants was a good example for me." (P04)*

While five participants stated that there would be no places or times when they felt uncomfortable using the app, the remaining three gave some indications thereof. For these participants, it would be important to use the app alone and in a private place. Participants also reflected on how they would like to discuss what they were learning in the app with others, but found it stigmatising:

> *"When I talk to friends about food, for example, all the experiences can be discussed. Apparently, that is not possible when talking about sex." (P20)*

> *"When I try to discuss with seniors of an association with a Catholic background*

that I am participating in this project, the reaction is 'that does not suit our people'." (P18)

Half of participants found an *8-week period* to be too long, the other half felt it was an acceptable or good duration. However, participants struggled with the idea of this being time-bound in some way because they could not understand why this specific duration was chosen. In one case, the participant felt this indication of duration could send the wrong message: "I have to be ready in 8 weeks" (P03).
Being presented with *content that had a specific reading order* was cumbersome to some participants. This was because, on the one hand, they could feel schooled, and, on the other hand, they did not want to feel they were losing time in content that they were not interested in. One participant shared their technique for when something like this happened: they just scrolled the content very fast to get to the bottom and move to the next chapter. Despite negative comments about the locked content (e.g., "I wanted to look at a topic in Module 4. But didn't do that out of irritation at the locks in the extended Module 3" (P04)), participants generally agreed that the content is well-structured, being easy to follow. Mindfulness is something that some interviewees found unnecessary. On the other hand, some interviewees would expect to read more about love and affection. There were also other suggestions of curated lists of contacts for further support (e.g., participants stated they would like to be able to ask questions to therapists over email), and fitness exercises (e.g., pelvic floor muscle exercises).
Although 9/15 participants in the questionnaire assessed Module 5 as useful or very useful, the interviews showed a slightly different picture. Interviewees had mixed opinions regarding the usefulness of the last module. With the exception of one person, those who did find it useful as a recap also reflected about the possibilities of *coupling the app* with curated contacts to therapists to continue exploring the topic or to find tailored help to a specific issue. One interviewee thought about accompanying the app with TV or radio shows, stating that this was the reason why they bought a book on sexuality. Another possible extension would be a course, workshops or group activities which would let people discuss and further explore what they had learned and experienced:

"In addition to using the app, it could be interesting to be in a discussion group with other couples as a couple. That could help improve communication about sex. The app provides plenty of conversation material for that" (P11)

Interviewees showed mixed opinions regarding *whether or not the app should be paid.* On one hand, participants shared they are not used to paying for apps, but on the other hand they recognised that they might pay for extra services (e.g., consultations) and that free apps do not have as much credibility. Credibility is something participants cling to when reflecting with the interviewer about how to make the app available to more people. Participants at times come to the conclusion that the app could be credibly made available through medical doctors, therapists or reliable associations. Although this was not asked, participants also share ideas on how to raise awareness about the Anathema app, for example through advertisement, TV/Radio shows, or leaflets.

Discussion

The pilot study conducted in the Netherlands with a group of 15 community-dwelling older adults was a novel study in the field of mobile health applications in sexual health. Although the drop-out rate was high (65%), there were no participants lost to follow-up nor non-use cases, i.e. participants answering the questionnaires without having used the mobile application until the end. We found that the app was usable, that participants showed high levels of self-confidence in using it, that the smartphone can be a useful and private way to have access to reliable sexual health information, that participants foresee how extra services could help tailor the programme to their specific needs, and that certain improvements in content and in interaction are likely to increase user experience for this

smartphone-delivered sexual health promotion programme.

As with other studies in the literature [19], the user experience was negatively affected by lack of social support to users' specific issues. In the interviews, participants gave examples of further content on love and affection, a curated list of resources and fitness exercises that they would like to see, as well as options to search through the content to get the information they were looking for. The lack of social support, ranging from relatives to professionals, also seems to have negatively affected participants' user experience. In their systematic review, van Acker et al [18] noted how social support (ranging from relatives to professionals) was an important factor in user experience. In our study, with the exception of one participant who could not convince their sexual partner to also use the app, there were no reports of available or lacking support from relatives, but participants specifically mentioned that professional support would be useful on top of the existing offer. A nuance with relation to the literature [18] is that participants in our study did not require professional support so much to interact with the programme, but rather as an extension to it, often to attain the personalisation requirement we have just described above. Furthermore, participants struggled with the locked content. Although the tunnelling technique has been used to increase engagement with the intervention/technology, in our study it did not seem to have this effect. This is similar to recent findings with an intervention for a younger generation [30].

As noted in the literature [19], trust is also an important dimension in user experience. Although not directly asked about it, our interviewees alluded to the element of credibility regarding willingness to pay, which was considered by Hurmuz et al [19] as a metric of user experience. To the participants in our sample, the channel via which they access the app is an important factor at the time of choosing whether or not to use and ultimately pay for the app.

Measured by the SUS instrument, self-confidence among the participants in our study was high. This might also have been influenced by the levels of education and digital literacy of the sample. The level of education might also explain why the participants often alluded to the experience of 'being schooled' as a negative valence one. Although the tone of voice for the programme regarding visual and written content was co-designed [22], it might have not been implemented properly to eliminate this negative experience. This aspect is further discussed in the 'Limitations' section below. On the other hand, some users also reacted negatively to content that seemed 'too scientific' and some commented that some terms might not be easy to understand to the wider population. This is at odds with the higher educational level of this sample, but the explanation for the dislike might be related not to the understandability of the content, but rather to a kind of experience users are expecting when they are using an app that is related to sexuality.

Participants stated that the topic of sexuality was not embarrassing to them. However, there were some accounts of users requiring privacy when going through the content, one user whose partner did not want to use the app because of the topic, or users commenting on how they did not feel free or at ease to discuss the topic with their peers. Therefore, the topic of taboo still requires further research in terms of how much of a barrier it is to accept and use technology around this topic. Participants' statements in the interviews suggest that a smartphone-based intervention can bring the advantages of ubiquity, intimacy, and anonymity to an intervention that is likely to elicit stigma in some contexts. The programme itself was regarded as a trustworthy source of information, which participants think is hard to find on this topic. On the other hand, it could be coupled with more targeted personal services for users who would like to interact with therapists or even join groups who are willing to openly discuss topics of sexual health. Future research should study the provision of such discussion groups, either in-person or through moderated and anonymous fora inside the app.

Our study was composed of participants who were interested in the topic of sexual health. In any case, even within our small sample, we witnessed a wide spectrum regarding taboo. For instance, some participants felt that blurring genitalia photographs by default with overlaid text: "Sensitive content. Click to view" was condescending, while others felt that suggesting exercises for sexual pleasure was going too far. As with other types of applications targeting older adult users, ours saw a

large heterogeneity in users' preferences. Even if resources allowed for the software development team to implement ultra-personalisation, we could be placing a large burden on users upon onboarding to setup preferences, which, in itself, would have a negative effect on technology acceptance. One way of addressing this could perhaps be to create certain user profiles and adapt scaffolding techniques, which have been used for usability [31], for the purpose of conspicuousness degrees. Future research should work on this balance between a certain level of tailoring to one's needs and preferences with time invested in customising the app.

Strengths

This was the first study to evaluate the user experience of a self-guided, smartphone-delivered programme to promote sexual health among older adults. The mixed-methods approach was a strength of this study in the sense that it provided a rich description of participants' experiences with the app and the programme. Without the interviews, we would hardly have had such detailed information that would indicate how to improve the app and the programme, as well as a first understanding of how participants appropriated the app.

Our study did not aim at generalisability, but rather at an in-depth understanding of user experience, which justified the emphasis on the qualitative data. Through this approach, we were able to derive actionable insights to improve content, structure, and format of the programme.

Although our study was conducted with a small and specific sample of older adults in the Netherlands, the methodology we employed allowed us to unveil nuances which can be useful for researchers to consider in implementing smartphone-based programmes for sexual health for different populations: the relevance of social support, the credibility of the programme, the opportunities that smartphone-based interventions may bring to sexual health interventions in terms of privacy or convenience, and the variability among programme users about what might be considered a taboo and how this might impact users' preferences, practices and attitudes towards the programmes.

Limitations

Since we conducted a user experience pilot aiming at getting in-depth feedback, the results might not reflect the characteristics of the older adult population in the Netherlands. Although further research is needed to reach generalisability, this study constitutes a stepping stone in that journey.

The sample characteristics in our study are its greater limitation. Only a fifth of our participants were dissatisfied with the current state of their sex lives and most consider themselves to be in fairly good or good health, which may not be representative of the older adults population. These characteristics may have biased how participants responded to a sexual health promotion programme that is tailored to help users identify and cope with issues related to their sexual health. Our sample was also composed of participants with a high level of education. This might explain why some participants felt schooled, as they were already in possession of information that was provided by the programme. As participants have suggested, for a future pilot study, it would be advisable to increase the number and type of channels used for dissemination and recruitment, such as mainstream media. This would help increase visibility of Anathema and reduce, if not altogether prevent, selection bias.

The features implemented on the app responded as much as possible to user research requirements, but not always was this possible or perhaps implemented at its best. In some cases, there were technical limitations that did not allow implementing all of them. For instance, the app began to be implemented as web-based, so that it would also run on desktop browsers if participants preferred, but the identification of a problem in a technical component ahead in the implementation process forced the software development team to develop natively for Android and for iOS.

We were expecting this lack of flexibility in the type of device to be a negative aspect for some participants. On the other hand, at least once, the preferences collected with participants in user

research studies preceding the pilot study were not aligned with the preferences of the pilot study sample. We describe two instances of this.

The first example is related to the choice of imagery. To select the photos for the app, we ran a survey with 111 older adults in the Netherlands in which we showed 10 different pictures and asked participants to rate the pictures, select their favourites, and justify their choices. The survey revealed that participants preferred uplifting, cheerful and romantic images of participants who were not young, but also not too old. The interviews in the pilot study revealed that for some participants these images were not appropriate.

Another example was the language used: a series of tests on preferred tone of voice were used to create the original content in English [22]. The content was translated into Dutch, which went through content reviews from native speakers with experience in older adult care. Nevertheless, for some participants in the sample, the language was described as 'too scientific'. It is also possible that the research team was not able to correctly implement the insights from the user research phase, thus causing a mismatch between users' expectations and the implemented app. Further research should revise the feedback from user research phases and cross it with the results from the pilot study to understand where the app can be improved to meet users' expectations.

Further research should also focus on interaction and content issues to improve the current mobile application towards improving user experience. In particular, there is a need to understand how to balance the quantity and type of content with an engaging user experience. Once an improvement in user experience has been noted through further formative testing, the pilot should be repeated. Since there was a mix of negative and positive comments provided by the participants, and since the results from the SUS score are aligned with the comments from the interviews, we do not think that social desirability influenced participants' answers. However, since social desirability plays an important role in sex research surveys, a future pilot could include a questionnaire [e.g., 32] to control for this effect. Further research should also focus on a larger and more diverse sample regarding sexual satisfaction, health status and literacy level.

Future pilots should include study designs that enable the collection of fine grained data about the user experience combined with an assessment of the programme's efficacy in improving sexual health, so that the aspects of appropriation and how the app fits into participants' practices could be better understood and, in turn, inform strategies to improve sexual health outcomes, engagement and user experience with such an intervention.

Conclusions and implications for design

The mobile application of Anathema with a sexual health promotion programme delivered in self-guided mode to a sample of older adults in the Netherlands was assessed as usable. Most participants tended to assess the app and programme as useful, but both the app and the programme would benefit from certain improvements, which we group under 'content' and 'interaction' as possible guidelines.

Content-wise, readability and engagement can be improved by using plainer language in general, revising sections that sound 'too scientific' (e.g., definition of sexual health) or too medical (e.g., content regarding erectile problems was very focused on the urological aspects). Although for some participants the content was too long, participants would also prefer not to have locked content, in which case the length would not be a barrier to engagement. It is clear that participants would appreciate more curated content that would refer them to support in the community or to further services.

Regarding *interaction*, there are suggestions to enable searching and asking questions so that the user could be directly guided to the content that is of most interest to them, or so that they could centre their learning in their own experiences. This would imply the content to be unlocked by default. Participants would also like to be able to bookmark certain sections and to have the means to know

where they are in the app. Finally, although participants share that some exercises made them reflect – and they see this as a positive – they struggle with the exercises that involve text input. Therefore, interaction modes in exercises could be improved. Although participants state they do not want to be schooled, they highlight 'learning' as one of the advantages of using the app. In the future, the Anathema app should be able to meet the goal of teaching without resembling a schoolbook. This was highlighted by participants who were expecting more interactivity from the app rather than an app that reads like a book.

Acknowledgements

Beyond the participants in this study, over 1.400 older adults from three different countries were involved in the design and testing of this programme. The authors are very thankful to all of these participants, as well as to secondary and tertiary users who provided valuable feedback.
The authors wish to acknowledge the European Commission through the AAL Programme (ref. AAL-2020-7-133-CP) and the Member States: Fundação para a Ciência e a Tecnologia, in Portugal, the Austrian Research Promotion Agency (FFG), in Austria, and ZonMw, the Netherlands Organisation for Health Research and Development, in the Netherlands for funding this project.

Conflicts of interest

None declared.

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Appendixes

Appendix I – Post-test questionnaire

I – Experience using Anathema app

1. **How useful do you think the Anathema app is for older adults?**

   Select your answer based on the scale below.
   Extremely useless
   Useless
   Neither useful nor useless
   Useful
   Very useful

2. **How easy was it for you to use the Anathema app without any help from others?**

   Select your answer based on the scale below.
   Extremely difficult
   Difficult
   Neither easy nor difficult
   Easy
   Very easy

3. **How many hours have you used the Anathema app?**
   (Add up the time you spent reading and completing the exercises.
   If you can't give us the exact time, please give us an estimate.)

4. **How readable did you find the content of the Anathema app?**

   Select your answer based on the scale below.
   Extremely difficult
   Difficult
   Neither easy nor difficult
   Easy
   Very easy

5. **How useful did you find the content of the 5 modules?**

Select your answer based on the scale below

	Extremely useless	Useless	Neither useful nor useless	Useful	Very useful
Module 1					
Module 2					
Module 3					
Module 4					
Module 5					

6. **How useful did you find the (writing) exercises you were offered?**
   Select your answer based on the scale below

Extremely useless
Useless
Neither useful nor useless
Useful
Very useful

7. What features do you associate the Anathema app with?
(Mark all that apply. Multiple answers are possible.)

Instructive
Meets expectations
Arousing curiosity
Boring
Accessible
Attractive
Strenuous
Elegant
Fascinating
Helping

8. Do you have the impression that the Anathema app can help you change satisfaction and pleasure in your sex life?

Yes, namely more satisfying and fun
Yes, namely less satisfying and fun
No, no change
Don't know

9. Would you recommend the Anathema app to friends and/or family members?
Yes
No
I don't know

10. **What score do you give the Anathema app?**
In the assessment from 1 to 10 I give the following grade:

[ ]

11. How do you think we can improve the app?

[ ]

II – System Usability Scale core list with 10 questions for user-friendliness
(System Usability Scale)

For the ten statements, indicate whether you strongly disagree, disagree, neutral, agree or strongly agree with them.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. I think I would like to use this system frequently.					
2. I found the system unnecessarily complex.					
3. I found the system was easy to use.					
4. I think that I would need the support of a technical person to be able to use this system.					
5. I found the various functions in this 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 very 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.					

Now follows a repetition of three questions from the questionnaire that you answered prior to using the Anathema app.

III- Sexual health

1. To what extent are you satisfied with your current sexual life?

Very dissatisfied				**Very satisfied**
☐	☐	☐	☐	☐

IV- Quality of life

		Very bad	Pretty bad	Neither good nor bad	Pretty good	Very good
1(G1)	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Content	Very satisfied
2(G4)	How satisfied are you with your health?	1	2	3	4	5

Appendix II – Semi-structured interview script

Usefulness and usability of the Anathema app

1. What do you think of the app?
2. How did you experience using the app?
3. What kind of phone were you using: Android or iPhone?
4. Which part was most useful to you?
5. What were the main problems you encountered?
6. How difficult was it to solve those problems?
7. What other issues did you encounter while using the app?
8. Do you have any suggestions on how we can improve those issues?
9. Is there anything else you want the app to do or entail?
10. Did you need training or support to use the app?

Feasibility

1. Under what circumstances and at what times did you use the app?
2. Were there any places or times when you felt uncomfortable using the app?
3. Was it difficult to make time to use the application?
4. What do you think of the structure and duration of the Anathema program (8 weeks)?
5. Would you like to tell us about your experience using the app on your phone?
6. How helpful did you find module 1 on sexual health?
7. How useful did you find module 2 on sexual health and ageing?
8. How useful did you find module 3 on thoughts, emotions, communication and about problems?
9. How useful did you find module 4 on treatment options?
10. How useful did you find module 5 looking back and looking forward?
11. Could you have benefited from support in another by a professional (e.g. phone call, video conference, in person)?

Clinical aspects

1. Do you believe that the expectations you had/goals you set before using the app were met or exceeded?
2. What impact did the use of Anathema have on your sexual health (e.g. knowledge or

satisfaction about sexuality)?
3. What do you think of the content and exercises you have in the app?
4. How useful were the app's content and exercises to you?
5. How can the app be improved to better meet your needs?
6. Which themes do you find important to find information about in the app?

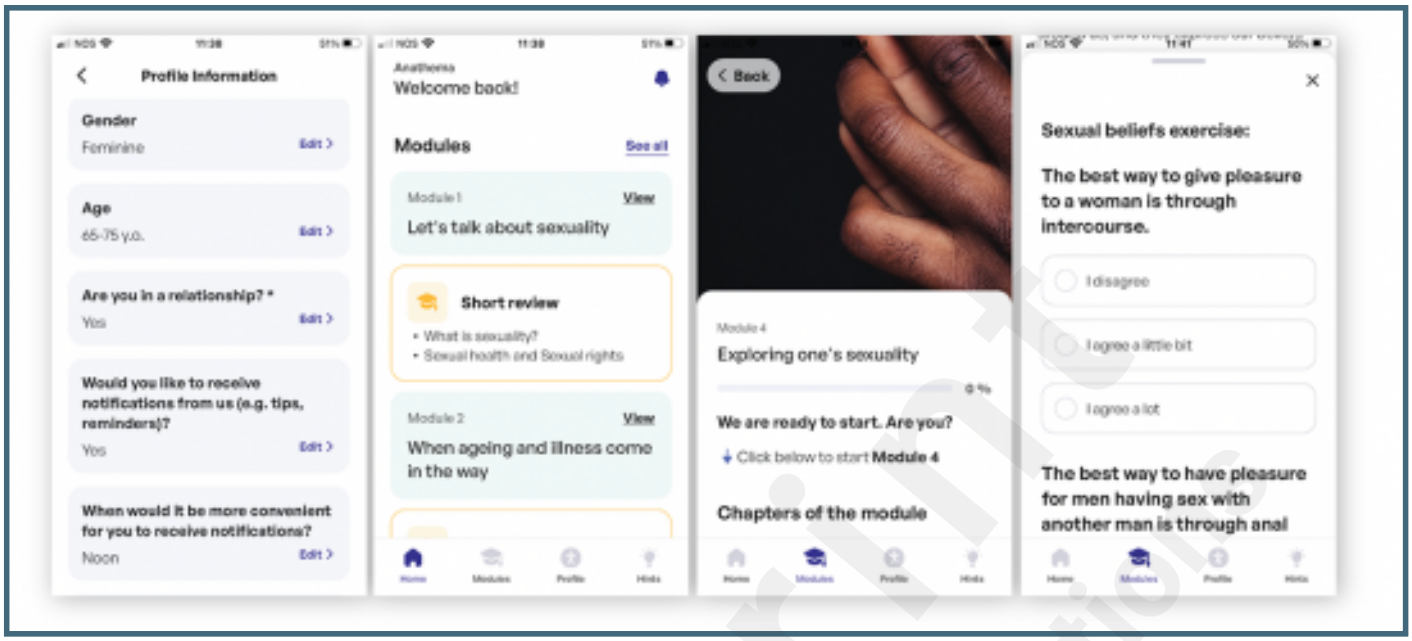
Implementation

1. Would you recommend the Anathema program to others? If so/if not, why?
2. Assuming the issues and proposed improvements are implemented. How should the Anathema program be made available to others?
3. Is there anything else you'd like to mention that we haven't addressed yet?

Supplementary Files

Figures

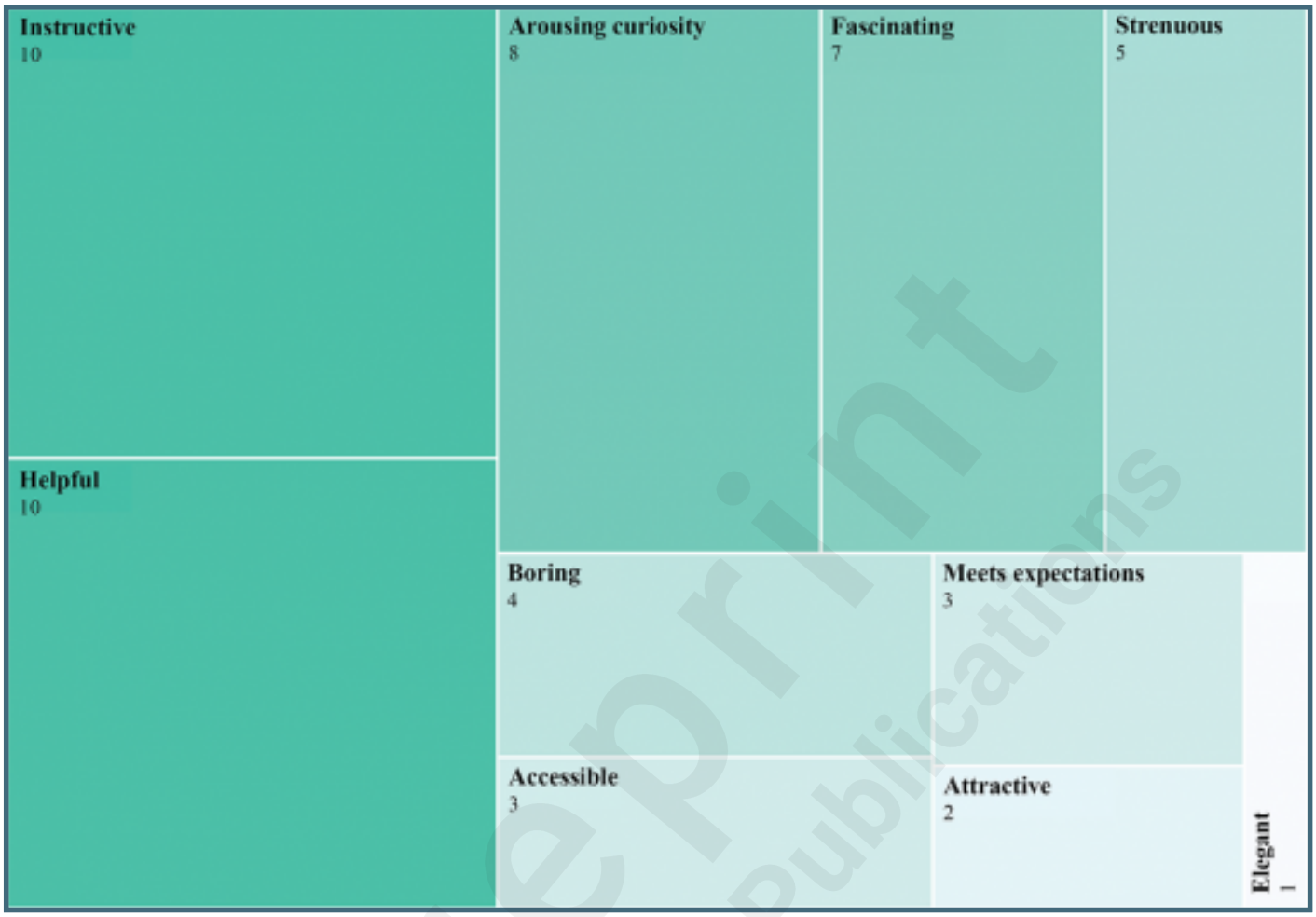
Sample screens from the Anathema app (left to right): Personal information; Overview of modules; Introduction to module; Exercise.



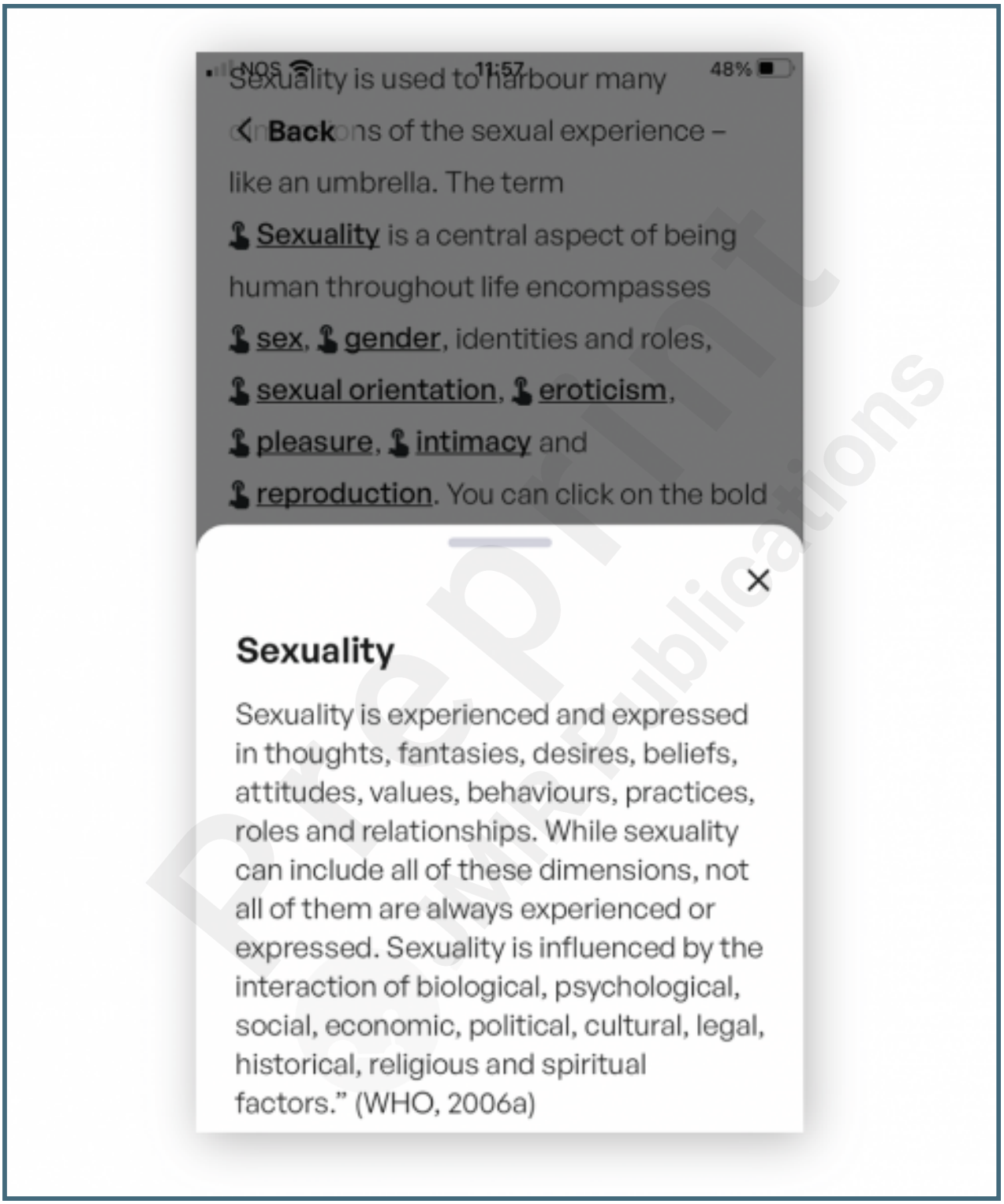
Visualisation of perceived usefulness by module.

Module 1	Module 2	Module 3	Module 4	Module 5
Extremely useless	Extremely useless	Extremely useless	Extremely useless	Extremely useless
Useless	Useless	Useless	Neither useful nor useless	Neither useful nor useless
Neither useful nor useless	Useless	Useless	Neither useful nor useless	Neither useful nor useless
Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless
Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless
Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Neither useful nor useless
Neither useful nor useless	Neither useful nor useless	Neither useful nor useless	Useful	Useful
Neither useful nor useless	Useful	Neither useful nor useless	Useful	Useful
Useful	Useful	Useful	Useful	Useful
Useful	Useful	Useful	Useful	Useful
Useful	Useful	Useful	Useful	Useful
Very useful	Very useful	Useful	Useful	Useful
Very useful	Very useful	Very useful	Very useful	Useful
Very useful	Very useful	Very useful	Very useful	Useful
Very useful	Very useful	Very useful	Very useful	Very useful

Visualisation of qualifiers attributed to the Anathema app and how often they were attributed.



Screenshot from the definition of sexuality which appears in a slide-up pop-up when the user taps the word “Sexuality” shown in the grey-faded part of the image.



Multimedia Appendixes

Post-test questionnaire.
URL: http://asset.jmir.pub/assets/9c64cd484829b222dcabf947d3a199d9.docx

Semi-structured interview script.
URL: http://asset.jmir.pub/assets/474a36d65f3fafc2fbe7f9bacc6309bb.docx