Mechael, Patricia. "mHealthy Behaviors: Engaging researchers and practitioners in a facilitated dialogue on mobile-mediated health behavior change." *mHealth in Practice: Mobile technology for health promotion in the developing world*. Ed. Jonathan Donner and Patricia Mechael. London: Bloomsbury Academic, 2013. 1–14. *Bloomsbury Collections*. Web. 26 Apr. 2023. <<http://dx.doi.org/10.5040/9781780932798.ch-001>>.

Downloaded from Bloomsbury Collections, www.bloomsburycollections.com, 26 April 2023, 11:42 UTC.

Copyright © Jonathan Donner and Patricia Mechael 2013. You may share this work for non-commercial purposes only, provided you give attribution to the copyright holder and the publisher, and provide a link to the Creative Commons licence.

1 mHealthy Behaviors

Engaging researchers and practitioners in a facilitated dialogue on mobile-mediated health behavior change

Patricia Mechael, mHealth Alliance at the UN Foundation and Earth Institute at Columbia University
Jonathan Donner, Microsoft Research

Introduction

From diagnostics to disease surveillance to telemedicine, there is an explosion of interest regarding the application of mobile communication technologies to support health initiatives. One topic garnering particular enthusiasm is the use of mobile telephones to support and promote healthy behaviors and to prevent unhealthy behaviors. These behavioral support and change initiatives are particularly challenging (and promising) when applied to resource-constrained settings where other forms of outreach and messaging are not cost-effective, and where few other channels for customized outreach (digital or otherwise) are available. In the first decade of the twenty-first century, billions of people have purchased the first telephone of their lives – clearly there are opportunities to leverage these new connections for public health.

As mobile phone-based health promotion activities and campaigns increase in scale and momentum, understanding the pathways to behavior change and the role of mobile technology is essential. This is not simply an abstract theoretical exercise, but rather a matter of immediate practical concern as programs need to be developed, protocols approved, and change pursued. Yet it seems that there are few opportunities for exchange of information and proven practice between practitioners and researchers. At the moment, there is limited knowledge among practitioners on best practices and how best to optimize or evaluate the role of mobile-mediated interactions as they relate to health behavior change.

To support this need, the Technology for Emerging Markets Group (TEM) at Microsoft Research India and the Center for Global Health and Development (CGHD) at the Earth Institute at Columbia University hosted a workshop and roundtable in London, from 16 to 17 December 2010, called mHealthy Behaviors: using mobile phones

to support and promote healthy behaviors in the developing world. Travel support was provided by MSR India and a generous grant from the GSMA Development Fund, with extensive additional technical support provided by CGHED. The first day of the event was an open session held in conjunction with the 4th International Conference on Information and Communication Technologies and Development (ICTD2010) conference at Royal Holloway Campus of the University of London¹. The second day was a closed-door roundtable hosted by London School of Hygiene and Tropical Medicine. Representing mobile-mediated behavioral change and support projects in Latin America, Africa, Europe, and South Asia, the contributors included mHealth practitioners from NGOs and the private sector, as well as researcher/practitioners from leading academic institutions.

The first goal of the sessions was to give practitioners an opportunity to make their implicit change models regarding the use of mobile technologies for behavior change and health promotion explicit, and to identify best practices for implementation as well as research priorities for the future. The second goal was to begin to craft the chapters in this volume.

The conversations in the United Kingdom and the accompanying background papers provided the basis for the original chapters on mobile-enabled behavioral change included in this volume. For some of our authors, this was a rare opportunity to document their experiences for their colleagues in the mHealth field, to explore behavior change and communication models, and to position their experiences within the context of other programs and research of relevance to their areas of practice. In other cases, behavioral researchers and epidemiologists working in the areas of mHealth and behavior change were engaged to share their own learning on what is working or not when it comes to evaluating the impact of such programs.

The domain of mediated behavior change is, of course, not new. There is a rich tradition of research and practice of mass media behavior change campaigns (Rice and Atkin, 2001; Hornick, 2002; Siegel and Lotenberg, 2004). Yet interactive channels such as computers and mobile phones bring new issues to the fore and may not be adequately addressed by established social marketing paradigms (Lefebvre and Flora, 1988). Thus, the closest volumes available now are from the internet space (Rice and Katz, 2001) and from the mobile field (Fogg and Eckles, 2007; Fogg and Adler, 2009). The latter is an excellent, accessible volume by leaders in the field. However – similar to much of the literature available on mHealth – Fogg and Alder do not focus on developing countries, nor do they directly interrogate what works and what does not work with an eye toward best practices Mechael, Batavia, Kaonga, Searle, Kwan, Fu, and Ossman (2010). Chapter two by Kwan, Mechael, and Kaonga in this volume aims to bridge this gap in the literature and pulls from existing sources as well as the work of contributing authors and other practitioners using mobile to promote healthier behaviors.

The mHealthy behaviors sessions

This work began in direct response to the ample programming, increasing hype, and recognizable gap within the mHealth literature of what works and how it works when it comes to programs that aim to leverage mobile technology to engage individuals in stopping an unhealthy behavior or taking up an activity that would preserve their well-being and prevent the onset of illness and disease. With rapid increases in funding for such programs, particularly in low and middle income countries – where the health disparities are greatest – the need to unlock the secrets to the pathways to change became increasingly apparent. To start, we began by combing the literature and mHealth community for projects and research that could tell the mobile-mediated behavior change story from multiple angles – particularly from the perspective of those of practitioners implementing such programs and researchers evaluating their impact. We also wanted to address the ‘do-know’ gap in mHealth, whereby the majority of programs are being implemented in low and middle income countries with the majority of research and evaluation coming from high-income settings (Mechael and Searle, 2010). We also wanted to ensure geographic representation to compare and contrast the maturity of mHealth, cultural, language, and socio-economic considerations. It was through these lenses that authors and their respective projects and research were selected and invited to participate in what would become a nine-month long reflective exercise, which ultimately led to the full development of the chapters included in this book.

The projects and authors involved in this effort are as follows:

Table 1.1 Authors and subjects

Author(s)	Organization	Chapter Description
Caroline Free	London School of Hygiene and Tropical Medicine	Outlines the methodology and processes used to develop the txt2stop intervention in the UK
Divya Ramachandran	University of California, Berkeley	Provides the author's personal experience and work on addressing rural maternal health issues using mobile persuasive messages in India
Hajo van Beijma and Bas Hoefman	Text to Change	Highlights positive feedback and challenges of Text to Change's early pilot and scale-up efforts of SMS campaigns in Uganda

Continued

Table 1.1 Continued

Author(s)	Organization	Chapter Description
Heather Cole-Lewis	Yale School of Public Health	Details the author's reasons for and experience in conducting a systematic review of literature on the use of text messaging as a tool for behavior change and disease management in a global context
Ilta Lange	Catholic University of Chile	Reflection on lessons learned from a tele-care initiative on self-management support of patients with Type 2 diabetes in Chile
Jessica Osborn	Grameen App Lab	Early lessons learned from one of the first fully implemented projects in mHealth – Mobile Technology for Community Health (MoTECH) in Ghana
Jose Gomez-Marquez	Massachusetts Institute of Technology	Underscores challenges and evolution of an approach to TB treatment adherence
Peter Benjamin	Cell-Life	Personal account of initiating and expanding HIV communications in the ICT field in South Africa
Salys Sultan and Permanand Mohan	University of the West Indies	Personal account from software developers in mHealth, working on the MediNet Project in the Caribbean
Subhi Quraishi and Hilmi Quraishi	ZMQ Software	Details experiences in developing mobile phone games for health communication, with a focus on HIV/AIDS, in India

While we specifically targeted this effort to focus on the use of mobile technologies for behavior change in developing countries, we included the work of Free at the London School of Hygiene and Tropical Medicine as the use of text messaging is increasingly being incorporated in smoking cessation campaigns

throughout the world. The rigorous intervention design and research provides an excellent case study of what mHealth for behavior change initiatives ought to aspire toward as many now seek to transition from pilots to scale.

To begin this process, we invited each author to develop an abstract and/or short outline that addressed the following (deceptively simple) question: what is it that you intended to do, and why/how did you believe it would work? Related questions for authors included:

- Did/does your project have a specific model of behavior change? If so, how did you match your design to this model?
- Where did you go for guidance? What literature or other projects were influential? Is your model unique to 'mobile' behavior change or does it draw on/inform broader behavior change models?
- Conversely, how did the project execution inform your model? How did it evolve over time? Did you make any mid-course adjustments? Would you use the model again?
- How was your change model reflected in your evaluation plans?
- What methods did you use to assess the success of your program? To what extent were you able to measure changes in behavior?
- What recommendations might you make to program implementers and evaluators based on your experience?

The back-to-back workshop and roundtable included a discussion on the need for practitioners to engage both with formal behavior change theory and with the more iterative, natural pursuit of technological and organizational best practices, a gap that many in the medical (Lomas, 2007), education (Amabile, Patterson, Mueller, Wojcik, Odomirok, Marsh, and Kramer (2001), and management (Amabile, Patterson, Mueller *et al.*, 2001) communities have argued can be hard to bridge. It involved a 'reflective spirit' of interactive discussion (Schön, 1983; Argyris, Putnam and Smith, 1985) with elements of action research, a focus on guided discussion, open exchange, and reflection. Pre-work included reading excerpts of the Reflective Practitioner (Schön, 1983), and made references to the theatrical practice of 'breaking frame' (for example, Kantor and Hoffman, 1966) and to Failfare², the set of ICT4D meetings in which failed projects are scrutinized, celebrated, and used as the basis for rapid learning. Returning to that deceptively simple question, part one (what is it you intended to do?) promised to bring us along well-trod paths in workshop settings, while part two (why did you believe it would work?) offered

more opportunities for reflection, and more explicit links to change models (Frumkin, 2006). Many of the change models utilized by the contributing authors were done without prior or formal articulation; only a few had proactively researched and applied explicit strategies for behavioral change.

The half-day workshop was open to attendees at ICTD2010, hosted at the Royal Holloway campus of the University of London. Eleven invited panelists from around the world shared their experiences in a format that actively engaged the audience, including other mHealth practitioners and researchers, in the discussions. The sessions followed a ‘fish-bowl’ design; audience participants moved in and out of the discussion by taking a seat among the panelists. This session enabled us to gain a sense of the interest levels in the broader ICTD community, as well as to identify questions that we ought to consider ensuring that we tackle within this volume. Notes from this session are available on the public website for this reflective writing collaboration³.

The second session was a full-day, closed-door roundtable at the London School of Hygiene and Tropical Medicine (also a part of the University of London). In preparation of the closed session, we provided targeted feedback to each of the authors to expand their abstracts to 3,500 – 6,000 word documents. The bulk of the roundtable was spent walking through change models and the application of theoretical frameworks to the various projects and research and discussing the paper drafts from participants. Practitioners and researchers in the mHealth domain were asked to approach their practice from a variety of perspectives, mixing formal or implicit theory (of behavior change, in this case), with intuition and adjustment on the fly. Numerous commentators have defined such approaches as ‘change models’.

mHealthy behavioral themes

This introductory chapter highlights many of the themes that emerged throughout the process of developing this edited volume and draws heavily on the public and private dialogue of the authors along with other mHealth and mobile communication practitioners. The following chapter provides the context out of which the programs described in this book grew, including an overview of the state of the mHealth and mHealth for behavior change fields. For the practitioner chapter contributions, each of the author experiences fell into one or more of the following themes:

- Designing for individuals is different from designing for caregivers.
- Technology-supported behavior change and support requires a multidisciplinary team.
- Calibrate for the low end vs. the high end of the technical landscape.

- Organizations matter. Ensure buy-in and openness.
- Start with scale in mind. Decide if failure is an option.
- Local context matters.
- Link theory to practice via behavior change models.
- The elusive art of measuring change.

Designing for patients is different from designing for caregivers

Some of the authors and workshop participants highlighted the differences between deploying mHealth solutions for caregivers and for individuals. The descriptions of ALTAS in Chile (by Lange) and MOTECH in Ghana (by Osborn) describe how the single systems had both a caregiver and a patient component, developed somewhat simultaneously. Cole-Lewis's paper correctly captures the essence of this distinction – 'even when the goal in any case may be behavioral change or support, we cannot skip from use of technology to measuring health outcomes, without understanding the mechanism of change by which we expect the health outcomes to improve'. Interventions focused on patients are different from interventions focused on providers, and demand different designs and evaluation methods.

For designers perhaps more familiar with working in organizational settings with people relatively more like them – nurses, doctors, managers – the shift to designing for end-users may require even more engagement and listening. Discussion at the workshops suggested that focus groups and follow ups could uncover mismatches between the assumptions of designers and the end-users (Heeks, 2002), such as the stigmas around reminders vs. the opportunity to develop self-esteem through positive messages, as discovered by many of the contributing authors. As Gomez-Marquez explained, securing user involvement (for example, participatory design processes (Sjöberg and Timpka, 1998)) right from the beginning was critical. By engaging users as designers, face-to-face beside the designer not in front of them during interviews (or worse, kept at a distance via mediated surveys and remote consultations), more optimal directions were discovered, including the opportunity to use cellphone minutes (airtime) as a reward and incentive.

Technology-supported behavior change and support requires a multidisciplinary team

Sultan and Mohan, Gomez-Marquez, Benjamin, and Cole-Lewis underscore how the development and deployment of a mobile-mediated behavior change initiative is, like most ICT initiatives in healthcare, a multidisciplinary undertaking

(Bakker, 2002). Sultan and Mohan were computer scientists with an inkling of a great idea, but without the help of a medical doctor, their initiative to craft a system to support diabetes care and treatment would not go far. Similarly, Benjamin described how important it was for their team of electrical engineers to work with a medical doctor – not as much for insights into end-users. In their case, the value was to allow for insights into how to work effectively within the national healthcare system and its associated bureaucracies. For the Adhere.IO project, Gomez-Marquez described the formation of a multidisciplinary team that combined ‘chemistry, mechanical engineering, policy, economics, and clinical experience. Beyond creating diversity in the group, we forced cross-functional tasks to avoid attacking the problem conventionally. In fact we did not have an IT person at the inception of the project.’

In the discussion of her systematic literature review, Cole-Lewis also broached the multidisciplinary issue, from a different angle. Not only are teams multidisciplinary, but so must be metrics and meta-analyses. Cole-Lewis could not count on a standardized set of metrics from the studies she assessed; they came from different disciplines, and had different approaches to assessment and evaluation.

Calibrate for the low end versus the high end of the technical landscape

Some people have smartphones. Some people have basic phones, capable of only voice calls and text messaging. However, a lot of people have something in-between – one of hundreds of different configurations of ‘feature phones’ capable of running some software, snapping a picture, accessing a simple web page, or playing back a video. A challenge for many mHealth projects in resource constrained settings is that the ratios of smartphones: feature phones: basic phones are shifting. As Benjamin describes in detail, practitioners must elect whether to proceed with a lowest common denominator approach (voice calls, IVR, SMS, USSD), or to build and deploy against higher expectations of users’ handsets and network capabilities, using data, images, software, video, etc. As with the case in other development domains, like livelihoods and agricultural information systems (Donner, 2009), there is no correct answer; only a caution that the set of options must be evaluated before a choice is made. What made sense for Text-to-Change (SMS messages to potentially every user in a geographic area) was not the same as what made sense for Ramachandran (prenatal care videos loaded on the handsets of healthcare workers, who then shared them by sitting alongside pregnant women and mothers).

Osborn’s chapter offered a detailed description of the trade-offs Grameen made in Ghana when selecting handsets for the nursing component of a project

leveraging mobile phones to facilitate reporting from clinics for maternal and child health. They elected to provide dedicated feature phones to nurses in their program, while end-users in the midwives program accessed their parts of the system using IVR. For the demands of the nurse's system SMS would have been expensive (on a per message basis), insecure, and hard to customize. Despite unease with providing dedicated handsets to nurses, the flexibility of the Java environment on the feature phones made the choice worthwhile.

But feature phones are not just for caregivers and dedicated users; Quraishi and Quraishi's chapter on mobile games in India suggests that scale can be achieved with initiatives targeting feature phone end-users, as well. They describe a suite of mobile games, calibrated to run on popular feature phone handset models and hosted by Reliance (a major network in India). Once the games became available on other networks, over 40 million users had potential access; ZMQ logged over ten million game sessions in three years.

Organizations matter. Ensure buy-in and openness

Participants and authors alike describe from how important it was, throughout their deployment processes, to secure deep and widespread commitment and organizational buy-in, not just from eventual users but the partner organizations. This buy-in may be a particularly important point in health initiatives – it is rare for a new initiative to emerge and tackle green-field terrain. Systems must work well within or alongside existing public health administrations and procedures. In Lange's case in Chile, this meant that her team at the university had to spread and share credit for the diabetes management system with the Ministry of Health. Meanwhile, for MOTECH in Ghana, Osborn explains how the cooperation of the Ghana Health Service helped signal to nurses that the requirements of the system were part of their core jobs, not simply as 'something extra brought to them by an external organization that would one day go away'.

In the fishbowl session, these themes also surfaced, including linking with government ministries from the beginning to keep them involved throughout different phases of the project; aligning project data structures with those used by government; actively educating government ministries about the opportunities in mHealth, and working with local nongovernmental organizations to find out how best to align with government priorities and existing programs and systems.

Start with scale in mind. Decide if failure is an option

Peter Benjamin, a leader in mHealth for over ten years, expressed strong opinions about the push for scale in the mHealth field. 'Going from pilots to scale is really hard. Pilots are easier; there's a lot of attention, excitement, focus, more support.

To go to scale is really hard because almost the only way to plan is top down. It's much harder to get enthusiasm, energy in doing that.' Scale can be easier when working with telecommunications companies (Donner, Verclas and Toyama, 2008). In the fishbowl, one participant described how working with telecommunications companies can be arduous, with long approval processes and layers of meetings, but the scale (as Quraishi and Quraishi describe working with Reliance) is enormous. Partnerships can be achieved via corporate social responsibility (CSR) goals (as was the case with Text to Change in Uganda) or with the business development group, if the business case can be made. Osborn explained Grameen pursued this latter strategy with MTN in Ghana: 'Compared with working with the public sector, it's easier because you have similar goals, but financial sustainability is an issue.'

Regardless of telecommunications companies' involvement, an initiative's path to widespread adoption and use is likely to be a mix of serendipity, organic growth, and careful choices. As Gomez-Marquez explained in the fishbowl, starting with scale in mind is essential. Audience members echoed this point, drawing examples of both technical robustness and business models.

But there is some merit in pilots, and in caution. One related conversation brought some productive tension to the fishbowl. Some suggested that scale is not likely to be achieved through incremental tweaks to other pilots. Gomez-Marquez's comments and chapter reflect this perspective, suggesting that mHealth interventions may still be a place for thinking big, about 'high-risk, high reward' projects. 'Some will surely flop, but the winners might shine through' (or you might learn from failure itself – see <http://failfaire.org>). Another audience member, on the other hand, suggested that pursuing projects that might fail was irresponsible, since lives were at stake in health. A third attendee suggested rapid prototyping and solid testing, as a way to marry innovation with caution. Thus the facilitated dialogue brought participants toward a discussion of deeper assumptions and of change models, and made salient some difficulties in moving from pilot to scale. (If it were easy to move from pilot to scale, we would not see so many pilots that stay pilots.)

Local context matters

Similarly there was a tension between localism and scalability among the various projects and authors and finding the balance between localization and universality. This led to a range of decisions and trade-offs among the various approaches. For Divya Ramachandran this meant opting for a higher level of technology, namely videos featuring local women and health workers to strengthen the ability of the health worker to more effectively engage women in improved behaviors during pregnancy. 'When you think about content design – you need to be thinking behavior change, not about knowledge. We focused on two actions – saving money

to prepare for an emergency during birth and ensuring women take iron.’ It became increasingly necessary to identify what would motivate women to take up these two actions and to tailor the videos to such things, including dispelling myths about the effects of iron on babies.

In the case of Grameen, the findings of a formative ethnographic field study meant forgoing the original plan to use text messaging as part of their Mobile Midwife platform and direct to ‘pregnant women’ messaging to using voice recordings in local language and expanding the target audience to ‘pregnant families’ due to preferences for voice communication and shared mobile phones at the household level. Through the process of testing out voices and messages with local stakeholders, they were also able to refine and tailor messaging to appeal to their target audience.

For Text to Change, they found that partnering with local content experts and linking their program to local institutions provided familiarity and a direct mechanism for measuring the impact of their SMS-based quiz programs. In the case of Text to Change, they were able to assess the knowledge levels through the responses to their questions and at one point discovered that the questions were too easy – that they had to make them more challenging. They were also able to assess the impact of their messaging program in the uptake of HIV and AIDS testing and counseling services through their partnership with local service providers. According to Hajo van Beijma, ‘as mHealth – we are trying to offer value to traditional health services.’

Link theory to practice via behavior change models

Linking theory to practice is common in academic settings. However, the notion of applying a change model to one’s work was less familiar to some of the practitioners in the group. This was particularly felt throughout the iterative writing process, where many of the practitioners expressed some difficulties in articulating and aligning their assumptions with existing behavior change models – even though many of them subconsciously applied such models to the design of their platforms and programs. Many of the initiatives described in the book aim to increase awareness, knowledge, and self-efficacy; address beliefs, misconceptions, myths, and barriers; and introduce new behaviors, such as self-monitoring skills and adherence to medication in an effort to improve health outcomes and contribute to reduced costs, achieving Millennium Development Goals, and connecting the previously unreached. To generate change such programs aim to leverage social and peer pressure, beliefs, incentives, and competition. Persuasion was highlighted by Divya Ramachandran as a key driver of her work to target the beliefs that people have and build on them to catalyze change.

Very few of the participants in this process began with an explicit, articulated change theory – but rather focused on techniques that cut across multiple models or reflected post-haste on models that might apply to the choices they made in designing and implementing their programs. Games as a medium as in the case of ZMQ allow users the choice to create a virtual real-time scenario, quick learning, and behavior change through a hybrid approach that engages people in the use of social platforms into which people opt. Caroline Free's work on Text2Stop provides a recounting of the theoretical underpinnings of message creation and the mechanisms through which they ought to be delivered. In the private author discussions, many found kindred spirits in the challenges of formulating messages in a positive way with the appropriate tone, type, and amount of information.

The elusive art of measuring change

Given the desire to explore the range of approaches to evaluating the impact of mHealth on behavior change, we explicitly asked participants in both the external and internal dialogues to share their experiences in research and monitoring and evaluation. Heather Cole-Lewis's systematic review of SMS in disease prevention and disease management identified twelve studies for inclusion. Seven focused on disease management of which six were diabetes and one was asthma. Five studies focused on prevention, including one on smoking cessation and one on weight loss. All study designs included a measurable health outcome, but only nine had sufficient power to identify change (Cole-Lewis and Kershaw, 2010). For the others, there was consensus that it was very difficult to start with a research-driven approach as program design and the capabilities of what technology can do are changing rapidly. In addition, it was felt that within a few years of operation on the ground, the research questions change – making it a challenge to measure behavior change in a coherent manner.

For Divya Ramachandran it was felt that the 'evaluation process and design process need to be very linked – but it was hard to disaggregate how mHealth versus other interventions were affecting these expectant mothers.' According to Hajo van Beijma, it was difficult to start with a research-driven approach. Text2Change was engaged in three studies at the time of publication to help answer the question – *can we use social incentives to engage people in health programs?* Just a few years ago, people thought that technology could not change people's behaviors. A word of caution repeated frequently by Peter Benjamin is that 'counting SMSes is not evaluation. Things are starting to change and mHealth is becoming more legit.' Cell-Life will soon have data from two formal randomized control trials to answer the questions – *can cellphones support HIV+ mothers in Prevention of Mother to Child Transmission of HIV?* and *does sending SMSes to people change their behavior?*

Many people say that there is a psychological value in receiving SMSes. It makes them feel that the health system cares for them. We will know more when the study results come out.

Conclusion

This edited volume provides a platform for reflection and dialogue on an aspect of public health that has challenged practitioners for decades, namely behavior change. What happens then when from technology is introduced into the mix? There is a significant amount of hype and optimism surrounding mobile-mediated behavior change. This book aims to bring us down to earth to consider the collective experience of the pioneers who have learned by doing, some for over ten years. mHealth as a field is continuously evolving and platforms increasingly being mainstreamed and deployed at scale. Short of reinventing the wheel, the authors in this book provide insights that rarely see the light of day and couple them with the more academic and structured application of change models to better understand the pathways through which behavior change is possible.

Notes

- 1 General conference website: <http://www.ictd2010.org>.
Workshop website: <http://www.mhealthybehaviors.org>
- 2 <http://failfaire.org>
- 3 <http://www.mhealthybehaviors.org>

References

- Amabile, T., Patterson, C., Mueller, J., Wojcik, T., Odomirok, P., Marsh, M. and Kramer, S. (2001), 'Academic-Practitioner Collaboration in Management Research: A Case of Cross-Profession Collaboration', *The Academy of Management Journal* 44(2): 418–31.
- Argyris, C., Putnam, R. and Smith, D. (1985), *Action Science: Concepts, Methods and Skills for Research and Intervention*, San Francisco: Jossey-Bass.
- Bakker, A. (2002), 'Health Care and ICT, Partnership Is a Must', *International Journal of Medical Informatics* 66(1-3): 51–7.
- Cole-Lewis, H. and Kershaw, T. (2010), 'Text Messaging as a Tool for Behavior Change in Disease Prevention and Management', *Epidemiologic Reviews* 32(1): 56–69.
- Donner, J. (2009), 'Mobile-Based Livelihood Services in Africa: Pilots and Early Deployments', in M. Fernandez-Ardevol and A. Ros (eds), *Communication Technologies in Latin America and Africa: A Multidisciplinary Perspective*, Barcelona: IN3: 37–58.
- Fogg, B. and Adler, R. (2009), *Texting 4 Health: A Simple, Powerful Way to Change Lives*, Stanford: Captology Media.
- Fogg, B. and Eckles, D. (2007), *Mobile Persuasion: 20 Perspectives of the Future of Behavior Change*, Stanford: Captology Media.
- Frumkin, P. (2006), *Strategic Giving: The Art and Science of Philanthropy*, Chicago: University of Chicago Press.

- Ginsburg, M. and Gorostiaga, J. (2001), 'Relationships between Theorists/Researchers and Policy Makers/Practitioners: Rethinking the Two-Cultures Thesis and the Possibility of Dialogue', *Comparative Education Review* 45(2): 173–96.
- Heeks, R. (2002), 'Information Systems and Developing Countries: Failure, Success, and Local Improvisations', *The Information Society* 18(2): 101–12.
- Hornick, R. ed. (2002), *Public Health Communication: Evidence for Behavior Change*. Mahwah, NJ, Lawrence Erlbaum.
- Kantor, R. and Hoffman, L. (1966), 'Brechtian Theater as a Model for Conjoint Family Therapy', *Family Process* 5(2): 218–29.
- Lefebvre, R. and Flora, J. (1988), 'Social Marketing and Public Health Intervention', *Health Education Behavior* 15(3): 299–315.
- Lomas, J. (2007), 'The in-between World of Knowledge Brokering', *BMJ (Clinical research ed.)* 334(7585): 129–32.
- Mechael, P., Batavia, H., Kaonga, N., Searle, S., Kwan, A., Fu, L. and Ossman, J. (2010), *Barriers and Gaps Affecting mHealth in Low and Middle Income Countries: Policy White Paper*. New York, Center for Global Health and Economic Development, Earth Institute, Columbia University.
- Rice, R. and Atkin, C. eds., (2001), *Public Communication Campaigns*. Thousand Oaks, CA, Sage Publications, Inc.
- Rice, R. and Katz, J. eds., (2001), *The Internet and Health Communication: Experiences and Expectations*. Thousand Oaks, CA, Sage Publications, Inc.
- Schön, D. (1983), *The Reflective Practitioner: How Professionals Think in Action*, New York: Basic Books.
- Siegel, M. and Lotenberg, L. (2004), *Marketing Public Health: Strategies to Promote Social Change*, Sudbury, MA: Jones and Bartlett.
- Sjöberg, C. and Timpka, T. (1998), 'Participatory Design of Information Systems in Health Care', *JAMIA* 5: 177–83.