Chapter 8
Afterword: Reflections on a Decade of mHealth Innovation in Asia

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The role of mobile phones in healthcare improvement in Asia, particularly in resource-constrained contexts, is a significant topic, and there has long been a need for quality research to develop the field regionally. In this pursuit, this volume is a timely contribution, focusing our shared interests on the importance of sociocultural influences on the adoption, appropriation, and impact of varied mobile affordances on health. This is a timely tome, particularly considering a personal trajectory of research—it is a decade since the publication of our first paper on Indonesian midwives and mobiles post-tsunami (Chib, Lwin, Ang, & Santosa, 2008), and half a decade since I summarized the benefits of, and barriers to, mHealth impact in developing countries (Chib, 2013), culminating in a call for application of contextual and critical conceptualization, methodological plurality, and expansion of the evidence base. As many scholars in this volume present evidence in response to those projections made, it seems fitting that this concluding chapter respond to their contributions.

It is obvious that we need to interrogate the existing literature, theories utilized, assumptions made, and the evidence available. In the past decade, there has been a spate of review studies in mHealth (Blynn & Aubuchon, 2009; Fjeldsoe, Marshall, & Miller, 2009; Fry & Neff, 2009; Gurol-Urganci, de Jongh, Vodopivec-Jamsek, Car, & Atun, 2012; Klasnja & Pratt, 2012; Mechael et al., 2010; Patrick, Griswold, Raab, & Intille, 2008; Tomlinson, Rotheram-Borus, Swartz, & Tsai, 2013). More recently, the attention of mHealth reviews has shifted gradually toward developing countries (Agarwal, Perry, Long, & Labrique, 2015; Chib, van Velthoven, & Car, 2014; Deglise, Suggs, & Odermatt, 2012), with two of the four most-read studies in the Journal of Health Communication concerning mHealth (Gurman, Rubin, & Roess, 2012; Higgs, et al., 2014). A common refrain, echoed by the editors of this volume, in this range of review studies is the lack of rigorous evidence, particularly

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in scaling pilot projects, usually program interventions conducted on small samples, to general populations. It is worthwhile to refrain on commenting on whether this volume addresses this research gap till we have reflected on the broader objectives strived for.

This manuscript provides a timely perspective within which to situate future developments for the use of mobile phones by healthcare service providers in resource-constrained contexts. The contributors to this volume present a range of studies based on empirical evidence from a range of Asian contexts. It is debatable whether any individual study provides substantive and irrefutable scientific evidence for mHealth impact, or an individual policy recommendation for mobile phone use (or a ban) within the formal healthcare system. However, taken as a whole, the volume can inform the complexity of policy development and enforcement, particularly illustrating the wide variety of sociocultural contexts encountered across communities in Asia. To provide an over-arching frame, this concluding chapter examines and interrogates the studies in the context of what appears to be the organic growth of mobile phone praxis in Asia. It is within this context that this concluding chapter will amplify the learnings from these current chapters versus a decade-long established trajectory of research, focusing on the sociocultural implications for the introduction, adoption, appropriation, and impact of mHealth for vulnerable communities in Asia.

Before we focus on the organic adoption and usage of mobile, we need to acknowledge the techno-deterministic framing of mobile phone use in planned interventions. Dutta, Kaur-Gill, Tan, and Lam present a critique of market- and state-driven logics of top-down mHealth interventions in Chap. 6. The culture-centered approach emphasized in this chapter promotes a critical perspective toward the implementation of mHealth projects in Asia, particularly hard to reach communities. The authors argue that the effects of mHealth are heavily dependent on the community in which the technology is deployed, with different environments and contexts leading to different outcomes. They identify a number of factors, similar to those stated by Evans, Bhatt, and Sharma in Chap. 3, including the problems faced by hard to reach communities where literacy and income levels are low, and traditional cultural barriers such as static gender roles are prevalent, thus impeding the adoption and growth of mHealth technologies. These authors propose a checklist for future mHealth programs run in low- and middle-income countries to overcome challenges and maximize effectiveness.

Evans et al. (see Chap. 3) develop a framework based on nine key components. At the technical level, tools have to be sustainable and feasible within the available infrastructure; hardware has to be context-appropriate, familiar and easily available to locals; and tool design has to be user-centered. At the organizational level, partnerships between the government and various enterprises will help establish a stable ecosystem for mHealth; the cooperation of the government through policies will support the integration of mHealth tools into the larger healthcare system. mHealth programs need to be financially sustainable through government support or other means, and use equipment that are cost-effective. In doing so, these authors reiterate prior categorizations of success factors in the field, such as the

Technology-Community-Management (TCM) model. The TCM model comprises the three intersects of technical factors, project management, and community participation for sustainable and successful mHealth interventions (Chib, Wilkin, & Hoefman, 2013). Especially relevant for this volume, the extended TCM model adds a vulnerability lens, arguing that sociocultural, informational, economic, and individual factors act as barriers.

Importantly, addressing vulnerable communities across Asia, Dutta et al. (Chap. 6) direct a critical lens on issues of power within mHealth. There is little doubt, despite our calls to strive for interdisciplinary collaborations, that the pendulum of mHealth research has swung in the direction of market-based interventions, with laboratory-based experiments and public health program interventions rife in the field. While these authors reiterate the intent of calls for future research to "examine potential shifts in power relationships caused by the introduction and adoption of mobile technologies in healthcare systems, and the extent and the limitations of their impact" (Chib, 2013, p. 5), they nonetheless limit the critical lens to state-driven and market-based mHealth programs. This volume provides a rich resource to investigate "the fissures that mobile systems implementation can introduce into the existing social-cultural hierarchies" (Chib, 2013, p. 5). There is much to be learnt from the organic adoption and appropriation of mobile technologies by communities in resource-constrained environments, particularly those most vulnerable. It is toward these issues that this chapter next turns, framing the contributions within the sociocultural, informational, economic, and individual vulnerabilities identified in the extended TCM model (Chib et al., 2013).

In Chap. 4, Pitaloka, investigating communicative practices related to diabetes among rural women in Java, Indonesia, found that many people in rural populations do not possess a smartphone and therefore cannot access relevant information. Similarly, utilizing a communicative ecologies framework in Chap. 5, Watkins and Baulch found two participants isolated from ongoing conversation within an HIV/AIDS network due to lack of the BlackBerry Messenger app, despite noting that in major regions of Indonesia, the required telecommunications infrastructure is present, with access to mobile phones and cellular networks not an issue. It is worth noting the multi-pronged nature of mHealth, with infrastructural challenges not limited to mere provision of communication networks and devices, but applicable to elements across the entire healthcare provision system. Watkins and Baulch (Chap. 5) found that medical supply issues and graft influenced the ability of community healthcare workers (CHWs) to keep their clients on ART (antiretroviral therapy) medication. These authors reiterate established facts within the literature related to economic and infrastructural challenges that are necessary to overcome before mHealth effectiveness can be brought to fruition in resource-constrained countries.

It is worth noting that with the relative ubiquity of mobile phones globally, as noted by the volume editors, that uneven technological infrastructure may not be the key barrier to mHealth success rates in the future; rather sociocultural factors may be a key concern when translating the usage of mobile technologies into positive health outcomes. Even in the case of provision of the requisite technological infrastructure by program managers in developing countries, individual

resistance to change occurs. In Chap. 2, Tariq and Durrani interviewed female CHWs, who collect patients' health data via mHealth monitoring solutions developed to enhance antenatal care in rural populations in Pakistan. These lady health workers work at the frontline (margins) of the formal healthcare system, making healthcare accessible to communities that lack the infrastructure and resources for more advanced services. Despite providing the CHWs with the data entry module as a means to ease data collection on the spot, they mostly used the mHealth application only in the latter part of the day, keying in data from their paper-based records. This defeated the purpose of the mobile application, which was intended for on-the-fly collection of patient data, and interaction with specialists. Watkins and Baulch (Chap. 5), studying how community health workers integrated personal mobile devices into their work with HIV/AIDS patients, too point out that, CHWs preferred traditional methods of data collection and communication to mHealth solutions. Most stakeholders within the healthcare systems, including nongovernmental organizations, health institutions and individual health workers, had not integrated mHealth tools, continuing to prefer paper records, with the result that few of them had transitioned to the digital systems. Given these examples, we next need to examine the sociocultural considerations that limit structural transformation, rather than merely studying individual behavior change. The chapter next turns our attention to specific illustrations from the contributors.

Tariq and Durrani (Chap. 2) state the importance of communication in the development of mHealth apps, proposing a framework of strategies that advocate making device choices that are contextually sensitive. Within the frame of sociocultural vulnerabilities, the chapter provides examples of the intersections of marginalization that *khatoon* community health workers face in the socio-structural hierarchy of Pakistani society. Intersectionality theory (Crenshaw, 1989) discusses the dynamic, multifaceted, and contextually (historical and sociocultural) situated experience of women, illustrated in this case by oppression along the lines of class and gender. The case study describes age as significant factor for adoption and continued usage of the mobile device, with younger CHWs both more likely to access (and own) mobile phones and have the requisite digital literacy for productive use. The constrained patriarchal environment included disapproving fathers, untrustworthy male relatives (both their own and those of their female patients), and competing domestic duties. We can begin to unpack the intersections of oppression that influence (non-) adoption and (lack of) productive usage of the introduced mobile intervention.

We know that the layering of a supposedly neutral socio-technical infrastructure on top of an existing sociocultural context embedded with complex and biased power relationships creates considerable tensions (Chib, 2013). An SMS-based mHealth program intervention, delivered via an HIV/AIDS quiz in Uganda, was found to have created complications for vulnerable rural women (Chib, Wilkin, Leow, Hoefman, & van Bejima, 2012). The program failed to address economic vulnerabilities (low access and ownership of mobile phones), informational vulnerabilities (illiteracy and lack of knowledge about HIV testing compounded by testing information only being relayed to those with correct answers), and

individual vulnerabilities (fear of being identified as HIV-positive). Requiring information about the HIV status of one's partner was compounded by the cultural communicative practice of shared mobile phone usage, creating a sociocultural vulnerability for women residing in deeply patriarchal societies, and rendering the program as potentially harmful as opposed to beneficial. The Pakistani case study (Chap. 2) conjectures that mediated interpersonal and mass media based campaigns be employed as micro- and macro-communicative strategies, but would gain considerable credibility if these recommendations were to be supported with empirical evidence linking these strategies to the sociocultural vulnerabilities presented. Further, these recommendations could be considerably strengthened were the analysis to be based on deliberation of the impact of the performance indicators identified. We can commend the attempt to utilize methodological pluralities to address the sensitive sociocultural issues identified. The relative strength of these communication tools (organic mobile-based strategies of individual actors vs. planned interventions, whether mobile-based or delivered via traditional mass media) can, allied with sophisticated and rigorous analysis, certainly provide context to policymakers.

The case studies from Indonesia and China provide us a rich evidence base to discuss sociocultural contexts across a number of dimensions. First, I shall continue to develop the particular dimension of gender as a key sociocultural dimension in Asia, elaborating on the patriarchal constraints identified. However, rather than merely considering this a barrier to the successful translation of mHealth introduction to public health outcomes, I advance the notion of technology appropriation as both a determinant of success (as articulated in health indicators) as well as a social outcome. Second, when arguing for the importance of sociocultural context, it is equally important to advance theoretical frames that are themselves driven from the ground up. To do so, I situate the learnings from the volume chapters within existing literature in the mHealth field.

First, it is hardly a coincidence that multiple chapters encounter the issue of gender inequality as a determinant of mHealth success. In particular, in Chap. 4, Pitaloka situates diabetes management via mobile communication within the context of gender empowerment and autonomy. In this case study, diabetic women in two rural Javanese villages have taken to using SMS as an alternative to diabetes apps, communicating with local health providers through their mobile phones, calling or texting them for help and advice regarding their health conditions, and receiving self-care reminders. As a consequence, texting seems to have become a practice and routine for diabetic self-management.

It is worth noting that agency and autonomy are complex phenomenon, and contested terms, in relation to gender and empowerment, thus require sensitive and meticulous elaboration (Nguyen, Chib, & Mahalingam, 2017). Pitaloka suggests that beyond traditional domestic roles, rural Javanese women, being petty traders, gain self-reliance as financial managers for the family. In addition, these women actively engage in public matters, particularly those related to religion. This vision of gender autonomy is interesting as mobile communicative practices reveal usage mediated by males, alongside a reinforcement of traditional gender roles amid

structural inequalities. Despite claiming financial control, the women report being bought phones by their male children, feeling *pekewuh* or discomfort when using the phone due to perceived neglect of domestic duties, and feeling *sungkan* or shame when contacting the *mantri* or doctor, perceived as having higher social status. Such attitudes and behavior, both internalized and enacted, seem at odds with diabetes self-management, a far from trivial concern. This is not the only illustration—it is worth noting the active gender discrimination and low social status of Pakistani lady healthcare workers reported by Tariq and Durrani (Chap. 2) which inhibit the acceptance of mHealth solutions.

It would be interesting to analyze whether communicative behaviors merely indicate inhibited agency and autonomy or whether these tools can simultaneously produce resistance and negotiation in response to established sociocultural inequalities (Nguyen et al., 2017). In Chap. 4, Pitaloka regards text messages as communicative practices that create an alternative space for negotiation. This case echoes the dialectic negotiations via mobile communicative practices (including hiding and sharing) that midwives in Aceh Besar employed to develop a nascent gender consciousness in relation to their social positionalities (Chib & Chen, 2011). Like the Acehnese midwives, Javanese diabetics engaged in culturally appropriate communicative practices of restraint in purchase and usage of mobile phones, often mediating both these practices via males, allowing them to enact agency while minimizing possible social repercussions by upholding the unequal social order. This suggests that mHealth programs and practices then require evaluation beyond the immediate objectives of improved health outcomes, to encompass the broader range of social structural change that occurs simultaneously, particularly in the area of power inequality.

A final note concerns the hegemonic practice of solely applying theories, regardless of appropriate application, developed in, and in relation to, Western frames and contexts, which does the cultural heritage of Asian communities, and Asian researchers, a disservice. I discuss the importance of the development and advancement of culturally contextualized theoretical frames for mHealth in Asia, as Asian scholars find few opportunities to substantially contribute to original theory. Certainly theory requires generalizability from specific contexts to others, but should also shed light on and glean insights from them. As described earlier, the chapter by Pitaloka (Chap. 4) provides us a range of sociocultural norms such as *pekewuh* and *sungkan* that advance our understanding of the constraints facing Javanese women. Given the spate of mHealth studies concentrating on SMS (see Cole-Lewis & Kershaw, 2010; Deglise et al., 2012; Guy et al., 2012; Krishna, Boren, & Balas, 2009), it would be interesting to see how the Indonesian examples could inform (generalize to) the broader field.

In Chap. 5, Watkins and Baulch find that participants prefer face-to-face encounters to mediated communication by mobiles phones, as a means to build and maintain trust. These communicative practices were hardly static, being highly dependent on the situation, and importantly, the social position of the party encountered. This case study is similar to that of barefoot doctors at the margins of

the healthcare system in China (Chib, Si, Hway, & Phuong, 2013), who utilized mobile phones to negotiate professional relationships depending on the social capital therein. While such a Western theory could well describe the phenomenon encountered, the Chinese cultural concept of *guanxi* provides far greater explanatory power and deeper insights. We find that *guanxi* relations describe the power hierarchies of rural barefoot doctors vis-à-vis their urban counterparts, who as the insider network, have greater medical knowledge, access to health resources, and comprise the formal healthcare information system (HIS). Rural doctors then utilize mobile phones in a parallel *guanxi* system using their existing social networks. The Chinese concept of social relations thus provides us insights into barriers faced in implementation of HIS. Further, the concept can be incorporated into program design for interventionary programs that minimize top-down centralized control in favor of more participatory designs that give voice to the margins. The implications from the cautionary tale of *guanxi* mimics the recommendations of Watkins and Baulch (Chap. 4) to pay attention to the sociocultural contexts of mHealth implementations.

In Chap. 7, Chen examines mHealth apps, having gained popularity in China with the proliferation of smartphones, and finds that levels of app integration into lifestyles and perceptions of the role of apps vary between users. Users have differing comfort levels and knowledge of how the apps work, leading to different usage patterns. In the intrapersonal sphere, while some users appreciated how apps gave them greater control over their health, others were worried about being over-dependent on apps. In the social sphere, mHealth apps gave users a sense of belonging to a larger community with similar health pursuits, but also caused some to feel lonely as apps facilitated exercise conducted in isolation. Chen proposes that app developers take into consideration how to empower users to feel in control of their health regime, and integrate them into a larger health community through social features in the app. Krömer (2016) argues that few mHealth projects have applied the theoretical concept of empowerment, with existing theories relating to either personal or psychological motivations. There is an opportunity to develop culturally relevant theorizing to integrate empowerment with social influences from a Chinese (Asian) perspective.

In conclusion, one might very well ask whether the 'hard scholarly evidence', the lack of which our editors lament, has been indeed discovered. We would do well to pause before making judgments about evidence of impact, given the range of illustrations available, and the respective lenses that varied stakeholders will use to examine the evidence base. The contribution of this volume is to argue for the application of a sociocultural structural lens to issues of power within complex and variegated societies which applies beyond that of the mHealth domain. This set of empirical and conceptual contributions provides such a lens, allowing us to shift the needle just that bit forward. This collection is exemplary in bringing a range of (new) voices in mHealth in Asia to the fore. The discipline can only gain from the increased research capacities and the growing body of sophisticated analysis and evidence.

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