

Special Section

Reducing the Health and Digital Divides: A Model for Using Community-Based Participatory Research Approach to E-Health Interventions in Low-Income Hispanic Communities

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Low-income Hispanics are the most digitally underserved population in the U.S. This article examines the potential of community-based participatory research approach to e-health to decrease the disparities in access to technology and health information in low-income Hispanic communities. To demonstrate this framework, we describe the process of designing a community-based e-health intervention to increase knowledge and parental self-efficacy in coping with young children's mental health problems including mental health service utilization. Our model incorporates utilizing promotoras de salud (lay community health educators) and community media principles to create the content of e-health interventions and train community members in using the technology. This case study illustrates the processes involved in using this approach, barriers for participatory e-health interventions in bridging the Digital Divide, and lessons learned.

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Introduction and Background

The rapid adoption of the Internet and its unprecedented diffusion of health information to the public are changing the ways in which most Americans seek and exchange health information and support (Eysenbach & Jadad, 2001; Napoli, 2001). In view of the importance of health communication and health information to individuals' and communities' well-being (Kreps, 2001; 2006), the exclusion of about a third of the public from access to the Internet is receiving increasing attention as a public health problem (Chang, Bakken, Brown, Houston, Kreps, Kukafka, et al., 2004; Cline & Haynes, 2001; Kreps, 2005; 2006; Lorence, Park & Fox, 2006; Neuhauser & Kreps, 2003). Like other social divides, the digital divide is multi-layered and is

embedded in larger social and political inequalities and is therefore challenging to overcome.

In this article, we propose that community-based participatory research approach (CBPR), utilizing the *promotoras de salud* (Spanish term for lay community health educators) model and community media principles has great potential in reducing the digital divide and in increasing access to health information. First, we review previous literature about the digital divide, health, and Hispanic users, and describe past e-health interventions for underserved populations and our theoretical and methodological approach. Second, we demonstrate this approach by describing a case study of a community-academic collaboration and the design of an e-health intervention to increase low-income Hispanic parents' knowledge of children's mental health (MH) issues and self-efficacy in coping with children's MH problems, including MH service utilization (MHSU). Finally, we draw lessons for policies, funding agencies, scholars, and community activists.

The Digital Divide

Although the availability of computers and Internet access in the United States has increased significantly, low-income groups are still consistently underserved in their access to the Internet as well as their use of computers. Researchers from the Pew Research Center (Lorence, et al. 2006) concluded that the digital divide between low- and high-income populations in the U.S. has not improved, and that the divide between Hispanics and other ethnic groups in low-income populations is significant and persistent. Scholars and stakeholders agree that vulnerable populations that typically suffer from disparities in health outcomes could be assisted by increased access to relevant health information resources and support, but disparities in technology access prevent them from benefiting from these advancements (Chang et al., 2004; Kreps, 2005). Such disparities in information technologies access and use are related to socioeconomic status, including income, educational level and race/ethnicity (NTIA, 1999). Thus, the digitally underserved are typically the same individuals and communities who are *medically underserved*, defined as those with "economic barriers, or cultural and/or linguistic access barriers to primary medical care services" by the Health Resources Services Administration. Such individuals are also vulnerable to problems in health care quality (Chang et al., 2004). Health information on the Internet has the potential to facilitate making informed health-related decisions, seeking appropriate health care and support, resisting avoidable and significant health risks, and promoting individuals' health. Therefore, the digital divide has been identified as a special problem in health care that can lead to significant disparities in care (Kreps, 2005; Neuhauser & Kreps, 2003). Moreover, Internet access to community specific and health information sources has been shown to increase empowerment in low income urban community members (Masi, Suarez-Balcazar, Cassey, Kinney, & Piotrowski, 2003).

Recent research shows the digital divide goes beyond simply having access to the computers and the Internet. Although providing underserved individuals with

physical access to the Internet is necessary, it is not sufficient in eliminating the divide. Research in e-Health (Brodie et al., 2000; Dutta-Bergman, 2004a, 2004d; Wagner et al., 2005) documented that individuals with access to the Internet vary in their use of the Internet for health purposes, time they spend online, and their concerns in using it (Cline and Haynes, 2001; Dutta-Bergman, 2004c). In addition to high literacy levels required in surfing the Internet successfully (Berland et al., 2001), health information users on the Internet need to be digitally literate. Digital literacy requires users to have complex skills including cognitive, motoric, sociological, and emotional in order to use digital environments effectively (Eshet Alkali & Amichai-Hamburger, 2004). For example, users need to have the ability to navigate massive amount of information (Cline and Haynes, 2001). Such endeavors increase access difficulties for many underserved populations.

Hispanics and the Digital Divide

Low-income Hispanics are the most digitally underserved population in the U.S. (Lorence, et al., 2006). Although low-income Hispanics are interested in using the Internet (Fox & Rainie, 2000), Hispanics are less likely than Whites to have access and to use the Internet, and Hispanic Internet users use the Internet less frequently than Whites (Fox & Livingston, 2007; Lorence, et al., 2006). Hispanics' lower rates of computer and Internet use are correlated with lower levels of education, costs of having a computer and Internet access (Fox & Livingston, 2007; Slate, Manuel, & Brinson, 2002), speaking Spanish at home (Slate et al., 2002) and access in the community (Mossberger, Tolbert, & Gilbert, 2006). Income and education contribute to most of the gap in Hispanic's use of the Internet, but do not fully explain it. Therefore, it is likely that cultural factors influence perceptions of use of the Internet for health information. Moreover, comprehension of web-based health information in English and in Spanish requires higher than average literacy skills (Berland et al., 2001). Low-income Hispanics, particularly those who have limited English proficiency (LEP), face additional barriers in accessing online health information.

Theoretical Framework

Two prominent theories that can explain the digital divide and guide interventions are Diffusion of Innovations theory (DI) (Rogers, 2003) and Social Cognitive Theory (SCT) (Bandura, 1986). The compatibility of these theories in informing attempts to bridge the digital divide have been previously established (Bandura, 2006). Whereas SCT provides theoretical framework to understand individuals' behavior and to guide our efforts to allow individuals to change their behavior, DI provides a framework for understanding how innovation permeates through a particular social system over time and can be applied at various levels of analysis, including an examination of the social system in which individuals function (Rogers, 2003).

Diffusion of Innovations theory is helpful in understanding the processes of the digital divide and health disparities and in our effort to reduce them. Rogers

(2003) identified five adopter categories: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. Rates in diffusion of the Internet today suggest that non-users are currently at the end of the late majority, and approaching being laggards. Laggards are typically individuals with lower income and education. To increase adoption among them, providing incentives for participation has proven a successful strategy (Rogers, 2003). Moreover, individuals' perceptions of an innovation impact its rate of diffusion, and the decision to adopt typically occurs in interpersonal communication. Since laggards typically lack opinion leaders in their social network that would promote diffusion, a strategy to diffuse innovations is to identify and support opinion leaders in late adopters' social networks (Rogers 2003; Valente & Pumpuang, 2007).

Social Cognitive Theory (SCT, Bandura, 1986) posits that factors such as economic conditions, socioeconomic status, and educational and familial structures do not affect human behavior directly. Instead, they affect it to the degree that they influence people's aspirations, self-efficacy beliefs, personal standards, emotional states, and other self-regulatory influences. A major construct in SCT is *self-efficacy*, which refers to peoples' judgments of their capabilities to perform certain actions (Bandura, 1986, p.391). The impact of self-efficacy beliefs has been demonstrated in a range of contexts including health behavior (Bandura, 1986; 1997; Schwarzer, 1992) and Internet and computer use (Cassidy & Eachus, 2002). Therefore, to allow individuals to obtain Web-based health information, it is essential to help them increase their self-efficacy in using the Internet and processing this information.

E-Health Interventions for the Underserved

Different e-health interventions for information and communication have been proving effective in serving underserved populations (Kreps, 2005). Anecdotal evidence shows that individuals from different cultural groups differ in their use of certain communication features of e-health interventions, which might suggest that they have different communication needs that e-health intervention can successfully meet (Gustafson, et al. 2001). However, e-health interventions for underserved populations are reaching only a few of the individuals and communities who can benefit from them.

Chang and others (2004) described e-health for underserved populations as "still in its infancy" (p. 450). They identified barriers to diffusion, including: (a) e-health interventions often are designed without involving the served community and without an understanding of community factors, (b) underserved consumers' low computer skills pose barriers to access and use of e-health tools, (c) designers of e-health interventions are typically not trained in meeting underserved consumers' communication needs, (d) consumer health informatics is a young science and there is limited evidence for usability and effectiveness in improving outcomes for the underserved, and (e) there is lack of financial incentives necessary to develop and diffuse e-health interventions for underserved populations. Also, there is a need to move beyond Limited definitions of the diversity of these target populations

that currently focus on social and demographic characteristics such as age, gender, race, ethnicity, and socioeconomic status. More meaningful ways of describing heterogeneity include understanding the life experiences of the communities and individuals being served, their attitudes, norms, beliefs, and practices, sociocultural environment, economic contexts and community resources are needed (Chang et al., 2004).

Although low-income Hispanics encounter special challenges in joining the digital revolution, no past e-health interventions focused on increasing access to health information and technology for this population. We argue that utilizing CBPR approach and principals of community media have the potential to facilitate effective e-health interventions for this underserved group. In the following section, we illustrate the potential of these approaches to overcome barriers to effective e-health interventions for underserved Hispanics.

Community Based Participatory Research

CBPR is “partnership approach to research that equitably involves community members, organization representatives, and researchers in all aspects of the research process” (Israel, Eng, Schulz et al., 2005). Partners contribute their expertise to enhance understanding of a given phenomenon and to integrate the knowledge gained with action to benefit the community involved (Israel, Schulz, Parker & Becker, 1998). CBPR has the potential to meet the needs for interventions that involve the community, are culturally appropriate, and are empowering to participants. A community-based participatory health communication research framework empowers members of the community to articulate their needs, identify available resources, and mobilize them to act in ways that positively impact sustainable health outcomes (Basu & Dutta, 2008). However, CBPR approach to health communication and to health informatics has been slow to diffuse.

Community Media

In contrast to the goal of mass media to transmit information, community media aim to create information exchange. Using mass media technologies, community media give participants control over the entire process, including message creation. Community media can help communities regain their voices, connect isolated communities and individuals, and serve as alternative sources of information (Melkote, 1993; Mody, 1991; Rodriguez, 2000). The creation of community media is a process that involves much more than learning technological skills. Its participatory nature differentiates community media groups from skill-building classes. Participation includes group members discussing, planning, producing, taking action, and reflecting. Thus, the ability to use media no longer rests solely in the hands of those with formal power and education such as big corporations or development agencies. The advent of the Internet is in many ways congruent with community media’s notion of participants as content creators, rather than receivers of messages.

To demonstrate our proposed approach to utilizing CBPR and community media in the design of e-health interventions by and for the underserved, we describe the design of a community-based e-health intervention to increase knowledge and parental self-efficacy in coping with young children's mental health problems including mental health service utilization.

Using CBPR Approach to the Design of an E-health Intervention to Reduce Disparities in Hispanic Children's Mental Health Service Utilization

Hispanic Children and Disparities in MH Service Utilization

MH utilization of Hispanic children is one of the most notable and under-researched health disparities among children in the U.S. (Kataoka et al., 2002). This disparity should be noted in the context of larger health disparities of Hispanic children. Hispanic children, who now comprise the largest racial/ethnic minority group of US children, experience disparities in health status, insurance coverage, topics discussed during pediatric visits, parents feeling understood by providers, parental satisfaction, and referrals to specialists (Flores et al., 2002). Such racial and ethnic disparities in health outcomes exist even when controlling for differences in income and health insurance (Flores, Olson, & Tomany-Korman, 2005). They are related to communication problems within the health care system, which lead to unequal access to health information and inadequate participation in health care decision making (Kreps, 2006).

Unmet MH needs in children can have major developmental consequences, yet most Hispanic children who need MH Services (MHS) do not receive them, and have greater odds than Caucasian children of having no care or unmet needs. In particular, rates of use of MHS are extremely low among preschool children (Kataoka et al., 2002). Eliminating this disparity is important in view of the impact that early detection and treatment of MH problems in children can have in improving their prognosis and quality of life (Leal, 2005).

Barriers to Hispanic children's MHS utilization. Eligibility for medical insurance is necessary in increasing MH care among immigrants, but is not sufficient in eliminating disparities in MHS utilization (Vega & Lopez, 2001; Zimmerman, 2005). Major barriers for parental help-seeking of MHS include (a) parents recognizing the presence of a problem, and (b) parents overcoming barriers (Pavuluri, Luk, & McGee, 1996). Among Hispanic parents, factors that are related to these two blocks are parents' knowledge of the problem and its treatment, health locus of control, self-efficacy, acculturation, social support (Power et al., 2005; Yeh et al., 2005), stigma of MH problems, and perceptions of the etiology of MH problems (Yeh et al., 2005). Factors that are related to overcoming perceived barriers to care pertain to knowing where to find a provider (Vega & Lopez, 2001), and perceptions of prejudice in the MH system (Yeh et al., 2005). Hispanic parents are less likely than Non-Hispanics to perceive certain behavioral problems as requiring MH intervention (Power et al., 2005).

The need for communication interventions. In view of these barriers to care, culturally appropriate health communication interventions have the potential to reduce barriers to MHS utilization by informing Hispanic parents about children's MH issues and availability of local MH resources (Vega & Lopez., 2001) and assist caregivers in linking a child's impairment with need for MH care (Alegria et al., 2004; Zimmerman, 2005). Additionally, it is important to increasing perceptions of the etiology of MH problems, since understanding the role of bio-physical causes and trauma in children's MH and behavioral problems has the potential to increase parental intentions to use MHS for their children (Yeh at al., 2005). Finally, communication interventions can reduce stigmatic perceptions and fear of stigma of MH and MHS utilization which are barriers to using health services (Chandra & Minkovitz, 2007; Leal, 2005).

The Local Context

The Community

The target community includes Hispanic parents and caregivers to children under the age of 8 who reside in two low-income neighborhoods in the Southeast (Southeast Heights) of a metropolitan area in a border state. This community suffers from higher rates of poverty and crime compare to other areas in town. Following CBPR principals, this is collaboration between an academic researcher (The first author-FA) and a community organization that is based in the southeast heights and is led by the second author (SA).

La Comunidad Habla

La Comunidad Habla (LCH) is a community organization based in Young Children's Health Center (YCHC), a community-based pediatric clinic in the targeted community. The clinic serves the community's documented and undocumented children and their families by providing comprehensive physical and MH care, as well as community and social services. LCH's main goal is to support women as leaders in technology and health communication in order to create community economic opportunities and advance health equity. The second author (SA), a community activist working and living in the community, formed LCH due to her interest in using community media for social change. Following the principals of community media, her strategy centered on community members learning and later teaching communication technologies and advocacy. As community media is based on community members' expertise, she taught herself various technical skills, including website design. In 2002, she offered a free weekly Spanish-language computer class to the community. By 2005, LCH grew into a multi-grant supported initiative. Six women from the computer class were recruited and contracted to work part-time as paid health and technology leaders, following the *promotoras* model. To our knowledge, this was the first attempt to utilize *promotoras* in e-health interventions bridging the digital divide.

LCH Promotoras

As mentioned above, the promotoras are members of the target community. They are all immigrants from Mexico. Due to low education and LEP, they typically take low-wage paying jobs that, though paying more than jobs in their original country, usually do not allow them to break out of the cycle of poverty. As with many other community members, they face poverty, neighborhood violence, social isolation, and lack of medical insurance. Thus, these women are marginalized on many levels. Despite these unfavorable conditions, they are determined to change their lives. LCH allows them to gain computer skills, to make decisions, and to inspire others. A visitor at their meetings or workshops will immediately recognize their confidence and competence in using computers. Moreover, since present to individuals and community groups and train them in using the Internet and a health resource manual, they gain valuable presentation skills. Participation also facilitated the creation of social connections between members, who participate in social and educational activities together, including studying for the GED.

LCH's Prior Work

LCH *promotoras* develop and maintain community-health websites. Most notably a website (www.saludmanual.org) that includes a database where local providers and consumers can access health resources for medically un/underinsured individuals. In addition, this website includes educational photonovela (illustrated stories) as entertainment-education tools that focus on overcoming barriers in the health system. This entertainment-education approach was chosen due to its reported impact on audiences' knowledge, attitudes, and behavior. These effects are related to audiences' para-social interactions and identification with the characters depicted in the stories (Papa, Singhal, Law, Pant, Sood, Rogers, & Shefner-Rogers, 2006). These photonovelas were created in a participatory process. The *promotoras* identified barriers to access to health care in the community including transportation, being asked for unnecessary documents, and being ignored and receiving bad service. They developed stories that illustrated how to overcome these barriers. A local community member illustrated these photonovelas and the *promotoras* posted them to the website. These photonovelas were also printed and distributed in the community.

The participatory nature of LCH's model is manifested in a few ways. First, whereas typically, health-related websites, including websites of community organizations are designed by professionals, LCH's websites are designed by LCH members (the *promotoras* and SA) with limited guidance and technical assistance from professionals. Moreover, to diffuse this information and the utilization of the website in the community, LCH *promotoras* also provide technology and health "Talleres," (workshops) in the community. The *Talleres* include: 1) basic technology skill training (Microsoft Office, Internet basics, email, and digital cameras), 2) discussions of the health system, disparities, and how to affect change, and 3) training on using the website. The *Talleres* also include issues of access to health care and empowerment, by having participants perform the stories of the photonovelas as a way to elicit

participants' own stories and experiences and ways to overcome barriers. This strategy enhances the participatory nature of LCH's efforts. It is consistent with Paulo Freire's notions of community participation through education and group dialogue to encourage critical thinking and motivates individuals to gain more control over their lives (Kane, 2001). Observations of the *Talleres* reveal that this approach encourages participants to reflect on their experiences and share them with others. Community members identify with the characters in the photonovelas and react emotionally to the stories, demonstrating processes that are consistent with entertainment-education effects (Papa et al., 2006). Since 2006, LCH *promotoras* trained in person almost 1,500 community members and service providers.

An additional aspect in the participatory strategies of LCH includes collaborations with other organizations in the community. In 2008, LCH collaborated with other local partners and developed a new website with information about health and social services (www.resourcesnm.org) that received over 3,306 hits in 2008 alone. Over 1500 hits were from community members, and the rest from service providers seeking information for their clients.

Evaluations of LCH's previous activities included testing of the website use by community members and local organizations, actual use as indicated in "hits" to the websites, and surveys to participants at the end of their training. These surveys typically examined different aspects of participation, including knowledge and self efficacy of the different topics before and after the sessions. The questions related to technology use, awareness of the health care system, comfort level in using advocacy strategies, etc. In view of the low literacy level of most participants, these surveys were written at low literacy level in Spanish and English, and were relatively short. The results of these surveys, as well as indication from other feedback from community members and the progress evident in participants' technical skills in using the Internet, show that this approach has potential in being an effective method in addressing health issues and the digital divide.

The Academic-Community Organization Collaboration: Processes in the Design of the E-Health Intervention Salud Mental Infantil

Academic-Community Collaboration-Formation

In Spring 2007, the activist (SA) and the researcher (FA) began their collaboration. Although the neighborhood is only a few miles away from the university, this was the first academic communication research project conducted in this community. This collaboration was formed based on the mutual interests of both authors in reducing disparities in communication technologies and health. Moreover, whereas SA is fluent in Spanish, the First Author (FA) has working knowledge in this language, which facilitated communication with community members. In view of the rich experience of the LCH prior to this collaboration, and in accordance with CBPR principles, it was important that LCH and the community it serves will not become a "research site." Instead, the goal of this research was to directly benefit the group and the community. Moreover, in design of the intervention we integrated (a) promoting

community leadership and voice, (b) using media tools, (c) securing the visibility of the project in the community and (d) identifying funding to create sustainability.

This proposed e-health intervention focuses on children's MH, with the dual aims of increasing access to health information on the Internet and meeting the community's information needs about children's' MH and service utilization. This goal was consistent with LCH's mission, could build on current strengths of the organization, appeal to the needs of the community, and provide a model for other underserved Hispanic communities, as well as for other health conditions. It was also consistent with the mission of Young Children's Health Center (YCHC), the pediatric clinic that employs SA. MH and family services receive priority at YCHC given the many risk factors affecting the overall health of the families in the Southeast Heights community. Additionally, one of the considerations in focusing on children's health was that children in the community have typically better access to health care than adults. It was important to avoid a possible outcome in which an e-health information-intervention would create frustration by describing treatments that many community members could not afford.

Topic Identification and Needs Assessment

The topic of the intervention emerged from the community. First, SA and the promotoras who administered training noticed that the most common topic of community members' Internet searches involved how to cope with behavioral problems of children, thus suggesting an unmet information needs regarding children's behavioral and MH. Following this initial need identification, FA conducted a literature review that confirmed the need for information about the topic as well as the severity of health disparities in low-income Hispanic children's mental health service utilization. In the third stage, a focus group with the *promotoras* was conducted. This focus group lasted about 90 minutes and was led by the authors. The focus group was audio recorded and notes were taken. It followed a semi-structure protocol with questions about information needs and information seeking regarding MH and MHS for children. All participants had young children or grandchildren. In addition to their own experiences, they shared stories about other family members and community members' experiences. Participants clearly indicated that they were interested in finding information that related to children's behavioral and MH. They listed different MH problems of children that are prevalent in their communities and families, including depression, anxiety, aggressive behavior and post-traumatic disorders, often occurring in very young children and toddlers. However, whereas the *promotoras* revealed great knowledge of information sources available in the community, even they were not aware of certain potential MH problems of children, most notably ADD/ADHD and delays in language and social skills. They identified barriers to obtaining information about children's MH through different face-to-face sources (partially due to stigma associated with behavioral/MH problems) and indicated that the Internet has the potential to provide information efficiently and confidentially.

The process of identifying and assessing the need for the intervention incorporated different stakeholders, including the clinic's family services manager, social workers, a child psychiatrist who works at YCHC and other clinics in the city, and a university hospital pediatrician who specializes in increasing developmental and MH screening for young children. Interviews were conducted at the clinics, and last between an hour to two hours. Due to technical difficulties, they were not recorded but careful notes were taken. Based on their experiences with patients, the community-based providers consistently reported high levels of anxiety in families living in this area, and that families commonly report during clinic visits that they have been affected directly or indirectly by violent crimes. In addition to the MH problems identified in community focus groups and listed above, MH specialists indicated the importance of early screening for communicative disorders, such as autism-spectrum disorders. Moreover, these MH care providers indicated that the children they see (i.e., that receive MHS) are typically school-aged children. Therefore, they observed that children with MH problems in the community are typically referred to services only after they enter the educational system, and therefore are diagnosed late and do not receive much-needed early interventions. These providers' experiences in the community were consistent with the research on children's MHS in the U.S. in general, and among Hispanic children in particular. These meetings with providers were important not only in further assessing the need for providing information for parents about MH screening for children, but also in establishing their support of our intervention.

Intervention Design

Overview of the Design of this E-health Intervention

Due to the increased need of preschool children in MHS, the proposed intervention is focused on this age group. The specific aims are: (a) to create a community-based participatory e-health intervention to provide culturally-appropriate information about pre-school age children's MH and MHS to low income Hispanic parents and caregivers at low literacy level in Spanish and English; and (b) to assess the feasibility of this intervention within a quasi-experimental field trial.

To accomplish these aims, we planned a three-phase project. In the first phase, we planned to create appropriate information about children's MH in a participatory process with equal input from the community and the researchers. In addition to the current first author, academic researchers and professionals who agreed to advice on this research collaboration include a health communication scholar who is an expert on e-health interventions with extensive experience in leading large Federally-funded e-health interventions targeting Hispanics in the border state in which this e-health intervention takes place, an academic expert on children's MHS utilization in culturally diverse populations, including large, Federal-funded research projects on cultural influence and barriers to care, and a child psychiatrist who works in the community. Whereas the promotoras will identify relevant information, these experts will provide professional guidance in the content creation, as well as in the

following phases of the intervention. In addition, the psychiatrist agreed to provide MHS for participants in the research if needed.

Applying Theoretical Framework and Previous Research

Following creation of the content, LCH *promotoras* will utilize health website expertise that they developed in previous projects to create a website that will include interactive presentation of information and different communication features. This phase will incorporate multiple usability tests into the design process using techniques from Nielsen's manual on designing Web usability (Nielsen, 2000) and qualitative research methods.

In the third phase, we will provide training sessions to community members in using the intervention's website and consequently measure the impact of our intervention on participants' intentions to use MHS for children, knowledge of sources of information about children's MH, knowledge of symptoms, perceived barriers to care, self-efficacy beliefs in seeking MH information online, perceptions of etiology, and self-efficacy in using computers and the Internet.

In the design of this intervention we were careful to incorporate findings from previous research of Hispanic children's MHS utilization and theoretical framework. To overcome barriers to MHS utilization, design of this e-health intervention aimed at providing information about the importance of early screening, specific symptoms that require interventions, the availability of MHS in the community, and how to communicate effectively with health care providers about children's MH. We believe that communication could play an important role in reducing disparities in MHS utilization, by (a) informing parents of MH issues and local resources that are available to them, and (b) encouraging communication about these issues that would lead to diffusion of the information and to reduction of stigma that is associated with MHS Utilization.

According to DI Theory, an effective strategy to diffuse innovations in late adopters' social networks is to identify and support opinion leaders in these networks (Rogers 2003; Valente & Pumpuang, 2007). Consistent with this theory, LCH *promotoras*, who come from the same community of the target population, serve as both change agents and opinion leaders. Their instruction and training of participants in using the Internet and the proposed e-health intervention aim at influencing participants' perceptions of the e-health intervention and children's MHS utilization. Moreover, participation in this e-health intervention will increase individuals' social networks, and their interactions with Internet users, which in turn is likely to increase diffusion.

Following SCT (Bandura, 1986), to facilitate Web-based MH information, we need to help participants increase their self efficacy in using computers and the Internet for health information seeking. Therefore, this intervention is aimed at influencing participants' self-efficacy perceptions by (1) creating successful experiences for participants through training sessions of Internet use and access to culturally appropriate, low literacy level, bilingual information about children's

MH; (2) providing examples of successful Internet use for children's MHS information via role modeling by LCH *promotoras* and "photonovelas" characters using entertainment-education approach; (3) utilizing verbal persuasion from LCH *promotoras*; and (4) improving emotional states of anxiety and depression through communication between participants.

In addition, SCT can aid in reducing the disparity in MHS utilization of Hispanic children. Major blocks for parental help-seeking are parents recognizing the presence of a problem, and overcoming perceived barriers (Pavuluri et al, 1996). Therefore, providing relevant information has the potential to increase parental knowledge of children's MH issues, and their self-efficacy in seeking services and therefore to increase children's MHS utilization.

Website's Content Principles

Although we will rely on CBPR procedures to define the exact content and structure of the intervention website, there are initial and preliminary concepts and content areas the project will employ based on previous research about barriers to MHS for children and the digital divide and the needs' assessment in the community. Web site features (see Table) will include modules on: (1) importance of addressing MH issues at a young age, (2) symptoms that require MH screening, (3) prevalent MH problems among children, like depression, anxiety, ADD/ADHD oppositional defiant and conduct disorders (Egger & Angold, 2006), (4) treatment for specific MH problems, (5) local MHS and information resources, and (6) trauma in the lives of children and how to help them cope. Each of the above modules will include brief information. To increase community involvement and exchange of information, we will include (7) a-synchronous discussion list where users can post their thoughts on children's MH, and share challenges of coping with children's MH issues. (8) To address certain issues that the community would identify as barriers, we will create photonovelas that aim at increasing parents' sense of empowerment by describing a story in which protagonists learn to overcome barriers. For example, a story about communicating with health care providers about children's MH concerns.

Feasibility Trial

As described previously, we propose to conduct a pilot study of the website use and effectiveness to assess the feasibility of this e-health intervention to provide bi-lingual, low literacy-level, culturally appropriate information in a way that would influence parental knowledge, perceptions and behavioral intentions regarding children's MH and MHS.

Recruitment

Recruitment will follow procedures that LCH has used and found to be effective. Bi-lingual, low-literacy level flyers with information about our study and contact information will be posted in prominent places in our recruiting sites. *Promotoras*

Table 1 Preliminary Planned Website Modules

Website Module	Module Description	Theoretical Principles Employed/Rational
Website introduction and overview Children's MH & development	Overview of the website's components. Interactive presentation of development and typical behavior of children ages 2–6.	Providing an overview of milestones in children's development to increase parental knowledge and coping by understanding what is age-appropriate behavior
Symptoms	Symptoms that require MH screenings; boundaries between normative variation and clinically significant presentations.	This need was identified in preliminary studies.
Specific MH problems	Prevalent MH problems of children (e.g., oppositional defiant disorder, depression, anxiety, ADD/ADHD, delay in speech development).	Perceived severity of symptoms is related to MHSU of Hispanic parents.
Children's MH and Early Intervention	The importance of addressing MH issues at a young age, treatment for specific MH problems, and parental role in coping.	Increasing knowledge of MH problems will allow for a change in social stigma by changing norm perceptions.
Social stigma	Information to reduce MH stigma.	Providing information about treatment and the role of parents in coping will 1) increase self-efficacy in coping with children's MH problems (following Social Learning Theory); and 2) can change norms perceptions and expectations that stigmatize MH problems. Norms Perception. MH norm perceptions and expectations, modification of those perceptions and expectations that stigmatize MH problems

Table 1 (Continued)

Trauma	Possible sources of trauma in the life of children, and how adults can help children cope with trauma.	In preliminary studies, community members and MH care providers identified trauma as a major cause for MH problems of Hispanic children. This information will 1) increase perceptions of the impact of trauma and thus will increase service utilization, and 2) increase parental self-efficacy in helping children cope with traumas.
Talking to health care providers	This module will present information about talking to health care providers about children's MH and will address specific barriers identified by the community, such as not understanding providers, and of providers not explaining referrals. Some content will be demonstrate using <i>photovovela</i> .	Community members described problems in communicating with health care providers as barriers to MH service utilization. Consistent with Social cognitive theory, this module will provide skills to improve parental self-efficacy in communicating with health care providers and advocating for their children.
Local resources	This module will provide interactive information about screening and local information resources in the community according to user's location and age of the child.	Providing information about local services can improve self-efficacy of parents in seeking MH services for their children
Discussion Board	An online forum for parents to share experiences and seek information and support from other parents.	Providing a forum to exchange information and emotional support provides role models to increase self-efficacy (Social Cognitive Theory) and increases diffusion through information exchange (Diffusion of Innovations).

will contact individuals in organizations and places in the community that serve predominantly Hispanic, lower SES individuals such as community centers, community groups, churches, clinics, and a local Mexican ice-cream shop. We will also utilize snowball procedure, which includes recruiting individuals referred by friends or acquaintances. These two methodologies are considered to be particularly appropriate for research focussing on immigrants (McKenzie & Mistiaen, 2007). We aim at recruiting 100 persons, 50 for the intervention and 50 for the control.

Training Sessions

The intervention group will be offered 5 training sessions. Using expertise that the *promotoras* and the research team gained in previous projects, *promotoras* will train participants in using the computer and the Internet, and will guide them on using the proposed website. These sessions will not only provide training, but will also provide access to the website, thus allowing participants to use it according to their preferences. These training will begin with a pre-test, followed by a brief (20 minutes long) discussion about children's MH, in order to introduce the topic to participants and create motivation to explore the topic further on their own. However, the majority of the training will focus on technical aspects of using the Internet and the website, in order to (a) allow participants to focus on topics that are interesting and relevant to them, (b) provide a similar experience to "typical" health information seeking on the Internet, and (c) ensuring as much similarity as possible between the experiences of the intervention and the control groups, and trying to secure that the main difference between these groups will include utilization of the website.

The control group will be contacted twice. The first meeting will include the same pre-test, followed by the same brief discussion about children's MH provided to the intervention group. Then, they will be provided with printed material about MHS for children. The second will include the post-test. Participants in both the intervention and the control groups will be compensated for their participation and will be provided child care for the duration of the sessions.

Assessments and Measurements

To examine the influence of this e-health intervention, we will administer a pre/post test that will assess: intentions to use MHS for children, demographic information, knowledge and perceptions about children's MH and MHS utilization, and Internet-use related self efficacy beliefs. These measurements have been previously established and validated in both English and Spanish. In addition, we will utilize traditional qualitative research methods, such as focus groups, interviews and direct observations.

Discussion and Conclusions

In this article, we proposed that using CBPR framework based on principles of community media and the *promotoras* model has the potential to bridge the digital

divide and increase the effectiveness of e-health interventions for the underserved. Specifically, we advocate provision of physical access to computers and the Internet, training, and community-based social and educational support provided on-site to underserved community members. We demonstrated the processes involved in designing e-health intervention based on this framework by describing the design of a community based participatory e-health information-intervention to reduce disparities in MHS utilization of pre-school age Hispanic children.

This approach is unique in a few ways. First, whereas previous scholars have highlighted the utility of participatory design in health promotion interventions (Neuhauser, 2001), no previous e-health interventions utilized a truly participatory design that involved the community in all stages, including actual content creation and provided the community with equal voice. We propose that using such a process, although more time-consuming than having “experts” design the intervention with minimal or no community involvement, is better suited to confront the digital divide and to promote real equity. In addition, such participatory design processes have the potential to lead to content creation that is culturally appropriate. With the absence of current theoretical understanding of what such cultural-appropriateness entails, creation of participatory e-health interventions have the potential to inform scholars on the constructs that should underline future interventions aimed at reaching minorities and underserved populations.

Using the Internet as a community medium, our approach allows for involving community members not only as capable of creating content, but also as able to have advanced technological skills and contribute to this aspect of the design. Such an approach, demonstrated in previous projects of the community organization collaborating on the design of this e-health intervention, not only provide community members of underserved communities with voice, but allows them to have better educational and economic opportunities after completing of participation in the intervention. This further facilitates the empowering processes and outcomes that CBPR approach aims to achieve.

Our model also has the potential to mobilize underserved communities by having people come together and communicate with each other. As noted earlier, underserved communities are often fragmented. Participation in social activities, social activism and health information seeking all have the potential to create and enhance social capital that lead to personal and community level empowerment (Basu & Dutta, 2008)

Furthermore, the proposed framework has particular advantage for health concerns that are stigmatized. Previous research indicated that the Internet is often perceived as an advantageous communication channel to individuals who cope with stigmatized conditions and illnesses (Berger, Wagner, & Baker, 2005). The participatory process of creating e-health intervention has the potential to not only provide information and meet information needs of individuals who cope with stigmatic conditions and illness, but also to reduce stigmatic perceptions through the process of communicating with others on and off line on these issues.

Despite the importance of communication in MH, previous health communication scholars did not create MH-related interventions. In particular, past communication research overlooked the potential importance of communication in increasing MHS utilization of minorities and underserved individuals. Based on previous research of barriers to MHS utilization of children, communication scholars can contribute to decreasing these health disparities by creating interventions that would address such barriers as understanding of symptoms that require MHS, reducing stigma, and increasing self-efficacy in accessing services.

In our experience, both community members and communication scholars can benefit from collaboration and using CBPR approach. In particular, community organizations already utilizing the *promotoras* model might be potential collaborators with health communication researchers, as the researchers can learn from the knowledge of *promotoras* working in the community, whereas the *promotoras* can benefit from academic knowledge and theoretical approaches. Such synergistic learning has the potential to advance health promotion of underserved populations (Larkey, 2006). Moreover, scholars can provide much needed systematic evaluations of community organizations' activities, whereas these organizations offer researchers access to otherwise hard to reach populations.

Clearly, the approach we describe here has significant challenges. Public health scholars who utilize CBPR approach have previously reported on barriers to implementing this approach, including the long process that is often incongruent with funding agencies' expectations of fast results (Wallerstein, 2006). In addition, the process of training community members in building websites requires time, technical expertise, and knowledge of working with underserved communities. In the case of the current collaboration, community members (the *promotoras*) were trained prior to this project, thanks to the technological skills and previous work of the community activist. However, future e-health interventions are unlikely to benefit from having a similar structure in place, as LCH is the first community organization using this model.

Another problem affecting CBPR projects is lack of sustainability of most community organizations. LCH did not escape such a fate. Despite proven success in confronting the digital divide and providing training to hundreds of community members and service providers in utilizing the Internet and health information, at the end of 2008 the project suffered from a significant decrease in funding. The need of the community project for immediate funding is inconsistent with the time frame required to apply for and to secure Federal research funding. Thus, to secure success of participatory e-health interventions and other health-related CBPR projects, significant changes need to occur in current policies and funding procedures. Federal funding mechanisms supporting research should change these processes and provide faster turn-around time for responses to proposals involving CBPR. In addition, local and private funding agencies can provide funding to community organizations who engage in the process of applying to larger Federal research funding, in order to

increase their chances of both receiving such funding and sustaining their members and activities during the wait period.

CBPR is a relatively new approach to research and CBPR processes are different from established “scientific” procedures that most Federal grants’ reviewers were trained to use. Procedures such as randomization might not be possible or desired in community-setting and CBPR projects, and evaluation of both processes and outcomes are different (Wallerstein, 2006). Consequently, reviewers often do not evaluate CBPR proposals favorably. Despite increases in CBPR funding, including NIH calls for CBPR, the majority of funded research is not based on CBPR principles. In view of the proven success of this approach, funding agencies should follow NIH’s lead and provide separate calls for CBPR proposals evaluated by CBPR experts.

We hope that despite these challenges, other community activists, community members, and communication scholars will come together to address health disparities and the digital divide. Our evolving collaboration was mutually beneficial, and as we engage in the process of applying for Federal grants, we hope to report in a future article on the further implementation and evaluation of the e-health intervention that was described here.

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