

Inspiring Older People to Eat Healthily

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Abstract. The APPETITT project set out to contribute to well-being by inspiration to healthy eating. We wanted to create an attractive, accessible, and easy to use tablet application that could support older people at risk of malnutrition. In our approach, home-dwelling older adults are inspired to organise their meals. The app presents pictures of inspiring common dishes and quality-ensured information about nutrition, gives adequate feedback to the users, and thus, contributes to create awareness to prevent malnutrition among older people. We report from experiences from the design and testing of this app.

Keywords. food intake, mal-nutrition, self-management, elderly care, usability, user-centred design

Introduction

A large proportion of older people living at home have nutritional risks. It is reported that between 20-50% of the elderly who are also chronically ill, are considered malnourished when they are hospitalised [1]. Adequate food and beverages are essential prerequisites for good health and well-being. Furthermore, research has shown that tablet applications can be created, which older people enjoy and benefit from [2]. Although older people consistently have lower rates of technology adoption than the general population, the number of older people that use Internet services with a tablet increases. More than 37% of Norwegians in the age group 61-100 years, and 26% in the age group 81-100 years use the Internet with a tablet daily or weekly, and the gender variations are small [3].

1. Related Work

Research on the impact of mobile health interventions for improving diets and food intake is increasing. A review of the mobile health intervention to promote healthy eating in adults found promising trends towards effectiveness [4]. Research has focused on overweight, but malnutrition represents a severe threat to health and well-being among older people, also in high-income countries [5]. The opportunities of mobile health (mHealth) systems provide individuals with relevant and quality ensured health information when and where they need it comes with great potential for enhancing timely support [6].

Challenges include quality of content, ease of use, and change of behaviour. One review [7] found that apps that contained more scientifically sound and evidence-based

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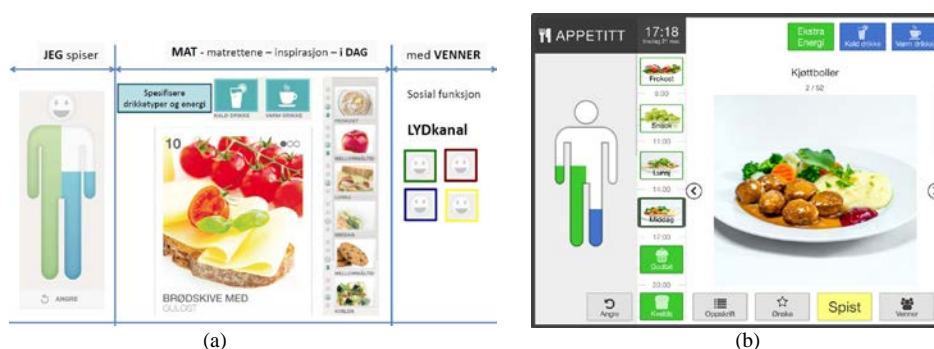


Figure 1. Versions of the app: (a) shows the design mockups; (b) shows the final version from 2017.

content were the least popular among consumers, presumably because of lack of visual appeal, intuitive user interfaces, and engaging user experience. Empirical studies show a lack of focus on usability, accessibility, and universal design in m-health applications [8]. In our project, we attempted to address such shortcomings through interdisciplinary collaboration and user centred design including a variety of stakeholders.

2. Methods, User Centred Design, and Design Choices

The Appetitus app has a goal to organise the meals, inspire to eat healthily and regularly, and to offer an easy way to register and keep overview of the food intake. To achieve this, our project applied user centred design (UCD), emphasising on iterative design, involvement of users in all phases of the design process, and empirical evaluation and testing of prototypes with users [9]. The ease of use and accessibility for increasingly frail elderly with mild cognitive decline is an important goal. The design addressed issues like good contrasts, appropriate text size, size of interaction elements, as well as limiting scrolling, reliance on memory, and number of necessary actions [8].

The app was developed in three main iterations with subsequent user trials. There were several smaller design adjustments within these iterations. User needs and requirements were gathered in workshops, interviews, and focus groups involving various stakeholders. Older users were interviewed and observed while using the app, both individually and during focus groups with opportunity to use the app. During the app development, various design choices were evaluated, tested and redesigned.

The features of the Appetitus app can be divided into the following main groups; a) the overall layout of the interface; b) inspiration to eat healthily and regularly; c) registering of food that has been consumed; d) motivation to reach the desired goal by visualisation of intake; and e) favourites, shopping list and the social function. These are described in more details in the next sections along with some of the choices that led to the final version. The concept includes quality ensured information by health professionals and national nutrition recommendations [10], motivation and empowerment.

2.1. The Overall Layout of the Interface

Simplicity is the key, as well as the requirement that the user does not need to remember or recollect facts, as capabilities for long-term and short-term memory of the users might vary. Therefore, the user interface is designed so that parts that are essential for elderly users are visible on the screen all the time.

The design sketch in Figure 1(a) conveys the main idea of separating information of the user, what she or he eats, and friends. Quite early, the idea of a three part user interface was conceived, following the metaphor phrase “I eat food today with friends”, emphasising the elements of the person (“I eat”), the inspiring food (“eat food”) including the time-dimension (“today”), and the social function (“with friends”). While this concept is still present, the placement of various buttons, information, and the importance of the social aspect have been changed between the versions.

Based on feedback from the users, the focus of the social activity while eating was reduced after each iteration and user trials. In the final version, shown in Figure 1(b), the social tab has been removed to avoid that it diverts the focus from the main objective, which is the presentation of appetising meals. Now, the social action can be activated through the friends-button at the bottom right (marked as ‘venner’).

2.2. Inspiration to Eat Healthily and Regularly – Meal Plan

Health and food literacy is important for empowerment. To foster this, the app contains a variety of healthy meals. Emphasis was given to let the meals appear appetising. Professionals from nutrition sciences had the responsibility for the selection and composition of the meals and calculation of nutritional values. Further, a professional photographer with expertise in the presentation of meals produced the photos.

The meals are placed on a vertical stripe from where the meal category related to the time of the day can be chosen. The user chooses the meal category first and can then select between different meals within this category. The suggestion of six meals a day is based on professional recommendations for the target group of the app. The names and sequence of the meal were guided by the Norwegian way of structuring the meals: breakfast, snack, lunch, dinner, treats in the afternoon and an evening meal.

Both swipe and touch actions can be used to browse through the meals, so that persons with different interaction preferences and abilities can operate the app easily. To all of the food suggestions a picture and recipes (‘oppskrift’) are available in up to three levels of difficulty: super simple, simple, and standard. While all varieties are visible on the screen, the user can select the difficulty level that fits best for preparing a meal.

2.3. Registering Food and Beverages

In the target group, many do not reach the recommended intake of energy. A way to achieve this can be to add extra energy to the regular meals. An important feature is, therefore, the green buttons to register food that gives extra energy, such as spoonful of cream, plant oil, nuts, or slices of eggs. Also, it is important to stimulate the users to get enough fluid during the day. Therefore, the app contains buttons for beverages (‘drikke’), split into cold and hot beverages (now placed on the top right), as well as a button for extra energy (‘ekstra energi’) to the left of the beverage buttons, as shown in Figure 1(b).

It is of importance that registering food intake can be done in a manner that is as simple as possible for the user. Self-registering food is not very accurate and has both strengths and limitations [11]; bothering the user with complex interactions would make the app unusable. Therefore, the registration consists of only to select the meal or beverage and then press the “eaten” button (“drank” for beverages).

2.4. Motivating by Visualising Food Intake

The user’s current state is represented by a schematic figure of a person on the left side. It shows a left and a right side with how many percent of recommended food and fluids the person has taken on this day. This is based on a calculation of the amount of protein, energy, and liquid from the registered food and beverages. On the left side is the amount of food, and on the right side the amount of fluids. Each of these sides are supposed to be filled up entirely during one day. Filling up the figure means that the user has taken enough nutrition and beverages. When the intake goal is reached there will be a reward; a cheer-sound and the figure will smile and stretch its hands up (gamification). There is also a separate interface for in-depth information and for personal settings. This functionality, is mainly for advanced users, health personnel, and caretakers, and shows history and statistics. It can be reached by pressing the logo using specific patterns.

2.5. Favourites and Shopping List

Based on input from users, we introduced a new functionality, the wish button (‘ønske’), marked with a star and placed at the bottom in Figure 1(b). The user can mark favourite or desired meals, upon which a shopping list can be generated. This can be sent to an email address, e.g., to a caretaker or family member.

In the design phase, a social function was envisaged, so that the users can share their food experiences with each other, based on the assumption that sharing a meal is an important social activity, and eating together can facilitate increased food intake. Feedback in our trials led us to reduce the importance of this functionality in the app.

3. Discussion

The development of the Appetitus app has been accompanied by evaluations and trials with potential users. Farsjø and Moen [12] reported from a qualitative study in 2014 with four participants, where the initial prototype of the app was considered a user-friendly tool. The app has been piloted in two iterations with home dwelling users and health providers in our partnering municipalities. Each pilot period lasted eight weeks. In these pilot tests, the users were provided with tablets (iPad) from the project. The first iteration focused on attractiveness and usability of the app, and potentials for collaboration from the perspective of elderly users. The second iteration added collection of the registrations from users, and one arm of this testing also included persons with intellectual disabilities. In iteration two, we collected over 350 registrations of food and beverage intake every day over the eight weeks of the pilot duration.

The evaluations showed that the elderly found the app to be inspiring and easy to use. Caretakers found it to be a useful tool for discussing healthy eating habits with the

elderly users and for monitoring their progress [13]. Each iteration gave many suggestions for further development, such as giving the caretakers remote access to information overviews which now can only be accessed in the app. There are also suggestions for more personalisation with regard to food preferences and diet, e.g., for persons suffering from diabetes. Further, some users suggested to integrate the app with food ordering services and online grocery stores.

4. Conclusion

The various methods of user involvement – from focus groups, individual observation and interview, to two eight weeks long pilots – led to refinements and modifications of the interface and functionality. It was necessary to balance the needs and requests from the various stakeholders. It was important that new functionality was not introduced at the expense of ease of use for the target user group. The strong involvement of various stakeholders and user groups in the iterative design process enabled the development of a tool with core functionality that fits the various user group needs and expectations, and with many options for further developments.

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