

SmartFeeding4Kids: a Digital Platform for Nutritional Behaviour Change of Parents of Young Children

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Abstract—There has been an increase of behavior change applications, particularly in the areas of nutrition and fitness. Whereas most applications are focused on self-reporting by adults, there is limited work on designing digital programs for parents to improve their children’s food habits. In this paper, we present SmartFeeding4Kids, a digital platform co-designed within a team of psychologists, nutritionists, designers, and computer scientists, for nutritional behaviour change of children aged 2 to 6 years old. We present the main elements of our application, and main iterations of their design. Namely, we focus on mechanisms for user engagement (avatar, badges, notifications, and personalized feedback), 24-h food recall adapted to parent reporting, and overall digital workflow of the program.

Index Terms—mHealth, behaviour change, co-design, parents, feeding practices

I. INTRODUCTION

Recently, there has been an emergent usage of applications for behavior change, mostly focused on the areas of fitness and nutrition [1]. There are already some approaches for children that focus on maintaining engagement during a meal, using lights, photos, or music [2], [3]. These approaches are shrouded in controversy because they tend to lead children’s attention away from the meal [4]. Another important aspect is reporting food intake; however, most digital platforms solely focus on self-reporting by adults [5]. There are studies focusing on reporting children’s food intake through their parents [6]. Nevertheless, it is challenging to sustain usage for long periods of time, as well as adapting the platform to them [7]. In this paper, we present a web application co-designed among a team of parents, computer scientists, psychologists, and dietists, for parents to report their children’s food intake, following an online self-guided nutritional behavior change digitized program during 11 sessions. We focus on maintaining users engaged during all the sessions and adapt it to their needs.

II. PLATFORM

SmartFeeding4Kids (“Fig. 1”) guides parents during an 11-session nutritional program that tracks young children’s dietary intake. For this, we needed to overcome three main challenges: 1) follow up users throughout the sessions; 2) provide a 24h food recall adapted to reporting by parents; and 3) keep users engaged during the program.

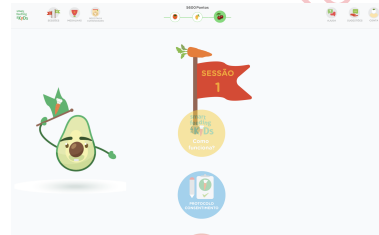


Fig. 1. The application’s main page.

A. The Program

The program consists in eight consecutive sessions, each taking between one and three weeks to complete (depending on how often parents access the platform), followed by three follow-up sessions (1-week, 3-months and 6-months after session eight). Each session represents a sequence of related activities. To increase users awareness about the program, users can see all the app path since the beginning. Different activities are represented by different icons, colours and may or not have a timer to unlock. The icon of the current moment is highlighted. Future moments are blocked (grey and not-clickable), and, if timed, with a countdown to be unlocked. The content of a moment is presented in a modal window, controlled by the user, but also automatically presented at some contexts (e.g., when opening the program page). We currently have four categories of moments:

a) Informative: A series of multimedia elements (images, videos or texts) that informing users through insightful information regarding the program, including tutorials, and about how parents could improve their child eating habits. Multimedia moments may be complemented with links to external sources. A special informative moment is the quiz. A quiz is a series of question-based challenges that force parents to reflect on their habits. This is a learning mechanism, so we guide parents to the most appropriate answer.

b) Evaluation protocol: A form to collect demographics of parents and their children, children eating habits, and the eating practices applied by parents. This protocol is present on the first session and on the follow-up sessions.

c) Objectives and habits: Based on session one’s evaluation protocol, the system identifies (through a set of predefined

rules) the eating habits and practices that should be improved. At this moment, at sessions two, three and four, parents are challenged to select two of those to improve (as objectives). At the end of all sessions (after session two) we ask parents to report (through a series of questions) on their practices and habits on that period.

d) *Food recall*: In parallel with the practices and habits' report, we ask parents to report their child's dietary intake on specific days. These are always at the end of sessions. We will describe further on subsection B.

e) *Feedback*: Based on the food recall data and on the practices and habits report, we provide feedback on how far the user are from achieving their objectives. Measurable feedback (e.g., sugar consume reduction) is presented through a line chart. Other feedback is provided through happy-unhappy faces. Feedback also shows the progress over the sessions. After session three, this is always the first moment of each session.

B. 24-hours food recall

As part of the program, parents need to report their children's dietary intake (up to three days per session). Depending on the session, the system may automatically select the days to report. Parents may report multiple meals at any time of that day. To report a meal they follow the following steps: 1) select a day; 2) create a new meal (if not previously created), with name and time; 3) select food to add (either searching or selecting from a list); 4) and select the portion size.

After adding food to a meal, users may add other foods to that meal or click the finish button to close the meal. Users may then add other meals, close the application and come back later to complete the report, or finish the report for that day. The system uses a slightly modified food database developed by the National Institute of Health Doutor Ricardo Jorge.

C. Mechanisms for user engagement

One key factor of the program is to keep parents engaged. In addition to feedback on their performance, the apps notify them with occasional reminders concerning more conscious food choices. Furthermore, we try to congratulate users throughout their achievements with medals.

a) *Avatar*: Aba, a friendly avatar is always present at the left side of the screen (see "Fig. 1") and is the pedagogical mascot that, throughout the program, is tasked with: explaining components, encouraging new habits, motivating, and congratulating (e.g., when objectives are met).

b) *Badges*: We introduced badges to reward users' progress. For instance, when users complete the evaluation protocol or when accomplishing objectives. Together with a badge, users also win points. The system has ten levels, represented by fruits (ordered by their rarity).

c) *Notifications*: Users are notified by email about important deadlines (e.g., to notify food report days) or events (e.g., at the end of a session to send a summary of the user performance on that period). During long break periods the system will also periodically send curiosities or healthy

recipes. Parents can also consult these curiosities and recipes on the platform.

III. DESIGN PROCESS

The design of SmartFeeding4Kids started with discussions among the multidisciplinary team over the paper-based program, creating a shared idea of what a digitized program could look alike. An initial workshop with psychologists and nutritionists took place to derive personas and daily scenarios for application usage. These personas, their capabilities, habits and restrictions were pivotal to understand timings, personalizing notifications, and understanding the relevance of feedback. Different iterations of the platform were evaluated within the team and with participants, leading to the version described in this paper.

IV. CONCLUSION

In this paper, we present the main components of our application for children nutritional behaviour change through their parents. We highlight the need of an adaptable digitized program, a flexible food intake report, and mechanisms for user engagement. The application will be part of a randomized control trial to evaluate the efficacy of the digitized program and the mechanisms for user engagement.

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