

Studying the Place of Technology to Lower Financial Barriers for Dietary Change

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Summary

Background: Current dietary self-monitoring systems assume users have access to healthy foods and resources to effectively implement and monitor dietary behavioral change.

Objectives: The purpose of this qualitative study is to understand the specific financial-related barriers that caregivers of low socioeconomic status encounter when attempting to make dietary behavior change.

Methods: In this qualitative study, we conducted a focus group and 14 in-person interviews with the primary caregivers of low socioeconomic families. Participants were recruited from a community considered to be 'at risk' through high levels of exposure to multiple modifiable risk factors for cardiovascular disease. All participants were English-speaking caregivers, who had children under

eight years old. The families lived in an urban, public housing community. The focus group and interviews were transcribed and coded during data analysis sessions, then analyzed for emergent themes.

Results: We abstracted three main themes from the data. The caregivers of 17 families: 1) feared trying healthier food alternatives because of possibly wasting the food; 2) planned meals only when they had enough time, space, and financial security; and 3) defined produce as luxury items and often could only afford staple food items, such as meat and grains.

Conclusion: We challenge the community to design technological interventions to lower the financial barriers presented with existing information and communication technology available to low socioeconomic populations. In addition, we encourage interventions to foster a community's social capital to decrease feelings of isolation and increase opportunities for cooperation.

3. purchased staple food items, such as meat and grains, and defined produce as luxury items.

In this paper, we describe the financial barriers low socioeconomic caregivers experience when enacting behavioral change and identify three health informatics research challenges that should be addressed if we, as a community, choose to focus efforts on assisting such caregivers by lowering these barriers. This work can inform the design of future community-based, health behavioral change systems for underserved populations.

It is widely acknowledged that poor diet is positively correlated with chronic diseases risk, including cardiovascular disease (CVD) [5]. CVD remains the biggest killer in the US and remains to be most prevalent in low socioeconomic communities [6, 8]. Furthermore a recent study found that 87% of children in low socioeconomic families we targeted for this study were already exposed to at least one modifiable CVD risk factor by preschool age (3–5 years old) [7]. The two most prevalent risk factors occurring within the preschool population were fat intake and physical inactivity. Therefore, researchers developing interventions to promote healthy dietary behaviors – technical and non-technical – are addressing an open and urgent research question.

We acknowledge that technology cannot solve all of the problems and barriers encountered by low socioeconomic caregivers. We challenge the community, however, to design interventions that assist in lowering financial barriers. More specifically, we can develop scheduling and meal-planning applications to assist families coordinate meals and identify inexpensive and healthy food alternatives. In addition, we can assist families learn about dietary change by utilizing existing dietary moni-

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1. Introduction

Current approaches to promoting dietary change often assume that the user has access to healthy foods and has the luxury to experiment with her family's diet. We make this inference based on the dietary promotion literature provided to low socioeconomic communities [1] and self-monitoring systems [2–4] that are designed to promote dietary behavioral change.

We found in our experiences interviewing 17 low socioeconomic, women caregivers that this is not the case. Specifically, caregivers in our qualitative study:

1. feared trying healthier food alternatives because of possibly wasting the food;
2. planned meals only when they had enough time, space, and financial security;

toring applications to design culturally relevant and personalized feedback. Finally, we can develop technology that fosters a community's social capital and provides users a way to communicate dietary behavior and personal successes and struggles. We advocate utilizing existing technology already adopted by the study population due to the population's financial constraints. The research challenges presented in this paper stand to establish a broader dietary behavior perspective – from grocery list to market shelf to dinner table.

2. Related Work

Here we briefly discuss non-technical interventions to assist low socioeconomic families improve their health. Overall, these programs typically provide in-person assistance, but are expensive to maintain and difficult to scale when accommodating differences in community culture. We then discuss technological interventions that provide an easier way to customize and deploy interventions, but lack personal communication and rely on expensive, commodity hardware.

2.1 Community Initiatives

Parents are the primary targets of initiatives aimed to improve the health of preschoolers. In spite of intensive face-to-face approaches, results have been relatively modest [9]. Two such outreach programs that currently serve the study population are Headstart (nhsa.org) and Women, Infants, and Children (fns.usda.gov/WIC/). Headstart is a national school readiness program, providing education, nutrition and health services to low socioeconomic children and their families in the US. WIC is a nutritional program that provides food supplements and education to nutritionally at-risk pregnant women and preschool children. Lee et al. [10] recognize that in addition to alerting underserved populations of their CVD risk factors, we must also create recommendations that are realistic based on the population's resources. The qualitative results presented in this study provide researchers a glimpse of the re-

sources available to a low socioeconomic population.

2.2 eHealth Promotion and Pervasive Health Technology

The range of technological interventions developed specifically for low socioeconomic populations have so far ranged from healthy eating information web-portals [11] to interactive multimedia teaching modules [12]. These interventions illustrate how different aspects of a study population's socioeconomic context can be integrated into the design of a health-related system.

Recently, the development of technology that promotes health-related behavioral change has become a topic of increasing interest to researchers in human-computer interaction (HCI). Apart from the work done by Grimes et al. [13, 14], and Khaled et al. [15], the needs of underserved communities and populations have mostly been ignored by HCI communities.

Generic approaches to health-related behavioral change within HCI have tended to include some form of self-monitoring; a well-recognized behavioral change technique [16]. Researchers are seeking to develop the basic format of self-logging, nutritional reference, and user feedback employed by commercial applications such as DietMatePro (dietmatepro.com) and BalanceLog (healthetech.com). In these applications, a user enters her dietary intake textually and then the system refers to a nutritional database to provide the user with feedback about her nutritional intake. Tsai et al. [3] also employ text-based data entry on their mobile-phone application that provides caloric balance feedback. Text-entry systems require a degree of technical aptitude and literacy that can become a barrier to adoption.

Alternative methods of data input include PDA-based scanning of receipts [4] and barcodes [2]. Camera phones are used as an alternative data-capture tool in myFoodPhone (myfoodphone.com), but the ease of data capture is traded off against automated nutritional analysis. A nutritionist provides feedback to users. This labor-intensive task can be avoided by

using the photograph itself as a reflective prompt [17]. Imagery may be preferable when considering raising dietary awareness within a population with varying literacy and language.

Systems have also been proposed to go beyond simply raising awareness of dietary intake to helping those already motivated to make a change to their nutritional behaviors. These commonly take the form of recipe repositories and price/nutritional value comparisons and recommendations [4, 11]. The interventions discussed so far help individuals monitor their dietary intake, however caregivers are often concerned with the intake of themselves and their families. Thus, our recommendations go beyond individual monitoring to family and (perhaps) communal monitoring.

3. The Study

We used a community-based research approach that has successfully been used with marginalized populations to give participants a long-term voice in the design process [18]. Human subjects approval from the University of Colorado at Boulder ethics committee was obtained before contacting any participants. We collaborated with the Bridge Project, a trusted resource within those communities, to recruit caregivers. This study was conducted in the same low socioeconomic communities where Barton et al. found children had at least one modifiable CVD risk factor [7].

3.1 The Bridge Project

The Bridge Project is a community outreach project with four centers situated within public housing neighborhoods where families are below the poverty line. The project provides after-school programs for children within these neighborhoods. In the after-school programs, children are given the opportunity to participate in various educational activities.

Health education is not a core component of the project's curriculum, but physical activity is encouraged through participation in outdoor activities. The children are given healthy eating education

intermittently. During homework hour the children are given a healthy snack. Anecdotally, a project employee commented that when the project first opened, some children would not drink the milk that was provided because they thought it was poison. Our future aim is to complement this exposure to positive health behaviors with health promotion technologies that extend the scope of exposure beyond the confines of the project centers into the project's children's homes and families.

3.2 Participants

We worked with administrators from the Bridge Project to recruit primary caregivers of children under eight years old who lived in the public housing community and spoke English. A total of 17 participants were recruited for the study. The participant group was primarily Latino ($n = 12$), but included African American ($n = 3$) and White ($n = 2$) individuals. Although not exactly proportional, this sample does compliment the most common ethnic orientations of the Bridge Project families (52%, 20%, 10% respectively).

All participants were women between the ages of 20 and 56 years old (average age = 32.3; $s.d. = 10.1$). The women were the primary caregivers for between two and five children (average $n = 3$; $s.d. = 0.94$) that ranged from one week to 16 years old. Three were married, one was engaged, and 13 were single. Eight women were not working outside of their homes, seven women worked full time, and two women worked part-time. Their out-of-home jobs included everything from sales associate to personal banker to janitor. The number of people in the participant's social network who helped them care for their children ranged from zero to four (average $n = 1.35$; $s.d. = 1.16$).

From a technological standpoint, nine participants owned a computer, however 16 participants had access to a computer either in their home or at a community center. Sixteen of the participants had at least one year of experience with computers – they felt the most competent with using the Internet and moderately comfortable with using word processing, e-mail and chat pro-

grams. Thirteen of the participants owned mobile phones and used their phones daily. Those who owned mobile phones had at least two years of experience using their phone, and felt comfortable using their phones for making and receiving calls, sending and receiving text messages, and taking pictures with their phones.

3.3 Methods

After the Bridge Project management team agreed to collaborate on the study, an author volunteered at the centers answering questions that the staff had about the study and helping the children during activities. Formal collaboration with a trusted party eased participant recruitment, while informal familiarity helped to establish a rapport with the family caregivers.

The primary caregivers of children up to the age of eight were invited to take part in either a focus group or one-to-one interview. The focus group and interviews took place in the Bridge Project building. Spatial constraints limited the maximum number of focus group participants to five. We originally recruited five mothers to participate in the focus group, but due to family and work demands two of the mothers had to cancel at short notice. We therefore carried out the focus group with three mothers. Twelve mothers and two grandmothers participated in the one-to-one interviews. Although the number of participants may appear low, we were recruiting from a pool of 21 potential participants that matched our criteria. We acknowledge the limitations of working with small numbers, but do not feel that the findings are of any less importance.

Initial topics of health, diet, and technology were raised in the focus group to generate insight into the main issues and concerns as perceived by the primary caregivers in low socioeconomic families. In-depth interviews then allowed us to elaborate on the emergent themes of lack of time, financial pressures, and the need for developmental knowledge to support the desire to change. Individual commonalities and differences in the participants' attitudes and approaches towards health-related behavioral change were also explored.

The focus group and interviews were transcribed and coded during data analysis sessions, then analyzed for emergent themes. We used the Transtheoretical Model of Behavior Change (TTM) [19] to interpret our findings within the context of the participants' current attempts to make dietary changes.

Change within TTM is viewed as a process. The five stages of change are precontemplation, contemplation, preparation, action and maintenance. TTM was chosen because of its widespread adoption and acceptance throughout the multiple disciplines concerned with health-related behavioral change. However, it is not without its critics. Adams et al. [20] suggest that by focusing solely on the individual, contributing factors such as gender and income are consequently ignored by the TTM. Additionally, when considering the complexity of dietary behaviors, Ni Murchu et al. [21] suggest that an individual may potentially be categorized into multiple stages. Despite its limitations, the model remains a useful tool to identify where in the process of change an individual is at any one time. Rather than assess stage of change using stage-based questioning, we chose to categorize participants based on evidence of their behavior and behavioral intent that arose during the interviews. We chose this approach, which has previously been employed by Lin et al. [22] because: 1) the majority of validated questionnaires focus on one particular dietary behavior (e.g., fat intake), and 2) direct questioning about their intention to change could be perceived as more judgmental than if the same information was elicited during the conversation flow.

It became apparent that Adams et al.'s criticism was relevant when analyzing the interview transcripts to categorize participants' stages of change as shown in ► Table 1^a. Many of our participants were only precontemplatives with respect to TTM because they lacked resources rather than motivation. For this reason we added an additional category, *Forced Precontem-*

^a Permission received from Maria Morozova, Pervasive Healthcare Conference Coordinator Chair, to reproduce Table 1.

plation, that we defined as currently being unable to change, despite intent or desire to do so.

4. Results

The research team categorized four participants as precontemplatives and five as forced precontemplatives – as shown in ►Table 1. Unsurprisingly, one of the recurring themes that emerged from the study was financial constraints and its impact on making dietary changes. In this paper we revisit and expand upon the financial barriers to implementing behavioral change that were included in our previous work [23].

4.1 Waste Not, Want Not

A common barrier that prevented most participants from purchasing health foods was the fear of waste. Waste was defined in many ways – from family members not eating to food spoilage to risking money on new food items. Participants were highly sensitive to waste because, with their limited resources, they had to consume each food item they purchase or risk the possibility of not having enough food for the month. Picky eaters were the most cited source of wasted healthy food. Children in ten of the participants' households refused to eat healthy foods purchased, thus the foods would rot. In extreme cases, participants had given up on purchasing healthy foods. Predictably, three of the four participants in this case were categorized as precontemplative.

Those participants who had not given up on purchasing fruits and vegetables, had the added challenge of finding a place to purchase unspoiled fresh food items. Participants discussed how the cheaper markets in close proximity to their homes had lower-quality fresh produce. Eight participants went to multiple supermarkets to get inexpensive staple foods at the cheaper shops and higher-quality produce and meat from more expensive shops. Unfortunately, going to the more expensive shops decreased the amount of food they could purchase because of food prices and travel

Table 1 Participants' stages of change

Stage of Change	Generic Definition	Example Evidence	Participant #
Precontemplation	No intention of changing within the next six months	I don't think I do [want to make dietary changes]. I'm not totally sure if I want to do it so that's why I really – I think that's why I keep putting it off maybe.	5, 11, 14, FG3
<i>Forced Precontemplation</i>	<i>Unable to change within next six months despite desire or intent to do so</i>	Well there is a lot of things I would like to change but you can't afford it.... They raised my food stamps to I think 262 I think a month that is supposed to feed a family of four. There is nothing left, you know, so we skimp on the meats one month, just so we can buy the fruits for the kids.	6, 7, 13, FG1,FG2
Contemplation	Seriously thinking of changing within the next six months	I am thinking about when I move to a bigger place that I want to make a menu, a weekly menu of what I want to make very week and paste it on the refrigerator, so the kids know what they are going to eat and they are prepared for it. That is what I am going to do.	3
Preparation	Intending to change in the next month	I'm going to try it. I'm telling you, I'm just going to get ready with all the research I started doing and print out everything that I want to start to know how to do and then from there on I'm going to try to see if I could achieve it. Hopefully I could.	10
Action	0–6 months after changing	I started [not buying snacks] the first of the year. I told myself that's my New Year's resolution, we going to lose some weight.	9
Maintenance	>6 months after changing	I don't feed my kids that anymore like I used to, like when they were young. When I was a teenager, like, "Oh, McDonald's. Here you go, here's dinner".	1, 2, 8, 12

costs. Occasionally, participants had to supplement their food supplies by going to food banks, where they risk receiving spoiled food and had limited food choices. Thus, people may have to get new foods that their families are not familiar with. In addition, when making a lifestyle change to eat more healthily, new foods most likely will be introduced. Three participants voiced concerns about cooking new, healthier foods because their families may not eat the food. Thus, they would waste both resources to obtain the food and the

food itself, as shown in the following quote by P12:

But I try not to cook too much that they ain't going to eat, because that is wasting food on my end and that is money, so I try to cook stuff I know they are going to eat.

The participants in the active and maintenance stages of change were more likely to discuss fears of waste as spoiled food and trying new food items. Based on their categorization, we can surmise that they had

more experience with purchasing and preparing healthy foods and thus had more experiences with wastage. Participants in earlier stages of change had more problems with picky eaters and were deterred from trying new foods because of waste fears.

4.2 Making Something Out of Nothing

Meal planning is recommended to the study population as a way to create healthier, well-balanced, inexpensive meals [1]. Overall, we found that eight participants planned their meals – five participants planned meals with their children. Six participants did not plan meals because of time limitations, space constraints, and financial uncertainty.

4.2.1 The Planners

Three participants who planned their meals did so because they were generally well-organized people who understood the benefits of budgeting. They planned exactly what their families were going to eat for a specific time period. The plan length ranged from two days to two weeks in advance. Participants who planned meals were also more likely to use coupons to save money or learn about deal availability.

Participants who planned meals with their children openly discussed healthy and unhealthy foods. These discussions provided the children with opportunities to learn about health and budgeting. For example, a participant described how her entire family changed their eating habits when her live-in mother was diagnosed with diabetes. Another caregiver, P10, discussed how her children went from helping her plan meals to helping her cook the meals.

4.2.2 Barriers to Planning

Participants who did not plan meals often described hectic schedules:

I work two jobs... I walk all day from 6:30 in the morning till about 10:30 at night... The only thing I sit down for is my breaks, when I eat lunch, when I eat and that is it. FG3

Two participants also discussed lack of physical space as a barrier to meal planning. When too many people are in one space, they do not have room to prepare meals at the same time, eat together, or talk together. These stressful environments make it difficult for the primary caregiver to keep track of what is being consumed and what needs to be replenished.

Although only one participant discussed financial uncertainty as a barrier for planning meals, based on the financial concerns voiced by other participants, we believe this may play into the lack of meal planning by other participants. We found that participants relied on many resources to purchase food, such as income, coupons, food vouchers, alimony, and child support. The latter two are not always received on time, thus budgets must be flexible. Even the change in receiving food stamps made one participant rethink meal planning:

I did for a while, but lately when we stopped getting our food stamps, it is like day to day now. It is just day to day, I will just look in the cupboard, this looks good, I will pull out the meat first, whatever looks good with the meat, I will pull out with it, the starch, the vegetables. But I don't plan anymore. P14

We highlighted space constraints and financial uncertainty as barriers to meal planning because they are specific to the study population and must be considered when developing applications to assist with meal planning. Participants who did not plan their meals were in different stages of change, thus addressing these barriers can help a large set of the study population.

4.3 The Bare Necessities

Low socioeconomic families face tremendous difficulties affording healthy foods to create well-balanced meals for their families. Our results supported findings from the USDA that found low socioeconomic people purchase discounted foods, bulk items, and less expensive food within the same product class [24]. For example, participants defined 'meat' only as hamburger – not better cuts of meat. In addition, we found that to make meals, partici-

pants' strategies included: 1) purchasing staple items, such as meat and grains, before looking at produce; 2) borrowing food from family; and 3) cooking with friends. Overall, we did not find a correlation between participants' state of change categorization and their preferred strategy for creating meals.

Four participants purchased staple items before looking at produce. Participants in this group typically saw produce as luxury items, instead of necessities:

I will try to get everything else and then the produce, what I do is I try to figure out what I have in my basket at the market, if I have extra money or I know that I am not going to spend that much, then I will go back though the produce and get the fruits. P4

In some cases, participants disclosed that sometimes they did not have enough money for produce and would try to purchase them the following months. P13 told us she receives \$216 a month in food vouchers – whereas the USDA estimates it costs \$570.20 to feed a family of the same size on a thrifty budget (a 38% difference) [25]! The staples first strategy ensures participants' families have enough to eat for their standard meals during the month. In addition, it helps participants budget their money more easily because they know exactly how much they have for luxury food items to enhance meals with produce or kid snacks.

When food stamps and money did run out some participants would reluctantly rely on food banks or family to provide sustenance. An alternative strategy two participants used when they did not have enough food for the month was community cooking with friends. Similar to borrowing, this strategy provides the participant with limited meal choices they can provide to their families. One benefit is that it provides participants with a better sense of community and personal ties with people in similar situations.

Participants who planned their meals were more likely to search for bargains and buy bulk items for food purchasing strategies. Those who used borrowing and community cooking strategies were more likely to not plan their meals ahead of time.

These results bolster findings that people who plan their meals in advance have more control over the foods their families consume [1].

5. Challenges to the Community

Based on the findings presented here and in our previous work [23], we have identified three research challenges to assist low socioeconomic caregivers lower existing barriers to improving their families' health and wellness. Here we briefly discuss each of them and illustrate how technology could contribute to the problem space by giving possible system examples: each example having been informed by the study population's current practices.

Firstly, we challenge researchers to *develop technological interventions that assist users overcome practical barriers to change*. Our findings bolster those in public health [26, 27] that often cite financial and temporal constraints as barriers for behavioral change. Indeed, the most obvious solutions to these barriers are budgeting and scheduling software. However, by themselves, these solutions do not capture the population needs. For example, consider the subtle differences between existing 'off the self' solutions and:

- Budgeting software that manages a family's checking accounts and assists with taxes to a system that helps a family *plan a meal together* based on their *fluctuating budget*. In addition, the system could assist with shopping by highlighting bargains at local stores and *minimizing food wastage* with an opportunistic recipe guide that suggests how to use the remaining food purchased during the week.
- Scheduling programs that provide families with the ability to coordinate schedules and pick-up times to a system that *recommends times to a user based on location and context*. The system would recommend times for the user to visit a store that has inexpensive, high-quality produce earlier in the day and then suggest another time slot later in the day to visit a market with inexpensive dietary staples.

The proposed systems are mashups that integrate standard functionality (e.g., budgeting and scheduling) with suitable (e.g., meal planning) and sometimes regionally available (e.g., location-based store recommendations) functionality. We believe these two examples could help the targeted population, who discussed financial barriers to affording produce, because studies have shown that people will purchase healthier food if the price is decreased [28, 29]. In addition, the proposed systems could provide participants, who said they could not plan their meals because of time and space constraints, the ability to plan because technical interventions could innately provide the asynchronous functionality needed to overcome these barriers. The proposed systems also provide users the ability to accommodate varying budgets without undue calculations. Participants disclosed how they often visited multiple places to purchase food for their families only to be disappointed by spoiled food. The proposed system could provide users the optimal routes with appropriate places to visit based on budgets and scheduling constraints.

In addition to the aforementioned issues relating to the accurate dietary intake monitoring, possible limitations to these systems include the data sources needed to build these systems (e.g., food item prices at each store) and data plans necessary for appropriate recommendations (e.g., GPS location). Another shortcoming of the proposed systems is that the caregivers have little time in their everyday lives for this type of planning, thus the interface must be easy to learn and quick to use. When considering those who do not currently plan their meals in advance, we must consider the issue of whether they would be motivated to use such an application. There are various possible strategies, both technical and non-technical, to try and engage potential users who do not necessarily appreciate the value of planning. Deployment may be accompanied with information sessions held within the community, ideally involving a member of the community who could act as a local advocate. Designers could employ principles of persuasive design [30] to encourage gradual engagement with the activity. We are conducting thor-

ough needs analyses and involving the study populations as designers to help identify and address design constraints.

For the second challenge, we reiterate a challenge from our previous work [23] to *design applications that deal with strategic barriers to implement health-related behavioral change*. More importantly, we explore the community to consider designing systems that *help users set realistic and incremental goals* rather than pursue a complete change of dietary intake. Borrowing from the budgeting mentioned earlier, the system could evaluate the family's desired food items during meal planning and recommend healthier equivalents to purchase with an additional incentive of a coupon to purchase the healthier item. Although this may go against traditional concepts of the success and failure of a system by not promoting complete behavioural change, we suggest that it is not our job to force new behaviors on people, but to assist users in making the changes they want to.

Unfortunately our results showed that only the participants who currently plan their meals are likely to use coupons. Thus, the same issues of how to engage potential users who do not currently plan meals also apply here. One strategy is to highlight the amount of money that can be saved by using the planning system-produced coupons to encourage system use – the more money saved, means the more groceries that can be purchased. We believe this kind of system has a chance of adoption by the study population because our previous work [23] showed that participants wanted to improve the dietary intake of their family, but they simply did not know where to begin. Thus, this type of system will provide incremental starting points to those who want to make changes.

Finally, we challenge the community to *develop technology that fosters a community's social capital*. In this paper, we discussed a population's financial capital constraints, however we found that the population felt relatively isolated and did not share with others their issues to overcome barriers [23]. We envision systems that can assist individuals develop their own strategies by engaging in discussions about health, shared experiences, and common knowledge. Some participants had voiced

concerns about the transient nature of the housing projects and the lack of trust in neighbors, these discussions would benefit from asynchronous and anonymous communication mediums for users to overcome such socially obstructive issues. In the envisioned systems, we could see participants communicating with their community about the availability of non-spoiled food in grocery stores. The EatWell System [14] provides a good example of how computer-mediated social capital can contribute to this problem space. Although none of our participants reported having experience with online communities, the isolation feelings that were expressed indicate that there is scope for investigations into how technology can be used to enhance existing support structures. Indeed, participants discussed how cathartic the focus group experience was – to understand that they were not alone in their problems.

6. Next Steps

The community must design solutions that can be adopted. More specifically, researchers should utilize the technology already available to the population. Recent data, also reflected in our own findings, show that low socioeconomic households are about twice as likely to have cable TV and mobile phone service than Internet access (<http://www.eia.doe.gov/emeu/recs/>). Thus, researchers should consider hybrid systems that capitalize on the mobility of phones for authentication with the display space of a television for ideal data viewing.

The community must design solutions that the population wants to adopt. Somewhat anecdotally, the Bridge Project staff reminded us that caregivers did not want another “white woman telling them how to raise their children.” The example solutions utilize dynamic and adaptable mediums that give public health messages a local face through technology. In the case of the social capital example, the inherently social nature of online networks makes participants feel like they are part of a community [31], instead of part of a lecture group.

In our previous work [23], we encouraged researchers to design for action, not

persuasion. However, when designing to lower the financial barriers of dietary change, we believe it may be necessary to convey the value of the solutions that we offer before we can expect them to be adopted. We maintain, however, that these systems will have the most impact when paired with context and community.

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