# Quantitative and qualitative evaluation of the COMPASS mobile app: a citizen science project

Jorge Luis Díaz[a,b], Núria Codern-Bové[c], Maria-Dolors Zomeño[d,e], Camille Lassale[d,e,f], Helmut Schröder[d,g], María Grau[a,g,h*]

[a] Cardiovascular Epidemiology and Genetics. IMIM – Hospital del Mar Medical Research Institute, Barcelona, Spain

[b] Docent Unit of Preventive Medicine and Public Health Mar Health Park – Pompeu-Fabra University – Barcelona Public Health Agency, Spain

[c] Escola Universitària d'Infermeria i Teràpia Ocupacional de Terrassa (EUIT), Universitat Autònoma de Barcelona, Terrassa, Spain

[d] Cardiovascular Risk and Nutrition, IMIM – Hospital del Mar Medical Research Institute, Barcelona, Spain

[e] Consortium for Biomedical Research in Obesity and Nutrition (CIBERobn), Barcelona, Spain

[f] Department of Behavioural Science and Health, University College London, London, United Kingdom

[g] Consortium for Biomedical Research in Epidemiology and Public Health (CIBEResp), Spain

[h] Serra-Húnter fellow, Department of Medicine, University of Barcelona, Spain

*Corresponding author at:

Correspondence to: María Grau, Department of Medicine; School of Medicine and Health Sciences, #143 Casanova St. 08036 - Barcelona, Spain; Email: mariagrau@ub.es

**Objective**: To evaluate the usability of the COMPASS application with mixed-methodology, using a citizen science approach.
**Participants:** Parents/tutors of 10-11 years old children attending a primary school in Barcelona, Spain, were invited to take part in the study.
**Methods:** We conducted semi-structured interviews on a subset (n=7) of participants, two weeks after using the app for the first time. A list of suggestions of improvement was extracted from the interviews. The System Usability Scale (SUS, range 0-100) was administered to all participants before and after the improvements were implemented. We provide both a quantitative analysis (t-test of change in SUS scores) and a qualitative thematic analysis of the interviews.
**Results:** A total of 22 participants were included in the study. The mean score before implementation of changes was 68.5 (Standard deviation, SD= 11.1), and improved to 73.1 (10.5) (p-value=0.025). Regarding the qualitative assessment, we obtained 24 codes and grouped them into 3 categories. It uncovered problems in the installation phase and the main barriers to use: lack of time and the need for the app to evolve.
**Conclusions:** The new version of COMPASS, improved by taking into account the participants' comments and suggestions, was more usable than the initial version.

**Keywords:** cardiovascular diseases, mobile applications, eHealth, mixed methodology, usability.

## Introduction

Cardiovascular diseases (CVD) are the main cause of morbidity and mortality worldwide.[1] CVD is estimated to cost the EU economy 210 billion euros a year.[2] Unhealthy lifestyles, such as smoking, being sedentary, having a poor-quality diet, or having a high body mass index, explain around 80% of ischemic heart disease and cerebrovascular disease, the most common diseases within this group of CVDs.[3,4] Scientific evidence shows that the adoption of a healthy lifestyle could substantially reduce premature mortality and prolong life expectancy: up to 14 and 12 years in female and male, respectively.[5] But, as pointed out by Dahlgren and Whitehead in the classic model of the determinants of health, individual lifestyles are embedded in social norms and networks, and in living and working conditions, which in turn are related to the wider socioeconomic and cultural environment.[6]

The fast information and communication technologies expansion, could specifically benefit CVD prevention programs that use mobile health (mHealth) tools for primary prevention.[7] Although many preventive apps have been developed to date,[8,9,10] most of them focus on individual empowerment, leaving behind the community aspect.[8]

The proposed COMPASS app put together four key elements to increase health literacy, individual and community empowerment: (1) it uses a validated method of automated cardiovascular risk self-screening;[11] (2) its personalized recommendations are based on algorithms designed from the best available evidence about CVD prevention (e.g. physical activity, diet quality, smoking cessation, and weight control); (3) it encourages self-management by supplying self-evaluation tools; and (4) it provides users with high-quality information to help individuals and communities sustain behavior changes, suggesting the community activities (health assets) available (or being developed) in the city or near the user's residence. In the present study, these health assets are promoted by the Barcelona City Council and local community associations.[12] Usability assessment is an important first step in the development of mHealth apps, and small usability improvements can have a great impact on the quality of the intervention.[13] To achieve this objective, we propose a citizen science approach that involves the general population in this scientific research project. The main goals of this methodology are to bring the public and science closer, fostering a "scientific citizenship," and empowering participants by increasing self-efficacy [14]. Moreover, citizen science promotes the democratization of science and has the potential to increase community engagement.[15]

Thus, the main objective was to evaluate, qualitatively and quantitatively the usability of the first version of the COMPASS app using a citizen science methodology, to produce an upgraded version including the participant's comments, which was also tested. In addition, the specific objectives were to test the experience with the use of a technology that helps the participants to take care of their health; to obtain insights of the mobile app use in healthy participants; and to assess the feedback from citizens on having a major role in a scientific project that takes place within their community.

## Methods

### *Study Design*

This is an intervention study using a citizen science approach to ascertain the usability of the COMPASS mobile app. At baseline (first visit) participants underwent an assessment of their cardiovascular risk factors, installed the first version of the COMPASS app on their smartphone and received training on how to use it. All participants were invited to complete the first quantitative assessment via an online survey (Google Forms), and then a subsample of participants was invited to complete semi-structured interviews. Based on the results of the interviews, an updated version of the app was developed. All participants were then invited to fill up the same quantitative assessment online questionnaire. The qualitative and quantitative findings were triangulated to provide a better understanding about the usability and acceptability of the mobile app.[16]

***Participants***

This study was performed in collaboration the docent community of La Maquinista primary school, located in the Sant Andreu area of Barcelona. Fifth grade students (10-11 years old) had a major role in the study: they learnt the scientific methodology, invited his/her relatives to participate in the study, and helped in the collection of the baseline data with the researchers' supervision.

Participants in the usability study were individuals aged 25 to 74 years, with no history of CVD and users of Apple or Android smartphones, who were relatives or teachers of 5$^{th}$ year students from the reference primary school (Figure 1).

The first visit took place at the school. Each participant underwent clinical measurements by a trained researcher and the collaboration of the students: anthropometrics, blood pressure, and rapid lipid profile and glycated hemoglobin testing, according to a validated methodology. Cardiovascular risk was estimated with the REGICOR function validated for the Spanish population.[17] They also completed questionnaires on sociodemographic characteristics, tobacco consumption, dietary pattern, and physical activity. All participants signed an informed consent at study entry. This study was approved by the local ethics committee (CEIC PSMAR: 2017/7467/I).

***Qualitative Assessment***

For the qualitative interviews, we performed an intentional theoretical sampling, looking for diverse socioeconomic patterns and maximum discourse variability. Sex (male-female) and age group (25-34 years, 35-44 years, and 45-75 years) were considered; the maximum number of interviews was based on achieving information saturation, meaning that the next interview was not going to contribute additional new information. Users were asked to review the app's content and invited to discuss, evaluate, and explore the strengths and limits of the app design, ease of use, and usefulness in semi-structured personal interviews, 2-3 weeks after their enrollment. The semi-structured interviews were performed face to face by an expert researcher (NC) and supervised by an observer (JLD). (Textbox 1). There was no relationship between the researchers and the interviewees prior to the study. The session was audio recorded. All proposed improvements were discussed with the development team for prompt implementation in the app.

***Quantitative assessment***

It is common to see samples between 10 and 20 participants in recent usability studies.[18–21]

The quantitative data was measured using the System Usability Scale (SUS),[22] a 10-item simple tool for measuring usability. SUS produces a score representing an integrated measure of the overall usability, ranging from 0 to 100. To calculate the SUS score, first we summed the score contributions from each item. Each item's score contribution ranges from 0 to 4 and the final score is obtained multiplying the sum of the scores by 2.5. According to the Adjective Rating Scale, a SUS score above 68 is considered above average.[23] The Spanish version of the SUS questionnaire has been used in different studies to measure usability of different digital devices.[24,25]

The SUS was first administered online to all participants about 2 weeks after their enrollment, to give them time to explore the app usability in depth. After the recommended app updates highlighted in the interviews were implemented in a new version of the app, and installed on their smartphones, participants were contacted again and invited to complete the online SUS a second time.

### *Qualitative Analysis*

Audio recordings from the interviews were literally transcribed. The information was analyzed using thematic analysis, which describes and interprets the thematic content of the data, focusing on "What is being said" rather than "How it is being said". The analysis procedure followed the following steps:[26]

a) a reading of the transcription, review of the notes taken during the interviews, and recording of preanalytical intuitions; b) selection of units of analysis (phrases and sentences) and codification by hand, resulting in a total of 24 codes; c) extraction of categories according to the study objectives and drafting a summary of results, finding 3 categories; d) qualitative and quantitative results triangulation. All the procedure was undertaken by two researchers (NC and JLD). The results were discussed and verified by all the research team members.

### *Statistical Analysis*

To minimize errors, descriptive data analysis was performed stratified by sex. Student's t-test was performed to compare changes in the first wave SUS questionnaire, and the second wave, once the new version of the COMPASS app was implemented according to the changes suggested by the participants. All statistical analysis was performed with R Software (version 3.6.1).

## Results

### *Participants Characteristics*

The study included 22 participants, with 68% female and mean age 44 years old (standard deviation=8), and had a very low cardiovascular risk (0.8%) (Table 1).

### *Qualitative Results*

A convenience subsample of 7 interviewees was performed. All the interviews lasted between 20 and 30 minutes. The main results and the characteristics of the participants are detailed in Table 2.

According to the study objectives, we grouped the list of codes generated by the codification process into three categories or themes: ease of use, usefulness, and recommendations for improvement.

<u>*Ease of use*</u>:

In this category we explore the barriers and facilitators to the incorporation of the COMPASS app in participants' daily lives.

- All of the participants had previous experience with apps in general, but they did not have any experience with health-related apps:

*I6* (*male, 39 years old): "No, not health related. None of this kind. I use a lot of apps, but for other purposes."*

- As a first barrier, we observed that four out of the seven interviewees mentioned an access difficulty:

*I2 (female, 46 years old): "[…] As a reminder, I had copied the link, but I would get several error messages, like it was unavailable, that I could not access the website. Finally, the following day I was able to do it. I tried several days, and some days it worked and some days it did not."*

- Three out of them experienced a problem with installing the app on their smartphones. They could use it with the URL address that we facilitated them with, but they were unable to set it up on the phone main desk:

*I3 (female, 58 years old): "Anyway, I think the app is not installed on my phone. Maybe I did not do it properly"*

- When asked about the frequency of use, five out of the seven participants said that they used the app just a couple of times, the first being the training during the day of data collection in the school.
- Related to the ease of use, six out of seven participants found it simple, fast and intuitive. One female, the oldest of the sample (70 years old), mentioned the need of more detailed information on how to use the app, because she could not use it:

*I5 (female, 70 years old): "Honestly, I would need someone who understand the thing well. Not the young men, they explained it well. It was at home when I tried to use it again, and I could not. […] In my case yes, in my particular case, because I am quite clumsy in terms of informatics."*

The researcher decided to look further into the issue of age as a barrier of use, so asked her directly about it. Her answer was a surprise for the research team, as she pointed the lack of time as the major inconvenient for learning how to use technology, not the age:

*I5 (female, 70 years old): "no, it has nothing to do with age. I have a friend who had free time to go to classes. She goes wherever she wants, looks for holiday destinations… things that I find very complicated […] and she is older than me."*

- The lack of time was a major barrier to the app usage, as it was expressed by five of the participants.

- When we asked the participants about the comprehension of the app content, we found that three of them had troubles understanding some of the biomedical parameters, like body mass index, or the meaning of the cholesterol values. They asked for a quick explanation:

*I2 (female, 46 years old): "[…] Well, there are concepts like body mass, where I did not know what the parameters meant, so I had to look it up on Internet […] It should include a little explanation, and if you don't have optimal levels, it should tell you."*

None of the participants had issues of comprehension regarding the community recommendations.

- One of the facilitators for engaging with the app is that the project was developed within the school, in collaboration with children. This distinctive aspect was highly valued by the participants:

*I1 (male, 44 years old): "Certainly it is one of the aspects of the project that I like the most, that children can participate in tasks and projects like this. […] Yes, logically it was my son who encouraged me to do it, me and my wife, but I was the one who was able to come."*

But we also saw that some participants had higher expectations about the participation of their children.

- Related to data protection, all the interviewees said that they trusted the research team to handle well their data.

- All of the participants found the app's aesthetics adequate and nice to look at:

*I6 (male, 39 years old): "It is an app that is nice to look at, it has to be simple and I think it is."*

Although one of them mentioned a possible re-structuration of the menus:

*I2 (female, 46 years old): "For example, maybe when you go to "recommendations", it should display menus with dietary recommendations on one side, and physical activity recommendations on the other side. That way you do not have to go through all of them, you see the ones you find more interesting at first glance, like ordered by categories."*

<u>*Usefulness:*</u>

In this theme, we evaluate the benefits (attitude changes, behavioral changes, knowledge improvement), that participants get from the app usage. We also explore their needs and expectations.

- The first aspect that all the participants refer to is that they expected more interaction and more data within the app. They ask that the app evolves, and the recommendations to change regularly. One participant recommended the inclusion of challenges and rewards.
- The proximity of the community recommendations was well valued by the participants:

*I3 (female, 58 years old): "It is a good thing that it is centered on the local community, because if it was not you could lose half of the morning in the metro."*

Although three participants found also interesting to recommend assets outside the community:

*I2 (female, 46 years old): "Yes, it could be interesting. Particularly, for people who do not work in the area where they live. It would not be a bad idea, for example, a person that finishes work at 19.00, can have some activity near their workplace."*

- Two participants refer to health literacy improvements, a direct benefit from the app usage during the intervention period.

- When asked if this kind of recommendations could end up in a change of their lifestyles, we had a variety of answers.

One of the interviewed participants considered the app as an alert system, designed for secondary prevention, not as a health promoting tool.

Three of them said that the app could help them make lifestyle changes, provided that the recommendations were more personalized:

*I3 (female, 58 years old): "Yes, if it was more personalized, which would help to self-monitor, it would be interesting."*

Another participant said that the app would not help him, and another one did not think about it so she was not sure.

*Recommendations:*

We gathered all the upgrades that the interviewees suggested.

- When we discussed what their thoughts were about the community recommendations, two participants said that they needed to be adjusted to everyday life, not too time consuming, and free:

*I2 (female, 46 years old): "What would work for me would be ideas of physical exercise that you can do at home, that don't take up too much time and that you can easily do in your daily life. That adjusts to our lifestyle. "You can do this while ironing". I spend a lot of time seating at work, well you see, while you are seating you can do this kind of movements, and this without interfering with your work".*

- Four participants expressed their need of a more personalized recommendation.
- One participant mentioned that she would prefer information about green spaces, as this will allow her to do physical activities with her relatives and friends:

*I3 (female,58 years old): "I enjoy physical activity shared with my relatives, therefore I prefer spaces to which I can go with them, rather than scheduled activities. It would be great to have many options. Spaces where you can do health, hike routes, activities."*

- Two participants recommended us to introduce a diet, with more detailed information about what to eat during the week.
- Two participants expressed their need that information comes from official organizations or proven authorities, with a strong evidence base, in order to improve reliability:

*I1 (male, 44 years old): "It could have other activities or general websites, like for example: "what to do to reduce cholesterol". That you can rely on them because they have solid arguments behind them, and they can help to have a healthier life: "what diet should I follow to reduce my cholesterol?". Official websites with instructive information, like the Catalan Government or the City Hall, or the Hospital… things like that and not only a workshop."*

***Quantitative Results***

The first wave of the SUS questionnaire had 19 answers [average score 68.55 (SD= 11.10)] and the second, 18 answers [73.13 (10.51)]. The mean difference between the first and the second scores was 4.57 [95% confidence interval (95%CI): (-2.87;12.02); *P* =0.220]. However, when two incongruent extreme values were excluded (i.e. those above and below ±1.96 SD*mean score in both SUS waves), the mean difference was 6.87 [95%CI: (0.94;12.81); *P* =0.025].

## Discussion

This citizen science project evaluated the usability of the COMPASS app using a mixed methodology. The usability of the app was improved following participants' recommendations, and yielded a more robust tool, to be tested as part of a randomized control trial in the future. We uncovered some of the COMPASS app flaws and aspects that needed improvement, by pooling together the results from the SUS questionnaire with the findings of the qualitative semi-structured interviews. The usability of the first version of the COMPASS was above the average, with a SUS mean value >68[23]. The second version of the app, upgraded taking into consideration the needs and complaints of the study participants, presented an improved usability, with a SUS mean value >73. Using the Adjective Rating Scale[23], and specific scale to interpret SUS scores, the first version of the app would be considered as "OK", and the improved version would be considered as "Good".

### *Barriers, facilitators of use and developmental solutions*

The qualitative results were divided into 3 categories, and within those categories there were barriers, facilitators, and general recommendations for improvements. Regarding the ease of use, some technical difficulties with installing or accessing the app were mentioned by most of the participants, so these steps were improved on the new version of the app. An explanation of the individual clinical data was also incorporated, as these data was not well understood by some interviewees. One of the interviewees made us realize that the structure of the menus was inefficient you had to go all the way down through all the recommendations, in order to find the ones that were more suitable to you. The second version of the app fixed this problem by structuring the menu into four different categories. The oldest participant (70 years old) had difficulties using the app, and mentioned the lack of time and support as the main barriers for her. This is in accordance with the conclusions of previous work on m-Health tools in health promotion programs for older adults[7].

Regarding the usefulness, a key requirement mentioned by most participants was the need of feedback and interaction. They wanted the app to evolve, to give weekly recommendations, and to include challenges and rewards. This is one of the requirements that the literature recommends for apps to be effective. [27–32]

Unfortunately, we could not improve this aspect in the second version, due to limited budget. Three of the interviewees considered that an app like COMPASS could help them make changes on their lifestyles. This data supports the theory that mHealth has the potential to be a useful tool for primary prevention of chronic diseases, specially by supporting lifestyles changes.[33]

In our study the participants in the interviews did not have experience with health-related apps. In a recent report made by Accenture[34], 41% of the surveyed used a smartphone or a tablet to manage their health status. This contradiction could be explained by the fact that lifestyle apps (for example, a running app) are not perceived as health-related.

The participants expressed their need of information about healthy menus and green spaces. In this regard, we incorporated a link directing to two websites from Canal Salut and the Mediterranean Diet Foundation.[35,36]

***The Need for Evidence-Based Apps***

During the interviews the participants mentioned several times the need for the health information to be reliable, and to come from trusted sources. Xu et al,[37] found more than 60.000 health related apps from Apple App Store and Google Play Store.

This number is probably low compared with the real amount, as they only extracted apps information from the top 5 regions according to the market size on Apple App Store, and only from the US market for Google Play Store, leaving out of the analysis big markets like Europe or Australia. However, out of this overwhelming number of choices, few health and fitness apps are underpinned by scientific evidence.[32] Examples of popular apps on Google Play in the "Health & Fitness" category, are "Six Pack in 30 days", "Let's meditate: Guided Meditation", or "Increase height workout", that lack scientific and evidence-based information.[38] This supports the theory that most physical activity apps are not developed on the basis of evidence-based data or on established behavior change theories.[39]

According to a report by the Spanish Foundation for Science and Technology (FECYT) "Science and technology social perception 2016",[40] doctors and scientist are the two most socially valued professions. Furthermore, the institutions ranking first, second and fourth position on generating confidence in the population, were hospitals, universities and public research centers, in that order. The conclusions of this report are in line with our results regarding data protection: all the participants trusted the app to deal with their clinical data.

***Health assets and the lack of time***

Five out of seven interviewees mentioned as a barrier the lack of time to spend in the healthy activities that the app recommended. Nevertheless, the fact that these activities were located within the community was very well valued. In the last ten years in Spain, many community-based health initiatives have been developed, interpreting the concept of community-based health as a nexus between public health and primary care.[41] There are many examples of programs that take advantage of community health assets, in different regions like Asturias,[42] Madrid[43,44] and Barcelona.[45]

The exploitation of health assets appears to be a cost-effective solution for improving health promotion, especially in cities like Barcelona that have a long history of local community work.

***The experience of a citizen science project***

Recently, there has been a surge of interest in developing more participatory approaches when designing public health projects. Citizen science is one of them, usually more used in ecology or biology.[46] We can mention other examples like participatory action research or popular epidemiology.[14,47] Using these participatory frameworks has showed many benefits, like increased research capacity or community empowerment.[48]

An important feature of this project was the enthusiastic involvement of the parents, students, and the faculty of La Maquinista primary school. The highly structured nature of the materials and methods was conceived to facilitate the participation of youth and their families. The participants found the experience in the school and the protagonist role of the children as key motivators. They also suggested an improvement in health literacy, which is in line with findings from other citizen science projects.[49,50]

We built a multidisciplinary team, involving nurses, doctors, researchers, nutritionist, teachers, parents and students. It is a very important step in order to develop a successful citizen science project. Furthermore, the connection between a research center and a primary school is a good example of the types of partnerships that this approach requires in order to reach new audiences. Such multidisciplinary collaborations give a broader sense to "expert knowledge" by also including local and community backgrounds.[14]

***Strengths and Limitations***

The first version of the app had many limitations, so we focused our study in explaining its mistakes and listening to the people's needs and desires for improving the app. We could not go deeper into details about the community programs, or the moments that the people were more likely to use the app, as it was a limited tool and the participants did not engage enough with it. The second version of the app was significantly better, but we could not resolve some of the requirements of the participants. The interaction that they demanded was not possible to achieve, as this was out of our budget. The same happened with the request of challenges and rewards. This requires a much more complex system that our current app cannot provide.

Another limitation was the lack of socioeconomic variability in the profile of respondents, which limits generalizability of the results, whereas the app is destined to users of all socioeconomic status. The Hawthorne effect is a type of bias related to individuals changing their behavior while being observed. To minimize this effect, the answers of the SUS questionnaire were anonymous. This practice has been recommended in the most recent literature despite the inherent incapacity to perform t-test paired tests.[51] Additionally, this anonymity allowed us to select the sample for the qualitative interviews independently of their SUS score.

This study has several strengths. The results of the SUS questionnaire were not enough to uncover the flaws and imperfections of the app, so we performed a mixed methodology assessment, with a triangulation of both quantitative and qualitative data. With the qualitative data, a lot of aspects that needed improvement were shown.

One of the secondary objectives of this study was to evaluate the participants' perceptions of joining a citizen science project. For this purpose, during its design we followed the guideline of the European Citizen Science Association.[49,52,53] Our intention was to bring closer the work of a research center and a school. The data of this study supports the theory that citizen science projects can enhance people's motivation for participation.

## Conclusions

The new version of the COMPASS app, created taking into account the participants comments and suggestions, was more usable than the first one. The efficacy of this app to empower the citizens to monitor and manage their cardiovascular risk factors will be assessed in a randomized controlled trial, also using a citizen science approach.

## CRediT authorship contribution statement

**Jorge Luis Díaz**: Conceptualization, Data collection and curation, Formal analysis, Methodology, Project administration, Writing - original draft. **Nuria Codern Bové**: Data collection and curation, Formal analysis, Project administration, Supervision, Writing - original draft. **Maria-Dolors Zomeño**: Project administration, Writing - review & editing. **Camille Lassale**: Conceptualization, Writing - review & editing. **Helmut Schröder**: Conceptualization, Funding acquisition, Writing - review & editing. **María Grau**: Conceptualization, Project administration, Funding acquisition, Methodology, Supervision, Writing - review & editing.

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**Conflicts of Interest**

None declared

**Abbreviations**

SUS: System usability scale

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## FIGURE LEGENDS

**Figure 1**. Recruitment process. *SUS, System Usability Scale

**Figure 2**. Screenshots of the COMPASS App:

A) lipid profile, blood pressure, body mass index and cardiovascular risk of the user; B) personalized recommendation and dietary, physical activity, healthy hikes and health assets recommendation; C) an example of health assets recommendations

**Textbox 1**. Interview Guideline Topics

Topic 1 - Usability related aspects:

Previous experience with apps, situations in which the app was useful, needs, advises, recommendations, motivations.

App performance: how was the learning process, how and when the participants used the app.

App review: barriers and facilitators during the app usage. Worries (data privacy)

Topic 2 - Usefulness and Ease of use:

Content evaluation: comprehensibility and quality of the information

Usefulness: content evaluation related to needs and expectations. Attitude changes, behavioral changes, improve in the asset's knowledge. Benefits from the technology usage.

**Textbox 2**. Developmental solutions for the second version of the COMPASS app

| |
|---|
| Easier and more intuitive way of installing the app on the smartphone desk. After visiting the official COMPASS website, a pop-up shows up that remarks the message: "press this button to fix the COMPASS App into your phone desk" |
| Inclusion of normal ranges and a brief explanation of the individual clinical data (high-density lipoprotein (HDL) and low-density lipoprotein (LDL) Cholesterol, Systolic Blood Pressure, Diastolic Blood Pressure, Body mass index, and Cardiovascular Risk) |
| Modification of the structure of the menus, separating the information into four categories: physical activity, nutritional and community recommendations, and healthy hikes |
| Incorporation of Healthy Hikes information website |
| Incorporation of menus and recipes from the Mediterranean Diet Foundation website |

**Table 1**. Characteristics of the study participants

| | **Male** N=7 | **Female** N=15 |
|---|---|---|
| Age in years, mean (SD) | 43 (2) | 46 (9) |
| Education level, n (%) | | |
| University graduate | 3 (42.9) | 4 (26.7) |
| Up to High School | 4 (57.1) | 11 (73.3) |
| Smoking status, n (%) | | |
| No, never | 4 (57.1) | 11 (73.3) |
| Yes, regularly | 3 (42.9) | 3 (20.0) |
| Ex-smoker, 0-1 years | 0 (0.0) | 1 (6.7) |
| Systolic Blood Pressure, mean (SD) | 122 (11) | 107 (13) |
| Diastolic Blood Pressure, mean (SD) | 81 (12) | 75 (8) |
| Body mass index, mean (SD) | 26.1 (2.8) | 26.3 (6.0) |
| Total Cholesterol, mean (SD) | 191 (34) | 181 (44) |
| High-density lipoprotein cholesterol, mean (SD) | 58 (10) | 61 (17) |
| Low-density lipoprotein cholesterol, mean (SD) | 109 (29) | 95 (27) |
| Triglyceride, median [IQR] | 95 [79;149] | 103 [97;112] |
| Glycated hemoglobin (%), mean (SD) | 5.3 (0.4) | 5.3 (0.4) |
| Cardiovascular risk, median [IQR] | 0.8 [0.7;1.6] | 0.8 [0.5;1.0] |

IQR. Interquartile Range; SD. Standard deviation