

Health Promotion as Activism: Building Community Capacity to Effect Social Change

Andrea G. Parker¹, Vasudhara Kantroo², Hee Rin Lee³, Miguel Osornio¹, Mansi Sharma¹ & Rebecca E. Grinter¹

¹College of Computing, Georgia Institute of Technology, ²Nokia R&D,

³School of Informatics & Computing, Indiana University

agrimes@cc.gatech.edu, vasudhara@gmail.com, hl34@indiana.edu, mosornio3@gatech.edu, mansi388@gmail.com, beki@cc.gatech.edu

ABSTRACT

As HCI researchers have designed tools to promote wellness, disease has often been approached as a general problem. In contrast, public health research argues for an activist approach focused on how certain groups disproportionately experience disease and eliminating these disparities. Taking this activist stance, we examine how technology can reduce health inequalities by disrupting power relationships and helping communities pursue social change. We discuss our tool, Community Mosaic (CM), which allows individuals to share their healthy eating ideas with one another as a means of advocating behavior change. Our results characterize how CM helped facilitate activism (*i.e.*, collective efforts to counter local challenges to healthy living) and shift users' attitudes regarding their role as advocates for health. We contribute to the field of HCI by using our findings to present a set of recommendations for future research focused on designing and evaluating health promotion tools using an activist lens.

Author Keywords

Activism; collective action; community; health; low-income; nutrition; social change; wellness.

ACM Classification Keywords

H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces - Collaborative computing;

INTRODUCTION

Researchers argue that Information and Communication Technologies (ICTs) such as social media and mobile phones have made it easier for lay people to address issues of societal importance [14,18,27]. For example, within HCI, designers have created tools to help citizens use natural resources more judiciously and become lobbyists for environmentally conscious behavior change [6,27]. The

diverse body of work using ICTs to encourage social change (*i.e.*, the transformation of societies) is characterized by its activist focus, whereby the status quo is challenged through an explicit examination of marginalized groups, societal problems, and the power relationships that perpetuate inequality [2,5,6,14,27].

In this paper we examine how an activist perspective might help HCI researchers design and evaluate tools that address health inequities and the ecological influences on behaviors and attitudes. We focused on a specific inequity: the disproportionate amount of diet-related health problems in low-income neighborhoods and amongst ethnic minority groups such as African Americans [1,35]. Researchers argue that to eliminate these inequities it is critical to examine the ecology of health management, including the cultural, economic, and political influences on health practices [1,33,35,36]. Yet, while HCI researchers have investigated a number of health concerns (*e.g.*, physical fitness and chronic illness [4,10]), there has been less work specifically focused on health inequalities. Furthermore, while designers have created tools that address the psychological, physiological and behavioral barriers to health [4,10,23], less research has explored how ICTs can address ecological barriers (though important research in this area is beginning to emerge, *e.g.*, see [12,13,22]).

To begin exploring the design space of activist health promotion tools, we developed Community Mosaic (CM). CM helps users advocate healthy living by sharing their ideas (via photo and text messages) for how to eat nutritiously within the local community. These ideas are then visualized on an interactive public display. In a three-month field study, we examined how CM impacted participants' ability to advocate social change (*i.e.*, healthier eating amongst residents). In this paper, we discuss how using CM affected users' confidence in their ability to improve the world around them, how important they believe it is to help others, and their perception of the value of their efforts. Further, we demonstrate how a community-anchored device can encourage social change by acting as a counterpoint to existing local health challenges.

Our work makes two contributions to HCI research. First, through our evaluation of CM, we demonstrate the positive

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impact that approaching health promotion as a form of activism can have, as well as challenges that arise. Second, we present three recommendations for future research on health activism in HCI: 1) complement the prevalent psychological and behavioral views of health management with an ecological perspective, 2) encourage wellness through collective action, and 3) carefully negotiate competing values and perspectives on how to best address health inequity.

RELATED WORK

Health activism involves challenging the “existing order and power relationships that are perceived to influence some aspects of health negatively or impede health promotion” [36]. From grassroots approaches to institutionally backed top-down efforts, health activists have fought for a range of issues, such as the elimination of racial discrimination in healthcare and the establishment of public health warnings about the dangers of tobacco use [36]. Researchers have used community-based participatory research to help communities identify local health issues, brainstorm ways to overcome them and take action to change social norms [33].

Our focus is on the inequity that exists between high and low-income communities and between ethnic majority and minority groups in the United States (U.S.). Low-income households have poorer health outcomes than more affluent ones and African Americans, Hispanics and other ethnic minorities fare worse on health and wellness than Caucasian Americans [1]. The World Health Organization (WHO) attributes these differences to the *social determinants of health*, that is, “the conditions in which people are born, grow, live, work and age that can contribute to or detract from the health of individuals and communities” [1]. The WHO adds that these conditions are caused by the unequal distribution of income, goods, services and power [35]. In our work, we explore to what extent considering such conditions can lead to the design of health applications that address these inequalities.

Digitally-Enabled Activism

We view activism as a set of interrelated concerns that commonly characterize societal change efforts (computer-mediated and otherwise). Though these features do not exhaustively define activism, they provide a useful starting point for articulating a health activism research agenda within HCI. First, inherent in activist efforts is an explicit or implicit confrontation with morality, as attempts for social change are driven by an articulation of what is “right”, “best”, and “fair” and how the current social order does not live up to that standard [6,7,27,36]. In HCI, previous work on environmental sustainability has yielded persuasive tools that help users change their behaviors in an ethically responsible way [6]. Such tools have helped users see the impact of their behaviors (e.g., energy consumption patterns) on the earth’s health [7].

In pursuing social change, activists often address issues of inequality by advocating on behalf of marginalized or underserved groups. Such advocacy involves explicitly acknowledging that quality of life, opportunities to thrive, and access to goods and services are unevenly distributed across society [36]. For example, Bardzell [2] has argued that feminist theory can help interaction designers avoid marginalizing people by accounting for their perspectives in design. Focusing on inequality raises issues of politics and the organization and distribution of power relationships within and between groups [5,15]. For example, in Zimbabwe, Dialup Radio (an information distribution system for mobile phones) empowered local NGOs and rural citizens to challenge the government’s tight control of broadcast media outlets [14].

Issues of conflict, particularly the structural forces working for and against groups, are also surfaced [11,36]. This reflects a concern not only with the manifested issue but also the underlying causes of the problem. For example, when Maitland *et al.* [22] studied the challenge of healthy eating in low-income communities they recommended shifting the focus of ICT design away from persuading individuals to change because their participants needed help with socio-economic barriers. We build on this work by describing the evaluation of a tool designed to address such barriers and presenting implications for future work of this type. Sociologists have argued that a structural approach to studying health is deterministic, discounting the existence of individual agency [34]. Accordingly, in our work we do not conceive of structural forces as insurmountable, but as part of the ecology of health management in which people both are affected by, and react to social forces.

Finally, activism involves examining forms of resistance [15,20]. Such resistance may be realized through collective mobilization, whereby the existing social order is challenged [36]. The “social order” refers to a society’s system of social structures (e.g., socioeconomic stratification), institutions (e.g., the government and healthcare industry), and norms. ICTs can facilitate collective resistance of this order by making collaboration, coordination and information dissemination easier, more efficient, and more engaging [18]. For example, networked devices have enabled new political alliances through the coordination of lay people from diverse interests groups [15].

The exploration of how technology can mobilize collectives to effect social change (and address associated issues of power, inequity, and conflict) is a burgeoning pursuit within HCI. Questions remain, including whether, and if so how, existing applications and infrastructure have helped citizens address societal issues [25]. Our field has a unique opportunity to study the impact of new tools and their ability to help people address serious societal issues. In this paper, we seek to provoke dialogue on this topic by focusing attention on activist health technology.

Health Promotion in HCI

Medical researchers and government agencies have called for social action to end ethnic health disparities in the U.S. [1]. A growing number of HCI researchers have begun to explore how technology can help in this effort [12,13,22]. Yet, overall, few projects have used activism as a lens for designing and evaluating wellness tools. Leveraging the characteristics of activism presented in the previous section, we overview three aspects of previous HCI health research and discuss open questions.

First, previous work has often examined how ICTs can address behavioral and psychological barriers to health. For example, researchers concerned with obesity prevention have focused on lack of exercise and high caloric intake [4,19]. Work has also focused on the role that online communities can play in addressing personal motivation to change [26]. Far less research has focused on the design of health applications that explicitly address the impact of structural forces on people's ability to manage their health (*e.g.*, poverty's effect on health decision making).

Second, much research has approached disease as a general problem. For example, researchers have studied diabetes as an issue in the overall U.S. population, examining how health applications can affect the way that people understand their disease [10,23]. To compliment this work, there exists opportunity to focus on health inequalities, exploring the design of tools that address disease amongst groups who disproportionately experience it. In the growing body of HCI research on developing countries, researchers have increasingly focused on both the structural forces on health (such as politics, educational opportunities, and economics) and health inequalities (*e.g.*, [30]). A similar focus is needed in the developed world as well, given the health disparities in that context [35]. Recent fieldwork and systems exploring health in low-income U.S. neighborhoods represent steps in this direction [12,22].

Finally, while research has focused on health management in close-tie social networks (*e.g.*, friends and family [4,16]), less work has looked at mobilizing larger collectives to resist societal inequities by empowering them to be agents for social change. To explore this space, in our previous work, we designed and evaluated EatWell [12], a system that helps community members share audio stories about how they have tried to eat nutritiously in their local neighborhoods. In our current research, we extend that work by developing Community Mosaic (CM). In contrast to EatWell, CM supports information sharing by allowing community members to submit healthy eating ideas visually and receive feedback on how viewers react to their contributions. Furthermore, we specifically examined the extent to which CM helped develop users' capacity to be health advocates.

COMMUNITY MOSAIC

Focusing on activist concerns creates opportunities for new types of health promotion systems. To begin unpacking the

implications of such an approach, we created Community Mosaic (CM). CM helps lay people encourage others in their neighborhood to eat healthfully by sharing how they have been able to make healthy eating decisions themselves—information that is, hopefully, locally and culturally relevant to other community members. CM aims to address the disproportionate amount of diet-related health problems in low-income African American neighborhoods by mobilizing people to speak out about the feasibility of eating nutritious foods. Additionally, we gave community members the sole authority to contribute to the system, rather than facilitate the dissemination of nutrition advice from medical experts. While information from the latter is certainly valuable, our goal was to place power in the hands of the community and examine the effect of health advocacy by lay people. (As we will discuss later, this decision yielded benefits and challenges.)

Our design approach was motivated by research showing that within low-income, predominantly African American neighborhoods, collectivist (emphasizing communal responsibility) approaches to health promotion are particularly effective [13]. For example, in the lay health advisor model, community members (not medical experts) are given resources and support to be advocates for healthy behaviors within their social networks [28]. In our evaluation of CM we examined the usefulness of providing a technological resource for such health advocacy.

CM has two interface points, the first being a user's cell phone. We chose cell phones because they are widely owned by lower-income individuals [12]. The second interface point is the CM Visualization software. This software runs on a touch-screen monitor that we installed in a public space within an Atlanta, GA YMCA branch. (The YMCA is a non-profit organization that provides resources to local communities such as exercise facilities and childcare.)

We used an iterative design process to create CM, beginning with formative focus groups at the same YMCA branch discussed above. Thirty-one YMCA members and staff attended these sessions, brainstorming how technology could best support health advocacy in their community. Their recommendations led us to develop CM; for example, 1) emphasize how the community is succeeding at eating healthfully (instead of focusing on the challenges), and 2) help residents take steps to eat well in spite of the local barriers to doing so. To prepare CM for our field study, we created a series of increasingly high-fidelity prototypes that were evaluated for robustness and basic usability with HCI experts. In the remainder of this section we detail the functionality of the resulting prototype.

Experience Sharing: In the CM Visualization (see Figure 1), users are greeted with the following prompt: *"How are we eating healthfully today? Share your experiences. Send pictures, text or both. Inspire others in the community."* Users send picture (MMS) and text (SMS) messages from

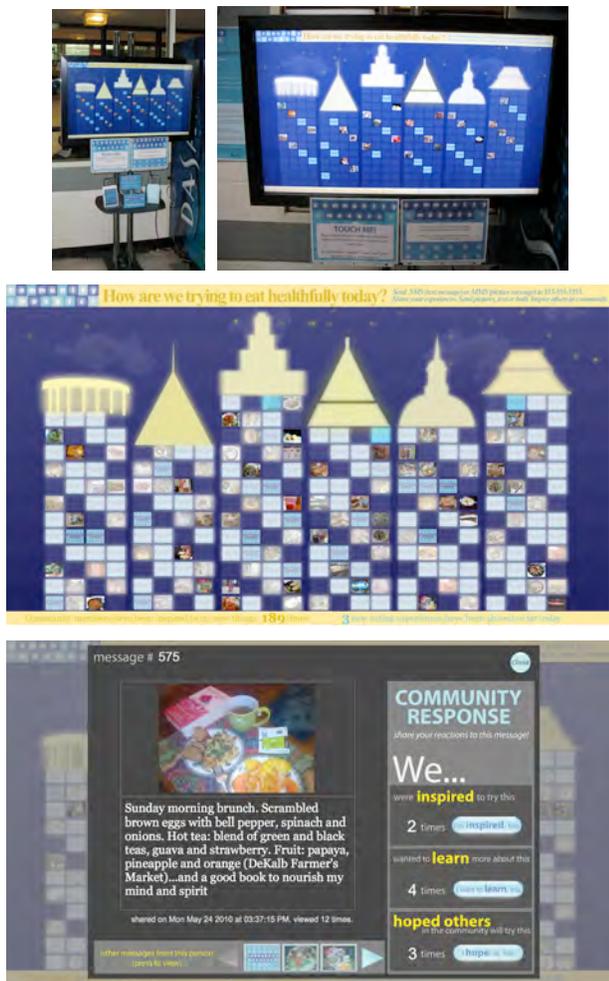


Figure 1. The CM Visualization runs on a touch-screen monitor (top). Larger screenshots of the CM Visualization are also shown, including the Main Screen (middle) and Detail Screen for one message (bottom).

their cell phones to the CM phone number to document their healthy eating experiences. The messages that users send can include anything that they feel relates to healthy eating (e.g., specific foods, establishments, and people). Messages are displayed in the CM Visualization software that runs on a 42” touch-screen monitor (see Figure 1).

CM Visualization Main Screen: The CM Visualization works as follows. The Main Screen shows a set of buildings that are evocative of the Atlanta skyline. Each building window represents one message that someone has shared. As messages are sent to CM, the building windows illuminate, either showing a small version of the picture shared, or if the user has only shared a text message, the CM logo. For aesthetic purposes, windows are populated based upon a pre-defined pattern that spreads messages evenly across the buildings. Windows with messages that have been sent “today” are overlaid with a blue flickering light, helping users locate new content.

CM Visualization Detail Screen: Users can press any of the illuminated building windows. Once a window is pressed, the Detail Screen for the message pops up (see Figure 1), showing the photo (if any), the text (if any), the date and time it was sent and how many times the message has been viewed. All messages are shown anonymously (the sender’s name and telephone number are not displayed) in an attempt to help users feel comfortable sharing their meals and ideas. At the bottom of the Detail Screen, viewers can scroll through thumbnails representing other messages that the same user has sent. They can then press any thumbnail to view that message’s Detail Screen.

On the right side of the Detail Screen is the Community Response Panel; here users can quickly share their reactions to the message’s healthy eating strategy by pressing buttons that say: 1) I’m inspired to try this, 2) I want to learn more about this, and 3) I hope others in the community will try this. A tally appears next to each button showing the number of times it has been pressed. The bottom of the CM Visualization Main Screen displays the total number of times users have been inspired to try ideas shared in CM.

Update Messages: Once a week, each user receives a personalized SMS telling them 1) how many CM messages were shared in the past week and 2) how often people were inspired to try messages that they have personally shared (based on the number of times that viewers pressed the “I’m inspired to try this” button for that user’s messages).

Our SMS/MMS Gateway software (developed in Java) processes messages sent to the CM phone number. The gateway runs on a Google Android G1 phone that parses and sends message data to a server hosted at our University, where the data is then stored in a MySQL database. The CM Visualization software was written in Adobe Flex and PHP and is shown in a full-screen mode web browser on a 42” Samsung TSN-2 touch-screen monitor.

METHOD

We conducted a 12-week field study with 43 participants in three phases: pre-CM deployment data collection (3 weeks), the CM deployment (6 weeks), and post-deployment data collection (3 weeks).

Study Site

The CM Display was installed in a public location of a local YMCA branch. This particular branch is located in a predominantly African American neighborhood (95%) in Atlanta where the median income is 34% below the state average (according the most recent U.S. census data at factfinder.census.gov). We chose this community because it is a setting partially characterized by low access to healthy foods and a disproportionate experience with health challenges. We were also motivated by previous work showing that such settings can also be characterized by experiential knowledge about local resources for healthy eating [12]. Our goal was to see whether CM tapped into these strengths and addressed the inequities. While the

YMCA provides exercise facilities and health programs, they also provide services unrelated to physical fitness. And, since anyone could use CM (even if not enrolled in our study) our participants had the opportunity to reach individuals with a variety of interests.

Participant Overview

We recruited participants by placing flyers in the YMCA, making announcements in exercise classes and asking participants to encourage others to sign up. Before we installed CM, we used a survey based upon the Transtheoretical Model (TTM) of behavior change to understand how healthfully participants were already eating [17]. The TTM measures the stages through which individuals progress as they attempt health behavior change—from *Pre-contemplation* to *Maintenance*. Thirty-nine participants fully completed the survey. Most had recently tried to eat less fat or intended to in the near future (the *Preparation* stage, $n=22$). Many had been eating a low-fat diet for the past 1-5 months (*Action*, $n=10$) or for more than six months (*Maintenance*, $n=5$). One participant was not thinking about changing her eating habits (*Pre-contemplation*, $n=1$) and one was just beginning to (*Contemplation*, $n=1$). As such, the majority of our participants were interested in eating nutritiously, making them excellent individuals to study as we examined how CM might empower people to advocate healthy eating.

Thirty-four females and seven males participated in the CM field study. While we attempted to achieve a gender balance, we had a much greater enrollment response from females. Most participants were aged 18-47 ($n=28$), with the rest aged 48-57 ($n=9$) and 58-67 ($n=3$). Twelve were married and 24 had children. Thirty-one were employed, eight were not, and two were retired. Thirty-nine participants reported their income. Roughly half had an annual household income between \$13k and \$45k/year ($n=19$) and the remainder had incomes from \$45,501 to over \$100k/year ($n=20$). Forty participants identified as Black, two as White and one as Black/White/Indian. While the membership of the YMCA branch that we worked with is primarily African American, there is some cultural diversity and as such we felt it important to include the few non-Black participants who signed up for the study.

Data Collection & Analysis

Pre-CM Deployment: Participants attended an introductory session at the YMCA where we described the study, how to send messages to CM, and how to use the CM Display. They also completed a pre-intervention survey that asked demographic questions and questions about their nutrition-related habits and attitudes (e.g., how important it is to advise others to eat well, and if they felt that they know enough about healthy eating to advise others). Participants were also asked to send 1-2 messages per month (or more, if they liked), for the duration of the study.

CM Deployment: The CM Display was installed at the YMCA for six weeks and was functioning for 25 days during this period, due to system glitches, thefts and disturbances of system components. Anyone at the YMCA could use the display, even if not formally enrolled in our study. During the deployment period, we conducted semi-structured interviews (15-20 minutes each) with 29 of our participants (20 participants completed two interviews, nine completed one). Interview topics included participants' experience sending messages and using the CM Display, their motivation for sending messages, and to what extent their use of CM affected their nutrition-related attitudes and their perception of their ability to help the community.

Post-CM Deployment: After the 6-week CM deployment, participants filled out a post-intervention survey that repeated the nutrition-related questions from the pre-intervention survey. Twenty-seven participants also came to one of five focus group sessions (about 20 minutes each). Focus groups were open-ended, and the discussion was guided by two broad topics: how useful (or not) CM is for helping to improve the community's eating habits and how CM could be improved. All participants who completed the interviews and focus group received a \$60 gift card (the rest received a \$30 gift card).

We completed an inductive analysis [32] of the interview and focus group transcripts, examining each transcript line by line to derive a set of codes describing the emergent phenomena in the data. Codes were then iteratively clustered to arrive at higher-level categories and the themes that we present in this paper. We computed descriptive statistics for our survey data and used the Wilcoxon signed-rank test to analyze the changes in pre- and post-CM deployment responses to the Likert scale survey questions.

RESULTS

Our system logs showed that CM users shared 278 messages (average=6, min=0, max=32) and viewed messages a total of 1585 times (an average of 63 messages each day that the display was up and running). As anyone at the YMCA could interact with the CM Display, this total includes messages viewed by study participants and YMCA patrons who were not formally enrolled in our study.

In our evaluation we examined a number of topics, such as the relative value of visual imagery and text, and the impact of CM on participants' eating behaviors. However, in this paper we focus our discussion on how participants used CM to advocate healthy behaviors to other community members. We also discuss how using CM affected participants' attitudes regarding their ability to advocate healthy eating and the importance of doing so. Through our findings, we show how a community-anchored digital tool can facilitate health activism (i.e., collective efforts to counter local and cultural challenges to healthy living) and help shift users' attitudes regarding their role as advocates for health behavior change.

Health Advocacy in Community Mosaic

CM helped participants counter cultural and environmental barriers to nutritious eating by reflecting on and challenging the status quo. In particular, they tried to inspire others to adopt healthy habits and expose them to new, yet practical, ideas for doing so.

Counteracting Local Barriers to Healthy Eating

In our interviews, 16 (55%) participants described challenges to healthy eating within the African American culture or their local environment. For example, participants expressed concern over the prevalence of diet-related health problems such as diabetes and high blood pressure within the African American population. As we discussed earlier, the disproportionate existence of these problems amongst African Americans is well documented [1]. Others spoke about the abundance of fast food and the challenge of finding healthy foods in their community. P6 described how CM made her more aware of this challenge:

When I look around in the community, the healthy choices for you know like... restaurants and places to eat are just not there and by having something like [CM] visible, it just, it makes me think I don't want to eat at a lot of the places that I see in this community; I may wanna, maybe cook my own food.

P8 also described the challenge to nutritious eating she faces because of the racial makeup of her neighborhood:

This week I was trying to find something quick without having anything greasy and [I realized] that there is nothing available... Eating in my community has always been hard because of the demographics, because of the race of people that lives in my community... the options, again, are limited.

P8's presumption is supported by studies showing that predominantly African American neighborhoods have fewer grocery stores than predominantly Caucasian ones, even when controlling for income [24]. Furthermore, the grocery stores that are in African American neighborhoods tend to have a smaller supply of healthy foods such as low-fat starches and meats [31]. CM reminded our participants of how this inequity is reflected in their own neighborhood.

However, 10 participants further described how CM is a useful way of addressing the local barriers to healthy eating. They explained that CM's presence in the YMCA reminds them of the importance of, and ideas for, nutritious eating. This reminder was particularly critical in the face of the prevalent information about, and access to, unhealthy options in the community. For example, P9 discussed how the community needs the information in CM because:

We can get a really good deal on... fast food or [fried chicken] wings... That's what people are inundated with. If you drive down some of the main streets in the community there's not... information encouraging you to improve your health or making those resources available to you.

Zoller [36] states that health activism involves challenging the existing power relationships that inhibit healthy living. In our study, one relevant issue of power was the inequity in healthy food access that our participants felt was unique

to their community compared to other areas of Atlanta. As such, their comments suggest that CM served as a vehicle for engaging in activism by reflecting on the problems in the existing social order. In the next section we further describe the steps they took to challenge these problems.

Activism Through Inspiration and Exposure

In line with the design goal of CM, participants wanted to pique others' interest in wellness and inspire them to engage in healthy behaviors. Thirteen participants (45%) specifically discussed sending messages to incite behavior change. They did not only use CM to gain ideas for themselves or discuss nutrition generally; they desired to motivate community members to eat more nutritious foods. For example, P6 hoped to influence even one person to stop eating fried foods. Others tried to show CM viewers that it is not as difficult as one might think to eat healthfully.

Participants further described how CM helped them share information in a new way, moving beyond word-of-mouth as a means of healthy advocacy. The system's fixed presence at the YMCA meant that users could repeatedly show others the feasibility of eating well. As P31 said:

The more we saturate [one another] with facts [about healthy eating]... the more it affects you, the more you think about it, the more it becomes, you know, part of your being.

Other participants described the value of CM in terms of how it supports the sharing of realistic and practical ways for people to change their habits. P7 explained how CM helped the community "spark change" one person at a time:

As oppose to going to Wendy's and getting that \$0.99 burger... we have something constantly giving us ideas [so we can] say, 'Well, you know what, let me just go... Subway and get a sandwich with lots of vegetables.'

The constant presence of CM, and more importantly, the content therein, helped participants take action against the draw of unhealthy foods within the community. As such, CM helped participants begin to challenge the status quo within the community—the abundance of unhealthy food access and the limited availability and promotion of healthy food. Our findings show that CM functioned as more than just an information gateway. It was also a platform for small-scale social change whereby the existing power relationships within the community were challenged. This happened as community members resisted the foods that vendors made readily available by suggesting other viable options. Examining participants' reactions to CM with an activist lens provides unique insight by highlighting the political nature of the tool within the community.

Innovation

CM was not only useful for sharing basic information about healthy eating (e.g., saying that it is important to eat vegetables). Many (n=9, 31%) participants described how they chose to share more innovative and creative foods that people may not have previously known about. They shared establishments, snacks and meals that may have been

outside of message viewers’ normal routine. For example, P9 shared foods that she felt people might not think of, like an organic protein shake that she sweetens with Stevia (a natural sweetener). In addition to highlighting new ideas for what to eat, some people shared creative ideas for *how* to eat. For example, P4 introduced viewers to her vegetarian lifestyle. P28 shared how she handles the large portion sizes provided at a Jamaican restaurant she frequents:

I normally just take the meal and divide it into three servings and then just add veggies or a salad with each serving...A lot of times when we eat out the portions are so large and we feel like we have to just consume all of it. So I was just hoping that [my idea] might inspire someone.

These findings suggest that many participants did not simply share any meal that they felt was healthy, but purposefully and selectively chose those experiences that might best expand viewers’ understanding of how to eat healthfully. In summary, these participants tried to encourage behavior change by giving message viewers a fresh perspective on eating nutritiously. While some activists attempt societal change through social critique or public demonstrations [15], another important way of responding to social issues is the articulation, by those affected, of pragmatic ways in which change can occur. And this sharing of practical, yet innovative ideas is precisely what we saw happen in our evaluation of CM.

Becoming an Advocate: 3 Key Attitudinal Shifts

We now move our discussion to the three attitudinal shifts that characterize how participants began to see themselves as health advocates. After using CM, they described feeling an increased sense of 1) competence in terms of their healthy eating knowledge, 2) the importance of their personal involvement in health advocacy, and 3) the potential impact of their ideas.

Competence & Views on the Importance of Advocacy

Our survey results showed that at the end of the study, participants felt more strongly that they know enough about healthy eating to give advice to the local community ($Z=2.06, p<.05$). Our interview data provide insight into the reasons behind this increased confidence. Most participants ($n=22, 76%$) felt that their messages were useful because they were detailed, the foods they discussed were both healthy and tasty, or the idea they shared was based on previous nutritional knowledge that they had obtained. These results suggest that the process of sharing messages in CM helped users realize that they, based on their practical experience with trying to eat nutritiously, had important ideas that might benefit others. At the end of the study, participants also felt more strongly that it is *important* for them to give healthy eating advice to others ($Z=-2.93, p<.01$). In summary, our findings suggest that participants began developing the mindset of a health activist (*i.e.*, someone interested in encouraging social change) by engaging in two attitudinal shifts: they became

Table 1: Participant Visits to the CM Display

# Visits	0	1-3	4-7	8+
% Participants	29%	34.2%	18.4%	18.4%

more confident in their ability to advocate health and saw more value in helping others to eat healthfully.

Potential for Impact

During our interviews, many participants ($n=10, 34%$) also said that they valued seeing viewers’ reactions to their messages (in the SMS updates and at the CM Display) because it showed them, in a small way, how many times they inspired others towards change. Our survey data helps substantiate these findings: most participants said that they help to improve the community’s health by sharing messages in CM ($n=30, 81%$). Interestingly, we saw these positive results though participants had relatively limited information about how viewers reacted to their messages. The CM update messages, while seen as useful, only provided each user with basic information summarizing the number of times the “I’m inspired to try this” button was pressed for his or her messages. Furthermore, as Table 1 shows, participants had a modest amount of interaction with the CM Display: most visited it less than eight times over the 6-week deployment and 29% did not visit it at all.

Our results suggest that even small amounts of feedback can help contributors see the impact they have on their community. At the same time, one direction for future work would be to provide more detailed feedback to CM users regarding *how* the information they have shared is helping to transform the community’s behaviors. Indeed, while many participants felt their messages were valued, some were unsure of how much they actually motivated viewers to change their habits. Ultimately, these participants felt that their ability to impact social change relies not only on their contributions but what the community does with that information. Future research on health advocacy systems should explore engaging ways of giving users more detailed feedback on the influence they are having.

STUDY LIMITATIONS

Our study was conducted over a relatively short time period. An important direction for future work will be to examine the impact of longer-term interactions with health advocacy tools such as CM. Another limitation of this work is that while participants felt confident in the ideas they shared, there was little external validation of the healthiness of these ideas. We did moderate CM messages based upon a set of YMCA guidelines; for example, we were required to filter out messages that encouraged dangerously low caloric intake. Still, while CM users shared many ideas that on the surface appear to be healthy (*e.g.*, smoothies, kale salad, and baked sweet potatoes), a nutrition expert did not carefully evaluate them. In addition, as users frequently shared only a photo of a meal, determining and assessing the specific ingredients in the dish was often impossible for

viewers. Finally, as messages were shared anonymously, viewers did not have a straightforward method of assessing content contributors' credibility. In summary, these limitations suggest two directions for future work on systems that support health advocacy: 1) examine previous research on online communities to identify potential mechanisms for conveying contributor expertise, and 2) explore how the involvement of nutrition experts affects user engagement, and encourages or inhibits the development of lay content contributors into effective health advocates.

DISCUSSION

Zoller [36] offers a theoretical perspective on how the field of health communication can be moved productively forward by using an activist lens that focuses on issues of power, inequality and the structural influences on health. A focus on similar issues is a valuable way for HCI to not only understand the broader context in which health and wellness is facilitated and inhibited; such a focus can also help us conceive of new ways that technology can help people live healthier lives. In the remainder of this paper, we propose an agenda for HCI research on health activism that involves a shift in how we examine the context of health management, promoting health through collective action, and carefully negotiating competing values.

Re-Thinking the Context of Health Management in HCI

Previous HCI research has often conceived of health and wellness as ideal states challenged mainly by an individual's lack of motivation, interest, knowledge, or access to social support [4,10,23,26]. Of course, these are important challenges that present great opportunities for technological innovation. However, broader structural challenges to health have been less explicitly confronted—challenges such as the imbalance of power between food vendors and the residents of predominantly African American communities. In our evaluation of CM, we examined how the content in CM pushed back on the unhealthy food advertisements and resources available within the community. Doing so helped us to understand CM as not simply an information appliance but as a political actor, giving the community an opportunity to broadcast their own health messaging and not just receive messaging from local food corporations. Public health researchers and policy makers regularly examine the ecology of health management [1]. HCI researchers should similarly study users' broader context of health decision-making to better appreciate how health and wellness tools might sit within users' lives, and ultimately facilitate social change (*e.g.*, as in [12,21,22,30]). Doing so necessitates approaching the pursuit of health not only as a matter of individual behavioral change but also explicitly confronting the community, cultural, and society-level forces that shape the conditions in which people live.

An examination of such contextual factors raises a complementary set of questions to those that HCI

researchers have typically explored in the past. For example, previous research has examined how physicians' use of computers in the exam room impacts their interaction with patients [3]. A consideration of the broader ecology of health and a critical focus on social justice would suggest stepping back to question, for example, how feasible it is for different populations to even access healthcare. For example, ethnic minority groups in the U.S. are significantly less likely than others to have health insurance, and those who do seek treatment consistently report receiving lower-quality healthcare [1]. Considering these issues could affect how HCI researchers design health applications. For example, research might focus on supporting communication between individuals and healthcare providers other than physicians, such as community health workers (*e.g.*, [30]). Another idea would be to examine the particular reasons for which ethnic minority groups report lower quality care and brainstorm tools that might help patients and providers identify ways to repair their relationship. In future HCI research on health, thoroughly examining "change" as a matter of social transformation (and not only individual modification) will necessitate a study of the forces that have led the collective to be what they are and those forces that hinder or help the collective in pursuing change.

Health Promotion Through Collective Action

In addition to understanding the ecological context of health management, one significant opportunity for future HCI health research is further examining how collectives can be organized to pursue social change. In writing about environmental sustainability, Dourish [7] suggests not only focusing on systems that persuade individuals to modify their behaviors but also "persuade people of the effectiveness of collective action and of their own positions within that collective". Doing so, he argues not only develops individuals who care about the earth's health, but also has the potential to shape larger-scale movements. Through our field evaluation of CM, we identified ways in which our participants were persuaded of the importance and value of advocating healthy eating to their friends, family and broader community. As they cared for others by sharing ideas and as they received feedback on these ideas, participants' attitudes changed regarding the value of health advocacy more broadly.

Based upon the positive results of our work, we encourage future research to study the design of applications that not only help users address social issues through the tool, but also help them become advocates of change apart from the tool. Such a design orientation is particularly important, as HCI projects are often short-term, yielding prototypes that are eventually removed from users. To better understand the potential of new ICTs to facilitate real social change, it will be critical to examine not only how the tool itself can enable social change but also to what extent users are more prepared to change the world around them (*e.g.*, due to their increased desire to effect change).

We also suggest that future work explore new ways in which technology can enable the collective pursuit of change in the context of health. Researchers have evaluated systems that facilitate the pursuit of wellness goals by leveraging small social networks of friends and larger networks of strangers in online communities [4,26]. Previously, such computer-mediated groups have provided informational, emotional and instrumental support to one another. But, how else might technology facilitate collective action? We can understand the range of possibilities by conceiving of collective action along two dimensions: the locus of change (a continuum from individual betterment to societal transformation) and the amount of change pursued (a continuum from partial to radical change) [36]. While tools might help collectives encourage people to modify their behaviors (as was the case with CM), other systems might help groups address social structures themselves. For example, applications could help citizens rally together to challenge government agencies to supplement existing legislation (partial change) or an overhaul of the healthcare system (radical change). Recent work by Maitland [21] and the growing body of HCI research on collective action outside of the health domain provide useful starting points for future research in this area (e.g., see [14,18,27]).

Negotiating Values

Within HCI and related fields, numerous researchers have advocated a careful focus on how stakeholder values are embedded into the design of ICTs [8]. Furthermore, recent work critiquing persuasive technology (tools with the explicit goal of shifting behaviors and attitudes) has encouraged designers to consider the line between persuasion and coercion and whose viewpoints are incorporated into systems encouraging behavior change [29]. Activist research on societal health issues must also carefully consider how values are designed into future applications. For example, stakeholders will undoubtedly have varied perspectives on topics such as the underlying causes of health inequity and how these problems are best addressed (e.g., through environmental transformation or improved access to healthcare).

An example of this value tension arose in our work between the YMCA and CM contributors. Recall that the YMCA requested we filter CM messages based upon a list of guidelines; for example, messages could not advocate caloric intake below a certain level or mention commercial weight loss programs such as Weight Watchers. These guidelines helped protect the welfare of YMCA members, but also the interests of the YMCA (e.g., ensuring it is not seen as endorsing a particular weight loss program). As we filtered messages, the YMCA's values became intertwined CM users': what the YMCA felt was appropriate to share ultimately superseded users' opinions. Based upon our experience, we see the value of future research on activist health systems transparently informing stakeholders of each party's interests and how they are harmonious or

conflicting. Such transparency could help resolve conflicts or unite stakeholders based upon shared values.

When developing tools that address health injustices, researchers may also be forced to make value assessments, taking a stand for what they feel is "right" and "wrong". As researchers approach the design of health promotion technologies from an activist perspective, they should carefully evaluate their place within the project and the values they are upholding and reinforcing. Focusing on these concerns more closely aligns health technology research with the existing and emerging agendas within HCI that have a focus on values at their core (e.g., [2,9]).

CONCLUSION

Previous HCI research has often focused on behavioral, psychological and physiological challenges to wellness. In our design and evaluation of CM, we used an ecological perspective, attempting to address cultural and economic disparities in health, and examining how the system nudged political relationships and affected community members' capacity to be change agents. Based on our results and the precedent of activist research in public health, we presented recommendations for future work in HCI that approaches health promotion as a form of activism. We hope that our findings and recommendations will catalyze future inquiry into how ICTs can address serious health disparities.

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