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MOBILE HEALTH APPLICATION EVALUATION POSSIBILITIES

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Purpose: Nowadays smart phone users can choose between millions of mhealth applications, but the huge selection raises an important question: how should the user choose? The information that is most readily available to the users, such as the star rating in app stores, reviews left by previous users, short descriptions and attractive screenshots, do not address many points which are important during use. How do users know that the application they are downloading is reliable, professionally relevant, and living up to its promise, for example? Several studies have already tried to answer this question and come up with models to help evaluating health applications. It is important to note that while applications focusing on more serious health areas are subject to more complex regulations, there are fewer rules for lighter topics such as weight-loss, fitness, smoking cessation, or drinking water. Thus, evaluation frameworks, usually created for serious health topic related apps, that are easy to use and understand for users, can play an important role for the less serious applications as well. The purpose of this article is to find and compare these models, to identify commonalities and any missing elements. In the second part of the article, the number one free application in the health and fitness category (considering in-app purchase revenue), MyFitnessPal is evaluated with the selected models. It will also be determined how these evaluating systems can be utilized from the users' point of view for hobby type mhealth apps, and if the suggested criteria are available for the average user at all.
Design/methodology/approach: After a literature review was conducted, four evaluation models were selected. With those, one of the most popular apps in the health and fitness category was assessed. This approach enabled the evaluation of the usability of the models from end user point of view. At the end of the article a common set of criteria is presented based on the models that were introduced and the usability of the evaluation criteria in them.
Findings: The paper points out the many possible angles that can be considered during an assessment of an application. Although not all the systems were created for end users, all are beneficial to them. Each model has criteria that is unique for them and that was not mentioned in other models, but there also were similarities. Although the authors were familiar with the application that is assessed with the models, before the evaluation was started, with the various questions from the models, lot of new useful information was found. At the end of the article a possible, useful blend of the assessment aspects is also presented.

Research limitations/implications: The authors of this paper selected various models for investigation, but the final selection was based on personal preferences to fit the aim of the article precisely.
Practical implications: Understanding the possible aspects of evaluating a mobile application is crucial for end users, especially if the app they are going to use is for health topics. Getting familiar with the models and assessing the application with a critical approach will help users to find more reliable, research based, secure applications.
Social implications: The secondary aim of the article is to raise awareness of the several aspects of using a mobile application. A lot has to be considered from end user point of view but also from app provider view, to make sure that users have the right information to trust the app.
Originality/value: The value of this paper is that it compares and describes the various methods for application evaluation, then it shows a possible blend for end users that would like to use applications more carefully. It points out that although there are end user focused models that help assessing an application, several other details can be checked that help deciding about an application, which are just as important for developers as for end users.

Keywords: MobileHealth, Application evaluation.

Category of the paper: General review.

1. Introduction

Nowadays smart phone users can choose between millions of applications, aiming for the biggest possible reach of users (Druć, Jóźwiak, Jóźwiak, Nowak, 2021) Although reports vary, it seems that the correct number was around 6 million by the end of 2020. About 8-10% of these apps are in the category of health and lifestyle in the two main app stores, Google Play, and Apple App Store. (Curry, Business of Apps, 2021) (Anthony, 2021) Together they are called mobile health or mHealth apps, which link healthcare and infocommunication technologies, including health-related services and prevention apps as well. (Buttarelli & EDPS, 2015) However, the huge selection raises an important question: how should the user choose? The information that is most readily available to the users, such as the star rating in app stores, reviews left by previous users (who are known to be easily influenced), short descriptions and attractive screenshots, do not address many points which are important during use. What aspects might be worth considering at all? For example, how do users know that the application they are downloading is reliable, professionally relevant, and living up to its promise? Several studies have already tried to answer this question. The purpose of this article is to locate and compare these studies, to identify commonalities and any missing elements. In the second part of the article, the number one free application in the health and fitness category (considering in-app purchase revenue), MyFitnessPal is also evaluated, and it will be determined how these models can be utilized from the users' point of view.

It is important to note that while applications focusing on more serious health areas are subject to more complex regulations, there are fewer rules for lighter topics such as weight-loss, smoking cessation, or drinking water. Thus, evaluation frameworks, usually created for serious health topic related apps, that are easy to use and understand for users can play an important role for the less serious applications as well. This article does not detail the regulations, it focuses on user evaluation. However, because these applications work with personal data, even applications for hobby topics are subject to strict regulations. As the market for applications is complex and cross-border, regulation and compliance is a difficult task. However, with user awareness, the risks can always be reduced.

2. Mobile app evaluation models

During the literature review, works aimed at creating a unified, practical health app evaluation system were selected (these include systematic research summaries on the topic that ensure quality content). The final selection was made based on personal opinion; the theories best suited for the purpose have been included in this paper. The articles are in English and were written after 2015. Although some of the below models are not made for end users' evaluation, because of the important aspects they raised, they are cited. It is important to note however, that selecting the correct mobile app is only part of the success, the user needs to be health conscious and motivated in order to achieve their goals with these kinds of apps (Birkmeyer, Wirtz, Langer, 2021).

2.1. MARS – Mobile App Rating Scale

The creators of the scale divide the identified rating criteria into five major categories. These are engagement, functionality, aesthetics, information quality and subjective quality. In a further 23 subcategories, the aspects can be evaluated on a scale from 1 to 5, for which descriptions are also available for the sake of objectivity. Engagement, for example, examines how well the app supports the user's entertainment, interest, and customization. The functionality analyses the app's performance, ease of use, and interactions. Aesthetics help judging the graphics, layout and display of the app's content. The quality of information is looking at data in and about the application as well, i.e. it also takes into account authenticity, validity, credibility and evidence base. The last aspect is the subjective quality, i.e. whether the user would recommend the application to others or pay for its services, but also includes the aforementioned star rating (Stoyanov et al., 2015).

2.2. Mobile Health App Trustworthiness Checklist (MHAT)

The creators of the list have identified five factors that affect users' confidence that the app is trustworthy. This analysis is more privacy and security focused than the scale presented earlier. These, as mentioned earlier, are also important aspects of the application usage, because of the amounts of personal data apps handle. Although made for application developers, this model is listed because end users could also benefit from it. The first aspect is the information content, which examines, among other things, the comprehensibility of the privacy policy and terms of service that accompany the application, the amount of personal data collected, the availability of regular updates, and that the app is based on reliable research. Organizational characteristics include aspects about the company that publishes the application, such as a history of data management and data leakage, compliance with data protection regulations, and the company's reputation. The social influence factor examines whether the user would recommend the app to others, whether the app is in the top results of the download lists, or whether it can keep its good ratings. Technology-related features analyse function, aesthetics, notifications, and data encryption. The last consideration is user control, which evaluates users 'disposition of their own data, whether they can simply delete their data, whether their data can be shared with a third party with their consent, whether they have influence over it (van Haasteren, Gille, Fadda, & Vayena) (van Haasteren, Vayena, & Powell, The Mobile Health App Trustworthiness Checklist: Usability Assessment, 2020).

2.3. Standards for Mobile Health–Related Apps

The authors aimed to create a standard set of criteria for health applications, which, as above, considered not only their literature review but also the perspectives of the stakeholders. Eight categories have been identified: usability, privacy, security, appropriateness and suitability, transparency and content, safety, technical support and upgrades, and technology. In addition to ease of use, usability examines, for example, whether the app has been tested before publication, whether assistance is available in case of problems, or whether the application is properly designed and fast. From a privacy point of view, it shall take into account, among others, appropriate information, information on the data collected, confidentiality, protection of minors and anonymisation. In terms of security, it analyses encryption mechanisms, cloud services and related security measures, authorization and authentication mechanisms, vulnerabilities and threats, and their risks. In terms of appropriateness and suitability, it examines whether the app has a well-defined target audience, whether the benefits of the app are understandable, and whether it was created with the help of experts. Transparency and content are the presentation of professional authors, the identification of the operator of the application, ethical conflicts of interest and the indication of sources of information. From safety point of view, the possible risks and dangers affecting the users are examined. The technical support and updates category includes how

often updates are performed, whether they affect performance and data collection, whether the content of the application is reviewed during the update, and what technical support the operator can provide to users. The last consideration is technology that examines, among others, whether the application is working properly, whether it is wasting resources (e.g., battery, CPU, memory), or whether it is working without data traffic (Llorens-Vernet & Miró , 2020).

2.4. Transparency for Trust (T4T)

The last model is a bit different than the ones above. The purpose of including it in the list, however, is that it could be a great addition to some other evaluation systems because of the criteria it queries. In the model, the authors name four areas that they think should be communicated to potential users in app stores to help making the best possible decision, and that developers consider while creating applications. These aspects can be grouped into privacy and security, development characteristics, feasibility data, and health benefits. In terms of privacy and security, it is necessary to examine where the data of the application is stored, what data leaves the user's device and who has access to it. Good development practice is scientifically sound, involving all stakeholders (including users) and then evaluates usability. The feasibility assessment analyses the usability, user experience, commitment, and potential adverse effects of the application. Finally, the health benefits include questions about the health effects of the application, such as the results of the application usage in clinical trials, and the opportunity cost, as using the app may even delay seeing a doctor, which may affect the success of a later treatment (Wykes & Schueller, 2019).

From the above list, it is visible that diverse criteria can be considered before downloading an application as well as when using it. Unfortunately, while all of them are valuable to the user, in many cases this information is not available, as it will be explained later. Sometimes apps are not transparent enough, which is a deficiency that can also be expressive to the user. People can already be more mindful application users, if aware that these aspects exist and may be worth looking for. Although the regulations already mentioned provide a great deal of protection for users, their own responsibility to protect themselves cannot be neglected.

Table 1.
Summary of the evaluation models, authors' own edition based on the cited sources

MARS	MHAT	STANDARDS	T4T
Engagement	Informational content – Information accuracy, Understandability, Transparency	Usability	Privacy and security
Functionality	Organizational attributes – Brand familiarity, Reputation	Privacy	Development characteristics
Aesthetics	Societal influences – Recommendations, External factor	Security	Feasibility
Information	Technology-related features – Usability, Privacy	Appropriateness and suitability	Benefits

Cont. table 1.

App subjective quality	User control – Autnomy, Empowerment	Transparency and content	
App-specific		Safety	
		Technical support and updates	
		Technology	

The above table summarizes the criteria of the selected evaluation models. To show the similarities, the same topics are highlighted in different colours. It is visible that each evaluation system has criteria which is unique to them (uncoloured cells), so it could be a good idea to combine them in order to achieve a complex assessment. Although the quality of the information for a hobby type application is not always considered the most important point, all these models mention it as one of the criteria (highlighted in orange). It is also noticeable that MARS is more focused on users' point of view, as it lists more usage-centred aspects. All other models address security and privacy in some way too (highlighted in green). MARS and MHAT also recognizes that societal influencers can play a role in selecting and using an application (highlighted in blue).

3. Putting models in practice

To test these models from users' point of view, the number one health and fitness application was selected based on its in-app purchase (IAP) revenue in 2020. IAP revenue was chosen as basis because in our opinion this metric shows real usage of the application from users. Once an app is downloaded, it is not necessarily used, but IAPs mean long-term usage and engagement with it. There are thousands of applications in this topic, but this one is popular which might be familiar to readers of this article as well. MyFitnessPal (with $43 million IAP revenue) is analysed below with the models described above. (Curry, Fitness App Revenue and Usage Statistics (2022), 2022)

MyFitnessPal is one of the most popular diet tracking app. It allows the user to track the calorie content of the foods they consume as well as the change of their own weight. When the user starts using the app, they can define their purpose: losing, maintaining, or gaining weight. Considering personal data, goals and activity levels, the application calculates the amount of appropriate energy intake. The user can then log their meals and the app will indicate the status compared to the recommended amount. Users can choose from millions of food records from a data base which is co-created by MyFitnessPal and its users. The app also provides possibility to connect with other smart devices and apps to track activity, water intake, or sleep, for example, which can improve users' understanding of the processes that affect the body and help to achieve goals. Articles on the topic and recipes, which are also available either in the application or on supporting website, can help to raise awareness. Friends in the app, reminders

and challenges help users to stay committed. Opinions about effectiveness of such apps are divided. According to a researcher group who ran a randomized controlled trial with MyFitnessPal, it is not likely to help patients to achieve significant weight change compared to traditional health care methods, but it might be useful if they are already self-monitoring. Interestingly that article also mentions that they experienced a sharp drop in usage after the first month, signalling that one of the biggest challenges for an app is to keep users' interest over time (Yoshio Laing et al., 2014). According to another study, MyFitnessPal helped users to make healthier choices, therefore reduce sugary food intake. It also highlights that benefits from app usage are dependent on the original intent of the user when they start to use the application (Slazus, Ebrahim, & Koen, 2022). A third study suggests that mobile applications were more successful in changing dietary behaviour than conventional methods (Ipjian, Johnston, 2017). In connection to usage, the other big challenge is to keep the user motivated, so they can take advantage of the application. The type of motivation, as other functions of the app, in the future could be tailored to the users' preferences what could help people achieve their best performance (Pendick, 2014). At the same time, in order to achieve the best results the app can bring, it might be a good idea to use it with a professional, because of for example a more accurate estimation of proportions could be reached with their help (Chen, Berkman, Bardouh, Yan Kammy, & Allman-Farinelli, 2019). To summarize, as already mentioned, users' attitude is just as important as selecting the correct application to help them on their health journey.

For the purpose of testing the evaluation models, the authors of this article downloaded MyFitnessPal and set up a new account, however they were familiar with the app already.

The evaluation was started with the MARS criteria (Stoyanov et al., 2015). This evaluation sheet has a header, asking information about the application, for example app name, developer, version, cost of basic version and cost of premium services, age group, etc. Then the questions are divided into sections. During the evaluation the criteria felt a bit subjective, although authors tried to describe the different ratings in detail to reduce subjectivity. It seems that the assessor has to be familiar with the app to be able to evaluate it, which criteria will be applicable to the other systems as well (Additionally for the other models, further research of the questions might also be required). Generally, the application got very good scores on each point because it is a well known app that is developed for a long period of time now with lot of user feedback. The total number of points that can be given during the evaluation is 115 (with section A-E). MyFitnessPal got 98 points (as for a research related question we gave non applicable as answer, that worth 0 and subjectively we marked no when the questionnaire asked if we would be willing to pay for the app, which worth 1), which is an 85% score. These scores are visible on the below figure. The summary points are also good for comparing applications. The information required for this rating is available for users, and can be easily found, which makes this model easy to use and practical. This might be also a good framework for creating new applications as all its points are needed for a good user experience.

Table 2.
MARS Evaluation Total Scores for MyFitnessPal, own edition

	TOTAL POINTS	MAXIMUM POSSIBLE
A: Engagement – fun, interesting, customisable, interactive, well-targeted to audience – Mean Score	22	25
B: Functionality – app functioning, easy to learn, navigation, flow logic, and gestural design of app – Mean Score	20	20
C: Aesthetics – graphic design, overall visual appeal, colour scheme, and stylistic consistency – Mean Score	14	15
D: Information – Contains high quality information from a credible source – Mean Score	28	35
App subjective quality Score	14	20
Total	98	115

Source: Stoyanov et al., 2015.

The second model that was tried was MHAT (van Haasteren, Vayena, & Powell, 2020). In this model the questions are also divided into categories, but instead of points the evaluator can select: Yes, No, Not Applicable or In progress (since it is originally for developers). Considering that this assessment was carried out by users' point of view, a fifth possibility was added called 'Information is not available for end users' to cover all scenarios. Overall, it was hard to find the requested information about the application, even if it has an additional website and blog as well. The available information in the app is more usage-focused and concentrates less on the actual scientific background or research that backs up the logic of the app, although, it could be mentioned in one of the blogposts or in FAQ, as an idea for the future. This evaluation system is useful because it makes the assessor try to discover information, which is relevant for users, but is not easy to find at a first glance. To answer the questions evaluators have to read the terms and conditions (MyFitnessPal, 2020), the privacy policy (MyFitnessPal, 2020), and disclaimers on the blog (MyFitnessPal, n.d.) or in the app too. This can lead to a well-informed and security/privacy-aware usage. The below figure shows part of the evaluation, where transparency was assessed. For the purpose of readability, the below screen shot does not contain the options 'Not applicable', 'In progress' and 'Information is not available for end users', because they were not selected for this particular criterion. The whole criteria was assessed this way, and every question was carefully researched and commented in the background for this article.

Table 3.
MHAT, Transparency evaluation, own edition

	YES	NO	COMMENTS
Does the app highlight potential risks or side-effects resulting from its use?	x		Yes, can be found in the terms and conditions- if the user reads it.
Are the 'terms of service' concise and easy to read?	x		The language is clear, there are smaller summaries for each point to help users understand the most important points of the chapters. Important details are also either highlighted in capital letters or written in bold. Bulleted lists are also easier to read.
Does the app require only minimal personal data of end-users?*		x	Reading the privacy policy, I think data collection is not on a minimal level.
Are the privacy policies concise, clear and easy to understand?	x		Yes, privacy policy is clear and easy to understand. It is devided into chapters, lists and bullet points. The language is also clear and easy to understand.

Source: van Haasteren, Vayena, & Powell, 2020.

Compared to the previous model, this one also makes users think about scientific background, which should be relevant for health and wellness type apps, and interestingly is not referenced in one of the most well-known applications in this field (However, it will be visible on figure 5 that National Institutes of Health (NIH) is referenced in one of the warning screens, suggesting that research was probably used). The information accuracy part questions the quality of the information provided in the application. Upon researching this, the app itself did not provide details, but papers were found examining for example the accuracy of nutrient calculations, which showed assuring results (Evenepoel et al., 2020; Lin et al., 2022). This system queries if users are aware of the production company of the app, and its reputation for data handling. These are also good indicators of security and could protect the users if they are aware of this information. MyFitnessPal had a famously unfortunate incident where they experienced a massive data breach, where 150 million accounts were compromised (Bradley, 2018). Directly trying to find this kind of information could be useful for a user, because understandably this is not advertised by providers. When authors tried to look this information up on the MyFitnessPal site, there was no result, but a Google search helped to find the result on the actual MFP site afterwards (MyFitnessPal, 2018). Although it must be noted that despite company's best efforts these can happen. While many users might not be interested in technical details about how their data is stored and processed, testing this questionnaire also points out that this information is not readily available to users generally. In summary, although this system was created for developers, many of the answers were obtainable for end users too. This is good news, because it would allow users to be more in control of their own data and responsible usage considering these criteria when using an app. There were 44 questions in total, to which 24 times the answer was yes (55%). This means that a lot of information was available for users as well for a developers' checklist. We answered no 9 times (20%). The mentioned 'Information is not available for end users' category was selected 11 times (25%). The missing points are concerning company background, research, and privacy details.

This shows how application information is presented and what is considered to be important (While personally for the authors these are important details, we can accept that these might not be important factors for an average user).

The third tested system was the Standards for Mobile Health–Related Apps questionnaire (Llorens-Vernet & Miró, 2020). The questions are also grouped into categories that can be evaluated. 'Not available' was added as an extra option, because although the developers might be aware of the answers, the average user might not find the queried information. This was the first questionnaire (of the selected ones) that asked about language setting possibilities, which signals that the most common languages for the apps are English and any local language if the app is created for or in a certain country. MyFitnessPal allows users to select one of 15 available languages, which shows that this is a mature application with a serious past already (MyFitnessPal, 2019). This system also urged the examiner to read the privacy policy (MyFitnessPal, 2020) and the terms (MyFitnessPal, 2020) with its questions, even in more detail than the previous one. The privacy policy felt a bit vague after reading the evaluation criteria, it was not too specific about the data collection and right to access for example. GDPR is specifically addressed in the privacy policy, special rights related to it can be exercised by contacting the support services of the app (MyFitnessPal, 2020). While researching this topic, authors were also able to find an article for GDPR on the MyFitnessPal support page, that contains a great amount of useful information for users for various topics (MyFitnessPal, 2021). After reading the terms and privacy policy thoroughly for these models, authors of this article appreciated that users usually agree to a lot of things when they just click on mandatory consents, but maybe upon detailed reading, they would be more selective of the apps they are using or the data they share. Some of the data usage felt ok and valid for using the app but for some in my opinion some users would opt out if they had the chance to do so. Thus, there is an ‘all-in approach’ to these documents, either the user accepts and can use the app or does not consent but cannot use the app at all. The below table shows the privacy section of the evaluation. It details questions and the authors’ opinion and reasoning why the answers were selected. The highlighted questions were marked as two of the most important points by the stakeholders that the original article of the evaluation criteria researched.

Table 4.
Standards for Mobile Health–Related Apps questionnaire, Privacy section evaluation, own edition

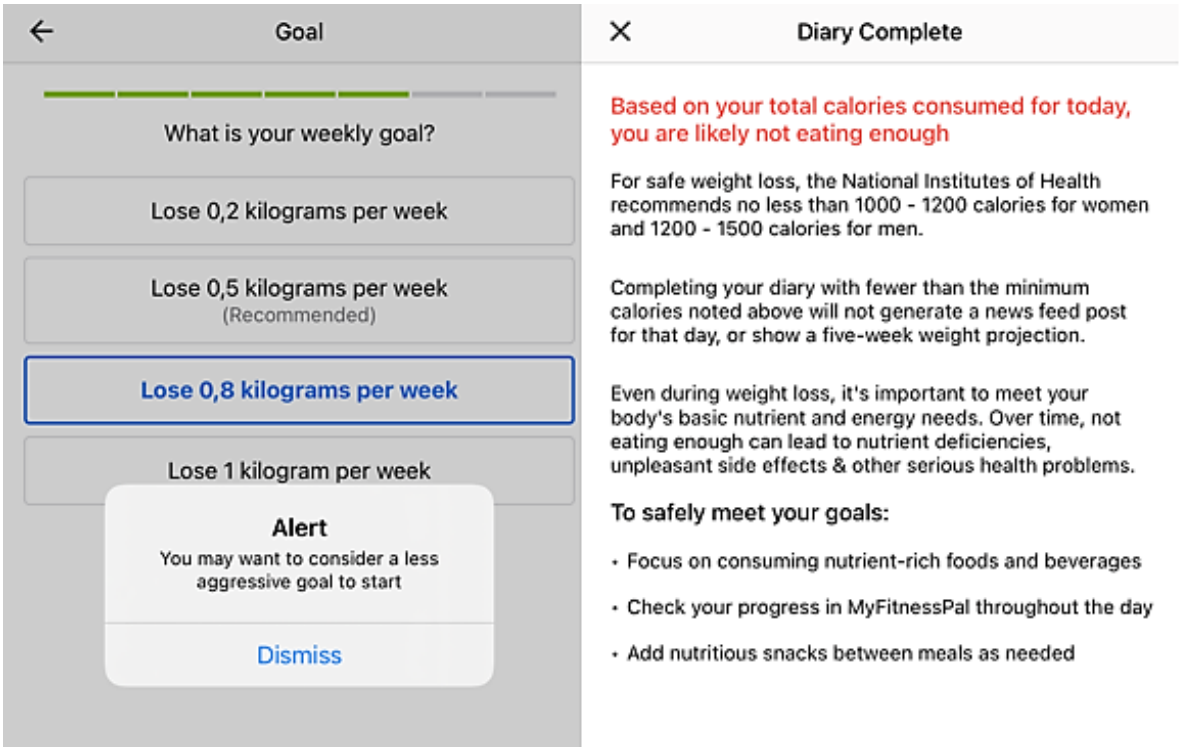
	YES/NO/ N/A FOR MyFitnessPal	COMMENTS
The app gives information about the terms and conditions of purchases in the app and personal data recorded.	Yes	Terms and privacy policy are requested to be approved upon registration, but they are also available for reading during app usage, and they can be found from the webpage and blog as well.
It gives information about the kind of user data to be collected and the reason (the app must only ask for user data that is essential for the app to operate). It gives information about access policies and data treatment and ensures the right of access to recorded information. It describes the maintenance policy and the data erasure procedure. It gives information about possible commercial agreements with third parties.	Yes	Privacy policy contains this information, however I have the feeling that it could be more specific- GDPR is addressed, special rights can be exercised by contacting support services of MFP
It guarantees the privacy of the information recorded. It requires users to give their express consent. It warns of the risks of using the app.	No	Although privacy policy has a lot of information about this, there is no warning of risks and consent is requested for the whole terms and privacy policy documents. So user can't opt out if they disagree with certain points of them.
It tells users when it accesses other resources of the device, such as their accounts or their social network profile.	Yes	This has to be initiated by the user
It takes measures to protect minors in accordance with the current legislation.	Yes	You have to be of age to be able to register
Confidential user data are protected and anonymized, and there is a privacy mechanism so that users can control their data.	Yes	MFP is trying to apply the GDPR rules for all of its users, however specific description of data protection done by the company is not available

Source: Llorens-Vernet & Miró, 2020.

In the model some of the criteria are too complex, they contain two or more sentences, of which one can be true and one can be false, making the evaluation harder in one line. Security related points were not clearly accessible for users, although a company and app of this size must have the mentioned measures in place. Technical support is not cited in the previous evaluation systems, however that is a useful and important point too that would be relevant for end users. Technical details, such as flight mode usage and resource usage are also valuable criteria, however presumably they are not in the other ones because hopefully these issues are addressed during a testing phase already. Finding the authors of the app was a difficult task, generally a page about authors, research and provider company would be useful for the average user considering the above evaluation systems and the value of this information. The total number of criteria was 36, of which 23 were answered with yes (64%). This also means that a lot of information was available from the checklist. No was selected 4 times (11%). 9 criteria were answered with ‘Not available’ concerning development details, security details, validation, and research (25%).

This model, among many other topics, asked about the possible safety of the app, namely if it is warning the users of possible risks of using the app and potential effects of bad usage (Llorens-Vernet & Miró, 2020). The following two screen shots are example from MyFitnessPal, taken by the authors, highlighting possible risks. On the first screen shot we tried to set a challenging weight loss goal during the app setup. On the second picture we tried to complete the daily food diary with very little food intake saved for the day. In relation to the possible risks, it is worth noting that according to a study there might be a relationship between using weight-related self-monitoring applications and disordered eating (Hahn et al., 2022), however there was no reference for MyFitnessPal of such risks.

Table 5.
Safety warnings in MyFitnessPal, screen shots taken by the authors



The last model that was tested was T4T (Wykes & Schueller, 2019). It is slightly different, as it focuses on trustworthiness of the app. This evaluation model is the shortest of the ones that were selected, so it was relatively quick to fill. The questions are data-aware, they helped to direct attention while reading the privacy policy, for example asking about the collected data and the 3rd party sharing details (MyFitnessPal, 2020), as the below screen shot shows. It contains one of the four criteria, privacy and security and the authors' comments after researching the questions.

Table 6.
T4T evaluation criteria and authors' comment, own edition

PRIVACY AND SECURITY	COMMENTS
1) What data leave the device?	The app collects personal data about the user- contact details, address, weight, hight, weight and fitness goals, activity, possibly sleep data, other health data if the app is connected to another device (heart rate, etc), photos
2) How are those data stored?	According to the privacy policy the data is stored on the company's server in the US
3) Who will have access to those data?	According to the privacy policy: Service providers and vendors "With business partners, marketing partners, and vendors to provide, improve, and personalize the Services.", Social network providers "With social network providers when we use social network widgets, buttons, or plug-ins in our Services." Other MFP users "With other users of the Services in the context of specific features that are social in nature. Additionally, any information you post or disclose in our community forums (e.g., Facebook, sponsored pages on the MyFitnessPal Blog) is public." Advertisers and marketing services "With advertising and marketing partners for advertising and marketing purposes on MyFitnessPal's behalf and on behalf of third parties, including but not limited to Facebook." Analytics and improvements "With certain companies for purposes of analytics and improvement of the Services." For personalized advertising For Legal Compliance, Law Enforcement, and Public Safety Purposes In the event of an actual or contemplated sale- with other companies/ investors

Sources: (MyFitnessPal, 2020), (Wykes & Schueller, 2019).

The model also highlights the importance of clinical research, for which details are not available for the average users. It was thought-provoking to think about the possibility that there are certain users that received no benefit from the app or even deteriorated due to the usage of the app. This data would be very significant too for users. In my opinion revealing how testing and evaluation of an app is done when it is already operational would help improving trust towards the app. The model asked about the proportion of users that use the app after two weeks, which is referring back to the previously mentioned challenge that users stop utilizing the application after a while. Although the precise answer to this question was not found, the already cited research (Yoshio Laing et al., 2014), and the statistics (Curry, Business of Apps, 2021) could give the assessor some insight. There were 12 questions in this system, but the answers to these were complex ones, so a total of points cannot be provided. Overall, this evaluation criteria could be a great addition to some of the other models because it asks important questions which should be considered for a health and fitness app but are not mentioned in the general evaluations.

4. Conclusion

Using these four evaluation criteria for a single app was an eye-opening exercise. It pointed out the many possible angles that can be considered during an assessment of an application. Although not all the systems were created for end users, in my opinion all are beneficial to them. Each model had criteria that was unique for them and that was not mentioned in other models, but there also were similarities. It would be a great habit to read the privacy policies and terms and conditions, because they provide valuable information for the users, which answer a lot of important questions. It also felt useful to research the scientific background and the organizational background of the application. Although the authors were familiar with the application already before we started the evaluations, we learned a lot about it with the various questions from the models.

In summary, as a possible blend of these models, the following areas have to be evaluated to establish if an app is good enough to be used.

- Usability, including function, engagement, aesthetics. In this category the aim could be to examine if the app is easily usable, intuitive, fun to use, visually appealing, customisable and fit for its purpose and target audience, etc.
- Content, including quality of the information provided, benefits, research, appropriateness, and suitability. This category could contain questions about measurements, research that backs up the contents of the app, the benefits of the app, etc.
- Security, privacy, safety, transparency. This could show potential risks of using the app, security measures that are taken to protect users, and privacy related questions about data handling, how the privacy policy is written, how the app is protecting user data, etc.
- Publishers: it could be beneficial for users to have more information about the app provider organization, its reputation, brand, and about the app's authors, possibly development characteristics.
- Technical support and updates: it is important to provide technical support for health and fitness related apps, and in general regular updates to improve the app's many aspects are also vital.
- Technology: the app should work well, should not waste resources, etc.

Using the models, the last factor could be societal influencers, but the authors of this article think that this is not needed as a criteria as other aspects feel more important. However, generally it is accepted that users are influenced by each other when selecting an app to download.

Although using a kind of combination of the evaluating systems or any individual evaluating system might give users a great knowledge and awareness of the app's quality, realistically usually not this many aspects are considered before a user downloads an app. Perhaps because this is health related, they could be more prudent. The more realistic approach could be that these assessments could be carried out by providers, for which results would be shown when an app is presented to the users (for example on the informational pages or supporting sites). Another solution could be that the medical personnel who recommends these types of apps does the evaluation and gives out recommendations based on the results. Even if these applications are not very serious health apps, their evaluation with more serious criteria gives valuable information to their users and enhances trustworthiness if provided.

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