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Harnessing Psychology and Technology to Contribute to Making Health Care a Universal Human Right

Ricardo F. Muñoz, *Palo Alto University*

The United Nations General Assembly proclaimed the Universal Declaration of Human Rights in 1948. It included the right to medical care. Now, 70 years later, psychologists are recognized as health care providers and have developed several evidence-based health interventions. Digital interventions have the potential to scale access to evidence-based interventions to a degree unimaginable even a few decades ago. This article addresses five key concepts: (a) knowledge is meant to be shared, (b) evidence-based interventions are essential, (c) treatment is not enough to reduce prevalence of mental disorders; prevention is key, (d) nonconsumable interventions have the greatest potential for scalability, and (e) technology now allows us to blanket the world with psychological interventions. By harnessing technology, we can now think globally, act locally, and share globally. Psychology can thus help reduce human suffering beyond our local settings, and contribute to making health care a universal human right.

The United Nations General Assembly proclaimed the Universal Declaration of Human Rights in Paris, France, on December 10, 1948. Article 25 stated: "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing, and *medical care* and necessary social services..." (United Nations [UN], 1948). This is the historical source of the goal to make health care a universal human right.

In 1948, physicians and nurses were the primary providers of medical care. By 2018, psychology has developed many evidence-based health interventions. Psychologists have joined the ranks of health care providers. We are now in a position to contribute to making health care a universal human right.

In this article, I describe in some detail the experiences that have led me to the conclusion that if psychology harnesses the potential of current digital technology, we could indeed contribute substantially to making health care a universal human right. In the process, I will address five key concepts:

1. Knowledge is meant to be shared.
2. Evidence-based interventions are essential in health care.
3. Treatment is not enough to reduce prevalence of mental disorders. Prevention is key.
4. Nonconsumable interventions have the greatest potential for scalability.
5. Technology now allows us to blanket the world with psychological interventions.

Concept #1: Knowledge Is Meant to Be Shared

I grew up in a town called Chosica, in Perú, South America. In 1961, when I was 10 years old, my mother sat me down and said to me: "Your father finished primary school, I finished high school, and we want our children to go to the university. But, we do not have the money to send you. So, your father has decided to immigrate to the United States, where there are many educational opportunities. When you finish your education we'll come back to Perú, so you can share what you've learned with people here."

In that moment, my mother taught me the following: First, knowledge was important enough for us to move halfway around the world in order to obtain it. Second, once obtained, that knowledge was meant to be shared.

Many years later, I ran across an inspiring quote from George Miller's presidential address to the American Psychological Association. The quote applied my mother's teachings to our work as psychologists: "I can imagine nothing we could do that would be more relevant to human welfare, and nothing that could pose a greater challenge to the next generation of psychologists, than to discover how best to give psychology away" (Miller, 1969, p. 1074).

Keywords: digital interventions; technology; prevention; nonconsumable interventions; universal human rights

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Concept #2: Evidence-Based Interventions Are Essential in Health Care

On September 6, 1977, six days after completing my Ph.D. in clinical psychology, I began working at the University of California, San Francisco, as an assistant professor in the department of psychiatry at one of our teaching hospitals, San Francisco General Hospital. The hospital is located in the Mission District, the Latino barrio where I had grown up after immigrating to the United States. As I began to try to share what I had learned in my training, I discovered that our services did not offer evidence-based psychological treatments, such as cognitive behavioral therapy. Neither did we offer mental health prevention interventions or mental health services in Spanish.

I had learned the importance of evidence-based interventions from Albert Bandura, my senior thesis advisor at Stanford University (Bandura, 1969). I still remember his drawing a graph on the board of an upward-moving line, depicting increasing symptoms, and explaining that by regression to the mean, on the average, symptoms were most likely to decrease, thus transitioning to a downward-moving line. To attribute improvement to the treatment, it was important to have a control condition so that one could test whether the active treatment produced faster reduction in symptoms than just the passage of time. Bandura's work on social learning/social cognitive theory and self-efficacy (Bandura, 1977a, 1977b, 2001, 2004) inspired me to try to share with my trainees and our patients psychological self-change methods to treat clinical problems, prevent such problems whenever possible, and continually promote healthy mental, emotional, and behavioral development to shape our personal reality (Muñoz, 1996).

As I began to work with the people served at San Francisco General Hospital, which is a safety-net hospital, it became increasingly clear to me that it was particularly important for people with the fewest resources not to receive inferior treatments. They had little discretionary time or money. Whatever interventions we offered them should have been well tested in treatment outcome studies and ideally evaluated again with our population and in our context.

In 1985, in collaboration with two fellows in the University of California, San Francisco Clinical Psychology Training Program (Muñoz et al., 2015), Jeanne Miranda and Sergio Aguilar-Gaxiola, I founded the Depression Clinic at San Francisco General Hospital (renamed Zuckerberg San Francisco General Hospital in 2015). The clinic provided individual and group cognitive behavioral therapy in Spanish and English to primary care patients of the hospital. We set up the clinic as a training clinic for psychiatry residents, psychology interns, and psychology postdoctoral fellows, and were thus able to provide therapy at no charge to the patients for 10 years. We developed treatment manuals based on the book *Control Your Depression* (Lewinsohn, Muñoz, Youngren, & Zeiss, 1992). The book was heavily influenced by the pioneering work of Peter M. Lewinsohn (Dimidjian, Barrera, Martell, Muñoz, & Lewinsohn, 2011), who was my dissertation chair, and the treatment manuals that Lewinsohn, Antonette Zeiss, Mary Ann Youngren, and I had developed as part of the randomized controlled trial that had been the core of our dissertation work (Zeiss, Lewinsohn, & Muñoz, 1979). The "Manual for Group Cognitive-behavioral Treatment for Major Depression: A Reality Management Approach" (Muñoz, Ghosh-Ippen, Rao, Le, & Dwyer, 2000) has gone through several revisions over the years. It consists of an "Instructor's Manual" and a "Participant's Manual," reflecting the social learning approach on which it was based.

Our group, the Latino Mental Health Research Program, conducted several studies to determine whether our manuals were effective in the very diverse, very low-income population served by San Francisco General Hospital (Aguilera et al., 2016). Our findings show that our adapted interventions are effective in reducing depression symptoms (Muñoz & Mendelson, 2005) in Spanish- and English-speaking, White, Latinx, and African American (Kohn, Oden, Muñoz, Robinson, & Leavitt, 2002) primary care patients. The manuals have also been shown to be effective in primary care settings across the country (Wells et al., 2000), with adolescents (Rosselló & Bernal, 1999; Rosselló, Bernal, & Rivera-Medina, 2008), and when administered by lay substance abuse counselors to depressed substance abusers (Watkins et al., 2011). The manuals are available for downloading at no charge from the Institute for International Internet Interventions for Health (i4health, n.d.) and have been used in several states and countries. We ask that translations of the manuals be sent to us for posting on our website, with the understanding that they can also be shared at no charge with anyone who wants to use them. Thus far, we have translations in Spanish, Chinese, Japanese, Korean, Greek, and Persian.

Freely sharing the treatment manuals we have developed at San Francisco General Hospital by offering them to anyone in the world is one way to contribute to making health care a universal human right. However, a limitation of the manuals is that they require a health care provider to administer the treatment. In addition, treatment is usually provided only to people with serious clinical depression. Why wait to teach people how to manage their mood until they are suffering from a major depressive episode? Why not

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teach them these skills *before* they develop clinical depression?

Concept #3: Treatment Is Not Enough to Reduce Prevalence of Mental Disorders— Prevention Is Key

In September 1972, as I began my Ph.D. training in clinical psychology at the University of Oregon in Eugene, I took a course on community psychology taught by Ed Lichtenstein. Our first assignment was to attend a board meeting of the Lane County Community Mental Health Center. At that meeting, a psychologist named Richard Ingraham gave an impassioned talk on what he termed "primary prevention." In brief, he chided us psychologists, psychiatrists, and social workers for sitting in our offices waiting for people to suffer enough to have to come to see us for treatment, or to be dragged into our offices by their families or by the police for being disruptive in the community. He suggested that, in addition to providing treatment, we should be going out into the community to share with people what we had learned as mental health service providers, in order to prevent mental, emotional, and behavioral disorders in their lives. His message was so compelling, that I decided then to devote a good portion of my professional time to develop, evaluate, and disseminate evidence-based preventive interventions to as many people as possible.

Under the mentorship of Jim Kelly, who invited me to coauthor my first publication (Muñoz & Kelly, 1975), and an *Annual Review of Psychology* chapter on social and community interventions (Kelly, Snowden, & Munoz, 1977), I did in-depth literature searches on prevention of mental disorders. My impression was that, at the time, there were many aspirational articles about the need to do prevention (Kessler & Albee, 1975). But there were no outcome studies showing that we could successfully prevent specific mental disorders. In 1984, the National Institute of Mental Health published *Depression: What We Know*, in which the authors stated: "In general, the onset of a clinical depression cannot be prevented" (Lobel & Hirschfeld, 1984, p. 4). I felt this categorical statement was not accurate because, although there were no studies showing that depression had been prevented, neither were there studies showing that it could not be prevented. In fact, there were no randomized controlled depression prevention trials at the time. My colleagues and I conducted the first such randomized controlled trial, with funding from the National Institute of Mental Health (Muñoz et al., 1995). And we published two books on the subject (Muñoz, 1987; Muñoz & Ying, 1993). Our first study focused on preventing major depressive episodes in primary care patients (Muñoz, Ying, Armas, Chan, & Gurza, 1987). In collaboration with Huynh-Nhu (Mimi) Le and others, we later developed interventions designed to prevent postpartum depression in women who are pregnant (Le, Muñoz, Soto, Delucchi, & Ippen, 2004; Muñoz et al., 2007). The Depression Prevention study was conducted in English, Spanish, and Chinese, and the Mothers and Babies study in Spanish and English. The Depression Prevention Course (Muñoz, 1984) and the Mothers and Babies Course (Muñoz, Ghosh-Ippen, Lieberman, Diaz, & La Plante, 2001) have been adapted to work with diverse populations. Mimi Le has brought the Mothers and Babies Course to Africa (Catholic Relief Services, 2018).

To conduct depression prevention trials, one must screen potential participants to ensure that they do not meet criteria for major depressive episodes at the beginning of the prevention trial. The logic of prevention studies is that you begin with individuals who do not have the clinical condition to be prevented and you examine whether the participants who received a preventive intervention develop the clinical condition at a significantly lower rate than the control group. As we conducted the first trial and screened a large number of primary care patients at the hospital, it became clear that many of these patients were already suffering from clinical depression. These findings led to the creation of the Depression Clinic, mentioned above.

As was the case for many of us who grew up in the 1960s, we took very seriously the idea of "thinking globally and acting locally." From that perspective, working to reduce the suffering caused by depression made sense. Depression is the number one cause of disability worldwide. The World Health Organization estimates that there are over 300 million people worldwide who suffer from major depression (World Health Organization [WHO], 2018). Providing depression prevention and treatment services for our local patients was a reasonable focus for our work. In addition, depression contributed to many other health problems, such as smoking (Hall, Muñoz, Reus, & Sees, 1993).

In the 1980s, I was asked by Sharon Hall to join her research program on smoking cessation. She was interested in testing whether interventions focused on depression could increase quit rates in smoking cessation trials. I learned a tremendous amount working with her (Hall, Muñoz, & Reus, 1994). Based on my work on smoking, Eliseo Pérez-Stable invited me to join his research program on smoking cessation for Spanish speaking smokers (Pérez-Stable, Marín, Marín, & Katz, 1990; Pérez-Stable, Sabogal, Marín, Marín, & Otero-Sabogal, 1991). When we were unable to recruit Spanish-speaking smokers to come in person to smoking cessation groups, we attempted and succeeded in helping Spanish-speaking smokers quit smoking using printed material administered via surface mail (Muñoz, VanOss Marín, Posner, & Pérez-Stable, 1997). At about the time we were conducting the mail intervention study in the 1990s,

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the World Wide Web came online. It occurred to me that if we could help smokers using materials sent through the mail, perhaps we could do the same via the Internet.

As I began working with smoking, it became clear to me that this health problem also fit well with the idea of "thinking globally and acting locally." After all, smoking is the number one cause of preventable death worldwide. But as I began this research program, I was still thinking locally. Our goal was to reach smokers in San Francisco and throughout the state of California.

In 1997, I wrote my first Internet grant, and successfully obtained funding from the Tobacco-Related Disease Research Program (TRDRP, n.d.) to develop a website for smoking cessation in Spanish and English. Our goal was to test the question, "Can web-based smoking cessation interventions match the patch and help reduce health disparities?" Smoking cessation rates range from 14% to 22% for the nicotine patch and 24% to 27% for smoking cessation groups. We found we could indeed match the patch. Our best condition tested so far yielded a 26% abstinence rate at 6 months for Spanish speakers (Muñoz et al., 2006). Later studies have yielded 12-month abstinence rates of 20% for Spanish speakers and 21% for English speakers (Muñoz et al., 2009). These rates use the conservative "missing equals smoking" convention, in which we assume that any participant who is missing data at any follow-up assessment is smoking. But what was really amazing to me was that from San Francisco General Hospital we were able to reach people throughout the country and throughout the world. With the support of a Google Ad grant we were able to advertise our website globally. In our last study, which lasted 2 ½ years, 292,278 smokers visited our website (Muñoz et al., 2016). In addition, we morphed this study from a randomized controlled trial format to a "Massive Open Online Intervention" (MOOI, inspired by Massive Open Online Courses, or MOOCs). Any smoker visiting the site was able to download our smoking cessation guide in Spanish or English at no charge from the landing page. The smoking cessation guide yielded a 10% abstinence rate in our earlier studies (Muñoz et al., 1997), so there is the potential that as many as 29,000 smokers (10% of those visiting the site) may have been able to quit using the guide. Smokers who signed consent were able to pick any of the intervention elements we had tested in previous randomized trials, thus making this study a participant preference trial. Of the 18,154 visitors who signed consent, allowing us to follow them up to obtain actual abstinence data from them, 3,479 (19%) provided data indicating that they had quit (Muñoz et al., 2016). Therefore, this MOOI, available to any adult smoker in the world at no charge, was still able to match the reported abstinence rates of the nicotine patch.

Could similar interventions be effective for the prevention of onset of major depressive episodes? First, we need to consider the evidence that major depression can be prevented. The Institute of Medicine (now the National Academy of Medicine) has published two consensus reports on the evidence for prevention of mental, emotional, and behavioral disorders. The first one, titled "Reducing Risks for Mental Disorders: Frontiers for Preventive Interventional Research" (Mrazek & Haggerty, 1994), pointed out that many risks for mental disorders have been identified, and reducing risks for these disorders was the way to begin efforts to prevent them. This second report, titled "Preventing Mental Emotional and Behavioral Disorders Among Young People" (National Research Council and Institute of Medicine, 2009), came to the conclusion that by 2009 there was sufficient evidence to support the contention that we could not only begin preventing mental, emotional, and behavioral disorders but that we could also begin engaging in promotion interventions to strengthen individuals, increase resilience, and increase their ability to manage their lives.

In 2015, the Institute of Medicine officially changed its name to the National Academy of Medicine (National Academies of Science, Engineering, and Medicine, 2015). The National Academy of Medicine is currently carrying out a third consensus study focused on "Fostering Health Mental, Emotional, and Behavioral (MEB) Development Among Children and Youth" (National Academies of Science, Engineering, and Medicine, 2018). The mental health field has been gradually moving from a sole focus on treatment of mental disorders, to prevention of mental disorders, promotion of health, and now fostering healthy development. This movement is obtaining momentum partially from the growing evidence base for prevention interventions, and partially from the failure of a sole focus on treatment to reduce the prevalence of mental disorders in our communities. George Albee's warning is relevant here:

> John Gordon, a professor of epidemiology at Harvard in the late fifties, sat me down and said:
> *"No mass disorder afflicting humankind has ever been brought under control or eliminated by attempts at treating the afflicted individual nor by training large numbers of therapists."*
> I never forgot his words, and I make my classes memorize them because this is the essence, the whole spirit of public health. One does not get rid of mass plagues afflicting humankind, including the plague of mental and emotional disorders, by attempts at treating the individual.
>
> (Albee, 1985, p. 213)

The evidence for prevention of mental disorders, for example, for the prevention of depression, is continuing to grow (Muñoz, Beardslee, & Leykin, 2012; Muñoz, Cuijpers, Smit, Barrera, & Leykin, 2010). However, to

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have an impact on incidence and prevalence of depression and other mental, emotional, and behavioral conditions, we need to consider ways to scale our efforts beyond individual face-to-face interventions to the population level.

Concept #4: Nonconsumable Interventions Have the Greatest Potential for Scalability

Our experience with Internet interventions has made clear to me that our massive reliance on consumable interventions keeps health care unnecessarily expensive. Consumable interventions are interventions that are "used up" when administered. For example, the nicotine patch is meant to be discarded at the end of today. Similarly, a cognitive behavioral treatment session is used up when administered. That is, the hour a therapist spends with a patient can never be used to help another patient. In contrast, nonconsumable interventions can be used again and again, without losing their therapeutic power. Neither do they "drift" from the intervention as tested. They can be used anytime, anyplace, and are scalable worldwide. They can also be provided at minimal marginal cost. As we stated in our recent article on "Digital Apothecaries":

> The marginal cost [of digital interventions], that is, the cost of providing it to one more person, gradually approaches (though never reaches) zero. A website or an app that costs $100,000 to create costs $1,000 per user if 100 people use it, $100 per user if 1,000 people use it, $1 per user if 100,000 use it, and 10 cents per user if one million people use it. Psychotherapy sessions (type 1 or type 2 interventions) generally cost one hour of a professional's time, no matter how many clients seek therapy...
>
> (Muñoz et al., 2018, p. 6)

Massive Open Online Interventions (MOOIs) offering prevention or treatment interventions online have the potential of reaching anyone in the world interested in utilizing such interventions. And, because, once constructed, they cost a relatively modest amount to keep active, they could feasibly be made available to users at no charge. One of the limitations of MOOCs, however, is the high level of attrition. For example, a MOOC provided by the Massachusetts Institute of Technology on "circuits and electronics" had 155,000 people register, of whom 7,157 (4.6%) passed the course. Although the proportion completing and passing the course could be seen as disappointing, one of the professors involved in the course pointed out that "If you look at the number in absolute terms, it's as many students as may take the course in 40 years at MIT" (Hardesty, 2012). As we begin using online interventions, we should pay greater attention to the *absolute number* of people who use our MOOIs as intended, and not just the *percentage* of visitors to MOOIs who utilize the sites.

As we reported in our article on MOOIs, to help 3,479 smokers quit would have cost much more using nicotine patches. Given that abstinence rates for the nicotine patch range from 14 to 22%, and

> ... assuming a 20% quit rate for illustrative purposes, one would have had to treat five times as many smokers to yield 3,479 who quit, or a total of 17,395 smokers... If the 17,395 smokers used the nicotine patch daily for 10 weeks and the patches cost $3 apiece, the individual cost would be $210 per smoker or a total of $3,652,950 for the patch alone (not counting the salary of the health-care providers) compared with the $200,000 to maintain our Web site.
>
> (Muñoz et al., 2016, p. 202)

The $200,000 we spent keeping the site live (which had already been constructed with a TRDRP research grant) was approximately $100,000 for advertisement, which we carried out using a Google Ad Words grant, and approximately $100,000 in support from the University of California Office of the President and a grant from the Brin/Wojcicki Foundation. The difference between $3,652,950 had we used the nicotine patch and $200,000 by keeping our website live and sharing it worldwide at no charge to the smoker illustrates the massive differences in cost between consumable and nonconsumable interventions.

Nonconsumable, web-based interventions have been shown to be effective for the treatment of depressive symptoms. A meta-analysis of individual participant data has shown that self-guided (and thus nonconsumable) Internet-based cognitive behavioral therapy is efficacious in the treatment of depressive symptoms (Karyotaki et al., 2017). However, meta-analysis is based on a review of randomized controlled trials. This leaves open the question of whether web-based interventions used routinely outside the strict structure of randomized controlled trials would also be effective. We certainly do not want to provide inferior treatment by using digital interventions. Fortunately, the United Kingdom's national health service provides a report on the routine use of psychological therapies provided to residents of the U.K. A report based on 1,267,193 referrals received between April 2014 and March 2015 indicates that 468,881 individuals who met criteria for a clinical "case" finished a course of treatment and, of these, 44.8% moved to recovery (Community and Mental Health Team & Health and Social Care Information Centre, 2015). A finding that I found surprising, as a cognitive-behavioral therapist, is that computerized cognitive behavioral therapy showed the

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highest rate of recovery (58.4%). Traditional face-to-face treatments, such as interpersonal psychotherapy, psychodynamic psychotherapy, behavioral activation, cognitive behavioral therapy, and others had recovery rates between 44% and 54%. These findings need to be interpreted with caution. The rates of recovery are based on the final modality of therapy used by the patient. Thus, individuals with more serious depression may have received face-to-face treatment after other modalities were not effective. Nevertheless, the computerized cognitive behavioral therapy recovery rates are based on responses to treatment for individuals who met clinical criteria for depression at the beginning of treatment. Computerized cognitive-behavioral therapy does not appear to be an inferior form of treatment.

Studies seeking to determine whether Internet interventions can also be effective in the prevention of depression are starting to appear. A randomized clinical trial carried out in Germany examined the effect of a web-based guided self-help intervention for prevention of major depression in adults with subthreshold depression (Buntrock et al., 2016). The study found an incidence rate of 41% in the control group and 27% in the intervention group, a statistically significant reduction in incidence. One way to think about these findings is that about a third of the individuals in the intervention group who might have developed a major depressive episode during the year of the study were spared that experience.

Based on the evidence available when we reviewed the literature for our 2014 chapter (Muñoz, Schueller, Barrera, Le, & Torres, 2014), I believe that, with current knowledge, it is possible to prevent 50% of new episodes of major depression. Already, groups of scientists are joining forces to move the field of prevention forward. The Global Consortium for the Prevention of Depression (GCPD, n.d.) has called for making the prevention of depression a global priority (Cuijpers, Beekman, & Reynolds, 2012). If we could actually reduce incidence of major depressive episodes by half, we would spare 150 million people worldwide from the emotional pain and problems in functioning associated with clinical depression. It is hard to imagine how we could do this without the use of massive means of communication that have the potential to reach everyone in the world, such as digital interventions.

Concept #5: Technology Now Allows Us to Blanket the World With Psychological Interventions

Digital interventions now allow us to add a third phrase to the "Think globally, act locally" dictum. We now have proof of concept that we can "Think globally, act locally, share globally" (Muñoz et al., 2016). Many evidence-based digital interventions have been shown to be effective in treating and preventing mental disorders. Given that such interventions could reach anyone with access to the Internet, does the health field have an ethical obligation to offer treatment and preventive services to all who could benefit from them? In 1955, Jonas Salk, when asked by Edward R. Murrow who owned the patent on the polio vaccine, answered: "The people, I would say. There is no patent. Could you patent the sun?" (Global Citizen, 2013).

The current cultural norms for "monetizing" intellectual property get in the way of actualizing the potential of sharing therapeutic and preventive knowledge freely with all those in need. It is important to acknowledge that, in order continually to improve interventions, to conduct outcome studies, and to keep websites and apps updated as digital platforms become obsolete, there must be a revenue stream for the developers of such interventions. This suggests the need to commercialize evidence-based digital interventions and to allow market forces to determine which interventions will become successful enough to endure. The danger in commercializing psychological knowledge is that companies offering such interventions may be subject to the same pressures of pharmacological companies to tout studies that show evidence of effectiveness and to withhold publicizing those that do not.

The field needs to encourage both commercial digital tools and freely available apps and MOOIs. We need to create public awareness of the difference between evidence-based interventions and those that are not based on any empirical evidence. In addition, we need to make sure that users are informed on whom the interventions were tested. Otherwise, the long-standing limitations of evidence-based interventions that have only been tested on selected populations will continue to hamper the digital intervention field. One way to increase transparency in this regard would be for digital interventions such as apps, websites, and text messaging interventions to provide easily accessible "box scores" that continually update their effectiveness data. For example, smoking cessation sites could list abstinence rates at 1, 3, 6, and 12 months for all users, and then, separately, for men and women, different age groups, educational levels, income levels, ethnicity, language, and so on. With the large numbers of users that are available to digital tools, this is much more feasible than for the smaller numbers available for face-to-face interventions.

We must be alert for the possibility that third-party payers could point to the empirical evidence that digital interventions, including totally automated ones, are effective to curtail payment to therapists providing face-to-face interventions. We should guard against low-income populations being offered only the less expensive, automated digital interventions, and be effectively blocked from seeing live therapists. It will obviously be important for the field to keep a close eye on these

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potential travesties and to advocate strongly for maintaining access to highly trained practitioners for those who need them. Empirical studies will be needed to identify who benefits from which type of intervention. Such studies can help provide evidence-based decision making to make sure that, as Isaac Marks and colleagues have stated, "Patients should get all the time, expertise and individual attention they need, but not more" (Marks, Cavanagh, & Gega, 2007, p. 9)

As we move forward, we need to examine carefully whom we are leaving behind. The "digital divide" is becoming less and less pronounced. By 2019, smartphone penetration is estimated to reach close to 80% in Western Europe and North America, and over 50% in Latin America and Asia/Pacific regions (Statista, n.d.). And mobile devices accounted for 73% of Internet consumption in 2018 (Zenith, 2017). This means that we can now reach over half of the world's population via mobile devices. In Internet studies conducted by my team since 2003, we have been able to reach most of the cities in most of the world (Figure 1). In the last 15 years, over 1,800,000 visitors from 233 countries and territories have landed on our Internet intervention websites (Figure 2). One small team of psychologists has been able to offer Internet interventions to a much larger number of people that we could have reached using traditional, consumable interventions.

Our team has put forward the idea that Internet interventions can reduce health disparities (Muñoz, 2010). However, we have also tested the hypothesis that lower income individuals from lower income countries are less likely to benefit from our Internet interventions. As it turns out, smoking cessation rates in users of our smoking cessation websites are higher in countries with greater gross domestic product and individuals with higher levels of education and higher subjective socioeconomic status (Bravin et al., 2015). This suggests that Internet interventions, though benefitting people across the world, have the potential to increase disparities between those with higher resources and those with lower resources, at both the individual level and the national level. This unintended consequence needs to be monitored by our field.

The Internet intervention field has created associations of clinical researchers interested in moving the field forward. For example, the International Society for Research on Internet Interventions (ISRII, n.d.) publishes the journal *Internet Interventions* (Elsevier, n.d.). Other major publications in this area are the *Journal of Medical Internet Research* (JMIR, n.d.) and sister publications. Researchers working in this field are developing ethical and legal guidelines (Fitzgerald, Hunter, Hadjistavropoulos, & Koocher, 2010) and are taking care to monitor potential negative effects of Internet

Figure 1. Cities represented in users to health intervention websites launched by Muñoz and colleagues.

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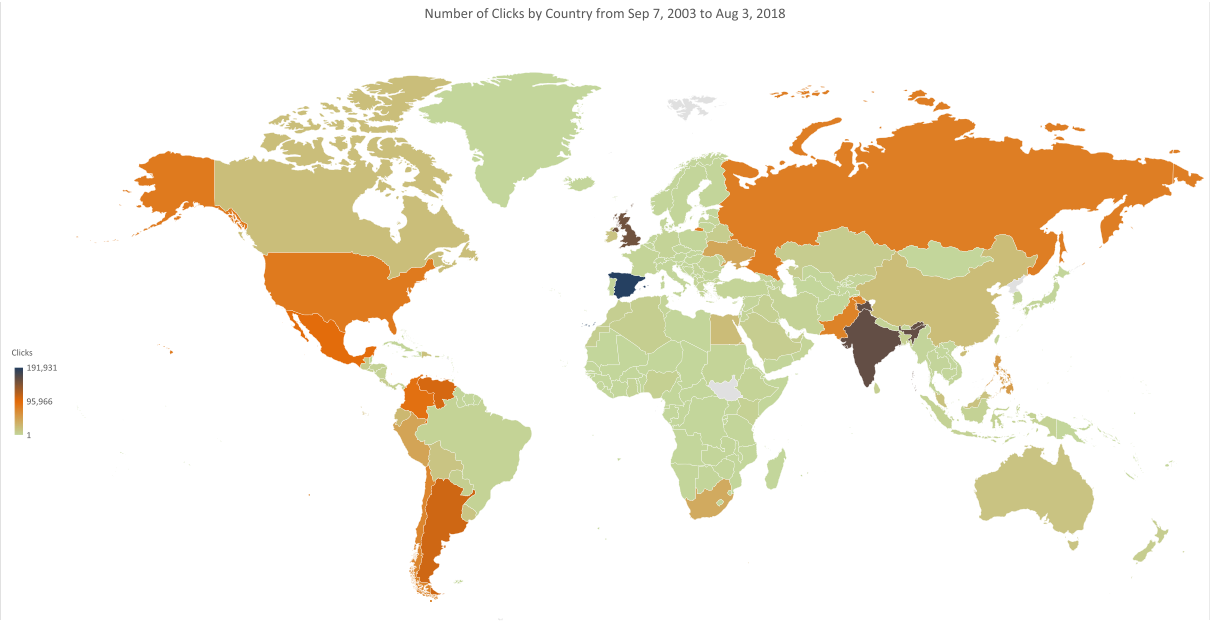

Figure 2. Number of visitors to health intervention websites hosted by Muñoz and colleagues, 2003–2018: 1,870,368 visitors from 233 countries and territories

interventions (Ebert et al., 2016; Rozental et al., 2014). As the field moves forward, clinicians need to remain open to both the potential benefits and the potential unintended consequences of advances in technology.

The 2017 ABCT Think Tank on Digital Interventions in Mental Health published an article titled "Digital Apothecaries: A Vision for Making Health Care Interventions Accessible Worldwide" (Muñoz et al., 2018). In that article, a taxonomy of health interventions is put forward which might be useful in considering how to integrate technology into practice. Four types of possible health interventions are put forward: Type 1 consists of traditional in-person clinical services that do not utilize digital tools. Type 2 retains the traditional therapist-client format, in which there is a formal therapeutic contract, with the therapist retaining clinical responsibility for the case, but now using digital tools, including apps, websites, text messaging, and perhaps wearable technology to monitor personal clinical data.

Type 3 and Type 4 are self-help interventions, in which there is no therapeutic contract, and no clinician in charge of the case. Type 3 are "guided" interventions, in which those hosting the website or providing the app also provide guidance in how to best use the app, including encouragement to adhere to the intervention to reduce dropout rates and increase effectiveness. Such coaching may be provided via chat rooms, text messages, email, phone contact, or in-person support. However, this support is not intended as therapy, and does not involve a therapist-client relationship. Type 4 interventions are unguided, self-help interventions provided on a totally automated website or app. Guided interventions have been shown to be more effective than totally automated self-help interventions (Andersson & Cuijpers, 2009). On the other hand, because they involve human intervention, they are consumable, and thus more expensive to provide.

Type 4 interventions are ones that have the greatest potential to be offered to anyone in the world. Once found to be reasonably effective, they can be shared freely or for relatively low cost. Type 3 interventions can be offered by localities that decide to devote the resources to staff them, or by commercial companies that charge their users a fee to pay for the coaches. Type 2 interventions are embedded in clinical practice, either by public sector therapists or by therapists in private practice. Again, the key difference between Type 2 interventions and Types 3 and 4 is that Type 2 interventions involve a therapeutic contract, with a professional provider being clinically responsible for the interventions used, including digital interventions. Type 2 interventions can be provided in person, via phone, online, using text messaging, and so on. The American Psychological Association has published guidelines on the practice of telepsychology (Joint Task Force for the Development of Telepsychology Guidelines for Psychologists, 2013).

One of the obstacles to the application of psychological advances in health care is the limited number of licensed professionals who can provide Type 1 interventions. Recent randomized control trials demonstrating the effectiveness of evidence-based interventions when delivered by trained lay health workers in India (Patel et al.,

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2017) and Africa (Chibanda et al., 2016) suggest that we could greatly increase access to these interventions by training more such providers. This would increase the number of people benefitting from Type 1, in-person interventions. Digital tools could also be used in training more providers. In fact, they could be used to train more Type 2 providers, by preparing both licensed professionals and lay health workers to use digital tools in their practice. Providing health care providers with well-tested digital tools shown to enhance the effectiveness of psychological interventions would decrease the tendency toward "drift" that is inherent in face-to-face therapies.

The optimal combination of Type 1, 2, 3, and 4 interventions will take some time to be determined and will vary depending on the local availability of resources. A helpful way to think about this issue is the concept of "market segmentation." Among all individuals in a community who could benefit from prevention or treatment interventions, some segments of the population will be willing and able to seek mental health services. But some segments will only accept help from primary care providers, or perhaps from religious leaders. Still others might be willing to use anonymous online tools or self-help books. The health care system ought to provide all these avenues of health care delivery in order to serve all segments of our communities.

Ideally, policy makers and the public health system would carefully examine data from clinical trials and cost-effectiveness studies and commit adequate funding to provide the most efficient combination of services. It is important for our field to continue to develop and evaluate innovative methods to reduce the prevalence of health problems in our communities and to share our findings widely. Unfortunately, empirical evidence does not always determine public policy. Limited resources, multiple demands on funds, political struggles to determine priorities, and institutional resistance to change all slow down the application of new knowledge. Often gatekeepers serve as obstacles to the dissemination of innovations that would greatly help people. One of the advantages of Type 4, fully automated digital interventions, is that we can go around these obstacles. Our studies have shown that people from all over the world can access evidence-based online interventions at no charge to them or to their local or national health care systems. We have not had to establish agreements with health bureaucracies or political systems. By going directly to the people via the Internet, we have been able to "give psychology away" to the world, as George Miller imagined (Miller, 1969, p. 1074).

Concluding Remarks

Psychologists are now recognized members of the health professions. The field of psychology has developed a large number of evidence-based interventions. We are therefore poised to contribute substantially to the goal of making health care a universal human right. Advances in digital technology make it possible to reach large proportions of the world population. Psychological interventions, and particularly cognitive-behavioral interventions, because of their strong learning components, have been successfully adapted for use via these mass communication methods. Thus, we can now share psychological knowledge on an unprecedented scale. Several digital interventions have earned the status of evidence-based interventions. Unlike other mass media channels, such as radio and television, digital tools do not just provide one-way communication, but also allow interaction with users. This allows the gathering of cognitive, emotional, and behavioral data to track clinical progress and to allow for tailor-made interventions responsive to individual data entry. Totally automated self-help interventions can now be provided in the form of MOOIs (Muñoz et al., 2016). Collections of such digital interventions could eventually be housed in "Digital Apothecaries" (Muñoz et al., 2018), that is, online portals that would provide access to evidence-based digital preventive and treatment interventions for many health conditions. By blanketing the world with nonconsumable digital interventions, psychology can now help reduce human suffering beyond our local settings, and contribute to making health care a universal human right.

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Address correspondence to Ricardo F. Muñoz, Ph.D., Institute for International Internet Interventions for Health (i4Health), Palo Alto University, Palo Alto, CA 94304.; e-mail: rmunoz@paloaltou.edu.

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