Title of Project

eHealth Activity among African American and White Cancer Survivors

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Inclusive Dates of Project
Funding period: 9/30/14 – 9/29/18
No-cost extension period: 9/30/18 – 9/29/19

Federal Project Officer
Derrick Wyatt
Grant Award Number
R01 HS022955

STRUCTURED ABSTRACT

Purpose: The purpose of the current study was to investigate eHealth activity among African American (AfAm) and White internet-using cancer survivors and the role eHealth in the context of survivors' strategies for personal health information management (PHIM).

Scope: There are approximately 16.9 million cancer survivors in the U.S. with a wide range of needs and racial disparities exist such that AfAm survivors have worse survivorship outcomes. eHealth holds promise in meeting those needs and eliminating disparities but more data is needed to better understand eHealth activity among diverse survivors and determinants of their eHealth activity.

Methods: In this study, 544 breast, prostate, and colorectal cancer survivors (AfAm: 55.5%; White: 44.5%) completed an interview that included the eHealth Activity Assessment (eHAA) of 17 activities across five separate domains. A subset of 68 survivors also completed an in-home ethnographic interview to explore the role of technology in their own PHIM.

Results: The mean number of eHealth activities across the entire sample was 6.65 (range: 0 - 16). AfAm survivors reported significantly fewer eHealth activities overall and fewer activities within each of the five domains. AfAm race was associated with eHealth activity in bivariate tests but when psychological and social-structural variables were included in multivariate models, race was no longer significant and age, socioeconomic status, technology acceptance indicators, and health care barriers emerged as independent predictors. Results of in-home ethnographic interviews provided additional insight into specific eHealth tools cancer survivors used to manage health information and cancer needs, along with non-eHealth strategies.   Findings also address survivors' use of smartphone apps, wearable technology and social media.

Key Words: eHealth, mHealth, internet use, cancer survivorship, racial disparities

PURPOSE

The purpose of the current study, referred to as the eSTAR Study (**E**nhancing **S**urvivorship through **T**echnology **a**nd **R**esearch), was to investigate engagement in eHealth activity among AfAm and White internet-using cancer survivors and the social-structural and psychological determinants of this activity. Additionally, the role eHealth and technology was explored in the context of survivors' strategies for PHIM. There were three specific aims:

Aim1: To examine racial differences in general eHealth activity among AfAm and white cancer survivors. We hypothesized that, among cancer survivors with internet access, AfAm survivors would be more likely to engage in eHealth activity compared to white survivors.

Aim 2: To examine racial differences in specific categories of eHealth activity among AfAm and white cancer survivors. We further hypothesized that AfAm survivors would be more likely to engage in eHealth activities that directly address healthcare domains in which racial disparities exist.

Aim 3: To explore the role of eHealth activity in the broader context of personal health information management among AfAm and White cancer survivors.

Aim 4: To establish survivor-centered design principles that will be applied to the development of an eHealth tool for cancer survivors.

SCOPE

There are approximately 16.9 million cancer survivors in the U.S. today representing 5% of the U.S. population [1]. Many patients transitioning from active cancer treatment to post-treatment survivorship confront a wide range of challenges, including long-term and late effects of treatment (i.e., unrecognized toxicities) that can impair virtually every tissue and organ system [2]. Survivors also face cancer-specific psychological difficulties, such as fear of recurrence or a

second primary cancer as well as substantially higher rates of some mental disorders, such as depression [3]. Concerns of survivors also extend to social and economic realms (e.g., the strain of a cancer diagnosis on one's family, threats to one's income, employment, etc.).

Alarmingly, there is strong evidence of racial disparities in survivorship. AfAm cancer survivors report worse health-related quality of life (QOL) and more cancer-related health problems compared to white survivors [4-8] [7,9-14]. AfAm survivors also report more supportive care needs and are more likely to want help with obtaining information, engaging in daily activities, and coping with the disease [15,16]. Disparities in care also exist such that physicians offer less biomedical information and psychosocial counseling to AfAm cancer patients compared to white patients, engage in less partnership building, and are perceived as less supportive [17-19]. Furthermore, AfAm cancer patients participate less actively and ask fewer questions overall during clinical interactions [18,20]. Such findings are significant in the context of survivorship care, which requires a fairly high level of healthcare involvement to control long-term and late treatment effects and surveillance for cancer recurrence and new cancers [2,21-24]. These findings are also provocative given evidence that AfAm cancer survivors are less likely to be adherent to guidelines for post-treatment cancer surveillance [25,26 27 28]. These disparities are especially concerning since the numbers of cancer survivors in the U.S. are expected to further grow based on cancer incidence projections, with greater increases in cancer incidence among AfAms (64%) than whites (31%) by 2030 [29].

There is increasing interest in the extent to which patient-facing technologies and eHealth can address these disparities. eHealth has been defined as, "… an emerging field in the intersection of medical informatics, public health, and business, referring to health services and information delivered or enhanced through the Internet and related technologies" [30]. In the context of the current proposal, eHealth refers to patient use of Internet-based and mobile communication and information technologies to assess, monitor, and improve health [31]. In light of recent advances in health IT, the effectiveness of digital interventions, the growing number of cancer survivors in the U.S., the extensive needs of cancer survivors, and persistent racial disparities in cancer survivorship, it is important to answer the following questions: 1) To what extent are diverse cancer survivors engaged in eHealth activity; 2) What are the determinants of eHealth activity; and 3) What role does eHealth activity have in the broader context of survivors' health management?

The current work was guided by a framework based on the integration of several theories (Figure 1). These included the Technology Acceptance Model (TAM) [32]. TAM focuses on two types of beliefs: 1) perceived ease of use, or one's perception that using technology will be free from physical or mental effort [33], and 2) perceived usefulness or the perception that using technology will lead to an enhanced personal experience [33]. The framework also included the Unified Theory of Acceptance and Use of Technology (UTAUT) [34] which adds social influence, defined as one's perception of important or relevant others' beliefs about one's use of technology [34 35]. Two additional variables included in the framework are perceived security of one's personal information or risk beliefs, the expectation that a high potential for loss is associated with the release of personal information online [36], and perceived credibility of online information. Finally, the framework addresses social-structural determinants as outlined by the Structural Influence Model of Communication (SIMC). SIMC focuses on the role of communication inequality in linking social determinants to health outcomes. According to this model, socioeconomic status, sociodemographics, health status, and health resources are all domains that potentially predict communication inequality in access to and use of eHealth strategies.

The current study investigated both the psychological and social-structural determinants of eHealth activity among AfAm and white cancer survivors reporting internet access, i.e., self-reported ability to go online oneself when one needs to or wants to. Guided by TAM, UTAUT, and SIMC, this investigation focused on the role of demographics, SES, healthcare resources, clinical factors, and beliefs related to technology adoption. Specific hypotheses are driven by Uses and Gratifications (U & G) Theory, which posits that the goals of eHealth are driven by specific needs. U&G theory is an influential theory in media research that posits that an individual's media exposure is not random or passive, but a strategic choice based on one's needs [82-84]. It is interesting to consider that potential racial differences in eHealth activity are informed by disparities in cancer care and the specific needs created by deficits in the survivor-provider

Figure 1. Guiding theoretical model: Determinants of eHealth activity.
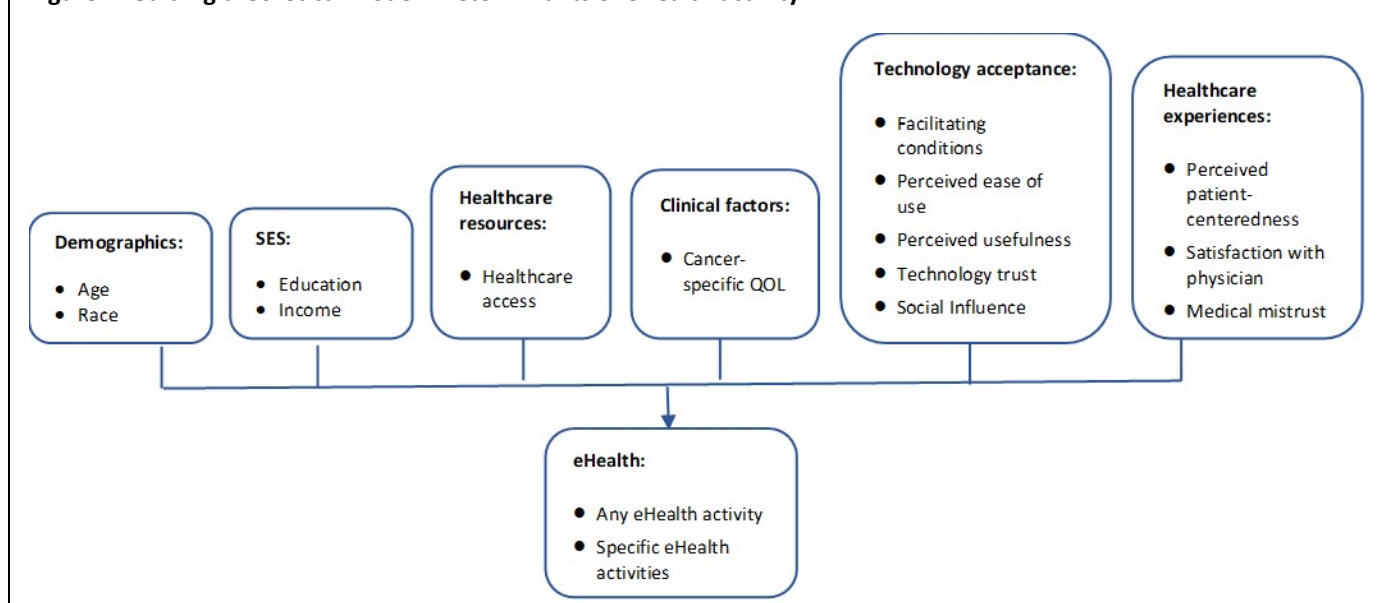
relationship. According to U&G Theory, communication disparities may represent a deficit in cancer care that creates a need for compensatory informational support that a survivor may decide is best met by eHealth. This is consistent with results of several studies reporting that negative perceptions of patient-provider interactions are associated with eHealth activity. For example, Hou et al. [81] found that individuals who viewed their medical interactions as low in patient-centered communication were more likely to use eHealth strategies. In a separate study, cancer patients who were dissatisfied with information provided at the time of diagnosis and rated their oncologist as low in empathy were more likely to choose the internet as their preferred source of cancer information[88]. U&G Theory may also account for eHealth activity resulting from unmet supportive care needs, including information needs, as at least one study of breast cancer patients using an eHealth program found that unmet need for information was a substantial predictor of time spent using that program's informational services [97]. Based on U&G Theory, it was hypothesized that AfAm cancer survivors are more likely to report any eHealth activity compared to white survivors due racial disparities in survivorship care and outcomes. It was also hypothesized that AfAm survivors are more likely than white survivors to report informational and self-care-related eHealth activity, and this relationship will be mediated by health resources and experiences such as low perceive patient-centered communication, satisfaction with one's physician, medical mistrust, and low healthcare access.

eHealth activity may be considered part of personal health information management (PHIM): "the process and strategies adopted by people to find, keep, organize, and share a broad range of personal and health information in order to manage a variety of health-related tasks including scheduling, planning, coordination, decision making, tracking, and communicating with others" [37] [38]. Among survivors who use eHealth resources, investigation of the extent to which eHealth resources are integrated with alternate PHIM strategies can lead to meaningful enhancements of existing tools. Given the heavy information management demands of cancer survivorship, it is important to characterize the PHIM strategies in this population in order to create effective eHealth tools. In the current study, we used an ethnographic approach to place cancer survivors' eHealth activity in context by examining the full range of PHIM strategies that survivors use, a critical piece given the dearth of information about PHIM among survivors. This ethnographic work was guided by the Balance Model [37], a work systems model emphasizing the interconnectedness of the individual, the tasks of PHIM and the tools and technologies used, and the physical and social political environment.

METHODS
Participants

Participants were cancer survivors identified through the Metropolitan Detroit Cancer Surveillance System (MDCSS), which was part of NCI's Surveillance Epidemiology End Results (SEER) Program that collected cancer data in the metropolitan Detroit area. Individuals were eligible if they were Internet users, self-identified as AfAm/Black or white/Caucasian, were age 21 years or older, had received a diagnosis of either breast cancer (BrCa), prostate cancer (PCa), or colorectal cancer (CRC), received definitive treatment (surgery, chemotherapy, radiation therapy) for Stage 0 (BrCa, CRC), I, II, III cancer, and were between 3 and 36 months post-treatment. Across all three cancer types, individuals were excluded if they 1) were not Internet users; 2) had been diagnosed with metastatic disease; 3) had more than one cancer diagnosis (i.e., recurrence or second primary cancer); or 4) could not provide a telephone number for contact.

Assessment: Primary Interview

eHealth activity: The primary outcome, *eHealth activity*, was measured using the eHealth Activity Assessment (eHAA). The eHAA assesses 17 eHealth activities across 5 domains:
- Informational activities that include self-directed efforts to find relevant, useful health information (3 items);
- Communal activities that increase one's sense of community and social support (2 items);
- Self-care activities that address the management of one's health information and conditions (5 items);
- Expert care activities that facilitate clinical services related to treatment and intervention (3 items);
- Transaction activities that facilitate administrative services (4 items).

Items were drawn and adapted from the four large-scale national surveys and other work [39-42]. The eHAA is a mixed methods approach to assessing health-related technology use. For each activity, participants were asked if they were aware the activity was possible; if they had ever engaged in the activity directly; whether someone else (surrogate) had engaged in the activity on their behalf; the recency of the eHealth activity; how often the activity was related to their cancer; and their interest in engaging in the activity in the future. These were quantitative (QUAN) items representing the "primary strand" of the measure, which also embedded qualitative (QUAL) items representing a "secondary strand." The embedded QUAL component contained a brief set of probes to follow participants' quantitative report of eHealth activity. These probes were intended to supplement the QUAN data by eliciting participants' perspectives on their reasons for eHealth activity (or lack of activity), the quality of their experiences with such activity, and outcomes.

The following were assessed as potential predictors of eHealth activity.

Demographics and socioeconomic status*: Age, race, education, and total annual household income* were included in a broader assessment of sociodemographic variables.

Healthcare resources: *Healthcare access* was assessed with 8 items from the U.S. National Health Interview Survey [43].

Clinical factors: *Quality of life (QOL)* was assessed using the Functional Assessment of Cancer Therapy – General (FACT-G) [44-47].

Technology acceptance: *Facilitating conditions* were measured using 2 items adapted from Venkatesh et al. [34] about perceived availability of skills, resources, and opportunities necessary for using the internet. *Perceived ease of use* was assessed with 3 items asking about the degree of ease associated with using the internet [48]. *Perceived usefulness* was assessed 3 items regarding the perception that the internet will enhance one's healthcare [48]. *Trust in technology*

was measured with 7 items assessing perceived security through risk beliefs, or the expectation that a high potential for loss is associated with the release of personal health information online; trust beliefs, or expectation that one's personal health information will be handled responsibly online; and perceived credibility, or trust in online health information [36] [49] [50]. *Social influence* was assessed with 4 items adapted from Venkatesh et al. [34] regarding one's perception of significant others' beliefs about one's use of eHealth.

Healthcare experiences: *Patient-centeredness* was assessed with six items from HINTS [49]. *Satisfaction with care* was assessed 4 items from the of the European Organisation for Research and Treatment of Cancer (EORTC) survey related to satisfaction with information provision and general satisfaction [51]. *Medical mistrust* was assessed with the 6-item suspicion subscale of the Group-Based Medical Mistrust Scale [52].

Assessment: Ethnography

Qualitative data on the role of eHealth in survivors' PHIM was collected through an ethnographic interview. The interview was semi-structured, with open ended questions designed to elicit participant survivors' current needs, concerns or goals and the types of health information (i.e., medical records, follow up appointments, medication use), technologies (i.e., devices and tools) and strategies (i.e., planning, organizing, saving, storing, sharing of health information) they use to address their needs. After a brief review of a survivor's cancer history, they were asked, as someone who has completed treatment for cancer, to describe areas most important for them to manage in terms of their health. For each area mentioned, the interviewer asked the participant to describe how they manage that need or concern. If needed, they were instructed that ways of managing a need or concern might include: people, such as family or friends or community resources; different kinds of health information; different kinds of devices; activities, such as exercise or prayer; and services. If the participant did not mention having any needs or concerns, the interviewer posed a number of concerns commonly experienced by survivors, such as new health concerns, access to health care, quality of life, changes in family relationships, or problems with work or money.

For each need expressed, the interviewer probed for how the participant manages that need. Within these discussions, the interviewer noted the specific types of health information, technologies and strategies mentioned for further probing about details of use, including where something was stored and how it was retrieved; its form (e.g., paper or digital); frequency of use; if others helped with use; how something was shared or backed up; and what participants liked or dislike about a particular form or process. Participants were asked to show the locations where they keep or use various kinds of health information and in some cases, participants were asked to demonstrate how they used something. Near the conclusion of the interview, if not previously discussed, participants were asked to create a "wish list" of   forms of health information they did not have access to or did not use that they would like.

Ethnographic data included field notes and digital images of PHI, any devices, and their locations. Hand written field notes, which included a short summary of the interview visit, were typed up and combined with digital images in a field note form within 24 hours post interview. Any personally identifying information present in images was obscured. Audio recordings of interviews were transcribed and de-identified. Interview transcripts were then joined with finalized observational field notes.

Procedures

Research study protocol approvals were obtained from Karmanos Cancer Institute's (KCI) Protocol Review and Monitoring Committee, the Wayne State University Institutional Review Board, and the Michigan Department of Community Health when required for specific participants. Over a 28-month period (January 2016 – April 2018), 2,989 potential participants, randomly selected from the MDCSS-SEER database and stratified by race and cancer diagnosis, were contacted regarding study participation. Of these, 1372 were screened and determined to be eligible. Of these 755, (55%) agreed to participate and were consented and of these, 561 (74%) completed the primary interview. All

interviews except for one (conducted in-person) were completed by telephone, lasting between 35 to 90 minutes. The eHAA portion of the interview was audio recorded. Participants received a $45 gift card incentive.

Those participants who completed the primary interview and agreed to be contacted regarding the in-home ethnography were contacted approximately 3 weeks after completion of the primary interview. Almost all ethnographic interviews were conducted in participants' homes (with one conducted at the participant's workplace). A team of two study staff were present at all interviews with a lead ethnographer (LE) who consented each participant and supervised data collection, and an observational recorder (OR) who took field notes and digital images of PHI, any devices, and their locations. Interviews lasted from 1.5 to 3 hours.

In our original proposal, we planned to enroll 1230 participants. However, this target sample size was based on an exploratory aim that proposed to compare survivors with and without Internet access, with the expectation that only 50% of our sample would report using the internet. However, after several months of recruitment, it was observed that approximately 90% of enrolled participants are internet users. Therefore, we dropped the exploratory aim. Power analyses related to our primary aims and hypotheses showed that a sample size of 615 was sufficient for adequate statistical power

DATA ANALYSIS

Analysis of primary interview data: Frequencies were calculated for all sociodemographic variables and chi-square analyses were conducted to examine differences between AfAm and White participants. Similarly, means of predictor variables were calculated and analyses of variance (ANOVAs) were conducted to further explore racial differences. Means were also calculated for total number of eHealth activities and well as mean number of activities within each of the five domains, and racial differences were examined via ANOVAs. Using linear regression modeling, bivariate and multivariate analyses were conducted to examine the effect of each theoretically driven determinant or predictor on eHealth outcomes.

Administration of the eHAA was audio recorded for qualitative data analysis. A total of 544 de-identified transcripts were analyzed using Dedoose, a qualitative software program designed to assist in thematic content analysis. A team of five study staff independently read through the same five transcripts to identify themes related to participants' perspectives on their eHealth use. Themes were compared and refined through an iterative process of discussion and re-reading of data to reach consensus of meaning. Themes and their meanings, along with specific instructions for use, were defined in a codebook. Once the codebook was finalized, two study staff members coded all remaining transcripts over a five-month period, with frequent verification and clarification of code meaning and use. Inter-rater reliability was initially calculated every 3 transcripts, then every 10 transcripts, then every 20 transcripts resulting in an average Kappa score of 85% throughout the coding period.

Analysis of ethnographic data: Transcribed interviews and field notes were uploaded into Atlas Ti, a software program designed to assist with qualitative analyses. Each ethnographic visit yielded three data sources: verbatim transcripts of audio recorded semi-structured interview, observational field notes and digital photographs. A coding team of 4 study staff met twice weekly to review interview transcripts for the purpose of identifying themes/codes. Following from the Balance Model [37], 211 codes were identified, defined and arranged within 5 categories in a codebook: **IND** (codes relating to the individuals knowledge, perceptions, thoughts and life experiences); **TASK** (codes describing tasks or activities involved in using PHI to meet the individual's goals), **ENV** (codes relating to the physical context in which PHIM occurs); **T&T** (Tools and Technology: codes that capture the artifacts, such as technology types, and processes used to accomplish the work of PHIM); **ORG** (codes capturing the organizational structures that form the sociopolitical context of PHIM). All 211 codes were entered into Atlas.

As a way of more quickly identifying survivors' specific PHIM strategies, the two ethnographers responsible for all ethnographic interviewing and coding of resulting interview data, created individual vignettes called "scenarios of use" summaries (SOUs) for each interview. These summaries involved a rapid harvesting of select codes associated with the goals, needs, and concerns (GCNs) found to be present in

Table 1: Participant characteristics (N=544)				
	All	**AfAm**	**White**	**p**
Race (%, n)	---	55.5 (302)	44.5 (242)	---
Age (mean, SD)	60.1 (9.86)	59.5 (9.5)	60.8 (10.3)	n.s.
Gender (%, n)				
Female	71.7 (390)	73.2 (221)	69.8 (169)	n.s.
Male or other group	28.3 (154)	26.8 (81)	30.2 (73)	
Education (%, n)				
High school degree or less	25.3 (134)	30.9 (90)	18.4 (44)	.0001
Some college or associate's degree	36.9 (195)	39.9 (116)	33.1 (79)	
College degree or greater	37.9 (201)	29.2 (85)	48.5 (116)	
Income				
30K or less	31.4 (154)	44.1 (120)	15.6 (34)	.0001
31K - 60K	24.7 (121)	26.8 (73)	22.0 (48)	
61K	43.9 (215)	29.0 (79)	62.4 (136)	
Cancer diagnosis				
Breast	66.4 (361)	67.6 (204)	64.9 (157)	n.s.
Prostate	24.6 (134)	22.9 (69)	24.6 (134)	
Fsou	9.0 (49)	9.6 (29)	8.3 (20)	
Time since end of treatment				
3-24 months	60.3 (328)	61.9 (187)	58.3 (141)	n.s.
24-48 months	39.7 (216)	38.1 (115)	41.7 (101)	

an interview transcript. The select codes of interest here include, "tasks", "strategies", "types of health information", "types of tools and technologies", "barriers", "likes/dislikes" and "suggestions for improvement." These codes and their locations within the interview transcript were placed in a table, with space designated to place in actual excerpts of text for the specific codes: barriers; likes/dislikes; and suggestions for improvement. Along with this table of codes, a second document labeled "Summary" was prepared. This summary contained elements of the original observational field note (i.e., demographic information, initial interviewer assessments of possible barriers to using health information and

Figure 2. Proprotion of participants reporting ever engaging in activity (%)
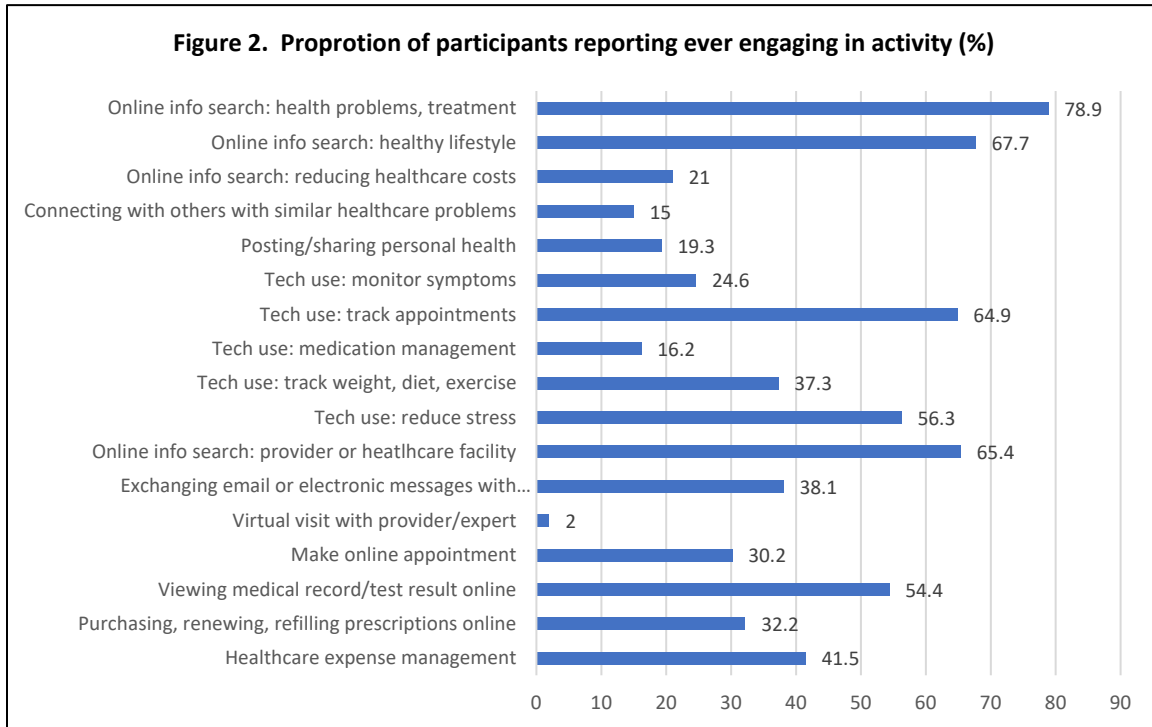
confidence levels of technology, and types of health information and devices found in home) along with a few relevant images of health information types or devices, the initial description of the participant's social context, and any new observations realized during the creation of the SOU.

RESULTS

Participant characteristics: In total, 544 participants completed the primary interview. Table 1 presents participant characteristics. The mean age of participants was 60.1 years (range: 32-88 years). In this sample, 55% of participants identified as AfAm and 72% identified as female. The majority of participants reported less than a college degree and a total annual household income of less than $61,000. Breast cancer was the most common diagnosis, followed by prostate cancer and over half of participants reported completion of treatment 3 and 24 months prior to study enrollment. Racial differences were observed in education and income, with a greater proportion of AfAms in the lower education and income groups.

eHealth activity and racial differences: Ninety-five percent (n=517) of the sample reported ever engaging in at least 1 eHealth activity. Figure 2 shows the proportion of all participants who reported ever engaging in each of the 17 eHealth activities. The most common activities were in the informational domain: searching online for health information, including symptoms, problems, medical treatments, or procedures (78.9%), and searching online for information about health lifestyle, including how to lose weight or control your weight, healthy eating, or how to stop smoking (67.7%). The next most frequently reported activity was in expert care domain: searching online for information about a healthcare provider or medical expert or a hospital or healthcare facilities. (65.4%). This was followed by two activities in the self- care domain: Using technology to keep track of medical appointments (64.9%) and using technology to reduce stress, e.g., apps, games, music (56.3%). The fifth most commonly reported activity was in the transactional domain: looking at one's medical record or test result online (54.4%).

The least common activities were video chatting or visiting (virtual visits) with a healthcare provider or medical expert (2%), connecting with others with similar health concerns, e.g., joining an online discussion forum or support group (15%), and using technology to remind one when to take medications or to manage medications (16.2%).

Racial differences in eHealth activity: Table 2 shows racial differences in report of each activity. Based on chi-square analyses, differences were observed for 10 of the 17 activities. Interestingly, there were two activities for which AfAm engagement was higher than that of Whites: using technology to manage one's medications (AfAm: 17.2%; White: 14.9%) and to reduce stress (AfAm: 57.6%; White 54.6%).However, these differences were not significant.

Table 2. Racial differences in each eHealth activity.			
	AfAm %	**White %**	**p**
Informational			
Online info search: health problems, treatment	73.8	85.1	.001
Online info search: healthy lifestyle	63.9	72.3	.04
Online info search: reducing healthcare costs	17.6	25.2	.03
Communal			
Connecting with others with similar healthcare problems	11.9	19.0	.02
Posting/sharing personal health	16.6	22.7	.07
Self-care/management			
Tech use: monitor symptoms	22.2	27.7	.13
Tech use: track appointments	61.3	69.4	.05
Tech use: medication management	17.2	14.9	.46
Tech use: track weight, diet, exercise	29.1	47.5	.0001
Tech use: reduce stress	57.6	54.6	.47
Expert care			
Online info search: provider or healthcare facility	59.9	72.3	.003
Exchanging email or electronic messages with provider/expert	34.8	42.2	.08
Virtual visit with provider/expert	2.0	2.0	.94
Transactional			
Make appointment online	29.1	31.4	.57
Viewing medical record/test result online	44.4	66.9	.0001
Purchasing, renewing, refilling prescriptions online	24.8	41.3	.0001
Healthcare expense management online	35.4	49.2	.001

Table 3 shows the mean number eHealth activities across the entire sample (6.65; SD=3.67; range: 0-16). Mean total eHealth activities overall were lower among AfAm participants versus Whites, as were the mean number of activities within each domain.

Predictors of eHealth activity: Table 4 presents descriptive statistics on potential determinants or predictors of eHealth activity as outlined in the study's theoretical framework, as well as racial differences across predictors. Results show that AfAm participants reported significantly lower QOL, facilitating conditions, trust in technology, and social influence supporting technology use.

Table 3. Mean number of Health activities total and within each domain.					
			Mean (SD)		p
	Possible range	All	AfAm	White	
eHealth activities, total	0-17	6.65 (3.67)	6.02 (3.71)	7.44 (3.47)	.0001
Informational	0-3	1.67 (.90)	1.55 (.94)	1.83 (.82)	.0004
Communal	0-2	0.34 (.63)	.28 (.59)	.42 (.68)	.02
Self-care/management	0-5	1.99 (1.36)	1.87 (1.40)	2.14 (1.31)	.03
Expert	0-3	1.06 (.80)	.97 (.81)	1.17 (.78)	.004
Transactional	0-4	1.58 (1.35)	1.34 (1.34)	1.89 (1.30)	.0001

Table 5 shows results of bivariate and multivariate analyses examining the association between predictors and total number of eHealth activities. Although AfAm race was associated with fewer eHealth activities compared to Whites in bivariate analyses, AfAm race was no longer associated with total activities in multivariate analyses. Independent predictors of total number of eHealth activities in multivariate analyses were younger age, higher education, higher income, and greater facilitating conditions, perceived usefulness, social influence, and satisfaction with one's physician. AfAm race was also associated with fewer informational activities compared to Whites in bivariate analyses (Table 6). However, race was no longer associated with informational activities in multivariate analyses, with younger age, higher education, and greater facilitating conditions and perceived usefulness emerging as independent predictors. Similarly, for communal activities, AfAm race was associated with these activities in bivariate analyses but that association was no longer significant in multivariate analyses. Independent predictors were younger age and more healthcare barriers (Table 7).

AfAm race was associated with fewer self-care activities compared to Whites in bivariate analyses but was no longer associated with these activities in multivariate analyses, with younger age and perceived usefulness emerging as independent predictors (Table 8). Again, AfAm race was associated with fewer expert care activities compared to Whites in bivariate analyses but was not associated with these activities in multivariate analyses (Table 9). Here, independent predictors of expert

Table 4. Descriptive statistics: determinants of eHealth activity.					
		All	AfAm	White	
		% (n)			p
Healthcare access					
≥ 1 barrier		14.4 (66)	14.9 (38)	13.7 (28)	n.s.
	Reliability (α)	Mean (SD)			
Clinical factors					
Cancer-specific QOL	.92	86.9 (16.49)	85.0 (17.3)	89.9 (14.0)	.0004
Technology acceptance					
Facilitating conditions	.64	4.66 (.63)	4.59 (.73)	4.76 (.46)	.002
Ease of use	.83	4.29 (.80)	4.27 (.89)	4.32 (.67)	n.s.
Usefulness	.91	3.68 (1.24)	3.66 (1.28)	3.72 (1.19)	n.s.
Trust in technology	.81	3.14 (.88)	3.07 (.87)	3.22 (.88)	.04
Social influence	.76	3.87 (1.07)	3.74 (1.45)	4.04 (.94)	.001
Healthcare experiences					
Patient-centeredness	.87	3.74 (.48)	3.74 (.48)	3.75 (.47)	n.s.
Satisfaction with physician	.93	4.32 (.79)	4.24 (.84)	4.42 (.71)	.008
Medical mistrust	.87	1.42 (.72)	1.59(.82)	1.20 (.51)	.0001

care activities were younger age, higher education, and greater facilitating conditions, perceived ease of use, perceived usefulness, and social influence. Finally, AfAm race was associated with fewer transactional activities compared to Whites in bivariate analyses but this association was no longer significant in multivariate analyses (Table 10). Independent predictors of transactional activities were younger age, higher income, and greater facilitating conditions, perceived ease of use, perceived usefulness, and social influence.

Table 5. Determinants of total eHealth activities: bivariate and multivariate analyses.		Bivariate		Multivariate	
		Beta	p	Beta	p
Demographics					
Age		-0.100	.0001	-0.066	.0001
Race (ref: White)					
	AfAm	-1.421	.0001	-0.519	.05
Socioeconomic status					
Education (ref: ≥ college degree)	High school degree or less	-2.699	.0001	-1.454	.001
	Some college or associate's degree	-1.191	.0001	-0.404	n.s.
Income (ref : ≥ $61K)	30K or less	-3.312	.0001	-1.328	.003
	31K - 60K	-1.543	.0001	-0.134	n.s.
Healthcare access					
Barriers (ref: **0**)	≥ 1	-0.187	n.s.	0.154	n.s.
Clinical factors					
Cancer-specific QOL		0.008	n.s.	-0.021	n.s.
Technology acceptance					
Facilitating conditions		2.389	.0001	1.045	.0009
Perceived ease of use		1.450	.0001	-0.240	n.s.
Perceived usefulness		1.317	.0001	0.681	.0001
Trust in technology		1.177	.0001	0.292	n.s.
Social influence		1.422	.0001	0.424	.01
Healthcare experiences					
Patient-centeredness		0.924	.005	-0.225	n.s.
Satisfaction with physician		0.719	.0003	0.556	.03
Medical mistrust		-0.285	n.s.	0.055	n.s.

Table 6. Determinants of informational activities: bivariate and multivariate analyses.		Bivariate		Multivariate	
		Beta	p	Beta	p
Demographics					
Age		-0.018	.0001	-.009	.03
Race (ref: White)	AfAm	-0.273	.0004	-.133	n.s.
Socioeconomic status					
Education (ref: ≥ college degree)					
	High school degree or less	-0.504	.0001	-.331	.006
	Some college or associate's degree	-0.168	n.s.	-.067	n.s.
Income (ref : ≥ $61K)	30K or less	-0.594	.0001	-.210	n.s.
	31K - 60K	-0.198	.04	0.069	n.s.
Healthcare access					
Barriers (ref: 0)	≥ 1	.0427	n.s.	0.013	n.s.
Clinical factors					
Cancer-specific QOL		-0.001	n.s.	-.007	.02
Technology acceptance					
Facilitating conditions		0.460	.0001	0.206	.02
Perceived ease of use		0.262	.0001	-.0329	n.s.
Perceived usefulness		0.222	.0001	0.094	.02
Trust in technology		0.202	.0001	0.021	n.s.
Social influence		0.249	.0001	0.068	n.s.
Healthcare experiences					
Patient-centeredness		0.268	.0008	0.129	n.s.
Satisfaction with physician		0.146	.003	0.107	n.s.
Medical mistrust		0.021	n.s.	0.072	n.s.

Table 7. Determinants of communal activities: bivariate and multivariate analyses.		Bivariate		Multivariate	
		Beta	p	Beta	p
Demographics					
Age		-0.016	.0001	.015	.0001
Race (ref: White)					
	AfAm	-.132	.02	-.114	n.s.
Socioeconomic status					
Education (ref: ≥ college degree)					
	High school degree or less	-.0945	n.s.	-.067	n.s.
	Some college or associate's degree	-.0191	n.s.	0.028	n.s.
Income (ref : ≥ $61K)	30K or less	-.159	.02	0.067	n.s.
	31K - 60K	-.101	n.s.	0.116	n.s.
Healthcare access					
Barriers (ref: 0)	≥ 1	0.174	.03	0.199	.04
Clinical factors					
Cancer-specific QOL		-.004	.007	-.0009	n.s.
Technology acceptance					
Facilitating conditions		0.165	.0001	0.075	n.s.
Perceived ease of use		0.134	.0001	-.014	n.s.
Perceived usefulness		0.105	.0001	0.024	n.s.
Trust in technology		0.088	.004	0.042	n.s.
Social influence		0.110	.0001	0.038	n.s.
Healthcare experiences					n.s.
Patient-centeredness		0.088	n.s.	0.041	n.s.
Satisfaction with physician		0.088	.01	0.045	n.s.
Medical mistrust		-.056	n.s.	-.084	n.s.

Table 8. Determinants of self-care activities: bivariate and multivariate analyses.		Bivariate		Multivariate	
		Beta	p	Beta	p
Demographics					
Age		-0.041	.0001	-0.028	.0001
Race (ref: AfAm)	White	-0.266	.02	-0.123	n.s.
Socioeconomic status					
Education (ref: ≥ college degree)	High school degree or less	-0.756	.0001	-0.412	.03
	Some college or associate's degree	-0.501	.0002	-0.267	n.s.
Income (ref : ≥ $61K)	30K or less	-0.911	.0001	-0.348	n.s.
	31K - 60K	-0.536	.0004	-0.164	n.s.
Healthcare access					
Barriers (ref: 0)	≥ 1	-0.136	n.s.	-0.313	n.s.
Clinical factors					
Cancer-specific QOL		0.0006	n.s.	-0.008	n.s.
Technology acceptance					
Facilitating conditions		0.638	.0001	0.160	n.s.
Perceived ease of use		0.466	.0001	0.015	n.s.
Perceived usefulness		0.439	.0001	0.265	.0001
Trust in technology		0.406	.0001	0.108	n.s.
Social influence		0.411	.0001	0.073	n.s.
Healthcare experiences					
Patient-centeredness		0.353	.004	-0.005	n.s.
Satisfaction with physician		0.209	.005	0.162	n.s.
Medical mistrust		0.030	n.s.	0.142	n.s.

Table 9. Determinants of expert care activities: bivariate and multivariate analyses.

		Bivariate		Multivariate	
		Beta	p	Beta	p
Demographics					
Age		-0.016	.0001	-0.013	.0006
Race (ref: White)	AfAm	-0.198	.0004	-0.013	n.s.
Socioeconomic status					
Education (ref: ≥ college degree)	High school degree or less	-0.582	.0001	-0.454	.0001
	Some college or associate's degree	-0.262	.0007	-0.210	.02
Income (ref : ≥ $61K)	30K or less	-0.521	.0001	-0.192	n.s.
	31K - 60K	-0.331	.0001	-0.063	n.s.
Healthcare access					
Barriers (ref: 0)	≥ 1	0.032	n.s.	0.165	n.s.
Clinical factors					
Cancer-specific QOL		0.002	n.s.	-0.002	n.s.
Technology acceptance					
Facilitating conditions		0.386	.0001	0.215	.004
Perceived ease of use		0.204	.0001	-0.129	.03
Perceived usefulness		0.204	.0001	0.107	.004
Trust of technology		0.179	.0001	0.045	n.s.
Social influence		0.220	.0001	0.091	.03
Healthcare experiences					
Patient-centeredness		0.029	n.s.	-0.142	n.s.
Satisfaction with physician		0.084	n.s.	0.093	n.s.
Medical mistrust		-0.027	n.s.	-0.068	n.s.

Table 10. Determinants of total transactional activities: bivariate and multivariate analyses.

		Bivariate		Multivariate	
		Beta	p	Beta	p
Demographics					
Age		-0.008	n.s.	0.0006	n.s.
Race (ref: White)					
	AfAm	-0.550	.0001	-0.134	n.s.
Socioeconomic status					
Education (ref: ≥ college degree)	High school degree or less	-0.761	.0001	-0.188	n.s.
	Some college or associate's degree	-0.240	n.s.	0.111	n.s.
Income (ref : ≥ $61K)	30K or less	-1.125	.0001	-0.643	.0004
	31K - 60K	-0.375	.009	-0.093	n.s.
Healthcare access					
Barriers (ref: 0)	≥ 1	-0.300	n.s.	0.089	n.s.
Clinical factors					
Cancer-specific QOL		0.012	.0007	-0.002	n.s.
Technology acceptance					
Facilitating conditions		0.739	.0001	0.387	.003
Perceived ease of use		0.382	.0001	-0.079	n.s.
Perceived usefulness		0.345	.0001	0.190	.003
Trust of technology		0.300	.0001	0.074	n.s.
Social influence		0.429	.0001	0.152	.03
Healthcare experiences					
Patient-centeredness		0.184	n.s.	-0.248	n.s.
Satisfaction with physician		0.191	.009	0.148	n.s.
Medical mistrust		-0.254	.002	-0.157	n.s.

QUAL strand of the eHAA: The qualitative strand within the eHAA revealed more in-depth information regarding participants' experiences with eHealth activities. Here, examples are provided with the leading three eHeatlh activities as well as the least common activities.

Searching online for information on or about health was the most frequently reported eHealth activity (444/544) (# of transcripts containing a description of engaging with activity/ # of total eHealth activity transcripts). Goals most reported for this activity include finding information regarding treatments, followed by disease information with an emphasis on finding information related to disease progression and survival. Of these participants, 45% reported problems engaging in this activity. The most cited challenges reported with this activity were mistrusting information, followed by difficulty completing the activity, and being overwhelmed by too much information. Recommendations from participants for making this task easier in the future included increased ease and convenience followed by use of key words. Searching online for information about health lifestyle (358/544) was the second most frequently reported activity. Goals most reported for this activity were first to improve health, followed by information on how to deal with side effects of treatment, and cancer prevention. Of these, 38% reported problems, the most common of which were mistrust of information followed by being overwhelmed by too much information. Recommendations included increased ease and convenience and attention to layout. The third most reported activity was use of technology to keep track of medical appointments (349/544). The most frequently reported goals were management of information, with an emphasis on memory and recall support. Of these, 34% reported challenges. The main challenge reported here was participants' lack of ability or knowledge necessary to perform the activity.

The least reported activity was virtual visits with healthcare provider of medical expert (11/544). The majority of those who had done so reported no challenges and recommendations were related to greater ease and convenience. The second least reported activity was connecting with others who might have similar health concerns (77/544). The most reported goals were by far social support followed by finding information related to side effects and treatments. Of these, 58% of participants reported challenges, including finding the activity to be unhelpful and too time-consuming. Recommendations were related to greater ease and convenience. The third least reported activity was use of technology for medication management (87/544). The most frequently reported goals were obtaining help with remembering to take medications and getting information about medications. Fifty-five percent of participants reported challenges and recommendations were related to greater ease and convenience.

Overall, the top three goals coded across all activities were increasing information and knowledge, specifically treatment information; management of health information, with "help remembering" and ease/convenience reported as specific management needs; and improving one's health in general. The most reported challenges across all activities were difficulty in understanding or using information found; mistrusting information found; and finding too much information making it difficult to manage and process information. The most reported recommendation across all activities was the need for ease and convenience, including use of key words, understandable language, and intuitive layouts.

Table 11. Ethnographic interview participants (N=68).				
	Breast % (n)	**Prostate % (n)**	**CRC/Male % (n)**	**CRC/Female % (n)**
AfAm	31 (21)	15 (10)	6 (4)	1 (1)
White	19 (13)	19 (13)	3 (2)	6 (4)

Personal health information management (PHIM): A total of 68 interview visits were conducted and characteristics of these participants are in Table 11. One interview was conducted at a participant's place of work with the rest of the interviews taking place in individuals' homes. Current preliminary analyses are based on a subsample of 50 coded ethnographic interviews within Atlas Ti. Using the analytic tools within Atlas Ti, the frequency of various codes were examined. Code rankings were determined by assigning a 1 count to each document/interview having at least 1 use of the code of interest. Table 12 shows "tech types" by race. The code "tech type" type" is defined as "a type of technology used to collect, manage, store, share or retrieve health information.

Additionally, 13 types of survivor goals/concerns/needs (termed "GCNs") were identified in the interview data. Table 13 presents the rankings of the GCNs identified in all 50 interviews, with need for follow-up care ranking first and concerns about aging ranking last. These quantitative frequency numbers and rankings and the gathering of coded excerpts via querying provide direction for next steps in the analysis, including identifying what survivors use to deal with goals concerns and needs, what types of health information are sought, which technologies are most helpful or least helpful, and how these strategies may vary by group.

Development of an eHealth tool for cancer survivors. As proposed, data from the primary interview and ethnographic interview were used to develop a prototype of a cross-platform software application, accessible across devices, to facilitate cancer survivors' access to a wide range of digital cancer survivorship resources. Study investigators worked closely with CrossComm (https://www.crosscomm.com/), minority-owned software development firm. This collaboration resulted in the creation of Cancer App Finder, a portal to support the customized aggregation digital resources based on cancer type and informational needs. Cancer App Finder is a digital strategy to support individuals diagnosed with cancer and their caregivers through a curated database of existing mobile and web-based apps intended to address cancer-related needs. In response to study participants' experiences, the app was developed to help users navigate, reduce, and manage the overwhelming amount of cancer-related information available online by aggregating cancer apps in within one tool, making it easier to locate such apps. Furthermore, the apps are searchable by rating, cancer type, purpose, cost, platform, and evidence-based content. The study team has also created tools to obtain expert ratings of each app from oncologists and others who provide oncology care within the PI's cancer center. Usability testing will be completed in 2021. Figure 3 presents several screens from the app, including the login page, the component of the user profile that allows one to choose areas of interest, app categories that can be browsed, and an example of the results following the selection of a category.

Figure 3 displays the filter variables for the app's internal search results, which were based on primary interview and ethnographic interview data. These filters allow the user to conduct a search based on the following criteria:

- Purpose: General cancer education/information; treatment-specific information; cancer risk, detection, and recurrence; healthcare management (e.g., tracking appointments, communicating with healthcare providers, etc.); symptom tracking/management; community/social support; spirituality/meaning in life; advocacy/fundraising;
- Cancer type: Lung, breast, prostate, colon/rectum, ovarian, cervical, kidney, pancreatic, liver, leukemia, non-Hodgkin's lymphoma;
- Inclusion of evidence based information or recommendations or indication that data is available supporting the benefits of app use (evidence-based, non-evidence-based);
- Platform (Android, iOS, Web);
- Cost (Free, paid);
- Inclusion of privacy policy;
- Developer type (commercial, not-for-profit, academic, hospital-based).

Table 12. Tech types by race, ranked.

	AfAm	White
1	Internet search	Personal calendar
2	Talking to others	Patient portal
3	Patient portal	Internet search
4	Personal calendar	Email
5	Email	Books
6	Social media	Talking to others

Table 13. Rankings of survivor goals/concerns/needs (GCNs).

|	1CT TOTALS	rank%	rank#
IND GCN: follow-up	47	94	1
IND GCN: new health con	37	74	2
IND GCN: healthy	36	72	3
IND GCN: stay informed	31	62	4
IND GCN: fear of return	28	56	5
IND GCN: new emot	27	54	7
IND GCN: qol	27	54	6
IND GCN: relationships	22	44	8
IND GCN: recovery	20	40	9
IND GCN: work/money	18	36	10
IND GCN: qoc	15	30	11
IND GCN: access to care	11	22	12
IND GCN: aging	7	14	13

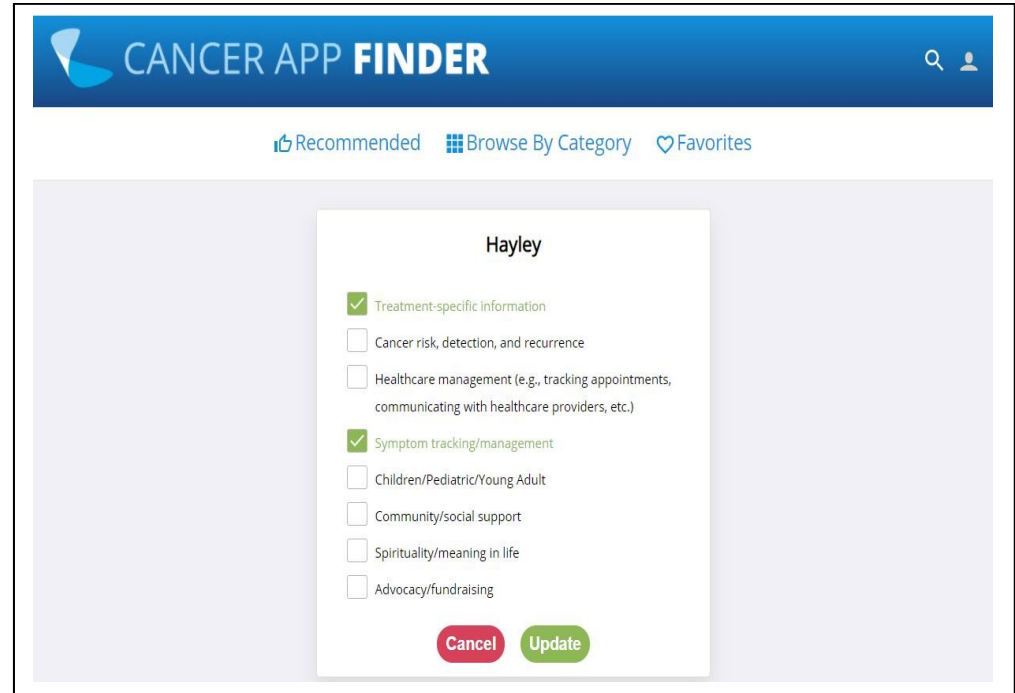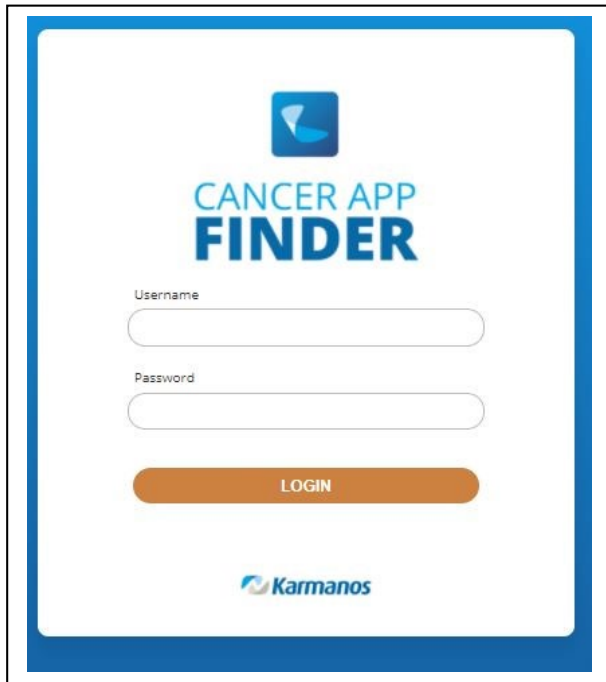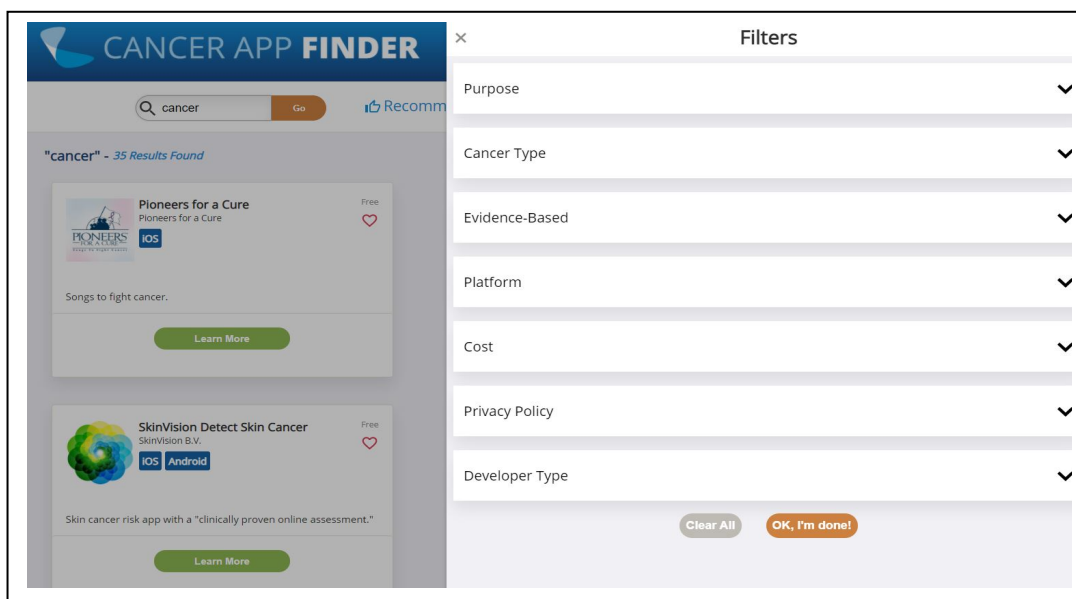**Figure 2. Screenshots from Cancer App Finder.**
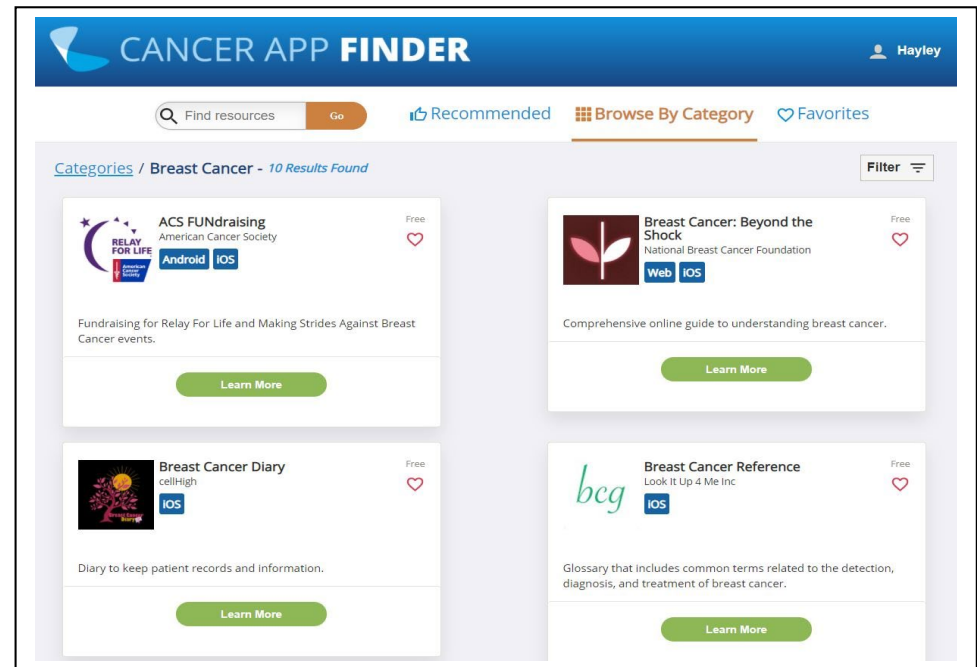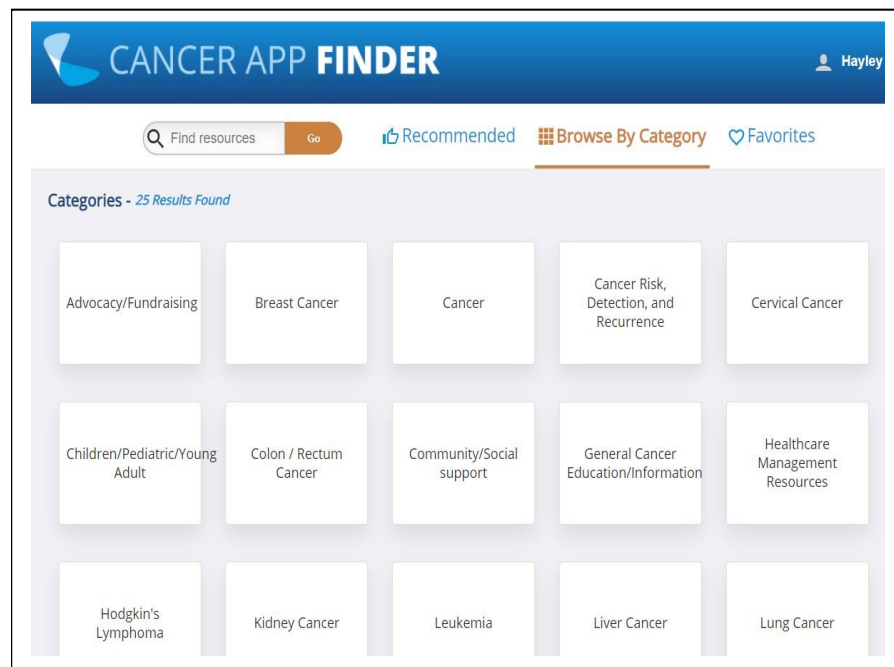
Figure 4. Search filters within Cancer App Finder.

Another feature that the study team and app developers were prepared to add was expert recommendations: reviews of these apps by oncology specialists with Karmanos Cancer Institute and clinic network. The team created an app review checklist that allowed these specialists to evaluate app quality, thereby providing another metric supporting or countering the app's usefulness and trustworthiness.

Additional findings on apps, wearables, and social media: There were additional areas of assessment relevant to the hypotheses. Here, we discuss preliminary results related to smartphone apps, wearable technology, and social media. In this sample, 41.1% reported having an app on their smartphone to manage or track health. There were no racial differences in report of having such an app. Participants were also asked if they used wearable technology, defined as, "…devices you wear on your body that store your information digitally or wirelessly transmit information through the internet. Some examples include Smartwatches, Fitbits or activity monitoring devices; sleep monitors, heart rate, glucometers, blood pressure monitors." In this sample, 21.6% reported using wearable technology with greater use among White participants (p<.0002). Finally, participants were asked if they used one of several social media sites at least occasionally. Among participants, 70.2% reported using Facebook (AfAm: 66.2%; White: 75.2%); 10.6% used Twitter (AfAm: 8.4%; White: 13.5%); 67% used YouTube (AfAm: 64.2%; White: 70.6%); 22.2% used Instagram (AfAm: 20.1%; White 24.8%), and 31% used Pinterest (AFAm: 22.1%; White: 43.2%). Results of chi-square analyses showed racial differences in use of Facebook (p<.02) and Pinterest (p<.0001), with a greater proportion of white survivors using both.

DISCUSSION

The study reported here investigated eHealth activity among diverse cancer survivors. Based on responses to quantitative items in the eHAA, eHealth activity was moderate across the total sample, with participants reporting 6-7 activities, on average. The most frequently reported activities were in the informational domain, specifically online search for health information and about healthy lifestyle, while the least frequently reported activities were virtual healthcare visits and connecting socially online with other with similar health concerns. Qualitative eHAA data showed that, across all activities, the most common goals were related to obtaining general health information and treatment information, as well as management of health information. The most reported challenges across all activities were

difficulty in understanding or using information found, finding trustworthy information, and being overwhelmed by too much information during online searches. The most reported recommendation from survivors across all activities was the implementation of approaches to increase ease and convenience in technology use, including use of key words, understandable language, and intuitive layouts.

These findings provide some guidance for future work on eHealth and cancer survivorship seeking to optimize survivors' experience of eHealth activities. Consistent with user-centered design, an approach that incorporates specific user group needs and places end-users at the center of the development process so that tools are of practical value to users [36] [37], data suggest that survivor-centered design should focus on helping survivors manage the vast amounts of information accessible online and reduce it to the material that is most relevant and credible. Management of one's own clinical interactions and clinical data was also prioritized by survivors. Cancer survivors in this study reported wanting management strategies that require minimal effort and instruction. Ethnographic data provides additional insight by offering specific targets for these efforts, such as general internet search, patient portals, and calendars. These data also provide future directions for the integration of "tech types" to support such management. For example, the leading tech types for AfAm cancer survivors were internet search and talking to others. Integration of these tech types might include the availability of a cancer information specialist or eHealth navigator whom one can contact and consult directly for education and guidance on how to conduct effective internet searches by helping survivors clarify their questions and needs, providing appropriate key words, and sharing pertinent websites.

In terms of eHealth use across race, study hypotheses were not supported. AfAm survivors did not report greater total eHealth activity or greater activity in any eHealth domain compared to Whites. Significant racial differences were observed such that the mean number of activities reported in total and within each domain was lower among AfAms. AfAm engagement was only greater for two activities: medication management and stress reduction. In addition to race, other psychological and social-cultural predictors of this activity were examined. Multivariate analyses revealed that race was no longer associated with eHealth activity when adjusting for other variables outlined by the TAM, UTAUT, and SIMC. Across most activities, age, SES, and technology acceptance variables were more strongly associated with self-reported activities than race (Table 14). These findings have implications for targeted interventions to support eHealth use among survivors. For example, a focus on older survivors is strongly warranted given that younger age was consistently associated with greater eHealth activity. Education and income also emerge as variables that can be used to identify additional survivors who may benefit from eHealth but are less likely to participate in these activities, particularly among AfAms. Third, interventions intended to improve technology acceptance, especially facilitating conditions and perceptions of usefulness, may be key in increasing eHealth use and decreasing racial differences in these activities. For example, interventions developed to increase digital skills and literacy among survivors and strategies to increase awareness of both proven and potential benefits of health-related technology use to address cancer survivor needs would be aligned with these determinants of eHealth activity.

Table 14. Independent predictors of eHealth activities based on multivariate analyses.									
	Age	Education	Income	Access - barriers	Facilitating Conditions	Ease	Usefulness	Social Influence	Satisfaction
Total	x	x	x		x		x	x	x
Informational	x	x			x		x		
Communal	x			x					
Self-care	x						x		
Expert care	x	x			x	x	x	x	
Transactional	x		x		x	x	x	x	

One notable exception related to determinants of eHealth activity is within the communal domain, in which the only variable other than age that is associated with amount of activity is healthcare access and report of one or more barriers to care. This finding is more consistent with original hypotheses proposing that eHealth activity is partially

driven by unmet healthcare need. Future analyses will draw upon eHAA qualitative data to better understand the nature of support obtained through social connections online (e.g., information/resource sharing, social/emotional support, etc.).

As proposed, the primary and ethnographic interview data was used to inform the development of Cancer App Finder, a curated database of existing mobile and web-based apps intended to address cancer-related needs. Based on the Sketch to Design Continuum outlined by Lepore [53], Cancer App Finder currently represents a medium-fidelity prototype that includes meaningful content and allows interactivity. However, the study failed to test and refine the user experience among cancer survivors as proposed. The resources required to both develop the prototype and conduct usability testing were greater than anticipated, including staff to responsible for liaising with the software development partner, building and maintaining a database of cancer-related apps, and obtaining expert reviews of the apps in the database. The PI will continue and complete usability testing through internal institutional funding already available.

List of Publications and Products

Charbonneau, D., Hightower, S., Katz, A., Senft, N., Eaton, T., Heath, E., Zhang, K., Beebe-Dimmer, J., & **Thompson, H.S.** (2020). Smartphone Apps for Cancer: A Content Analysis of the Digital Health Marketplace. Digital Health, 6, 1-7.

Senft, N., Abrams, J., Katz, A., Barnes, C., Charbonneau, D.H., Beebe-Dimmer, J.L., Zhang, K., Eaton, T., Heath, E., & **Thompson, H.S.** (2020). eHealth Activity among African American and White Cancer Survivors: A New Application of Theory. Health Communication, 35 (3), 350-355.

Thompson H.S., Senft, N., Katz A, Charbonneau, D., Abrams, J., Heath, E. (2018) Abstract: Health-related quality of life as a determinant of eHealth actvity frequency among cancer survivors. Annals of Behavioral Medicine, 52 (Supplement 1), S1-S838.

Thompson, H.S., Senft, N., Katz, A., Eaton, T., Charbonneau, D.. Barnes, C., Beebe-Dimmer, J., Zhang, K., Abrams, J., Heath, E. (2017). Abstract: The eHealth Activity Assessment: Preliminary Findings and Implications for Cancer Survivorship and User-Centered Design. Annals of Behavioral Medicine, 51 (Supplement 1), s1–s2867.

Thompson H.S., Katz A, Barnes C, Smith M, Eaton T. (2016). Abstract A19: A mixed methods approach to assessing ehealth activity among African American cancer survivors. Cancer Epidemiology, Biomarkers & Prevention, 25 (3 Supplement), A19.

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