Food for thought

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Abstract: Healthy eating is essential to avoid many health problems, but identifying health-promoting foods and behaviors is difficult for most individuals. Fooducate is a diet tracking app that comes with a variety of tools, features and support mechanisms that claim to simplify the task of eating healthy. Based on our analysis of the user reviews, we identified five benefits that Fooducate users have reported experiencing in relation to achieving good health: improved food choices, increased awareness, weight loss personalized care and "ever-present" human support. Fooducate can align itself more closely with users' goal of achieving healthy lifestyle by expanding its database, making its interfaces flexible, improving its ability to provide personalized care and revising its ideological choices.

Keywords: Food; goal; education; database; personalized; real-time

Introduction

Eating healthy can help us avoid a myriad of diseases such as cancer, diabetes, obesity etc. and serious health concerns such as poor mental health and low quality of life. A food diary can help people record their eating habits and, in collaboration with a dietitian, prompt them to make dietary adjustments. Unfortunately, modifying existing behaviors or adopting healthier ones is challenging for many individuals, particularly those who lack sufficient organizational and motivational skills. The self-quantification movement started by mobile apps has been trying to address such user challenges, but the evidence of their effectiveness is scant. In this article, we review a popular diet tracking app called Fooducate to test the claim that mobile apps can help people adopt a healthy diet.

Analysis

We analyzed over 260 reviews posted between October 10, 2018 and March 20, 2019 by Fooducate users on Google Play to understand how people are using this app, what they feel about it, and what are its perceived benefits and challenges for the users. The author also engaged in a self-guided exploration of the app to understand how it works and what it offers. Seventy reviews were discarded because they lacked discussion of the app's value to the user. We assigned one code to ninety four reviews, and 2–8 codes to the remaining ones. Ninety-one reviews were purely positive and 37 purely negative. The remaining 62 were mixed, discussing both negative and positive experiences with the app (*Table 1*).

Benefits

Improved Food Choices. Fooducate has been designed to be used like a food diary. But, instead of writing down what they eat, users only have to scan food items to log them in Fooducate's diary. As soon as a food item is recorded, the app acts like a nutritionist and returns a grade that shows how healthy the food item is according to the scientific ideology that appears to be based healthiness of macro-nutrients. For example, fries are given a grade of C due to high calorie and low protein content. But, an apple is graded A for being high-vitamin food item. Users report that this real-time feedback motivates them to reflect on their food choices and take steps to change it. Moreover, when a food item receives a

Table 1 Classification of the analyzed reviews

Category	Total
Reviews with only positive theme(s)	91
Reviews with only negative theme(s)	37
Reviews with single themes (positive or negative)	94

low grade, the app also provides alternative food choices. Thirty-seven percent of the reviewers reported using this feature to decide what to eat and what not to eat. Sixteen percent reviewers reported that they use this feature on a regularly during grocery shopping to help them make decisions about what to eat.

"*I love the grading system for foods and suggested alternatives... I have been using this app for a week and learning more everyday. I searched the app when I stopped at the grocery store to buy some soup. After looking at the grades of two available choices, I opted to buy Annie's Chicken Noodle Soup instead of the usual Campbell. The app is helping me make some gradual changes which feels good,*" (Kelly Craighead, February 8, 2019).

Increased Awareness. Fooducate also enables users to track macro-nutrients such as protein, sugar etc. In pre-app days, users spent a lot of time to research and write down macro-nutrients present in their meals. The app does this automatically with the help of its underlying database, which is quite extensive hence making it possible to obtain nutritional information of a wide range of food items. Eighteen point five percent reviews discussed the benefit of reviewing nutritional make-up of food items, especially those who had dietary restrictions.

"*...so much information that makes sense ... no fooling around. just plain sense. I have really educated myself with this app,*" (A Google User, February 24, 2019).

Weight Loss. About 9% of reviewers reported that they have been able to lose weight with the Fooducate app. The calorie information provided in the app allows users to opt for low calorie food items, which helps avoid unnecessary packing of calories. Moreover, users can also track their physical activities. Calories that are burned as a result of physical activities automatically adjust daily calorie intake values in the app. This helps the user how well they are doing with the deficit they are required to lose weight. Many reviewers reported that their nutritionists encouraged the use of Fooducate for weight loss purposes too.

"*Great app for tracking what you eat and losing weight. I*

have lost 9.5 lbs and 4" of fat with the help of this app,*" (Sandra Hewitt, March 2, 2019).

Personalized Care. The app allows users to personalize its content, so they can receive tips and support that applies to them. For example, if a user wants to lose weight by a certain date, the app can suggest a daily amount for either calories or sugar, depending on the user's preference. Similarly, individuals who do not want to track calories can use a different metric called food points (a food quality monitoring metric devised by Fooducate). This metric assigns a healthy point to the food item rather than calories. Users must receive certain food points every day to ensure they are receiving good nutrition.

The app also includes several premium features that are available on paying a subscription fee. With the help of these features, the user can personalize the app content even more. For example, the user can personalize the app to generate alerts about allergens, or tips and tricks in support of some goals. People who are thinking about adopting a specific type of diet such as paleo, keto etc., can access the diet and recipe section on upgrading to the premium version. You can also pay a fee to get connected to a licensed dietitian who can help you make new goals or achieve your existing ones. Moreover, people who have dietary restrictions or specific chronic conditions, such as osteoarthritis and high blood pressure, can customize this app to receive diet recommendations to help them cope with their chronic conditions.

"*I am currently on a heart healthy diet due to open heart surgery. I find this app extremely useful in selecting and researching foods that are the best for me. I love the ease and versatility in using the app,*" (A Google User, March 3, 2019).

"Ever-present" Human Support. Fooducate also has a community module where Fooducate users avidly share pictures and posts about their food related activities. For example, many people post pictures of their healthy home-cooked meals, which can be inspiring for those who are struggling to become healthy. Other times, these pictures allow users to showcase their accomplishments such as changes in body weight and shape after making certain dietary changes. Many users share weight control tips and help each other recognize what to eat and what not to eat. People also post their doubts and confusions as well as discuss how to use the app effectively. In short, this is a great place to gain support to achieve ones' goals.

"*So much good information. You can also find a lot of encouragement in the "community" of like-minded people. We all want to eat healthy and live a healthy lifestyle,*" (Donna Shelton, February 15, 2019).

Limitations

Specialized Database. Despite its extensive database, many Fooducate users are not able to find many food items which they regularly consume. Some users complain that the database contains food items only available in big and specialty food stores, such as Trader's Joe.

"It would be great if the food list was more specific to a person's location. Everything that pops up is Trader Joe's. The closest one to me is 40 miles away. I shouldn't have to drive that far away to get healthy options," (Amanda McEachran, March 7 th, 2019).

Users can add new food items to Fooducate's database, but user-contributed information does not appear until it has been verified by the app company. Currently, this takes a long time, which many people find undesirable. Sometimes, even after verification the information is incorrect and there is no easy way for users to report inaccuracies or ask questions.

"If a product did not exist yet ... you take a picture and the app emails it them, but you have to wait until they update the database. Once updated, there's is no way or users to report errors on the website or provide updated images. Everything goes via email which is an outdated method of data aggregation. It's an app ... It needs functionality. Everyone I talk to no longer uses the app for this same reason...," (Ian Scheil, November 8, 2018).

Another prevalent complaint about Fooducate's database is that the nutritional content does not translate well for home-cooked meals. Since everyone cooks differently, Fooducate needs to make it easier for users to get accurate feedback. One suggestion is to include a "build a dish feature" that would allow users to prepare a virtual dish by combining the ingredients used by them in real life. This virtual dish can then be added by the user to their personal Fooducate database.

"I have some difficulty getting accurate info for home cooked meals, but I'm not sure how they could fix this because there's such variety in how people cook," (Sarah G, February 24, 2019).

Unrelatable ideology. A discontent with the grading system is that the grades are based on (some) ideology as opposed to science. The reviews point out that everyone has her own beliefs and ideologies with respect to what is healthy. Fooducate is trying to promote one ideology about being healthy which seems to conflict with the beliefs and needs of many users.

"... the useful stuff is buried under a megaload of diet/food moralizing BS. Those food grades are based way more on ideology than any science and that's why it gets as low a rating from me as it does ...," (Angela T, February 28, 2019).

Limited personalization. Although Fooducate makes it possible for users to personalize the app on many levels, there is still room for improvements. The personalization features could be improved if the app becomes more user-centered. For example, some reviewers had pointed out that they would not use this app because it would exasperate their disordered eating behaviors. They thought that the app should give them more control over what could be displayed on its interfaces. Particularly, users wanted to have the ability to turn off the calorie counting feature or to choose between displaying "calories consumed" versus "calories remaining" on the screen.

"There's no way to disable the calorie counter, I just want this app to track my meals nutrients, and food but I cannot count calories or it puts me in an eating disordered mindset. Right at the top of the app it tells me how many calories I have "remaining" and that's just extremely unhealthy and toxic," (Michelle I, January 15, 2019).

On the flip side, many users wanted to maintain a disordered eating mindset to achieve their own health goals such as weight control etc. Indeed, there are many online forums where disordered eating mindsets are promoted and supported by those who value this type of lifestyle.

In order to enhance its personalization algorithm, Fooducate will have to collect a lot of personal information from its users. It will be interesting to find out what kind of information are users willing to share with the app to increase its relevance to themselves. On the hand, an effective design strategy can increase users trust in the app, and hence willingness to share personal information.

Non-optimal interaction design. Despite having easy to use interfaces and an intuitive interaction style, the app can still make huge improvements in these areas. Firstly, the login wall turns off many individuals because it prevents people without accounts from freely experimenting with the app. At least five reviewers expressed their frustration with this constraint, and three decided to quit the app due to this restriction. It is also impacting user's trust in the app.

"...requires account sign up so they can track and sell your data," (A Google User, February 16, 2019).

Secondly, some users think that the main function of the app, i.e., barcode scanning could be made more seamless, e.g., by having it as a widget on the phone's screen. This will minimize the effort involved in scanning a barcode. Users will only have to click the widget to open the scanner, instead of using the three-step process of first opening the app, then navigating to the barcode screen, and then, finally,

aligning the phone on the barcode to scan it.

"*Adding a home screen widget for Scanning bar codes would be appreciated,*" (A Google User, February 6, 2019).

Similarly, on the physical activities front, Fooducate also has a huge opportunity to improve. Many users suggest integrating the app with an external health device such as a Fitbit. This will help address limited physical activities choices and also the complexity of recording them.

"*Love the ease of using but wish it was connected with a step tracker,*" (Cindy Lease, February 11, 2019).

Thirdly, users find it hard to make changes to the recorded entries, i.e., contents and timings of the meals. In general, users wanted more control over what was displayed on the interfaces of the app, particularly, freedom to change what they had recorded and how the app displayed the information. Finally, Fooducate can think about incorporating reminders to help users become consistent with tracking.

Conclusions

Based on our short exploration, we conclude that Fooducate

has shown effectiveness in impacting some aspects of its users' lives by providing a tool that can help people understand their dietary intake on a daily basis. Getting tips on what to eat and what to avoid eating is now as simple as scanning a food item or posting a question. We have discussed some limitations of the app and made some suggestions that can make the app more useful for its users.

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Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.