A Circle of Friends: Persuasive Tools to Improve Heart Health

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Abstract
Cardiovascular disease (CVD) is the leading causes of death in the United States and worldwide. While CVD risk factors are well-known and many can be changed with diet and exercise, more research is needed to understand how to design effective interventions that help patients reduce CVD risk. In this paper, we present the results of a content analysis of the Health Freedom Circle of Friends (COF) Walking Program, a community-based health program run by a public health non-profit that has been shown to reduce CVD risks. We examine the design to better understand the persuasive tools used as well as parts of the design that might benefit from a technological intervention.

Author Keywords
Personal informatics; health equity; community-based participatory research; heart disease; public health.

ACM Classification Keywords
Human-centered computing ~ Empirical studies in HCI

Introduction
Cardiovascular disease (CVD) is the leading cause of death in the United States especially among African-Americans, low-income communities, and individuals in urban environments [1]. While some CVD risk factors are hereditary, others such as high blood pressure,

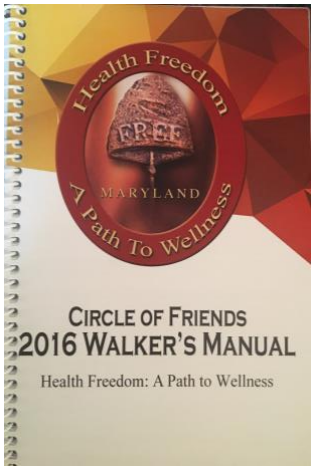


Figure 1. Participants walker's manual (diary).

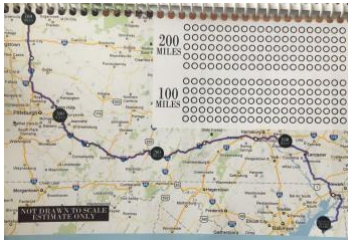


Figure 2. Tracking sheet with milestone markers included in diary.

high cholesterol, physical inactivity, and obesity can be changed [1]. Evidence suggests that diet changes and increased physical activity can reduce some CVD risks [1]. However, diet and exercise changes can be difficult for patients if they do not have the proper structural and motivational support to do so [1]. Therefore, more research is needed to identify effective methods of encouraging patients to improve their heart health.

In this paper, we explore the persuasive (motivational) tools [2] included in a community-based health intervention, the Health Freedom Circle of Friends (COF) Walking Program. COF has been shown to be effective in reducing certain CVD factors among individuals in a 6-week period. We performed a content analysis of the existing program documents to identify the persuasive tools used and to understand potentially problematic design elements for personal informatics [5, 6]. We found that the design includes several persuasive tools to encourage participation in heart healthy activities, but it may benefit from technology to better support tracking efforts, self-reflection, communication and engagement.

Health Freedom: Circle of Friends Program (COF)

The Circle of Friend Program is developed by Health Freedom, Incorporated a 501c3 non-profit in Baltimore, Maryland [4]. The program has two main components: a training session for community health advocates (conductors) and a COF walking program (See Figure 1). The COF walking program is inspired by the stories of abolitionists, Quakers and freedom seekers that traveled the underground railroad (UR) to freedom from slavery. The COF program is composed of several participant groups each led by a trained community health advocate (the conductor). The community health advocate is provided with training but is not necessarily a healthcare professional. Over the course of six weeks, the participants take on the persona of an abolitionist, Quaker or freedom seeker on a journey to (health) freedom and keep a walker's journey (diary) where they track their steps and are provided information about healthy eating, exercise, and historical narratives about the UR (See Figure 3). At the end of the program, all participants are invited to participate in a freedom walk 5K celebration where they visit historic landmarks significant to the UR.

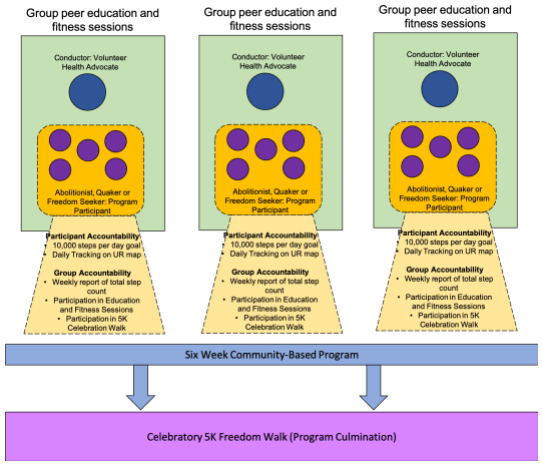


Figure 3: Diagram of COF Walking program.

Initial analysis of the COF program suggests that it is effective at reducing CVD risk factors of patients over the 6-week period. Therefore, the design shows promise as a personal informatics tool for motivating behavior change among those with CVD risks. We therefore examine the design of COF to better understand the persuasive tools present.

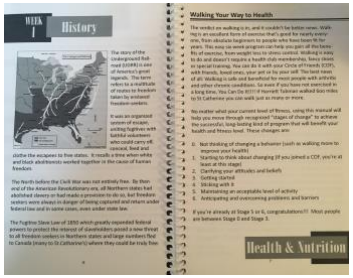


Figure 4: Historical narrative and Health education components included in the diary.

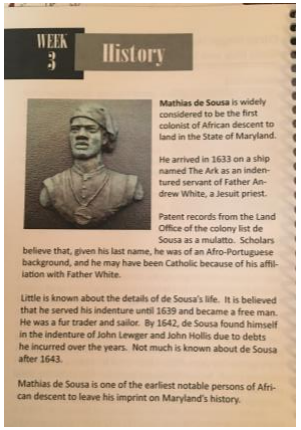


Figure 5: Historical narrative included in walker's manual.

Methods

We conducted a content analysis of a recent version of the existing circle of friend walkers' manual (See Figure 1) and supporting program documents including those for related events provided to participants in a cohort. We analyzed the documents to address the following research questions: *What persuasive tools were used in the design of circle of friends to motivate behavior change? What parts of the design are potentially problematic based on known personal informatics design implications?*

Two researchers independently analyzed images of available documents, and made marginal notes about the type of persuasive tools present and potentially problematic design elements. Researchers performed several iterations of analysis to reconcile emerging themes and come to a consensus.

Findings: Persuasive Tools

Researchers identified several different persuasive tools [2, 3] being used in the intervention's design including support for reflection and goal setting, reward systems, and peer accountability [5]. We discuss each below.

Support for Reflection and Goal Setting

One of the main persuasive tools used in the design was the inclusion of features to support reflection. The intervention itself requires users to track daily step counts and provides a map where they can mark off their steps daily for later reflection (See Figure 2). The manual makes a suggested goal of 10,000 steps daily. Participants can track their steps at their leisure; however, they must report their progress each week during meetings with the group lead and peers. While the intervention suggests 10,000 steps daily, the map is flexible enough to allow the participant to set individual goals and provides different types of rewards to encourage those that do not meet and exceed the suggested goal.

Reward Systems

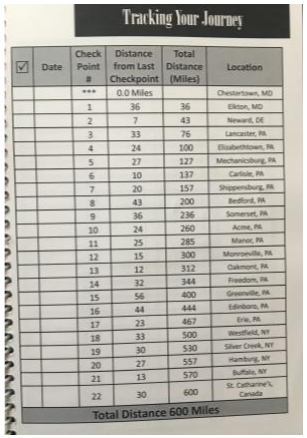
The intervention uses several types of rewards to encourage participants to reach their goals. As participants reach different milestones they are provided with a narrative history of how their journey relates to a freedom seeker traveling on the underground railroad (See Figures 4 and 5). When they reach certain milestones, participants are provided with history of an important historical fact about the UR to further motivate them. Participants also convert their step counts to reflect the miles traveled on the UR.

Peer and Group Accountability

The COF program also uses peer and group accountability to encourage participants. Each week, participants meet with their conductor and other members of their group for health activities, to report progress from the prior week and collect data about health indicators (e.g. blood pressure). The culmination of the six-week COF program is an organized community 5K walk where COF groups walk various historical sites related to the UR.

Discussion: Opportunities for Technology

We found that the COF program incorporates a variety of tools to encourage and support participants. For example, the use of culturally relevant storytelling to engage participants by comparing their health journey to a freedom seeker's journey to freedom on the UR. We also identified opportunities where technology might further improve participants' experiences.

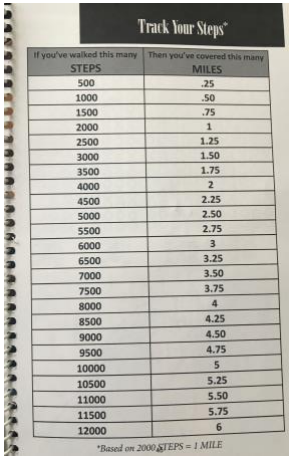


Tracking Your Journey

☑	Date	Check Point #	Distance from Last Checkpoint	Total Distance (Miles)	Location
		***	0.0 Miles		Chestertown, MD
		1	36	36	Elkton, MD
		2	7	43	Newark, DE
		3	33	76	Lancaster, PA
		4	24	100	Elizabethtown, PA
		5	27	127	Mechanicsburg, PA
		6	10	137	Carlisle, PA
		7	20	157	Shippensburg, PA
		8	43	200	Bedford, PA
		9	36	236	Somerset, PA
		10	24	260	Acme, PA
		11	25	285	Manor, PA
		12	15	300	Monroeville, PA
		13	12	312	Oakmont, PA
		14	32	344	Freedom, PA
		15	56	400	Greenville, PA
		16	44	444	Edinboro, PA
		17	23	467	Erie, PA
		18	33	500	Westfield, NY
		19	30	530	Silver Creek, NY
		20	27	557	Hamburg, NY
		21	13	570	Buffalo, NY
		22	30	600	St. Catharine's, Canada

Total Distance 600 Miles

Figure 6. Reference to help participants calculate distance traveled on the UR.



Track Your Steps*

If you've walked this many STEPS	Then you've covered this many MILES
500	.25
1000	.50
1500	.75
2000	1
2500	1.25
3000	1.50
3500	1.75
4000	2
4500	2.25
5000	2.50
5500	2.75
6000	3
6500	3.25
7000	3.50
7500	3.75
8000	4
8500	4.25
9000	4.50
9500	4.75
10000	5
10500	5.25
11000	5.50
11500	5.75
12000	6

*Based on 2000 STEPS = 1 MILE

Figure 7. Participant reference for convert steps to miles.

Reducing Tracking Effort and Improving Reflection
Currently participants manually track their steps using a map included in the walker's manual (See Figures 6 and 7). Participants must also perform manual calculations to determine the distance traveled on the UR and if they have reached a milestone (See Figure 7). This approach is prone to miscalculations, miscounting, and other human errors. A technological intervention that automatically tracks and performs calculations could reduce user burden [3, 5].

Improving Communication Among Peers and Leaders
In the current program the community health advocate that serves as the leader determines the level of communication with the group members outside of weekly meetings. Therefore, communication practices can be inconsistent from group to group. The program also currently does not provide any formal support for peer-to-peer communication outside of the in-person meetings. The lack of communication between peers can lead to missed goals and loss of motivation. In the future, exploring technological interventions such as open messaging or peer support that facilitates ongoing communication could further improve user experience.

Improving Engagement with Information and Rewards
While the current intervention supports user engagement, the user must manually locate and read information that corresponds to the milestone reached. While the rewards provide some incentive, they are not easily accessed which can affect participant engagement. In the future, exploring ways technology can provide more real-time and engaging rewards [3, 6] may improve users' experiences such as by connecting past history with current landmarks and monuments virtually.

Conclusion and Future Work

In this paper, we describe persuasive tools present in the design of the COF Walking Program, a community-based health intervention to improve heart health. In the future, we will continue to examine COF's design to uncover ways technology can support participants' self-reflection, communication, and health outcomes.

Acknowledgements

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