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Use of a Web Application for Self-Monitoring Dietary Intake: Feasibility Test and an Intervention Study

Khushabu Hemraj Yewale
Department Of Computer Engineering SSBT COET, Bambhori, Jalgaon.
khyewale@gmail.com

Sakshi Rajesh Patil
Department Of Computer Engineering SSBT COET, Bambhori, Jalgaon.
sakshi.rpatil28@gmail.com

Rushikesh Vilas Wagh
Department Of Computer Engineering SSBT COET, Bambhori, Jalgaon.
rwaghe2018@gmail.com

Amol Surdas Purbhe
Department Of Computer Engineering SSBT COET, Bambhori, Jalgaon.
amolpurbhe1104@gmail.com

Abstract

Web applications are increasingly being used to support nutrition improvement in community settings. However, practical literature is scarce to support researchers and practitioners in choosing or developing health applications. This work maps the features, key content, theoretical approaches, and methods of consumer testing of applications intended for nutrition improvement in community settings. A systematic, scoping review methodology was used to map published, peer-reviewed literature reporting on applications with a specific nutrition-improvement focus intended for use in the community setting. After the screening, articles were grouped into 4 categories: dietary self-monitoring trials, nutrition improvement trials, application description articles, and qualitative application development studies. Collaboration between practitioners and application developers promotes an appropriate balance of evidence-based content and functionality. This work provides a unique resource for program development teams and practitioners seeking to use an application for nutrition improvement in community settings.

Keywords: dietary assessment; feasibility; pre–post intervention

Introduction

The popular burdensome collection of accurate and comprehensive dietary data facilitates the provision of effective nutrition interventions and, more broadly, deepens our understanding of the complex relationship between diet and health. However, traditional dietary assessment methods that capture granular data are burdensome for respondents and investigators and ill-suited to modern users. The adoption of technology, particularly through smartphone ownership and internet usage, continues to grow worldwide, and research participants have expressed a preference for digital tools over traditional "pen-and-paper" methods for logging dietary intake. In addition, web apps for health and fitness, including apps with diet-tracking features, grew by >30% from 2014 to 2017. While popular, these and other technology-based diet-tracking tools require further development for validity and ease of use. Dietary assessment tools that rely solely on self-report are natural targets for improvement. These include pen-and-paper dietary records and the interviewer-administered 24-h dietary recall (24HR), both of which have been adapted for technology platforms [as diet-tracking apps and the automated self-administered 24-h recall (ASA24). The newly developed PIQNIQ app aims to mitigate issues associated with self-reports by incorporating common data entry features, such as text entry and dropdown menus to facilitate choice, as well as a portion size selector—a timesaving feature with a slider for visually estimating food or drink portions. In this report, we describe a study evaluating the accuracy of PIQNIQ in capturing self-reported dietary intake across 3 healthy dietary patterns. Our primary objective was to assess the accuracy of 2 food capture methods using PIQNIQ, use. comparing the energy and nutrient content of reported foods with those of foods actually consumed.

Materials and Methods

The National We developed a dietary self-monitoring web application called 'Diet-A'; its development process has been published elsewhere [9,10]. The menu of the application was composed of three parts: records of dietary intake, real-time feedback, and provision of information on disease prevention in accordance with the participant's input (Figure 1). The structure of the Diet-A system allows input of dietary data, calculation of nutrients, comparison with dietary reference intake, production of descriptive statistics of nutrient intakes, and display of personalized advice, and a food recommendation list [9]. After users logged into Diet-A, they entered their sex, age, height, and weight, Nutrients 2017, 9, 748 3 of 12, and then their estimated energy requirements were calculated. To record their food, dish, and beverage intake, users can speak or type in the name of the food, dish, or beverage. When users spoke food, dish, or beverage names, the application showed its name and the number of one serving size on the screen. Users could check whether their voice was well recognized accordingly. If not, users could speak again or type in the name of the food, dish, or beverage. Users then record the proportion of the pre-specified portion size (e.g., 1 serving size of bowl). Daily energy and nutrient intakes were calculated by summing the nutrient content for quantities of foods and beverages consumed, which were calculated by multiplying grams of one pre-specified portion size by the proportion of portion size that they recorded. We used the database of the National Rural Living Science Institute [11] for grams of one serving size commonly consumed in Korea. Users were instructed to take a photograph to remind them of foods, dishes, and beverages that they consumed on that day so that they could record the meal later when they had time for data input. Also, Diet-A had a pop-up function that reminded users to record their meals if they did not record their breakfast, lunch, or dinner until 11:00 a.m., 3:00 p.m., or 8:00 p.m., respectively The percentage energy intake of each carbohydrate, fat, and saturated fat was compared to the Acceptable Macronutrient Distribution Range. Intakes of sodium, calcium, and iron

were compared to the intake goal or recommended intake (RI) of Dietary Reference Intakes for Koreans 2010. On the feedback screen, intakes of total energy, carbohydrates, protein, and fat and the contribution of each macronutrient to energy were displayed. To build our database of foods and dishes, we used the database of Korea's Ministry of Food and Drug Safety [13], the food composition table of the National Rural Living Science Institute [8], KNHANES 24-h recall data and nutrient content provided by food product companies.

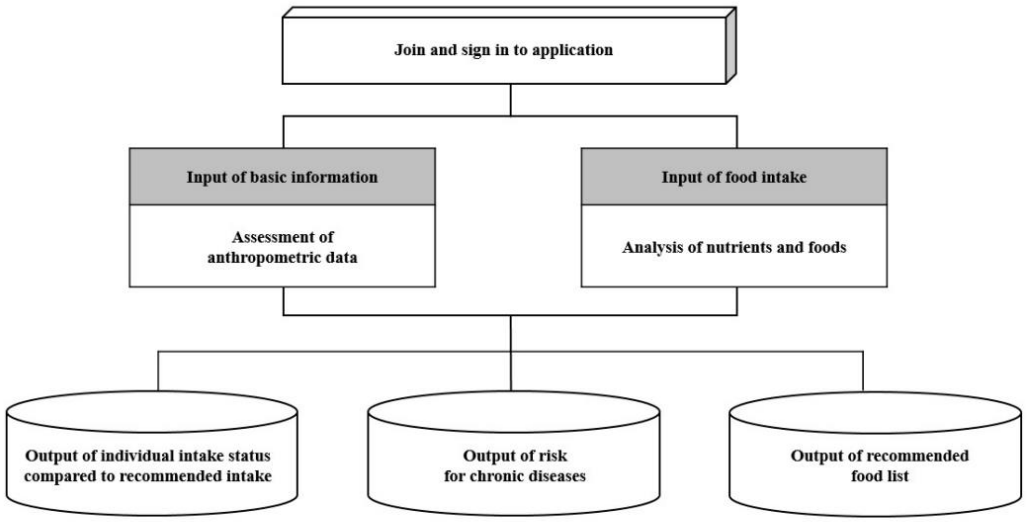

Figure 1. Flow chart of developing stage of application.

Why Do You Actually Need A Fitness Mobile App?

Workout to stay healthy is one of the prime aims of everyone's life, since the claw of deadly disease is growing tighter and stronger around us, we need invincible health to envelop us which can blanket our bodies so we can stay protected and safe.

But our ever-demanding work schedule suppresses our daily motivation to stay up and do some beneficiary acts for our body, in such a scenario something which can guide us at our fingertips, is something much required…and a web app is the best option to make it happen.

There are various types of health and fitness web apps, which help users to utilize the benefits of fitness and health by preferring an option as per their specific set of needs. Some of the health and fitness web app types are:

- Workout and Exercise web Apps- Workout apps focus on workouts, and explain to users what exercises to do and explain exactly how to do them.

- Personal Trainer web Apps- This app offers an exercise system, where users can tailor the complexity and the set of exercises they prefer.

- Logbook Apps- These apps are just to-do list type, which just stores information about workouts.

- Nutrition Apps- With these apps, users can control their weight by counting calories consumed and burned, controlling water balance, and encouraging healthy eating habits.

Now that you know the concept of fitness mobile apps, the next big thing is to discuss the features of the health and fitness mobile app, so let's explore further…

Feature #1

Login Accounts

This is one of the most expected and obvious features of fitness web apps. Indeed by integrating the login feature in your fitness web app, you create a personalization factor with your users, but something more which is the important benefit of this particular feature, is the retention of data, once users would change the device.

The login account must be of few steps, and must not ask for irrelevant information from the users; it must be simple and short. Another aspect of your login account must state that users can log in through any social media login, and it must not be rigid enough to get the login through the login only, but your app must give the option from social media as well.

Feature #2

Personal Info

The health and fitness web app fits the bill of requirement, only when it allows the users to integrate the option of adding personal information since the diet or workout programs work in accordance with the users' age, weight, height, and other physical parameters.

A health and fitness web app, which considers these points is always appreciated by the users.

Feature #3

Notifications To Motivate

Although notifications are an integral part of web apps, in health and fitness, these notifications help users to stay motivated to perform their set goals.

Notifications such as: 'Healthy and tasty recipe to burn those extra inches, is just uploaded or You are only 2 miles away from your goal this week'…to make it a worthy experience you can add the adjusting feature in the notification, so users don't get irked.

Feature #4

Target Setting

If your user is unable to set targets in the fitness web application, then the app is of no use. You must ensure that your health and fitness web app allows the users to have targets for workouts, the number of steps or hours of sleep, or the targets for calorie limits or pounds lost.

This would help the users to see where they are heading towards.

Feature #5

Settings

Your app must carve out the engaging factor deep within the app, so the users can stay hooked to the app, this can be done by allowing the users to pick and customize their settings as per their needs and requirements.

When you decide to proceed with a **top web app development company in India**, then ultimately you secure your web app to be in success mode, thus is highly recommended to pick the right web app development partner for your health and fitness web app, so your app can gain its deserving recognition in the app market effortlessly.

Discussion

The number of randomized controlled trials on the effectiveness of web apps in improving diet and nutrition and controlling weight is still modest, and some trials are limited by small sample sizes. Differences in study design (e.g., choice of a comparison group, outcome measures) and web app functionalities also increase the difficulty of drawing firm conclusions about the effectiveness of apps in modifying behaviors. The results of this review indicate that the magnitude of the intervention effect (e.g., decrease in BMI) is likely to be modest.

Nevertheless, web apps have several advantages. The results of this review indicate that apps can be effective in promoting healthy eating and weight loss and that they are likely to be a useful and low-cost intervention for improving diet and nutrition and addressing obesity in the general population. In validation studies, the accuracy of diet and nutrition measurements obtained using mobile devices has generally been found to be good.

Rapid technological advances have led to the emergence of web that combine the voice and text messaging functions of cell phones with powerful computing technology that can support third-party applications, Internet access, and wireless connectivity with other Coughlin. Author Manuscript Author Manuscript Author Manuscript Author Manuscript devices. About 53% of adults in the U.S. All major web platforms provide third-party developers with application programming interfaces that can be used to build special-purpose applications referred to as native apps. In April 2012, there were an estimated 13,600 consumer health web apps. Additional research is needed to examine the effectiveness of intervention components in web technology. Future studies should utilize randomized controlled trial research designs, larger sample sizes, and longer study periods to better explore the diet and nutrition measurement and intervention capabilities of smartphones. There is a need for culturally appropriate, tailored health messages to increase knowledge and awareness of health behaviors such as healthy eating. There are currently no culturally tailored, research-tested web apps suitable for non-English speakers or for persons with low health literacy. Health promotion messages that are culturally tailored for a group address the unique needs of individuals, increase their motivation, tend to be perceived as more personally relevant, and lead to a greater likelihood of behavior change. The tailoring of health promotion messages to cultural groups increases the relevance of the messages to members of the target audience.

Conclusions

Web apps are likely to be a useful and low-cost intervention for improving diet and nutrition and addressing obesity in the general population. The accuracy of diet and nutrition measurements obtained using mobile devices has generally been found to be good. Participants prefer applications that are quick and easy to administer and those that increase awareness of food intake and weight management. Research-tested web apps are needed that are culturally tailored and appropriate for persons with lower health literacy and for non-English speakers.

Diet-A is developed to provide users with real-time feedback on their diet and assess food and nutrient intakes. Diet-A is equipped with voice recognition and photography functions for accurate recording. It focuses on four chronic diseases, namely, obesity, diabetes, hypertension, and dyslipidemia, providing users with real-time feedback. However, the dietary recording remains burdensome even with the web application. Overall, our study revealed some challenges to the use of our web application for dietary assessment and self-management of dietary habits, including underestimation, promotion of motivation to use, and improvement of the food and dish database.

This single-site randomized trial testing the accuracy of PIQNIQ, a novel app designed to capture dietary intake, showed that simultaneous entry and photo-assisted recall methods had similar accuracy. Further, nutrients captured by the app, except added sugars and total fat, were highly comparable to those collected by traditional 24HR. Our findings underscore the importance of developing and enhancing technological tools for dietary assessment. Such tools can replace traditional methods, which are burdensome to investigators and respondents, while better engaging the general public.

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