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Perspectives, Experiences, and Practices in the Use of Digital Information Technologies in the Management of Depression and Alcohol Use Disorder in Health Care Systems in Colombia

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Abstract

Digital information technologies are increasingly used in the treatment of mental health disorders. Through this qualitative study, researchers illuminated perspectives, experiences, and practices among diverse stakeholders in the use of digital information technologies in the management of depression and alcohol use disorders in Colombia. In-depth interviews and focus groups were conducted in five primary care institutions across Colombia. Thematic analysis was used to analyze the data. The use of technology in the treatment of mental health disorders can facilitate the *evaluation and diagnosis, treatment, and promotion and prevention of mental health disorders*, as well as *multiple nonmental health applications in the primary care setting*. Potential barriers to the use of technology in this setting include challenges of *digital literacy, access to technology, confidentiality, and financing*. This study can inform the implementation of digital information

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The authors declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: One of the principal investigators on this project is affiliated with the business that developed the mobile intervention platform that is being used in this research. This relationship is extensively managed by this investigator and her academic institution.

Supplemental Material

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technologies in the care of depression and problematic alcohol use within health care systems in Colombia.

Keywords

implementation research; qualitative methods; Latin America; Colombia; technology; depression; alcohol; primary health care; qualitative

Introduction

Global leaders have increasingly recognized mental health as a significant contributor to health worldwide. Mental health disorders are among the main causes of morbidity, constituting 7.4% of the global burden of disease (World Health Organization [WHO], 2004, 2011; Pan American Health Organization [PAHO], 2012). Mental health promotion is a significant goal for many countries, especially for those with low and middle incomes. This is in part because more than half of the global population resides in low- and middle-income countries (LMICs), and 76% to 85% of those who suffer from serious mental illness in LMICs do not receive treatment (WHO, 2011). In addition, an insufficient number of mental health professionals are available in these contexts, where there is an average ratio of one psychiatrist per 200,000 people (the ratio of psychiatrists is 120 times greater in high-income compared with low-income countries; “Global Health Observatory [GHO] data,” n.d.; WHO, 2011, 2017). Furthermore, in countries with high rates of violence, citizens tend to suffer increased rates of mental illnesses, such as major depressive disorders and post-traumatic stress disorder.

Colombia’s armed civil conflict generated a large number of victims of violence (Gómez-Restrepo, 2003). This conflict contributes to Colombia’s high rates of mental health disorders among its population (Campo-Arias et al., 2014). Data from the 2015 Colombian National Mental Health Survey show that 6.7% of the population (6.3% of men and 7.1% of women) will have some affective disorder during their lifetime. Depression and alcohol use disorder are common among the Colombian population, as 12.1% and 6.7%, respectively, of Colombians will experience these disorders at some point in their lifetime (Posada-Villa et al., 2004). Furthermore, major depressive disorder is the most common lifetime psychiatric diagnosis among women (14.9%), and alcohol use disorder is among the most common lifetime disorder among men (6.7%; Chaskel et al., 2015; Posada-Villa et al., 2004).

Because of the mental health care system’s lack of capacity to meet the population’s needs, the Ministry of Health and Social Protection of Colombia implemented new policies to improve mental health care, based on the WHO’s “Action Program for the Mental Health Gap” (mhGAP) initiative (Ministerio de Salud y Protección Social, 2012; PAHO & WHO, 2016; Pontificia Universidad Javeriana, 2016). To address the global burden of common mental disorders and alcohol use disorder, WHO promotes a strategy of comprehensive care at the primary care level. It is estimated that up to 80% of depression cases can be resolved in primary care (PAHO & WHO, 2016; Pontificia Universidad Javeriana, 2016). For this resolution to be possible, it is necessary to strengthen primary care teams’ capacity to address common mental and alcohol use disorders.

Colombia is in the process of launching a new model of mental health care to increase the capacity of primary care providers to manage mental health problems and define pathways of care for common mental disorders. This model is aimed at improving access, quality and integration of care, continuity and systematic follow-up of care processes, capacity for problem solving, coordination of professionals to provide integrated services, and continuous measurement of patient outcomes (Gómez-Restrepo, 2003; Pontificia Universidad Javeriana, 2016). To help achieve part of these goals, with funding from the U.S. National Institute of Mental Health, Dartmouth College in the United States and Javeriana University in Colombia have collaborated to launch a new service model called the DIADA project (Diagnosis and Integrated Care for Depression and Alcohol Use Disorder in Primary Care). DIADA aims to implement an evidence-based mental health care model for the comprehensive management of these disorders in some primary care settings in Colombia. We are testing this model in urban, semirural, and rural primary care sites to understand the differences in implementation across sites with differing levels of resources and urbanization.

A key element of DIADA is harnessing the widespread use of mobile phones in Colombia (Ministerio de Tecnologías de la Información y las Comunicaciones [MinTIC], 2017b). As of 2018, mobile penetration in Colombia was as high as 84.5% in some regions of the country, and internet penetration was projected to reach 65% (Chevalier, 2018; Statista Research Department, 2015). Digital therapeutics for mental health and substance use disorders delivered via mobile devices are shown to be highly useful in the widespread delivery of evidence-based mental health therapeutic support tools in many populations worldwide (Marsch & Gustafson, 2013; National Institute of Mental Health [NIMH], 2017; Pontificia Universidad Javeriana, 2016). In LMICs, digital technologies can increase the capacity of the mental health workforce, allowing community health workers and nonmedical health providers to deliver mental health interventions (Naslund et al., 2017). Likewise, these technologies may enable improved access to mental health care. Digital technologies can also play an important role in providing care for stigmatized individuals, as studies have found patient-perceived stigma to be one of the greatest barriers to depression treatment in the primary care setting (Naslund et al., 2017; Whitebird et al., 2013). Digital technologies are also shown to be effective for providing care to displaced populations and to victims of armed conflicts (Naslund et al., 2017). This advantage is particularly pertinent in the post-conflict context in Colombia, allowing individuals to receive evidence-based mental health interventions wherever they are, as long as they have access to a computer or phone.

The incorporation of information and communication technologies (ICTs) in the health care setting may not achieve its objective if cultural, economic, and health system factors are not considered during the implementation process. These challenges underscore the necessity of qualitative studies that seek to understand different perspectives about ICTs and their potential usage. In preparation for the launch of DIADA, we conducted a qualitative study intended to understand the perspectives, experiences, and practices among diverse stakeholders in the use of ICTs in the integrated management of depression and alcohol use disorders in Colombia.

Method

The researchers chose to use a qualitative descriptive design to explore the issues under investigation (Sandelowski, 2000). This design was selected because it allowed the researchers to gain a comprehensive understanding, using the participants' own language and experiences, of perceptions about the use of ICTs in primary care for depression and alcohol use disorder treatment (Kim et al., 2017). In this way, participants' experiences within the primary care setting in Colombia, and opinions about the utility of ICTs, were analyzed and described.

For this study, qualitative research experts conducted focus groups and in-depth interviews. Immediately following the completion of the focus groups, participants were invited to complete an additional interview. If interested, participants were contacted in the following days to complete the interview. The goal of these interviews was to improve our understanding of important aspects of the discussion that occurred during prior focus groups. This study was conducted in partnership with five health care institutions in five Colombian cities located in the country's central zone. The institutions included in project DIADA provide primary care to rural, semirural, and urban populations. These institutions include Site 1 (Bogotá), Site 2 (Duitama), Site 3 (Santa Rosa de Viterbo), Site 4 (Armero-Guayabal), and Site 5 (Lérida). Dartmouth College and Javeriana University's Institutional Review Boards approved this study.

At each participating site, we recruited four types of participants: health professionals, administrative professionals, patients, and community organization representatives. Participants were recruited based on convenience, availability, and willingness to participate. Patients were recruited in hospital departments and community services. Patients were also recruited from patients' associations, which are groups of patients that act as a bridge between patients and hospital administration to ensure that patients' needs are met. We recruited patients across a variety of hospital departments and did not only include patients with a diagnosis of depression or alcohol use disorder, as we wanted to obtain a variety of perspectives and information about stigmas and stereotypes. Patients were eligible for the study if they had used the institutions' services in the last 12 months and were covered by the Colombian health insurance system.

We included health professionals and administrators who work at any one of the participating health care institutions. Potential participants were recruited from hospital departments, through personal contacts, and through hospital mailing lists. The inclusion criterion for community health organization representatives was that they were a social or community organization member who had at least 5 years of experience working in their respective community. All participants were 18 years old or older and signed informed consent before each interview or focus group. Purposive sampling was used for gender, education level, and socioeconomic status in all groups.

A Colombian anthropologist with expertise in health research conducted the focus groups, which were held in the participants' native language of Spanish. None of the participants knew the moderator before the study. Each focus group lasted around 90 minutes. Focus

groups and semi-structured interviews explored topics such as the use of digital technology; use of mobile applications for the management of depression and alcohol use disorder; ease of, and difficulties with, accessing technology; and the feasibility of the integration of technology into depression and alcohol use disorder management (see Supplemental Appendix 1 for example interview questions). The moderator oriented each group to the idea of ICTs and opened a discussion about the use of ICTs, specifically smartphone-based applications for mental health provision, to elicit initial feedback from participants. Two interviewers trained in qualitative methodology conducted the semi-structured interviews. Each interview lasted about 1 hour. Interview and focus group participants were compensated with a gift card of US\$16 (COP 48,000) for their participation. We used audio recorders to record focus group and interview discussions. We transcribed recordings in Spanish so that the full meanings could be captured and analyzed. All identifying information detected in transcripts was replaced with de-identified labels.

Qualitative Analysis

We first completed a deductive analysis of the data using a preliminary matrix created before the start of the data collection process, based on a review of the literature and the specific goals of DIADA (Gilgun, 2019). The matrix included categories such as “health care coverage,” “housing,” and “education” (see Supplemental Appendix 2 for a full list of categories). Three experts, an anthropologist, psychologist, and psychiatrist, discussed and agreed on these categories.

We then conducted a thematic analysis of the data, guided by the preliminary matrix, using NVivo 11 software (Nowell et al., 2017; NVivo Qualitative Data Analysis Software Version 11, 2015). The authors chose to perform a thematic analysis, as it allowed them to conduct an exploratory, content-driven study (vs. confirmatory, hypothesis-driven), as the goal of this research was to help us to better understand and explore patterns across stakeholder perceptions (Guest et al., 2011). This thematic analysis was conducted with a constructionist perspective that sought to understand stakeholder perspectives within their sociocultural contexts and structural conditions (Braun & Clarke, 2006). Three experts in qualitative research, two Colombian psychologists and one American public health researcher, independently read and highlighted the transcripts to first familiarize themselves with the data and then to identify emergent themes.

Transcript analysis was completed in Spanish to ensure fidelity and consistency of findings. These themes were then refined to create a preliminary codebook. We open coded a selected transcript, using the preliminary codebook, to ensure consistency of coding. We then discussed and added additional codes iteratively until reaching thematic saturation (Levitt et al., 2017). Following recommendations for methods to improve rigor in qualitative research, three qualitative experts coded all transcripts using the final codebook (Barbour, 2001). As a form of quality analysis, we conducted a test of intercoder reliability to verify the consistency of the results, demonstrating confidence with Cohen’s kappa coefficient greater than .60. In cases where the coefficient was lower than .60, two coders reviewed the quote, taking into account the definitions in each category, and discussed until reaching consensus. Quotes included in this article were translated from Spanish to English by one of the authors

(who is bilingual) and were verified for cultural accuracy by a Colombian researcher at Javeriana University.

Results

In total, researchers at Javeriana University completed 16 focus groups and four in-depth interviews across our five collaborating health care sites. In-depth interview and focus group breakdowns by site, gender, and age are summarized in Supplemental Tables 1 and 2. The researchers derived eight themes from the categorical analysis of the focus group and interview data. The themes were consistent across focus groups and interviews, and we combined the data in our analysis below. Stakeholders identified multiple opportunities for the use of technology in the (a) *evaluation and diagnosis*, (b) *treatment*, and (c) *promotion and prevention* of mental health disorders. They also found that there are (d) *multiple nonmental health uses of technology in the primary care settings*. However, they identified challenges to the use of technology in this setting including (e) *digital literacy*, (f) *access to technology*, (g) *confidentiality*, and (h) *financing*. Patterns across these data are described below (see Supplemental Table 3 for a comparison table [“community organization representatives,” “patients,” and “patients’ associations” are combined, as comments were consistent across these groups]).

Use of Technologies in the Evaluation and Diagnosis of Mental Health Disorders

In this category, health professionals discussed potential opportunities for the use of technology to access diagnostic criteria, clinical practice guidelines, and measurement scales. In response to a question about what important information a mental health application could include, providers stated, “diagnostic criteria, the [diagnostic] codes, ... scales, interactions with medications ... for basic care management, the *DSM* criteria” (F.G. Health Professionals, Site 2 and F.G. Health Professionals, Site 4).

Health professionals and administrators described how having easy access to the information outlined above could help them to optimize consultation time and streamline the diagnostic process. In addition, they mentioned that through technology they could add fields in the Electronic Health Record (EHR), which could include questions about patients’ mental health. They felt that this addition could facilitate a more comprehensive evaluation and timely diagnosis. Health professionals also expressed that they use technology to seek information that helps them at the time of evaluation and diagnosis. For example, using other health applications, they consult the growth and development tables, as well as the cardiovascular risk, sleep quality, and occupational risk scales.

Use of Technologies in the Treatment of Mental Health Disorders

Health professionals indicated that the use of technology in the delivery of mental health interventions could also help them during the process of remote patient follow-up. They described how patients could use technology to self-monitor their symptoms and generate alerts related to their health. They also discussed how they could use technology to facilitate the improvement of patients’ symptoms and monitor patients’ mental states. They indicated that these improved processes could help them make correct and timely decisions regarding

patient care. In addition, they reported that introducing technologies could be an opportunity to improve communication mechanisms between primary and secondary levels of health care. They felt that technology could facilitate the exchange of information about treatment protocols to patients, thus improving the resolution of cases at primary and secondary care levels. Moreover, they mentioned that mobile applications could be useful if they included clinical practice guidelines, care routes, contraindications, drug interactions, and medication side effects.

However, health professionals expressed concern that the use of mobile applications could interfere with their daily life outside of the workplace by reducing their ability to disconnect from their work. They also agreed that the introduction of mobile applications in mental health interventions, while useful, cannot replace the role of health professionals and the direct contact established in care centers. They described how "... we cannot expect software to do the work that we should do because that would be dehumanizing health" (F.G. Health Professionals, Site 2).

The administrative professionals interviewed expressed that technology could allow them to create an information system where they could access data about the costs of treatment, prescribe medications, and obtain mental health service statistics. This information could provide them with greater knowledge about the field of mental health in Colombia, as in the current health system in Colombia, minimal information is available about the prevalence of depression and alcohol use disorders for specific populations.

Individuals in patients' associations described how the involvement of technologies in treatment could be useful to remind patients to take medicines as prescribed. They also discussed how technologies could be used to help patients understand insurance authorizations within the health insurance system (EPS). In addition, they felt that it could improve and maintain an open channel of communication between health professionals and their patients, where symptoms and requests for appointments could be addressed. They also mentioned that peer groups could be formed using technology to expand patients' support network around health-related issues, to help them learn new skills, and to engage in interactive chats on topics that support healthy lifestyles. Likewise, they described how the use of technology may encourage patients to develop greater knowledge about their symptoms, illness, and treatment. Patients' increased knowledge about their care could allow them to assume a more active role in decision-making regarding their treatment and increase overall patient activation.

Use of Technology in the Promotion and Prevention of Mental Health Disorders

One health professional discussed how important technology has become for publicity and promotion through the internet, television, and social media. Health professionals expressed that because young people pay attention to messages that are delivered through technology, this could represent an important opportunity to promote mental health among this population.

Both administrators and individuals from patients' associations discussed the use of technology in health promotion and prevention. Overall, these individuals were positive

about the potential for the use of technology in promotion and prevention. One respondent felt that technology could be particularly useful for the prevention of mental illness among adolescents. This participant felt that technology could help them become motivated and address their signs of depression before their condition worsened. In relation to a question about the utility of a mental health application for the promotion and prevention of mental health disorders, one respondent from the patients' association in Site 1 stated,

I think that it would be used a lot in prevention ... because I believe that when there is an application that interests people, they start to say: come ...we can be a network of support for this person or that person, or to prevent a person from entering into high levels of depression. (F.G. Patients' Association, Site 1)

However, one of the concerns that administrative professionals raised was that patients might not use technology for prevention because they could feel that it was not necessary. They were concerned that technology might only be used when a patient is already suffering from severe depression or alcohol use disorder, rather than as preventive tool. To address this concern, participants across the focus group categories discussed how this technology would need to be advertised as an application for holistic health, not just mental health, and that it should be promoted as an educational tool.

Nonmental Health Uses of Technology in the Primary Care Settings

In regard to the use of technology to promote general health in the primary care setting, health professionals described how they have an instant messaging group where they share information on topics related to health procedures. In relation to patients' use of technology, health professionals mentioned that they are careful with the type of information or internet pages that they recommend patients to consult, considering that the information could be erroneous or incomprehensible to them.

Patients expressed that they use technology to learn about their health and as therapeutic alternatives to traditional medicine. They also discussed how they use technology to learn about healthy lifestyles that improve their well-being, such as the pursuit of exercise, physical activity, breathing, yoga, and other activities that help them to control their stress and anxiety. In addition, they described how through these tools they acquire new knowledge and skills, such as weaving and cooking. Individuals in the patients' association also recognized the utility of the integration of technology into health care, but shared that it is important to limit its use to prevent its interference with interpersonal relationships: "cell phones separate people, then it becomes all about the cell phone. In my house, what we do is have a game night where everyone throws their cell phones aside and we play games" (F.G. Patients' Association, Site 1). Participants in this group expressed the importance of creating an e-mail account that would allow them to communicate with their relatives to keep them informed about their family member's treatment. These patients also discussed how technology can be used to access social networks.

Digital Literacy

Health professionals, administrative professionals, and patients agreed that the use of technologies could be beneficial for mental health interventions. However, they described

how in general, in the older adult population there is unfamiliarity with the use of technology. They felt that the older population would need support in the use of cell phones and other technologies. Some health professionals also reported difficulties in using these devices: “Do not send me this service because I do not have any idea about [technological] systems” (F.G. Health Professionals, Site 4). Health professionals also expressed that in rural populations there are patients who do not know how to read or write, which could hinder their use of technologies: “Many are still illiterate, in the twenty-first century, and still do not know how to read or write ... they do not even know how to write their signature” (F.G. Health Professionals, Site 2). As a potential solution to this challenge, participants suggested that mobile applications should have an audio component. An additional solution that arose from the health administrators’ focus group was the idea that there could be trainings for older adults around the use of technology. These administrators expressed that because young people have more knowledge about this topic, they could form a group to teach this older population about technology.

Some patients also mentioned that, due to difficulty in the use of technologies, they sometimes lose valuable information about their health processes. For example, they described experiencing this difficulty when the results of health exams are sent to them by e-mail or when they need to download them from virtual platforms. These difficulties were evident not only from patients’ comments, but also from health professionals’ responses. Health professionals described how they occasionally have problems when entering data into the EHR.

Access to Technology

Health administrators mentioned access to technology as a second challenge in the use of ICTs in the primary care setting. They discussed how not all providers have smartphones, and that it is unlikely that the institution where they work provides them: “Not all doctors have cell phones ... what is the chance that there are institutional telephones? There is no chance” (F.G. Administrative Professionals, Site 1). In addition, not all health care centers have broadband internet or state-of-the-art equipment, which can make the use of ICTs more complicated.

We also identified some difficulties in patients’ access to technologies, including that some report not having smartphones, computers or internet connection in their homes: “populations that live in the rural areas do not have computers, ... do not have access to the internet ... I see a limitation there” (F.G. Administrative Professionals, Site 2). Consequently, access to technology could present a barrier to the widespread provision of mental health services facilitated by smartphones or computers. This barrier is particularly prevalent in rural areas of the country, like Site 2 in our study, where one study in 2014 found only a 19% use of smartphones among patients compared with the national average of 42% (Puerto et al., 2016).

Confidentiality and Financing

We identified administrative professionals’ concerns related to the treatment and confidentiality of patients’ data:

when a doctor leaves ... what happens with this application? And the information within it? When a doctor resigns, do we delete the application? That is, I don't have any idea how to manage this type of confidentiality because this is sensitive patient information. (F.G. Administrative Professionals, Site 1)

In turn, some health professionals are reluctant to use their personal cell phones for a hospital service, as they fear that the confidentiality of their information could be affected.

Across stakeholders, another theme discussed was the cost of using technology. Health administrators were concerned about how hospitals would pay for ICTs and how EPS would reimburse them for the use of these services. In contrast, doctors and patients were more focused on the cost of technology for consumers.

Health administrators were also worried that hospitals would not have enough financial resources to sustain the maintenance of technology. They described how there were not enough financial resources in the budget to pay for investment in new projects. One health administrator from Site 1 mentioned,

The other question is the updates of these applications, the cost of the updates of these applications, the maintenance, because in the end, while the project is happening it's ok, but after ... you have to see what it would represent in terms of costs. (F.G. Health Administrators, Site 1)

Health administrators also worried that the EPS would not pay for technology. They mentioned one example where a hospital tried to start a telemedicine program, and although there was interest in telemedicine, psychiatrists were unable to bill for these services:

As a hospital, we have been interested in starting a telemedicine program, nevertheless the same system has impeded the billing for these services ... for two months we had a psychiatrist designated for providing telemedicine who in two months could not bill services, ... the system does not allow the adequate sale of services ... (F.G. Health Administrators, Site 5)

However, health administrators also felt that it was possible that the Ministry of Health or the Ministry of Information Technologies and Communications could provide resources to pay for technology.

In contrast, doctors and patients were more concerned about patients' ability to pay for technology. They felt that an application would have to be free for patients to use it reliably. They were concerned that patients either did not have telephones or only had basic cell phones without data plans. In response to a question about if they would use free mobile technology for health purposes, one patient responded, "If it were free that would be the only way, because sometimes one adds funds [to a cellphone plan], and sometimes one waits so long to add funds that it all runs out" (F.G. Community Organization Representative, Site 2).

Discussion

The main goal of the study reported herein was to explore the perspectives, experiences, and practices among diverse stakeholders in the use of ICTs in the management of depression and alcohol use disorders in Colombia. We sought to understand these patterns of experience within these individuals' sociocultural contexts and the structural conditions that operate within Colombia.

Our participant groups shared distinct points of view about the use of technology in the field of mental health care, given their different roles within the health care system. Nevertheless, health professionals, administrators, patients, and community organization representatives all agreed that technology can benefit the processes of patient care. These participants expressed that technology can facilitate the strengthening of communication between health care professionals and patients and between different levels of care. This opportunity is particularly important in the Colombian context, where there is often a weak coordination of mental health care between multiple levels of care, largely due to fragmentation and instability of networks (Vargas et al., 2016). Furthermore, they agreed that it can facilitate the creation of a record of relevant public health information.

However, although these stakeholders agreed that technology, when used as a tool for mental health, can be beneficial, they also felt that it should only be used as a complementary tool that serves as a bridge for communication. They strongly emphasized that it should not replace the patient-provider relationship. These perceptions may be unique to the Colombian experience around alcohol use disorder treatment, as previous research in the United States has found that patients often prefer online, as opposed to face-to-face counseling, as it allows for anonymity (Dilkes-Frayne et al., 2019). Furthermore, studies have shown that e-mediated communication can strengthen the patient-provider relationship and improve trust by lowering barriers for contacting providers, which was a benefit that was not discussed during our focus groups or interviews (Andreassen et al., 2006).

Among the differences between stakeholders' opinions about the use of technology in the health care field, we found that health professionals, in particular, affirmed that technologies were useful in diagnosis and treatment. ICTs can optimize appointment time, provide doctors with access to clinical practice guidelines and routes of care, and allow them to share information with other colleagues and institutions. They also described how the implementation of technology for patient treatment could facilitate follow-ups with patients over the phone or internet, which could promote the improvement of symptoms and behavioral changes. These findings are consistent with the research of Välimäki et al. (2012) and Marin-Torres et al. (2013) who describe how in the last two decades the use of technology has provided individuals with health difficulties an opportunity to access different sources of information about their illness. Health professionals also described how technology could save them time in appointments and facilitate health data exchange between professionals. They expressed that it could be used in the prevention of mental health disorders to provide health information to patients.

Patients and community organization representatives also focused on how technology could allow patients to play a more active role in their health. They described how ICTs could amplify patients' support network through their inclusion in peer groups. Patients mentioned that through technology they could expand their support network through the creation of chats where they can exchange information about healthy lifestyles. Huang and Su (2009) and Beléndez and Suriá (2010) similarly recognize the use of technology as a valuable means to combat difficulties that affect the quality of life of individuals suffering from mental illness. They describe how challenges such as a lack of personal achievements, difficulties in relating to others, and a lack of leisure activities could be improved through technology. These benefits may be particularly relevant in the post-conflict context of Colombia, where individuals who have experienced violence due to the armed conflict may have augmented difficulties establishing connections (Campo-Arias et al., 2014). Therefore, the integration of ICTs into treatment that facilitate the creation of peer networks could be an important opportunity for improving mental health care in Colombia.

The various stakeholders interviewed also had differing concerns about the use of technology to deliver health interventions. We found that some health professionals were concerned about the confidentiality and treatment of patient data. These fears are related to Arboleda (2010) and Garay-Fernández and Gómez-Restrepo's (2011) work highlighting how the handling of data electronically has become a concern in the health field. Hyler and Gangure (2004) highlight two important aspects of this topic: confidentiality and security. Concerns about confidentiality relate to control of the use and disclosure of patient information, considering the sensitivity of patient data. Security refers to how the protection of patient information is guaranteed. Our results indicate that health professionals may more readily accept the use of technology in health care settings if they feel that participants know the strategies used to increase the security of their data. Some of these strategies include the permanent monitoring of technology-based health interventions and the existence of systems that prevent unauthorized access to patient data.

In contrast, health administrators saw the ability to finance the implementation and sustainability of these tools as the main challenge to their integration into health settings. Health administrators were concerned that there are not enough financial resources to invest in new projects and to update technology. Furthermore, they mentioned that insurance providers cannot assume the financial cost of these projects, and that they currently do not have billing codes for this type of technology usage in Colombia. To further introduce technology into the health workforce, it is necessary to have a greater diffusion of technology and better knowledge among health professionals and administrators about the utility of these tools. Above all, the health system could consider including digital technologies in the publicly funded health basket.

Finally, patients and community organization representatives were most focused on the idea that in the creation of mental health applications, researchers should pay attention to their acceptability to patients. They felt that applications should not be presented as only for individuals with mental disorders or "alcoholics"; rather, they should be marketed as holistic health applications. In LMICs like Colombia, a lack of information or false information about mental illness is one of the main drivers of stigma and major reasons why individuals

do not seek care (Campo-Arias et al., 2014). Colombia's experience with internal conflict is associated with an increase in mental illness stigma, due to the challenges that victims of violence experience in establishing connections and their fears of social rejection (Campo-Arias et al., 2014). Consequently, the creation of a more comprehensive application with aspects of promotion and prevention, in addition to therapeutic aspects, could be a strategy to reduce stigma-related barriers that are unique to patients with mental illness in Colombia.

Regarding digital literacy, most of the stakeholders interviewed agreed that there is a generational difference in the capacity to use technology. This challenge is evident within a study of access, use, and challenges of ICTs in Colombia (MinTIC, 2017b). This study found that 70% of the population between 16 and 34 consider the internet to be very important in their lives, whereas 55% of individuals over 55 do not consider it to be relevant (MinTIC, 2017a, 2017b). It is essential to educate patients about the use of these technologies to achieve better dissemination. Our participants reported that to resolve these disparities, older adults could be trained by younger individuals in the use of technology to increase their access to this tool. These findings align with current research in Colombia that found that 46% of people over the age of 55 do not use the internet, due to a lack of knowledge, but that 63% of these individuals were willing to learn (MinTIC, 2017a, 2017b). In addition, global trends point toward older adults' increasing use of technology and social media; from 2017 to 2018, the number of global Facebook users aged 65 and older increased by almost 20%, which could represent increased opportunities for delivering care to this population through technology (McDonald, 2018).

This novel, formative study has influenced the creation of a new model of care for providing depression and alcohol use disorder screening and treatment in primary care settings in Colombia. From this study, we learned that some health professionals and administrators feel uncomfortable using technology and have concerns about data confidentiality. These responses led us to implement technology trainings for these stakeholder groups regarding our novel model of care. Patients' feedback about their concerns around technology usage affected how we implemented technology in the primary care setting; we have support staff available at each step of patients' interactions with technology, from the electronic screening kiosk to the mobile intervention application.

Health professionals' insights around their desire for tools that include mental health symptoms, psychological treatments, and clinical practice guidelines led us to create a tablet-based decision aid for patient screening and treatment. The distinct perspectives of the four stakeholder groups interviewed during this study provide new insights into opportunities to leverage digital technology in scaling-up access to evidence-based mental health resources in Colombia and could inform future qualitative studies in other LMICs worldwide, particularly those that have experienced internal conflict.

One of the limitations of this study is that we recruited from health care centers that had already agreed to participate in the DIADA project. As this project is based around the use of technology, individuals affiliated with these sites may be more supportive of the integration of technology into primary centers than individuals in the general population. In addition, our study findings could be limited by the relatively low number of in-depth

interviews conducted as part of our study, as well as a lack of data on race and socioeconomic status of stakeholders. This sample choice and size could limit the generalizability of our findings.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Diana Goretty Oviedo-Manrique is anthropologist and PhD in Public Health with a meritorious degree for her research on health social movements in Colombia. Her experience focuses on the judicialization of the health right, the forms of access to health services and the experiences of illness in the health system in vulnerable populations as migrants. She has been a political advisor to organizations of patients with orphan diseases and high-cost treatments.

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