Original Paper

Smart healthy diet for all? An interview study on the usage and perception of a designed cooking app for the low-income population

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Contributions
FR: conceived the protocol of the field survey, performed a part of the interviews, analyzed the interviews, and wrote the manuscript,
MD: conceived the pedagogical program, prepared and distributed the questionnaires, prepared, and conducted the focus group discussions.
ND: conceived the protocol for the questionnaires and focus group discussions, and wrote the manuscript.
CA: performed a part of the interviews, analyzed the interviews, and participated in writing the manuscript.
Abstract

Background: Health behaviors among low-income groups have become a major issue, in the context of increasing social inequalities. Moreover, the low-income population is less likely to be receptive to nutritional recommendations, whereas providing cooking advice could be more effective. In this domain, taking advantage of digital devices can be a bonus with its own challenges.

Objective: To develop and deploy Facecook, a social network-based cooking app for low-income population, including cooking tips and nutritional advices, aiming at creating small online communities. We further determined the usefulness, perceptions, barriers, and motivators to use Facecook.

Methods: The smartphone app was designed jointly with beneficiaries of the social emergency services, and implemented in a disadvantaged neighborhood of Magny, (Paris region, France). Once the app was available, 28 subjects, living in the neighborhood tested the app for a period of 6 month. Logs to the app and usages were collected by the software. Twelve in-depth, semi-structured interviews were conducted among the users and the social workers, to analyze their uses and perceptions of the app relative to their interest in cooking, cooking skills, socio-economic constraints, and social integration. These interviews were compared with 21 supplementary interviews conducted among low-income individuals in the general population.

Results: Facecook was developed as a social network based app, including cooking tips, nutritional advices, and online quizzes. We identified barriers to uses (especially technical barriers, lack of knowledge in the field of new technologies and written comprehension, and search for real contacts) and motivators (in particular good social integration, previous use of social networks, and help of children as intermediaries). Cooking skills were both a barrier and a lever.

Conclusion: Targeting the low-income groups through a cooking app is more justified than public education on health. However, the barriers in low-income milieu remain high, especially among the less socially-integrated strata. Lessons from this intervention allow to identify barriers and possible levers to improve nutrition promotion and awareness in deprived areas, especially in the time of social crisis.

Keywords: health; cooking; mobile phone; low-income population; social networks; user characteristics
Introduction

Current health promotion campaigns that aim at motivating individuals toward healthier eating habits are inefficient among low-income populations. This situation is particularly concerning in the current context where social inequalities in health are very marked and are rising in western countries [1]. Health behaviors among the lower strata appear, more than ever, as a major issue. They face a high rate of obesity due to ignoring generic nutritional recommendations because of their social lifestyle, tastes and preferences, despite being well aware of the guidelines for healthy eating [2, 3].

Thus, it is necessary to identify more efficient strategies to raise nutrition awareness and promote healthy behaviors in disadvantaged populations through novel interventions specifically targeting these populations. Hence, using interventions that include a cooking component seem to be an effective way for the adoption of better eating behaviors [4], especially among low-income individuals [5].

Digital technologies could offer a good platform to help build and disseminate appropriate individualized recommendations targeting special social groups. As described by the European Commission’s Green Paper on mHealth [6], mobile health solutions appear as a solid basis for people’s empowerment. However, not many culinary apps with health promotion prospects have been developed for mobile devices. Facecook – continued in the FacilEat4All project – is an interventional-research project based on the development of a cooking app to promote healthy nutrition in low-income groups, jointly designed with its final beneficiaries.

In this study we aimed to: 1) present the co-construction of Facecook, specifically designed for low-income people, promoting a healthy diet, 2) describe the results of its usage and determine the barriers and levers of this process, and 3) discuss the main lessons that can be drawn from this experiment.

Methods

We worked with the disadvantaged households of Magny, Paris region – France to design a mobile app for healthy cooking and nutrition. When this app was released, it was tested by 28 volunteers in the same neighborhoods. Data on Individual app usage (logs, visited features) were collected, and an in-depth, semi-structured interview was performed to assess this app.

Recruitment

The project was performed in collaboration with beneficiaries of social emergency services living in disadvantaged neighborhoods of Magny (Yvelines, Paris Region – France). This city has a total population of 32,639 inhabitants in 2015 [7] mainly of a low social level, with 24.6% of its population living below the poverty threshold (national average 14.1%) [8]. The rate of unemployment is high (19.4% vs national average 10.4% [8]. Participants in this study were volunteers recruited via social care services and local NGOs.
Joint-design of the mobile app

The app was jointly designed with its future beneficiaries in a two-step process. Firstly, questionnaires were distributed among 46 participants with the help of the local social workers. The questionnaire focused on the socio-economic status of the respondents, the foods commonly consumed, food supply, expectations and general perception towards food, importance of eating, importance granted to nutritional issues, level of culinary skills and the availability of cooking equipment (see supplementary file). In the second round, a collective session with eight participants was organized along with volunteers to design the mobile app. In these sessions, to facilitate discussions and to remove social inhibition stemming from the individual’s own situations, we used a persona method, where a fictional character was created to represent a user type that might use the mobile app [9, 10]. The objective of the session was to reach a consensus on the overall design of the mobile app and general recommendation on its features. The outcomes of these sessions were used as the outline for the app developer.

Interview study

Our study was a qualitative survey with 33 semi-structured interviews, and we used the 32-item Consolidated Criteria for Reporting Qualitative Research checklist [11]. To evaluate the usage and perceptions of the Facecook app, a field study was carried out among individual project participants (12 in total, comprising 8 users and 4 social workers) conducting semi-structured, face-to-face interviews. Our interview guide contained a series of open-ended questions about their use of the app, their favorite features, the barriers encountered and, more generally, their use of digital devices and the web with regards to cooking and other areas, i.e. social networking, gaming, online purchases, and performing administrative tasks. All participants were from the municipality of Magny.

Along with this sample, 21 interviews were conducted in the Paris region, among individuals of the lower strata. We investigated these individuals’ exiting attitudes towards and acceptance of the digital world and their use of new technologies in all their forms. This additional sample allowed us to determine whether the field results for Facecook revealed specificities linked to the app or if they reflected larger, shared trends related to digital “cooking” tools in deprived areas.

These interviews, which on average lasted one hour, were carried out face-to-face, recorded (except for one participant who refused), transcribed in their entirety and anonymized. The interviews were conducted by the two sociologists of the project, and transcribed by a team of transcription consultants. Analyses of the data were double-checked by the two sociologists, then discussed and validated with the team involved in the project (i.e. the four researchers directly involved, and the scientific committee of five experts). We developed a content analysis. Three main themes were investigated in the interviews guide: the uses; the barriers and levers in using Facecook; and digital devices in the field of cooking, diet and other related areas. Among the themes, sub-themes were identified, following the themes of the interviews guide, and included new themes derived from the data collected (see Tables 2, 3 and 4).

Ethical consideration

The goals of this research were explained to the interviewees and individual consent was obtained for the recording.
Results

Joint-design of the app

The results from analyzing the questionnaires emphasized the importance of food abundance and variety, the desire to please children with food, and the value put on national brands as markers of food quality. Although generic nutrition recommendations are very well known, the importance of nutritional issues, such as criteria for food choices, appeared to be less important for the low-income population than for people with higher social ranking. Respondents declared to use mobile technologies frequently with 72% owning a smartphone (national average 58% in 2015 [12]). We noted a substantial use of social networks (i.e. Snapchat, Whatsapp, Facebook, Twitter, Instagram). When questioned about their expectations from a “nutrition program,” respondents pointed the need for tips on cheap and healthy foods. Indeed, in the questionnaire 39% responded that they had not enough money to eat well and 62% responded that they would eat better quality foods if they had more money. Using leftovers appeared in the top five responses to the question on what they would like to find in a mobile nutrition app. In focus group discussions, 75% of the participants (6/8) hinted on the importance of providing the price or “low budget” labelling choices for the suggested recipes as well as tips to cook with leftover food. Respondents also indicated the need for cooking tips (one of the top five responses to the question on their expectations from a mobile nutrition app). The key for better understanding nutritional information and food labeling were also part of the expectations, with 19% of the respondents claiming they had insufficient knowledge of nutrition. The mobile app created based on this groundwork consisted of four features: (i) a collaborative online recipe book including recipes with inexpensive foods and good nutritional quality (ii) a series of simple nutrition information and cooking tips, (iii) a collection of nutrition quizzes, and (iv) a social network component allowing users to share, like, and comment on recipes or share their achievements in the quizzes. The app was also designed to allow the collection of logs and usages from individual users. The data collected by the app were number and dates of logs to the app per user; number of viewed recipes per user; quizzes taken and percentage of correct responses; and recipes entered, shared, and liked.

Once the app was created, it was released and made available for download to all participants of the study. Twenty-eight households corresponding to the selection criteria mentioned above were selected to use the mobile app over a period of 6 month (from May to October 2016).

Sample characteristics

Of the 29 participants in the study, 26 were women, which further shows that in low-income families, women are often responsible for domestic tasks related to food [13]. These individuals were between 28 and 58 years old, with a median age of 46 years. These women were from underprivileged backgrounds. The most underprivileged individuals using the Facecook sample in this study were foreign housewives. Their living conditions are unstable and highly dependent on social services. Due to unemployment, the social integration of these women is based entirely on the social group they belong to and on family integration [14]. The general population sample contained individuals from low-income categories who were better off socially, either due to having a job (they were employed as blue collar or employee), or because they lived in more socially diverse municipalities than Magny.
Table 1. Sociodemographic characteristics of the participants

<table>
<thead>
<tr>
<th>Sex</th>
<th>Facecook target population, (total n=8)</th>
<th>Low-income milieus in general population (total n=21)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-29</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>30-39</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>40-49</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>50+</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td>2</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Manual workers</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Unemployed</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Students</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>21</td>
<td>29</td>
</tr>
</tbody>
</table>

Note: The four social workers participating in the assessment of the app are not included in this Table, as they do not belong to the target population of our study, namely the low-income milieus. To determine the social position of the students, we used their parents’ professions.

Limited uses of Facecook and new technologies

The post-intervention field research highlighted a very limited use of Facecook among its intended target population, namely the women (Table 2). Of the 28 women who were presented the app, only seven downloaded it, four used it, and in only two this was a regular occurrence. Only one participant used Facecook actively, publishing recipes (nine recipes shared) and answering quizzes (she answered >200 questions).

Table 2. Uses of Facebook and new technologies in the Facecook sample and low-income control population

<table>
<thead>
<tr>
<th>Uses</th>
<th>Verbatim</th>
<th>Facecook target population, (total n=8)</th>
<th>Low-income milieus in general population (total n=21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facecook app</td>
<td>&quot;(Facebook), I don’t have it on my phone anymore, I don’t know why, I had downloaded it and it was really interesting.&quot;</td>
<td>4/8</td>
<td>NA</td>
</tr>
<tr>
<td>Cooking apps or websites</td>
<td>&quot;Marmiton website... it’s complete, and it works really well&quot;</td>
<td>5/8</td>
<td>14/21</td>
</tr>
<tr>
<td>Online trade</td>
<td>&quot;I sell things on eBay&quot;</td>
<td>0/8</td>
<td>5/21</td>
</tr>
<tr>
<td>Online games</td>
<td>&quot;I play poker on the Internet&quot;</td>
<td>0/8</td>
<td>3/21</td>
</tr>
<tr>
<td>Administrative online tasks</td>
<td>&quot;My bank accounts, I have everything, the RATP, I have WhatsApp, etc. and I even have Carrefour,&quot;</td>
<td>4/8</td>
<td>11/21</td>
</tr>
</tbody>
</table>
Wish, I have my accounts, I have Mappy to get around, I have music stuff"

Diet or physical activity self-tracking

I use the app MyFitnessPal"

0/8 1/21

NA, not applicable

By contrast, the app was much more successful among the general population, where it was spread through a network of interconnections. Between May and October 2016, 378 connections were made, 600 recipes were viewed, 18 recipes were shared via the app, and 1200 quiz questions were responded to by the users.

On the broader aspect, participants from Magny had more limited access to the Internet and new technologies than participants from low-income milieus in the general population (Table 2). Participants in the general population use the internet to access cooking websites and perform online trade, games, or administrative tasks more frequently. Diet or physical self-tracking devices were not used in the target population.

### Barriers to use Facecook and new technologies

Based on the inductive thematic analysis methodology of Peng et al. [15], several types of reasons for not using Facecook were identified (table 3).

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Verbatim</th>
<th>Facecook target population, (total n=8)</th>
<th>Low-income milieus in general population (total n=21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical barriers</td>
<td>&quot;I don't think my telephone is good enough…I will change it, but I don't know when (...) It's another expense&quot;</td>
<td>3/4*</td>
<td>10/21</td>
</tr>
<tr>
<td>Unfamiliarity with new technologies</td>
<td>&quot;Administration services computerize, but people are lost. Not everyone has an email address&quot;</td>
<td>4/8</td>
<td>5/21</td>
</tr>
<tr>
<td>Comprehension and written barriers</td>
<td>&quot;We can speak French well, we know how to write, but there are things that we have trouble deciphering&quot;</td>
<td>4/8</td>
<td>2/21</td>
</tr>
<tr>
<td>Time constraints</td>
<td>&quot;As I work mornings and evenings, I don't have a lot of time. (...) I don't have the time.&quot;</td>
<td>3/8</td>
<td>3/21</td>
</tr>
<tr>
<td>Competition from TV</td>
<td>&quot;I watch (the Samira channel) all the time - as soon as my children leave, I watch it.&quot;</td>
<td>3/8</td>
<td>2/21</td>
</tr>
<tr>
<td>Search for real contacts</td>
<td>&quot;Cooking workshops give you the opportunity to get out from of home and meet other people&quot;</td>
<td>8/8</td>
<td>1/21</td>
</tr>
<tr>
<td>Live social network</td>
<td>&quot;So, do you like it (what I published)? I'm the only one who publish, it's a shame&quot;</td>
<td>1/8</td>
<td>NA</td>
</tr>
<tr>
<td>Fear of being stalked on the Internet</td>
<td>&quot;There are always dangers. And I'm scared of... (...) I don't like it, it's scary.&quot;</td>
<td>4/8</td>
<td>4/21</td>
</tr>
</tbody>
</table>
And... well (...) it can cause damage *

| Interest for cooking and cooking skills** | "I have everything in my head" | NA | NA |

* We only considered the four participants who used the app
** Interest for cooking and cooking skills were impossible to quantify
NA, not applicable

Technical barriers
The most frequent barrier cited in the interviews was the technical instability of the prototype leading to recurrent interruptions during the sessions. Another factor was the necessity to provide user name and password at every session, as well as not being able to quickly reset the password.

These technical barriers, though unique to Facecook, reflect, and exacerbate, a trend of limited use of under-performing, if not defective, equipment in low-income milieus: nine individuals mentioned these issues, which were essentially caused by the lack of enough available memory or an overtaxing app as most individuals preferred to keep what space they had for personal photos or videos:

“I don’t have many apps on my telephone, I have to buy a card, I don’t have enough memory. All this stuff takes space!” (General population, 43 years old, Secretary, two children)

Lack of knowledge: New technologies, French language & written comprehension
A lack of knowledge on new technologies was also an obstacle. In the least well-integrated fringes of low-income categories (unemployed women, education level lower than a bachelor’s degree), everyday internet tasks are neglected, unless they attend specific training programs in social centers where they learn how to create and use an email account and a password on a computer before moving to using a mobile phone.

All women in the Facecook intervention group were foreigners and some of them only had a basic command of French or were not comfortable with written French (four of eight). These two barriers explained both the low rate of usage of Facecook, and the overall use of digital technologies.

“I am taking French courses (...) because there are some words that I don’t understand. I can read, but I don’t understand. (...) I have some difficulty” (Facecook, 44 years old, housewife, four children)

This lack of knowledge regarding the new technologies did not appear as a real barrier in our sample in the general population.

Time constraints
The project participants who did not download Facecook were characterized by a few financial constraints as they were either unemployed or earned a very low salary. They also were short on time. For the unemployed women, domestic tasks, most notably in the case of large families, were cited as barriers to using Facecook. Eveline and Hawa were employed, but they had long commutes to work, and their workdays as housekeepers were split in two (early mornings and evenings).

Competition from television
In Magny, three of the women interviewed expressed a preference for passive media (television), which allowed them to have their hands free, unlike a smartphone, tablet or computer. It gave them the opportunity to do household chores with the television playing in the background.
Regarding cooking more specifically, and for the most underprivileged participants in our study, television was the main source of culinary know-how; television channels, such as the Algerian channel Samira, which is entirely devoted to cooking and gastronomy, were greatly valued. Among the participants from the general population, the television rarely prevented them from using digital devices.

**Search for social contact in real life**
The Facecook app aimed to connect women from underprivileged areas to an online micro-network; however, the interviews with these women showed that they preferred to socialize “in the real-world.” Given their extreme social isolation, these women sought social contact outside of the domestic realm [14]. Workshops in social centers where they were introduced to the app represented a place of freedom for them. This attachment to “real” encounters was associated with low use of digital communities. This refusal of being part of virtual socializing was observed in only one participant from the low-income milieu sample; she was better positioned socially, but her real-life socializing was affected by a break-up. Following her divorce, Elga was seeking stronger social ties: “There are already so many things that we can buy on the internet, if we add food to that, we will never leave the house. I need to get out of the house” (General population, 47 years old, employed, two children).

**Large number of members for a living social network**
The small number of members prevented the creation of an active and thriving social network. Those individuals, such as Martine (Facecook, 39 years old, housewife, 3 children), who were the most enthusiastic, found themselves to be quite alone in their investment in Facecook, which led them to stop using the app. For example, in her interview, Martine said that her enthusiasm waned once she realized that she was one of the few active people in the network and that no one was responding to her posts.

**Fear of the internet and participating in social networks**
The Facecook app depended on women publishing their recipes, but women expressed a reluctance to publish recipes and share their own experience. Furthermore, putting one’s own recipes online implies exposing oneself, as food is closely connected to identity, whether individual or social [16]. It is quite likely that for many of these women, publishing a recipe was seen as exposing an intimate realm, that of their home cooking or their cultural origins, which they perceived as being devalued in a migratory context. This also explains why publishing recipes as part of a group in a workshop was much easier than doing so individually. Instead of involving risky personal exposure, the collective posting was perceived as developing a collective identity: “…putting up their recipes, they were happy, it was gratifying” (Facecook, social worker). In the general population, participants more rarely mentioned the fear of a digital tracking (four of 21), and in these cases, the individuals also expressed a fear of being overwhelmed by the internet and becoming addicted to digital tools. Here, also, limiting the use of digital tools was presented as a choice by participants from a better social position.

**Levers for using Facecook and new technologies**
The results show some levers for using Facecook and new technologies (table 4).
Table 4. Levers for using Facecook and new technologies in the Facecook sample and control population

<table>
<thead>
<tr>
<th>Levers</th>
<th>Verbatim</th>
<th>Facecook target population, (total n=8)</th>
<th>Low-income milieus in general population (total n=21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social integration</td>
<td>“I’m an outgoing person... I’m too outgoing (...) I’m organizing a pastry competition (at school) for the mums”</td>
<td>2/8</td>
<td>17/21</td>
</tr>
<tr>
<td>Knowledge of TICs</td>
<td>“I already had a Facebook page precisely on cooking, I was used to publish recipes every week”</td>
<td>4/8</td>
<td>18/21</td>
</tr>
<tr>
<td>Familiarity with other social networks</td>
<td>“It’s the kids who know about that”</td>
<td>6/8</td>
<td>10/21</td>
</tr>
<tr>
<td>Children acting as intermediaries</td>
<td>“I'm a geek of my smartphone”</td>
<td>2/8</td>
<td>2/21</td>
</tr>
<tr>
<td>Digital and modernity</td>
<td>“But there’s everything on YouTube (...) You just type ‘chicken’ or ‘Tajine’ and it gives you (...) there are tons of different videos.”</td>
<td>3/8</td>
<td>7/21</td>
</tr>
<tr>
<td>Interest for cooking and cooking skills</td>
<td>“Maybe I’ll find some ideas (on the app) in order to make my children eat vegetables”</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

NA, not applicable

Social status and familiarity with new technologies
As expected, the participants who were more familiar with new technologies were the ones who most easily took to the Facecook app, and was related to the social position of the individuals. They had a slightly higher social status (most notably through their husbands’ professions in the case of the two most active users), a higher level of education (high school degree), which in itself requires a certain familiarity with digital and information technology devices, a functional equipment (a powerful smartphone, a home PC), and a keen interest in cooking. This outcome was confirmed by our general population sample, where participants have a higher social position (in terms of occupation and/or level of education) and almost all participants used the internet and new technologies.

Former uses of social networks and leadership
The participants who were most active in Facecook were also those who were already familiar with social network apps most used in low-income areas (Table 4). This online sociability was bolstered by an already well-developed real-life sociability. Martine represents a case study in this area. Martine’s social insertion proved to be successful, as it was strongly linked to local social bonds, notably within the NGOs, alongside a high level of online sociability (on Facebook, Twitter, Snapchat, Pinterest, and YouTube).

Furthermore, Martine characterized herself through her position as an intermediary which drove her to invest herself in the digital “culinary” realm, whether on Facecook or, previously, other sites or social networks (especially Marmiton, or her personal Facebook page where she published recipes). Originally from Senegal, Martine arrived in France a few days after she was born: “I’m familiar with French culture, as well as my homeland’s culture, so I quite enjoy kind of mixing both cultures and all, yes, that’s me.” This distinguished her from the other participants who had arrived in France much later in life, and often as adults. This sense of double belonging, associated with pride in her two cultures, led her to see cooking as a way
of exchanging and discovering new cultures. This positive self-image also helped her feel more comfortable publishing her personal recipes online.

**Children as intermediaries**
The Facecook experiment highlighted the role of children as essential intermediaries for digital technologies as they were regarded the experts in the field. All the more, as there is a tendency for the underprivileged to spoil their kids with the symbols of consumer society [3], which now includes mobile devices: quite often, the women’s mobile phone was not capable of connecting to the internet, whereas the children had a smartphone. Kelthoum spoke about her children’s expertise: “*I know how to use it, but there are a lot of things we don’t know (…) but young people, they know everything*” (Facecook, 44 years old, housewife, two children).

Eveline’s case was interesting as well: “*It’s my daughter who knows, because she’s the one who installed my [Viber] app (…) She knows how to do everything on the internet.*” Among the low-income milieus in general, children appear as mediators, and they may help in case of technical difficulties, but their role was not as essential as in deprived households, and they were rarely mentioned in the discourses we collected (once only).

**Added-value of videos on Internet**
Those participants who were the least comfortable with the French language preferred using visual material on the internet or in apps to increase their culinary know-how (3 of 8 in the Facecook group); watching cooking videos on Youtube was preferred to using websites or apps which were predominantly text-based. Thus, Fatima (Magny), who had difficulty with the French language, used Youtube videos – the links were sent to her by her friends via Whatsapp: “*I start the video, I put it on full screen (…) it’s faster, it’s easier*” (Facecook 44 years old, housewife, 4 children). Additionally, when she looked something up on the internet, she used the ‘microphone’ function on Google so that she did not have to write anything.

This approach was also a trend we observed in low-income milieus in the general population (for example Rabia, 38 years old, employee: “*I watch videos (on YouTube) for recipes*”) that was exacerbated in Magny.

**Cooking skills: both a barrier and a lever**
Cooking skills appear as both a barrier and a lever. The two women who actually used Facecook had a keen interest in cooking – for Martine the appeal was more on the ‘cooking’ side and, for Kelthoum, who was mostly looking for fast and easy ways to get her children to eat vegetables, it was more on the ‘health’ side. She explained why she really got into the project:

“*Maybe I’ll find a way to get my children to eat my food, vegetables included. (…) There are a lot of moms who have trouble getting their kids to eat vegetables*” (Facecook, 43 years old, housewife, three children)

On the other end of the spectrum, great culinary traditions based on oral transmission, rendered the use of the internet unnecessary and unattractive when it came to cooking. Eveline echoed this when explaining why she did not need the internet to nourish her culinary inspiration: “*It’s all in my head*” (Facecook, 44 years old, employed). Exactly the same words (“*it’s all in my head*”) were expressed in the general population by Savina, 45 years old, manual worker).

Furthermore, in this specific social milieu, cooking was not necessarily connected to the digital domain, as emphasized by a social worker in Magny: “…*making the connection with the app is very, very difficult.*” Cooking is the realm of the tangible and the emotional, which
is disconnected from the digital world. It is difficult determine, at this stage of our investigation, whether this separation is specific to people from underprivileged groups or not. Finally, and somewhat unexpectedly, those who were completely uninterested in cooking were the ones who demonstrated the most interest in the app; they figured that the digital tool could provide them with ideas to turn what they saw as a tedious task into something more fun. For Clarisse, cooking was like “a chore; when we get home from work, we’re tired.” Therefore, regarding an app: “Yes, why not? It could provide some ideas.” (General population, 54 years old, employed, 2 children)

Discussion

While the designers of the project had great expectations and foresaw a high membership rate, the real results may appear disappointing. Many hypotheses can shed light on this discrepancy. To begin with, a social desirability bias linked to the group’s situation, where the participants find it difficult to express reluctance towards a project concerning a pleasant and well-liked area like cooking and the symbols of modernity i.e. digital tools. Furthermore, the participation of these women in this project reveals a desire to move upwards socially in very underprivileged areas by gaining access to information deemed good and desirable (eating healthy, at a low cost) as these recommendations by the PNNS (National Program for Nutrition and Health) have been widely promoted since 2001 [2]. For these women, culinary innovation and having access to affordable recipes containing ingredients promoted by public health campaigns (fruits and vegetables) to prepare for their children are ways to project themselves as being ‘good cooks’ and ‘good mothers’ and to conform to the values and practices of those who are more well off. Finally, the prospect of using a socially-valued tool gives these women the feeling of participating in and benefitting from the consumer society in the same way as individuals from more privileged backgrounds.

The reality of the experiment itself also revealed some barriers, first and foremost being those related to the slowness or capacity issues of the devices, all the more as smartphones were often the only internet access for the household in our survey. Our work corroborates previous studies that noted that the speed the apps use was critical to the satisfaction of users [17]. Studies also show that although digital tools are relatively common amongst the French population, the distribution of smartphones is much more unequal than that of mobile telephones [18], which our study corroborates.

We have also added some new elements to the digital divide, such as the difficulties experienced by our participants, which reflect the working class’s unfamiliarity with ITCs. Our results demonstrate that the lowest percentile of the low-income population, which is least socially integrated, is at greater risk of digital inequalities, which is in line with previous reports [14, 19]. Conversely, a good social integration promotes the use of cooking apps, and the knowledge of social norms affecting significantly food choices [20] and uses of new technologies [19].

Our study confirms a gap in the use of digital self-tracking tools. While individuals from well-off backgrounds choose to use these tools [19], individuals from underprivileged backgrounds are forced to use them. The low usage rate for Facecook by its target population was mainly due to constraints in time and equipment, whereas individuals who were more socially integrated, including those from underprivileged areas, exercised their choice and decision-making power in using the digital world.

This research also confirms the ability of this app to act as a culinary lever to promote healthier eating habits [4, 21] through the interest of people in using digital tools and not through providing health information. “Cooking” apps are among the tools often used in
underprivileged areas, while self-tracking devices, based on a dietary and quantified approach, are not familiar.

However, the connection between cooking and the digital world is very weak and should be explored further in future. Our results highlight the widespread reliance of the target population on videos, which allow them to overcome the written-language barrier and to rematerialize cooking through direct access to tips and tricks emphasizing the significance of visual material. The use of videos to develop cooking skills [22], is currently being tested in the FacilEat4All project, which is expanding on the Facecook experiment.

Finally, we have demonstrated the difficulty experienced by women of very underprivileged backgrounds to integrate and participate in online social networks, barring women who were already well-integrated in their real-world and were active on social media. Our results corroborate studies performed on digital technologies that highlight the complementarity and overlapping between real-world and online sociability [23, 24]. To compensate for the difficulty in creating an autonomous ex nihilo social network, our team suggests to use the existing social networks through a private Facebook group to foster a sense of community spirit more quickly. Recent work has shown the circulation of a prevention program based on social networks [25]. Lastly, the Facecook experience shows the relevance of individuals-as-intermediaries: their investment in digital tools makes them opinion leaders, and their importance has recently been emphasized in the field of e-health [26, 27]. We consider the position of cultural intermediary to be crucial to this investment, which made Martine a “champion” of the app [28].

Limitations

The app was disseminated among a small sample of participants. Current experiments are based on a broader community (approx. 100 volunteers).

Conclusion

The Facecook and FacilEat4all projects bring new elements to a theme that had not been studied closely until now. They promote healthy eating through culinary levers and digital tools. The Facecook app and the study of the use and perception of digital “diet” tools (nutrition or cooking) by people from underprivileged backgrounds has highlighted the numerous barriers in using cooking apps for people from modest backgrounds. In addition to technical barriers, a lack of skills related to new technologies, a reluctance towards written material, and a combination of time and financial constraints also restricted the use of the app. What stopped the participants from inserting themselves into the online social micro-network were difficulties regarding self-expression online and a need to integrate socially in real-life. Our study also shed light on the levers we rely on, such as prior experience and use of social networks, which led certain participants to become leaders. We also observed the importance of children as intermediaries of new technologies. Finally, our research has demonstrated the importance of culinary levers in the development of digital tools for people in the low-income categories. Further interventions should assess the advantages of a cooking-base communication platform to promote healthier behaviors.
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Conflicts of Interest
None declared.

Supplementary files (screenshots of a website, SPSS files containing original data)

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