ORIGINAL ARTICLE

Increasing exposure to complementary and alternative medicine treatment options through the design of a social media tool

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ABSTRACT

The current study outlines the creation of an online community designed to connect patients to providers of Complementary and Alternative Medicine (CAM) and western biomedicine. The purpose of the site was to create a forum for patients and healthcare providers to share information and social support regarding eight popular CAM treatments. First, we created a prototype and pilot tested it through a usability analysis. Second, we conducted semi-structured interviews with 12 key stakeholders from the CAM, biomedicine, and patient populations. Third, we conducted a content analysis of the discussion forums to examine common posting behaviour. We found that CAM providers were the most active contributors to the forums. This project provides proof of concept for using an online community platform to connect patients and CAM providers. Future work should attempt to engage Western medicine providers while studying techniques and features that best engage users.

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1. Introduction

Many individuals with complex health issues are reaching beyond standard Western biomedical treatments and into the realm of complementary and alternative medicine (CAM). CAM practices and products are currently not considered part of conventional medicine due to insufficient proof of their safety and effectiveness (Barnes, Bloom, & Nahin, 2008). Yet, their use in the United States in the last couple of decades has been constantly growing (Barnes, Powell-Griner, McFann, & Nahin, 2004; DiGianni, Garber, & Winer, 2002; Su & Li, 2011). CAM incorporates a wide range of practices varying from alternative medical systems to natural product-based therapies, natural energy therapies, manipulation and body-based methods, and mind-body interventions (Wieland, Manheimer, & Berman, 2011). This variety allows individuals to select products or practices that fit them best and provide the most effective results for their particular circumstance. Furthermore, many consumers turn to the Internet and particularly social media for information about their specific health condition or for information regarding potential treatment options (Tang & Yang, 2012).

The present paper focuses on patient and provider engagement with a web-based platform that is an online community accessed via mobile device, personal computer, or any Internet compatible device. The

site was designed as an opportunity for patients and healthcare professionals to gain knowledge about CAM, build community, and facilitate communication among a diverse group of users. These goals are enacted through the following means: increasing awareness of treatment options, sharing stories and social support, and increasing opportunities for patient-provider as well as provider-provider communication. Individuals create a profile, and identify themselves as a general user, a physician, or a CAM practitioner. Once a profile has been created, individuals can then sign in to watch videos about common CAM therapies (acupuncture, chiropractic, herbal remedies, relaxation, vitamins, and yoga), share their experiences with specific treatment modalities, discuss health challenges, or ask questions of the community.

2. Context and background

2.1. CAM definition

Many therapies, more than 100, fall under the umbrella term, CAM. The Office of Alternative Medicine (OAM) expert panel at the Conference on CAM Research Methodology arrived at the widely accepted theoretical definition of CAM (Wieland et al., 2011, p. 4):

Complementary and alternative medicine (CAM) is a broad domain of healing resources that encompasses

all health systems, modalities, and practices and their accompanying theories and beliefs, other than those intrinsic to the politically dominant health system of a particular society or culture in a given historical period. (Institute of Medicine, 2005)

This broad definition gives a general overview of the domain and presents the various aspects of CAM.

2.2. Online communities in the healthcare context

The terms “online community” and “social network” are often conflated; however, the primary difference is that an online community provides content that is visible to everyone on the site, while a social network requires users to make connections or request access to other users before seeing their information (Hsu & Lu, 2007). Online communities and social media are increasingly being utilised in the healthcare field for their ability to provide users with a platform to self-generate knowledge (Terry, 2009). There have been numerous studies investigating how these new outlets affect healthcare outcomes (Hawn, 2009) and reshape patient, physician, and organisational perspectives (Courtney, 2013). For the purpose of the present paper, we use the term “social media” as our site had components of an online community (everyone had access to discussion forums) as well as the option to add other users to their social network.

2.2.1. Health 2.0

A 2010 survey indicated that over 60% of individuals have used the Internet to search for health-related information (Domingo Aladrén, 2010). This increased reliance on online sources has led to what is being called Health 2.0. “Health 2.0 leverages social software to promote collaboration among patients, caregivers, medical professionals, and other health stakeholders” (Sarasohn-Kahn, 2008).

2.2.2. Patients

A new patient identity is emerging in the wake of the health 2.0 movement, the e-patient, defined as: “individuals who are equipped, enabled, empowered, and engaged in their own healthcare needs” (Ferguson, 2007). However, the phenomenon of the engaged patient who finds health information online may also come with some potential challenges, including incomplete or inaccurate information and reluctance to disclose findings of online research to one’s provider (Gualtieri, 2009). Patient empowerment is central to our motivation to build the mobile CAM (mCAM) platform. A secondary component of our mCAM platform is creating a forum for social support to be enacted as social support has been linked to positive health outcomes for a number of health conditions, including: breast cancer, heart disease, and other

lifestyle diseases (Rubenstein, 2013). The contribution of our platform, however, is that rather than focusing on a particular disease or disorder, we focus on the CAM modalities themselves, as the potential utility of CAM treatments may span multiple health conditions in addition to prevention and improvements in overall quality of life.

2.2.3. Providers

Providers and healthcare institutions are also utilising the World Wide Web as a means to disseminate information to patients. Indeed, over 900 hospitals have an active social media account (Lewis, 2011). Further, a paediatrician highlighted the limitations of a traditional 15-min interaction and the opportunities provided by online forums such as blogging and social media to reach a broader audience and give more detailed health information (Lewis, 2011).

Based on these studies of the growing use of online communities and social media for healthcare, we expect to see similar trends related to CAM. However, our research indicated a potential gap in this area and as such, this is one of our motivations to further pursue the problem.

2.3. Mobile technology and CAM

Kumar et al. (2013) define mobile technology as “wireless devices and sensors (including mobile phones) that are intended to be worn, carried, or accessed by the person during normal daily activities” (p. 228). They outline mHealth as the application of these technologies either by consumers or providers, for monitoring health status or improving health outcomes, including wireless diagnostic and clinical decision support. Although there are several mCAM applications available in the Apple and Android App Stores, scientific research has been slowed to develop in this domain. In fact, one of the few studies on mCAM is on developing and evaluating an Android application called Tension Tamer (Gregoski, Vertegel, Shaporev, & Treiber, 2013), which is used to measure heart rate and adherence to breathing awareness meditation. Another study discussed iMINDr – an application for iOS – whose objective was to develop an adherence measurement system that may help mind–body researchers examine how home practice adherence may affect outcomes in future clinical trials (Wahbeh, Zwickey, & Oken, 2011). Although these two studies demonstrated the potential of mobile applications for CAM, neither application addresses the problem of patient–physician communication, and overall the domain is still relatively unexplored due to its recent development.

In addition to mobile applications, telemedicine is also used to improve efforts in healthcare.

Telemedicine allows physicians to provide services to patients who are in remote locations using advanced telecommunication tools. Tulu, Chatterjee, and Maheshwari (2007) developed a taxonomy to systematically classify various telemedicine efforts. Further, they found that interactive video is a preferred modality by most users. This demonstrates the importance of including interactive tools and videos when developing an mCAM application, as this is a highly desirable method for disseminating information, particularly to segments of the population with low literacy rates (Adams, 2010). Mobile applications are a potential solution to the lack of CAM disclosure among patients and can provide a more effective and accessible communication channel. Development of such an application is necessary but it also needs to be rigorously evaluated to make sure it provides value to users and that it meets the stated goals and objectives.

3. Theoretical framework

We have developed a theoretical framework to explain the CAM healing process used by patients (see Figure 1). We used the grounded theory methodology (Glaser, 2002) in the social sciences to derive this theory model. We met with a group of practitioners, physicians, and researchers and brainstormed how individuals might discover and subsequently explore CAM. After talking to CAM users, it became apparent that it is the CAM users who will share their knowledge from CAM sites to their attending doctors and hence, some form of integration between CAM treatments and Western medicine is possible. We also built upon constructs from medium theory (Deibert, 1997; Innis, 1972; McLuhan, 1964), social capital theory (Siriani &

Friedland, 1995), and theory of trust (Lewis, 2007; Putnam, 2001).

The development and mass use of the Internet has made a significant impact on healthcare and is one example of how medium theory (Deibert, 1997; Innis, 1972; McLuhan, 1964) has been applied in practice. The Internet provides a massive expert database, a repository for more than a billion up-to-date articles; it is a global broker of information, a way for individuals with special concerns to find each other anywhere; and it is a global collective memory, allowing people to contribute, store, and annotate comments (Radin, 2006). The discovery and engagement constructs in Figure 1 were derived using the medium theory because the medium of the Internet allows users to discover and engage with information about CAM. The mCAM application we suggest offers these features while addressing the existing communication gap for patients who want to explore various CAM treatments. Furthermore, our mCAM application fills a niche in the online community environment by focusing on complementary and alternative treatment *practices* rather than the typical approach of creating communities around particular health conditions.

The social capital theory builds upon medium theory, as it describes the conditions necessary for people to help each other voluntarily. Social capital theory relies on social cohesion to build trust and cooperation in a society and to engage individuals in reciprocal networks (Siriani & Friedland, 1995). These theories are fundamental to ensure collaboration and trust in the CAM online community. We derived the constructs of evidence and champion from this theory. Evidence can only be built if many people voluntarily share their experiences. Champions are those who are trusted and they care by contributing the most. Trust is of key significance, as patients, physicians, and CAM practitioners need to feel comfortable sharing personal experiences and information, which can ultimately have a positive impact on CAM disclosure. Lewis (2007) describes “deep trust” as “trusting interpersonal relationships built on liking and mutual appreciation between people who have to work toward a mutual goal” (p. 9). It is crucial for the proposed tool to encourage the development of deep trust among users regardless of their background.

Many patients, when diagnosed with chronic diseases or other serious illnesses, turn to CAM, as they are often too traumatised by contact with conventional physicians (Middlebrook, 1997; Radin, 2006). However, patients feel discouraged to share their CAM therapy information with conventional physicians, which increases the communication gap between them and may negatively impact the

Figure 1. Stages of the CAM healing process.

prescribed treatment (Adler & Fosket, 1999; Rausch et al., 2011).

We draw upon concepts and theories from prior literature to understand the CAM healing process. It is represented as a cycle (Figure 1) because it is an ongoing process and each stage provides valuable input for the next one. The five stages we identified are further explained below.

Discovery: In this initial stage, patients who are interested in CAM start considering different sources of information. They evaluate the credibility of the source and decide whether to trust the source or not.

Engagement: At this stage, patients are browsing the application and deciding how to become part of the community, to be more engaged in the CAM discourse, and to take advantage of the benefits of the online community.

Integration: At this next stage, patients are now considering sharing CAM information with their physicians, as they feel more confident and motivated by participating in the online community. Physicians acknowledge some of the benefits of taking an integrative approach to conventional healthcare. They also become more familiar with the struggles of the patients and get a better understanding of their needs to feel more empowered and engaged in the healing process.

Evidence: Due to the extensive use of mCAM and other applications, there is now a critical amount of data which can support physicians' decisions to recommend CAM treatment to their patients. Further, evidence-based medicine is a very popular approach in conventional medicine and a similar approach can be taken for CAM. To achieve this stage, it is important for the mobile application to become viral and reach out to many users.

Champion: In this final stage, patients who have personally experienced a positive effect of CAM provide testimony and become champions of the cause. They engage others and share their experience and knowledge with them. User testimonials are crucially important because they provide an identifiable, even familiar, face for the cause.

Based on this theoretical foundation, we developed the mCAM application. It provides a platform for users to express their opinion and we expect that over time they will go through the five stages of the CAM healing process. We reached out into people who we identified would be potential champions for the cause and help increase the discovery and engagement on the platform. We looked specifically into theories about the use and adoption of CAM so that we can better understand our users' needs and provide them with a supportive environment and useful resources.

4. Research question and propositions

The main research question guiding our study is:

“Can a social media platform be utilized to improve communication on CAM?”

To the best of our knowledge, a social media platform on CAM does not currently exist. Thus, we would like to know whether the one we are proposing can potentially address the issues of CAM disclosure and sharing of information between patients, physicians, and CAM providers. In addition, we would monitor how the proposed artefact can encompass the different stages of the CAM healing process.

Based on the theoretical foundation discussed, three propositions were formed to guide the research work. The main purpose of this application is to serve as a social media platform and connect users, we expect that the tool will be able to bridge the gap between the three main categories of potential users and allow them to communicate about CAM regardless of their background, experience, and skills. Thus, our first proposition is as follows:

P1: The mCAM application will allow for enhanced communication between patients, conventional physicians, and CAM practitioners.

In addition to connecting users of various backgrounds and knowledge, the mCAM application is expected to provide an online environment where CAM discussions will be encouraged and supported. Further, it will lead to increased knowledge sharing among the participants. Therefore, our second proposition is as follows:

P2: The mCAM application will enable CAM discussions and stimulate knowledge sharing.

We expected the mCAM application to be a forum for individuals to ask questions about CAM, state concerns, and post about their experiences with the application. In addition, users may be able to post links with further information for the benefit of other users.

P3: We expect users to display a bias towards positive comments about CAM because their voluntary participation in the online community may indicate a preference for CAM treatments.

We expected a greater incidence of comments of a positive nature because of the likelihood of participants already being somewhat supportive of CAM.

5. Design and build

5.1. Design science approach

The research approach we utilise for this study is based on design science principles suggested by Hevner and Chatterjee (2010). They discuss an

iterative approach to designing, building, and testing artefacts, which consists of the following three cycles: relevance, rigour, and design. We chose this specific methodology as it provides guidelines to address the relevant issues of CAM communication. The fact that this approach successfully combines theory and practice is of great significance to us as it minimises the potential for error in the design and development of the application. Appendix A illustrates the various design and research activities performed throughout the project.

To further describe the Design Science Research (DSR) methodology we implemented, following is an overview of the principles, methods, outcomes, and contributions of our project please refer to [Figure A1](#). Each step of the process is presented through the lens of DSR – from the rigour and relevance of the problem, to the specific actionable items, to the theoretical and practical contributions of our work. Through our study we provide a solid foundation for others to build upon and expand the features of the mCAM social media platform. We outline best practices that are grounded in theory and implement them in an artefact that can solve real-world problems. The mixed methods we use for evaluating the tool help us gather more comprehensive and meaningful feedback for further improving it. The contributions of our work are focused on the lessons learned, the design principles of developing an mCAM tool, and the new theory we developed about the CAM healing process. [Figure 2](#) presents a summary of our work on this project and the various sections of the paper provide additional information of how each of the outcomes was achieved.

5.2. CAM mobile application design

To better design and implement the proposed tool, we elicited the requirements for the mobile application based on best practices established in prior literature and observations on other applications for healthcare, well-being, and health promotion (e.g., Patients Like Me, Microsoft HealthVault, and WebMD). We also consulted with two experts on CAM and as a result, we developed a list of requirements, which went into several iterations. We adopted agile concepts, as they strive to offer flexibility and to respond in a timely manner to the existing opportunities of mCAM (Sull, 2009).

The specific requirements for developing an mCAM platform are related to the different audiences such a tool is targeting. The fact that the proposed application encompasses Western physicians, CAM practitioners, and patients demonstrates the need to differentiate the user experience for these three groups and provide them with the necessary resources related to their specific needs. For instance, a patient may be searching for a CAM practitioner with specific expertise or a Western physician may be looking for CAM practitioners who share their experiences with a therapy. What makes this platform unique is the ability to cater to the needs of all three user groups, while at the same time engaging them in an online community and building trust among them. Some requirements and design objectives that differentiate this platform from any other system are the diverse stakeholders involved in the project as well as the specific functions each of them is looking for (a Western physician or CAM practitioner in the

Figure 2. Overall mCAM research approach and process.

area, advice from another patient with the same diagnosis on the CAM treatment they are having, etc.).

The mobile application can be used by a variety of CAM providers. In the registration form, we provide users with the option to select their category – patient, physician, or CAM practitioner and then there is a text box where the individuals can input information about their CAM interests, skills, knowledge, and experiences. There is no specific format for this field, so the platform can encompass any type of CAM provider or therapies that may appear in the future. Providing this information allows the users to get to know each other better and to learn more about new therapies and approaches to CAM.

Before proceeding to the development phase of the application, we focused on the design process to ensure usability and high quality of the proposed artefact. We followed Norman's (2002) principles for transforming difficult tasks into simpler ones, as these are directly relevant to building user-centred design, are applicable to the evaluation process, and are also consistent with Dix, Finlay, Abowd, and Beale (2004) principles of usability. We used these recommendations to guide us in developing the mock-up objects and screens relevant to each step of the user interaction with the proposed artefact.

The mobile application is designed as a mobile-responsive website and, thus, it is accessible by any device and any browser. We provided users with a simple URL that they only have to click on.

The mobile application was designed using WordPress and was hosted using a third-party provider platform. The open architecture concept was selected because it offers more flexibility and more options for customising the application without necessarily requiring sophisticated programming skills or purchasing expensive software or hardware to build and maintain the application. Further, we installed plug-ins to support the necessary features of the platform outlined in the requirements and engineering process.

We conducted pilot tests with eight subjects (graduate students with a technical background) who evaluated the usability of the mobile application and provided feedback on the features and functionality of the tool. We used their input to make the necessary changes and improve the quality and usability of the app. The following screenshots (Figures 3–7) reveal some of the mCAM features as suggested by prior literature and the test subjects. Those include but are not limited to: user profiles with specific CAM information, relevant videos on various CAM topics, discussion board where users can provide advice and share information with each other, activity wall where each user can see his or her activity on the app,

post statuses, images, and other types of information, and a rating system that allows each user to get star ratings based on the quality of their posts. Thus, the tool can increase deep trust and help build social capital related to CAM.

6. Evaluation

Patients, physicians, and CAM practitioners were recruited to participate in semi-structured interviews regarding the potential utility of the site and any further modifications they would recommend. Individuals from each of the three populations were recruited through word-of-mouth, social network sites, and online forums, as well as at a continuing medical education conference.

The site remained active after the interview phase of the study to allow interested users time to use the site and participate in the discussions. A content analysis of the discussion forums was conducted based on content from active users ($n = 11$) who had created a profile and contributed to the discussions. To uphold user privacy, we did not track whether these active users were also the individuals who were interviewed, although there is likely to be some overlap in the populations.

After 3 months of activity, we took a snapshot of the Google Analytics to view activity that was not captured by content analysis of written material in the discussion forums. For example, people could visit the site just to read what others had written or watch the video clips.

6.1. Usability

To evaluate the technical effectiveness of the mobile application, we conducted usability tests with eight subjects. All subjects were graduate students and had some basic familiarity with smartphones. Each of them used their own device with proprietary software and an Internet connection of their choice. This diversity allowed for the mCAM application to be tested on a much broader range of mobile devices, platforms, and browsers. The usability testing interviews were all conducted in person during the period of April 15–June 17 2015. After each interview, iterations to the mobile application were made to reflect the feedback and suggestions made by respondents and to troubleshoot technical issues, if any. After the interviews, the participants were sent a link to an online survey, which asked them to evaluate the usability of the presented tool. We used the System Usability Scale (SUS).

Following the instructions provided for interpreting the SUS scores, the participants' scores for each question were converted to a new number, added

@corey
active 5 seconds ago

Activity Profile Notifications 0 Messages 0 Friends 0 Groups 0 Forums Settings

Personal Mentions Favorites Friends Groups

Show: — Everything —

What's new, Corey?

Corey Taylor's profile was updated 2 hours, 14 minutes ago

Comment 0 Favorite Delete 0

Corey Taylor changed their profile picture 2 hours, 15 minutes ago

Comment 0 Favorite Delete 0

Corey Taylor became a registered member 2 hours, 21 minutes ago

Comment 0 Favorite Delete 0

@corey
active 1 minute ago

Add Friend Public Message Private Message

Activity Profile Notifications 0 Friends 0 Groups 0 Forums Settings

View Edit Change Profile Photo

Additional Information

Type of user	Physician
Name	Corey Taylor

Profile Details

Gender (optional)	Male
Age (optional)	38
Location (optional)	Los Angeles
Website	drtaylor.org
CAM Interests	Yoga, meditation, vitamins

Figure 3. User profile information.

together, and then multiplied by 2.5 to convert the original scores of 0–40 to 0–100 (see Table 1). Though the scores are 0–100, these are not percentages and should be considered only in terms of their percentile ranking.

In the follow-up online survey, each participant had to state to what extent they agree with the presented statements, using the scale from 1 to 5, where 1 was “Strongly Disagree” and 5 was “Strongly Agree”.

Table 2 below presents the recalculated scores for each participant based on the recommendations for interpreting the SUS provided by Sauro (2011). Based

on the instructions, we performed the following operations:

- For odd numbered items: we subtracted one from the user response.
- For even-numbered items: we subtracted the user responses from 5.
- This scales all values from 0 to 4 (with 4 being the most positive response).
- We added up the converted responses for each user and multiplied that total by 2.5. This converted the range of possible values from 0 to 100 instead of from 0 to 40.

Figure 4. Social platform features – mCAM videos.

The average SUS score of Social Healing is 73.125, which is above average as suggested by literature (68) and demonstrates the utility and usability of the proposed mobile application. It meets the needs of the users and provides them with an easy to use interface, which is intuitive and easy to navigate. The converted scores vary from 55 to 82.5 with a standard deviation of 11.31923. According to the instructions for interpreting the SUS, the results of these usability tests indicate that the mobile application meets all user criteria and can successfully be deployed on the Internet for a wide audience to access it. Although SUS was designed primarily to evaluate software, the results obtained from the usability testing

demonstrate that the scale can be successfully applied to mobile applications as well.

6.2. Semi-structured interviews

Twelve participants took part in semi-structured interviews. Three individuals who completed interviews were identified as patients, six as CAM or Integrative Medicine (IM) practitioners, and three were MDs or Physician's Assistants working within a conventional medical framework. Eight were female and four were males. Seven were White/non-Latino, two were Latino, and two were Asian/Indian. No compensation was received for participation in these interviews. The

About › Forum

Forum	Topics	Posts	Freshness
My Story Share your stories and inspire others	4	17	1 day, 21 hours ago Katalin Lanczi
Acupuncture Have you used acupuncture before? Did it help you and how?	4	9	1 day, 20 hours ago Katalin Lanczi
Ayurveda Ayurveda, is an ancient healing system based in Indian philosophy that means "the science of life." Has anyone tried an Ayurvedic lifestyle plan?	2	10	2 days ago Mia Plachkinova
Biofield therapies Has anyone used Reiki or therapeutic touch? Although Wikipedia calls these practices, "pseudoscience", in fact there is a systematic review of 66 studies that have been done on biofield therapies showing evidence for their effectiveness.	1	2	1 day, 21 hours ago Katalin Lanczi
Chiropractic Have you used a chiropractor before? What was your experience and would you recommend any specialists?	3	8	1 day, 20 hours ago Katalin Lanczi
Herbal Remedies What herbal remedies have you used? Share your experience and advise others.	2	7	1 day, 23 hours ago Katalin Lanczi
Relaxation How do you relax? Share inspirational music and videos and describe your experience.	2	3	1 week, 1 day ago Mia Plachkinova
Vitamins What kind of vitamins do you use? Share your experience with them to help others.	2	8	1 day, 21 hours ago Katalin Lanczi
Yoga What kinds of yoga do you practice? Recommend exercises and provide feedback to others.	3	8	1 day, 23 hours ago Katalin Lanczi
Other For all other types of complementary and alternative medicine	2	6	1 day, 18 hours ago Mia Plachkinova

Figure 5. Social platform features – mCAM discussion board.

discrepancy between the number of interviewees and the number of registered participants on the platform (12 and 11, respectively) comes from the fact that not all interviewees had accounts with the platform and one can simply read the content without necessarily engaging with the community.

An iterative coding process was used to clarify key concepts from the interviews. Topics that were mentioned by just one or two interviewees were not included in the final coding system but may have been included in a notable quotes section if deemed relevant to the project. Further information about specific treatments used by the interviewee was excluded from the analysis. The next section outlines changes that were made to the platform based on these interviews. Twenty codes were identified during preliminary analyses, which were reduced to two main themes by the final analysis: (1) feedback, including comments and suggestions about the platform, and (2) information regarding CAM provider–physician relationships.

6.3. User feedback

During the semi-structured interviews, the participants provided valuable feedback and suggestions for improving the mCAM application. Next, we outline the most important of them.

6.3.1. Functionality

Three of the six CAM providers mentioned that people would want to use the site only if they were able to search for their problem specifically. This same point was made in a different way by two other providers who said that pain would be the main motivation for using the site. Therefore, people should be able to easily find information about their question or condition.

6.3.2. Credibility

To enhance the site's credibility, we added the logo of the university conducting the study to the homepage. In addition, we made this, rather than the discussion

Figure 6. Social platform features – mCAM activity wall.

forums, the landing page so that individuals who were visiting the site for the first time would be able to readily understand the source of the information. To further clarify the purpose for new visitors and to enhance credibility, the following statement of purpose was added:

This is a safe place for patients and providers to learn more about various therapeutic modalities. The platform aims at improving communication between patients, physicians, and practitioners regarding alternative treatments.

The following suggestions were also made:

- (1) Addition of a search function so that individuals can easily find threads related to their disease state or treatment of interest.
Solution: A search function was added. However, the functionality may still need to be improved.

- (2) The font size may be too small.
- (3) Suggestions that the appearance of the site is a bit too monotonous with numerous threads and videos rather than an appealing layout with pertinent information.
Solution: To make the site more aesthetically appealing, the researcher changed from the basic responsive theme, with a blue and white colour scheme, to a format that used more colours and images.
- (4) It came to light throughout the course of the project that the term *alternative medicine* is falling out of favour because of the implication that these treatments are somehow marginalised or not accepted.
Solution: The site tagline was updated from “The platform for complementary and alternative medicine” to “The platform for complementary and integrative medicine” to reflect this ethos.

Figure 7. Social platform features – mCAM rating system.

6.4. Google analytics

We found that there were 4576 discrete visits to the site or sessions; however, this number includes visits from the researchers, so this may be an overestimate of the number of times the site was visited by our target audience. Further, there were 1.85 pages viewed per session meaning that on an average visit (session), our users viewed a little less than two different pages. For example, they viewed the home page and the video page, or the home page and the discussion forums page. Interestingly, our bounce rate was 83.78% meaning that almost 84% of visitors to the site only looked at the first page before leaving the site. The most common reason for such high bounce rate are problems with content or navigation on the platform (Hasan, Morris, & Proberts, 2009). Since this is a brand-new platform and there is not too much content generated by users yet, we believe that once we provide sufficient content, the bounce rate will decrease. In terms of navigation, we can perform A/B testing (Kohavi & Longbotham, 2015) and see which types of content organisation and design would generate lower bounce rates. This is the first social platform of its kind and we anticipate that it will take us a while to adjust the content and design to the diverse needs of the various audiences of the tool.

There was a calculated total of 4097 users, meaning that from March 2015 to November

2015, this many distinct users visited the site. Google calculates this number based on the user's cookies, or stored information about them, so the same person visiting the site on multiple days should be counted as one user. Although this is not an exact calculation, it is likely to be a reasonable estimate. Finally, there were 15 organic searches, meaning that 15 of the visitors came to the site through a search engine. Although this number is small compared to the total number of users, this is higher than expected because we did not do any Search Engine Optimization (SEO). Organic searches contrast with searches that came to the site via an advertisement. We did not post any web advertisements, only handwritten flyers which are harder to track in the online environment.

6.5. Content analysis

The final version of the site contained 10 overall categories to reflect 8 main categories of CAM with an additional category where people could tell their story and an "other" category for discussions about topics that were not reflected in the other areas. Participants could then create a topic within one of these main categories. The posts within a particular topic are referred to here as a "discussion thread".

Table 1. Software usability scale converted scores.

Item No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total Score	Converted SUS Score
SUS Scale	I think that I would like to use this system frequently	I found the system unnecessarily complex	I thought the system was easy to use.	I think that I would need the support of a technical person to be able to use this system.	I found the various functions in this system were well integrated.	I thought there was too much inconsistency in this system.	I would imagine that most people would learn to use this system very quickly.	I found the system very cumbersome to use.	I felt very confident using the system.	I needed to learn a lot of things before I could get going with this system.		
Part. #1	3	2	2	3	1	2	3	1	2	3	22	55
Part. #2	3	4	3	4	2	3	4	3	4	4	34	85
Part. #3	3	4	4	4	3	3	4	2	2	3	32	80
Part. #4	1	3	3	3	1	1	4	3	2	4	25	62.5
Part. #5	1	3	3	3	1	1	4	3	2	4	25	62.5
Part. #6	3	2	3	4	3	3	4	2	4	4	32	80
Part. #7	2	4	3	3	3	4	3	4	3	4	33	82.5
Part. #8	3	3	3	4	3	3	2	3	3	4	31	77.5

A quantitative content analysis was first conducted which involved word counts (as measured by Microsoft Word, 2015–2016) per discussion forum and user to determine the level of engagement of each user and user type (general user, CAM provider, Western Medicine Provider) (Table 2). The discussion forums were then examined using thematic analysis for evidence of the following: self-disclosure, self-promotion, stating an opinion, sharing of a resource (informational support), asking a question, agreement with previous statement, offering emotional support (Table 3). An a priori code system was created to reflect these categories. During the coding process, the categories were further refined to reflect sharing an anecdote about a friend, family member or patient as a subcategory of self-disclosure/personal experience. Agreement with a previous statement and expanding on a previous statement became subcategories of the “response to discussion” theme. Finally, we also examined posts for positive, negative, and neutral valence (Table 4).

There were 23 topics within the discussion forums with 83 total posts by 11 different users. Of these 11 users, 3 identified as male and the rest as female. The word count of each post was also measured ($M_{wc} = 104.08$, $SD = 67.64$)¹. The “My Story” category had the highest word count (2242) and the highest $M_{wc} = 142.53$. Further, 52.2% of the discussions were started by CAM practitioners, while the other 47.8% were started by someone who identified as a general user or patient. The two creators of the site started 43.5% of the discussion, while other users of the site created the remaining 56.5% of the discussion topics. The first post appeared on the forum on April 24 2015 and the final post was created on June 23 2015. The breakdown of posts within each category is displayed in Table 2. The first line is the total category and each subsequent line is the breakdown for each topic.

A priori codes were applied to the text of the posts. We were particularly looking for evidence of informational or social support, as these two types of information sharing in online communities have been linked to more active management of illness and positive health outcomes (Rubenstein, 2013). “Agreement with or expanding upon previous statement” was the most frequently applied code, followed by “stating an opinion” and “personal experience”. Emotional and informational support were not as frequently used as expected, although informational support (sharing a resource) occurred much more frequently than incidences of social support 11 versus 1 times. Further, there were surprisingly few incidences of self-promotion (2) indicating that the users, even those who were trying to build a practice used the site more for social interaction and discussion than marketing per se. The complete breakdown of coded excerpts is available in Table 3.

Table 2. Content analysis results.

Category	Topic	Post by Km	Post by CP	Post by GU	Total Posts	M _{wc}	SD
MY STORY	3 Pain reduction without drugs or surgery Practising pharmacist providing guidance to patients to find balance Changing my lifestyle	8 1 3 4	9 4 4 1	0 0 0 0	17 5 7 5	142.53 185.60 92.86 169.00	74.58 61.44 54.18 80.99
ACUPUNCTURE	4 Acupuncture Needle phobia and anxiety Excited I tried it	4 2 1 0 1	4 3 1 0 0	2 1 0 1 1	10 6 2 1 4	69.00 82.00 81.00 NA (post contained 4 words) NA (post contained 32 words)	35.00 29.85 29.70 NA NA
AYURVEDA	2 Ayurveda Green drink for hydration Evidence	7 3 4 1	3 2 1 1	1 1 0 0	11 6 5 2	57.82 77.17 34.60 84.50	43.67 32.22 47.27 3.54
BIOFIELD THERAPIES	3 Chiropractic Nervous about seeing a chiropractor? Benefits of chiropractic	4 2 1 1	4 3 1 0	0 0 0 0	8 5 2 1	75.50 62.2 125.00 NA (43 words in post)	46.66 21.81 80.61 NA
HERBOLOGY	2 Herbal remedies List of popular herbs	3 2 1	3 3 0	1 1 0	7 6 1	103.29 113.67 NA (41 words in post)	64.80 64.30 NA
RELAXATION	2 How to handle stress Relaxation	2 0 2	1 0 1	1 0 1	4 1 16	54.00 66.67 NA (16 words in post)	42.74 42.16 NA
VITAMINS	2 Vitamins Multi-Million \$ industry	4 2 2	3 3 0	2 2 0	9 7 2	63.11 72.71 29.5	30.81 25.59 27.58
YOGA	3 Yoga More than an exercise routine 30 days of yoga	4 2 1	4 4 0	0 0 0	8 6 1	86.75 90.00 NA (95 words in post)	33.10 36.77 NA
OTHER	2 The experience of a fool who had an epiphany to get rid of his glasses Mind over medicine	3 2 1	3 1 2	0 0 0	6 3 3	110.83 117.33 104.33	54.06 83.43 14.84

M_{wc} = average word count of a discussion forum or group of posts
SD = standard deviation of word count of posts included in each analysis
KM = Keymaster (owner/creator of site)
CP = Complementary and Alternative Medicine Practitioner
GU = General User
NA = Not applicable (if only one post in a discussion thread).

Table 3. Thematic analysis results.

User type	Giving advice	Offering emotional support	Sharing a resource (Informational support)	Personal experience	Anecdote about a friend or patient	Self-promotion	Gratitude for comment/resource	Stating opinion	Asking a question to generate discussion	Total
KM	0	0	6	5	0	16	4	7	2	40
CP	2	1	5	24	2	46	4	39	8	133
GU	0	0	0	0	0	0	0	0	0	0
Total	2	1	11	29	2	62	8	46	10	173

Table 4. Valence coding results.

Positive post	30
Life changing experience	4
Caring for others	3
Implementing lifestyle changes	5
Healing power of acupuncture	2
Exposure treatment	2
Self-care/structure from CAM	2
Chiropractic	5
Herbal medicine	4
Herbal medicine in other countries	1
Benefits of yoga	1
Meditation and journaling	1
Neutral post	15
Causes of disease	3
Convenience of drugs	1
Implementing lifestyle changes	2
Cross cultural comparisons–acupuncture	5
Chiropractic treatment	1
Credibility of providers	1
Comparison of CAM to conventional treatment	1
When to practice yoga/meditation	1
Negative post	14
Side effects of pharmaceuticals	2
Pharmaceutical industry/advertising	2
Lack of social support	1
Healing power of acupuncture	1
Implementing lifestyle changes	4
Fear of chiropractor	3
Difficulty of obtaining herbs in US	1

CAM practitioners were the most frequent contributors to the site, followed by the keymasters (site creators). This reflects that only those with a vested interest are likely to use and return to this service in its current form. CAM practitioners may hope to gain additional patients or help to dispel myths about their treatments, while the keymasters were using the site with the intention of spurring interest and generating further discussion.

The authors also looked for evidence of common behaviour in online communities, such as courtesy to other users, sharing personal experiences and anecdotes, or attempting to generate discussion via a targeted question. Additional coding to determine whether statements were positive, negative, or neutral was carried out. Although we expected and discovered a bias towards positive comments, there were some neutral posts that were simply requesting information or asking questions and some individuals who shared negative experiences with particular CAM therapies. There were about twice as many positive comments that negative or neutral.

7. Discussion

The current study aims to answer the question: “*Can a social media platform be utilized to improve communication on CAM?*” Based on the extensive analysis we did on developing the tool and evaluating its effectiveness and efficiency from a user’s perspective, we consider that a social media platform can indeed be used to support CAM communication. The fact that so many participants freely discussed their experiences with both conventional and alternative medicine demonstrates that they are willing to utilise such a platform to share their opinions and talk about various CAM topics. In a very short time frame, we were able to see many postings by CAM champions, which speak to the need for such online communities to better support patients, physicians, and CAM providers.

We found partial support for P1 and demonstrated that a social media platform available on Internet enabled devices allows for more communication between patients and CAM practitioners. To the best of our knowledge, this is the first platform to unite these two user groups and provide them with the means to openly communicate and share their opinions. The mCAM app was received positively and users were eager to engage in discussions on various topics; some of them even offered new content and videos to be provided on the platform.

Our second proposition, P2, was also supported. Through the various features such as discussion boards, activity walls, and personal messages, we demonstrated significant engagement, interactions, and knowledge sharing in the community. The fact that we provided so many different channels of communication made it easier for users to select the one that best fit their needs and the one with which can they felt most comfortable. The most active forum in terms of word count was the “My Story” forum where individuals could share their experiences with particular treatments or health challenges, followed by the “Herbology” and then the “Yoga” forums. The overall purpose of posts tended to be building community or sharing opinions. Agreeing with or expanding upon a previous statement was the most commonly occurring pattern in the discussion forums.

We were also able to also find support for P3. We found about twice as many positive comments as negative or neutral comments in the valence content analysis. Users in the community were likely to already be supportive towards many CAM modalities and indeed, this was reflected in their comments.

During the initial analysis, we discovered that a mobile-responsive website would be preferable since it could be opened not only on mobile devices but also on PCs. This expectation was confirmed during the analysis when it turned out over 90% of all visitors used a PC to browse the application. During the interview process, only one person indicated they preferred a mobile application rather than a mobile-responsive website. This person also believed that the application should have less text and be more interactive, as he did not see that much value in the online discussion board. The rest of the participants supported the option to access the application on their PCs, as it made it much easier for them to type responses and actively participate in the discussions. One potential reason for the preference for PC over mobile device could be the age of the participants. Many of them were 40–50 years old and above, so for them a PC would be more intuitive and easy to navigate than a mobile device. Since we have such a small sample size, it is not feasible to look for any correlations between user demographics and platform features. However, the study can be replicated with a much larger sample size and such tests could be performed. In addition, future iterations of the artefact can include a mobile-only version, but it should not impact the main functions of the platform such as sharing experiences and giving advice.

Another interesting finding is related to the concerns users had about the mCAM app. Despite the best practices incorporated in the design and development of the app, some patients would still prefer face-to-face interactions with both their physicians and CAM practitioners, as they were worried about the privacy and security of their health information being posted online. Another problem was the insufficient content on the discussion boards. Users indicated they would be interested in joining such a community if a knowledge base already existed. Engaging champions and generating data are the two aspects of the CAM healing process that the study did not address directly and this may be another reason for the users' concerns.

7.1. Limitations

Some of the main limitations of the current study are the generalisability and small sample size. We acknowledge that the small number of participants

may have an impact on the analysis of the data, especially considering the lack of engagement from Western physicians. Further, due to the specifics of the targeted population and the nature of the research, we used a convenience sample. However, prior research (Nielsen & Landauer, 1993, May) has discovered that having 3–5 participants is a sufficient sample to test the usability of a system. In addition, collecting longitudinal data can be used to better understand the long-term effects of the application on the target audience. Further, we expect some of the tests to be replicated and more content to be analysed once the application is officially marketed and a much larger number of individuals become aware of it.

Another important limitation was the overrepresentation of CAM providers in the interview sample as well as users of the site. While CAM practitioners and patients were easy to approach and gladly participated in the project, we had a lot of obstacles in engaging conventional medical practitioners to join the mCAM community. Further, Western medicine providers who agreed to participate in the study were likely to be more biased towards acceptance of CAM than their colleagues who declined to be interviewed. The patient population was under-represented mainly because of confidentiality issues with reaching this population. Specifically, we were not able to use snowball sampling procedures and as such, we had more difficulty recruiting individuals who were interested in or had used some form of CAM in the past.

Finally, the stop criterion for our DSR was a length of time (10 months) rather than some more objective metric such as patient outcomes. Due to the challenges with comparing CAM treatment outcomes to those in Western medicine, in addition to concerns over confidentiality, we chose not to include a patient health measure as our criteria for success.

Some future steps can also be taken to replicate the mCAM application using professional programmers and platforms for mobile development. Although WordPress was a feasible option at the time of the study, its capabilities are limited and dependent upon the plug-ins provided by third parties. Thus, one improvement would be to recreate the application using independent programming platforms. That can guarantee the owners' ultimate control over the content, features, and capabilities of the mobile application.

7.2. Conclusion

The current study makes several important contributions to science and practice. First, we designed and developed a mobile application to stimulate communication between patients, physicians, and CAM practitioners about CAM modalities. We identified

five stages of the CAM healing process, many of which were addressed by the current study. These stages assisted in tailoring the mobile application to the needs of the participants in each stage and aided the design and build processes.

Second, the process of designing and developing the mobile applications can be used to create a set of guidelines for effective mobile application workflow and identify recommendations for improving the CAM communication process between patients and physicians. By considering best practices in human–computer interaction (HCI) and usability testing, we proposed a more successful strategy for building and managing a CAM mobile application with a user-centred design.

And third, CAM has been widely investigated but mainly from the perspective of understanding its benefits and providing evidence of successful healing methods. Mobile communication, on the other hand, has been considered mostly for its application in healthcare. Exploring how CAM can benefit from utilising Web 2.0 and providing new communication channels to connect patients, CAM practitioners, and conventional physicians has not been fully understood yet. Patients' unwillingness to disclose CAM information to their physicians may lead to harmful treatments with negative outcomes (Levin, 1996; Plaut, 1995). Thus, the proposed artefact can be successfully utilised to bridge the gap and restore trust among patients and physicians by including CAM practitioners in the conversation. Finally, we took an innovative approach to creating an online community of patients, and providers centred around treatment modalities rather than particular health conditions.

7.3. Implications for research and academia

Future research should include the study of different types of messaging and their impact on user participation. In addition, studying user behaviour in a peer-to-peer network compared to a peer-to-provider network may provide useful insight into possible differences in willingness to disclose information or the types of information and reviews that individuals give about treatments or providers. Finally, further investigation into the relative effectiveness of a modality-based platform compared to a platform that is centred around a particular disease state is warranted.

7.4. Implications for practice

This project provides proof of concept for using a social network to enhance communication among patients and CAM providers. To the best of our

knowledge, such a platform does not exist yet so the current study is addressing an important gap in providing a valuable support mechanism to these individuals. A further expansion of the mCAM application is for providers and patients to be able to upload their own video content. Other websites and mobile applications with the purpose of connecting patients and providers and serving as a credible source of information about treatments that are outside of the mainstream are encouraged. Considerations about continuing user interest beyond the course of a study like this will also need to be taken into account.

Disclosure statement

No potential conflict of interest was reported by the authors.

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APPENDIX

Figure A1. Iterative design.