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Translating the Knowledge Gap Between Researchers and Communication Designers for Improved mHealth Research

Knowledge Gap mHealth

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Our industry insight focuses on the challenges for health researchers collaborating with communication designers during the development of an App for improving maternal mental health and parenting stress. We discuss the challenges around explicating and communicating tacit and domain knowledge across disciplinary boundaries. We believe this report can widen communication design's traditional focus on users in mHealth research to consider partnerships with academic researchers. The lessons learned from our experience developing a mHealth program can be used to reduce challenges in future mHealth research, especially for collaborations between health researchers and communications designers. Considering the growth of interest in mHealth, this is extremely relevant for future team satisfaction, the optimal use of research funds and industry time, and faster development of effective mHealth tools.

CCS CONCEPTS • Design • Collaborative content creation • Mobile devices • Project and people management • Remote medicine

Additional Keywords and Phrases: Mobile Health, App Design, Knowledge Translation, Industry-Academia Partnership

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1 INTRODUCTION

Along with other eHealth technologies, mobile health (mHealth) has received major interest for its potential in improving access to medical and mental health services [1, 2]. mHealth research has gradually increased in numbers since its early beginning in the late 1990s [3]. With the COVID-19 pandemic accelerating the need for evidence-based, efficacious telehealth services [4], research on mHealth recently increased exponentially, almost doubling in a year (5184 articles on PubMed in 2020; 9948 in 2021; see Figure 1). As new research teams enter the field of mHealth, the success of many interventions rests on successful collaborations between academics and communication designers.

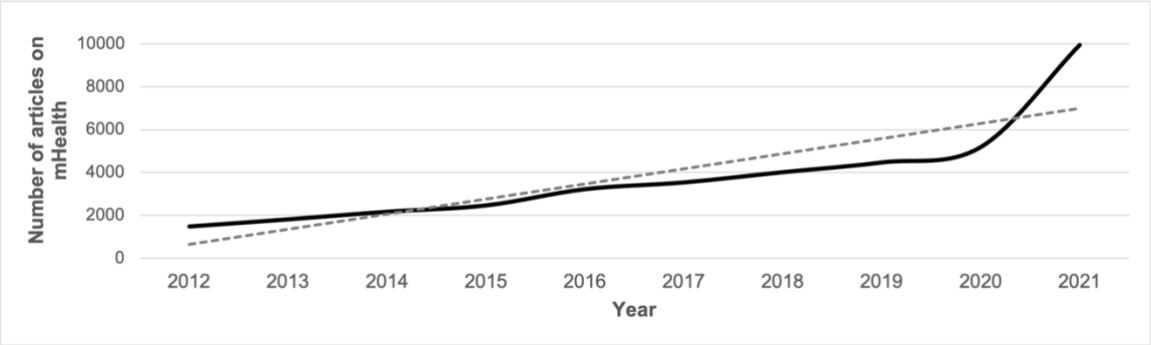

Figure 1: Yearly number of articles on mHealth in the last decade. Full line = number of articles per year; dashed line = linear trend. The keywords mHealth OR "mobile health" were searched as a topic field in PubMed and the number of articles/year were extracted.

Our team recently designed the Building Emotional Awareness and Mental Health (BEAM) mHealth program to reduce maternal mental health problems and parenting stress, see [5]. The program was developed in collaboration with our Parent Advisory Board (PAB; ten mothers with lived experience of depression) who indicated that connection to other mothers, contact with therapists, and access to short evidenced-based videos on mental health and parenting strategies would be most helpful in supporting them. The research team worked closely with a digital design company to build the mHealth App. Throughout the course of pilot testing [5], significant challenges in communication with the design company arose regarding app functionality, incommensurate standards for a minimum viable product (MVP), and data collection. This industry insight discusses the main challenges and lessons learned from this academia-industry collaboration experience.

2 CHALLENGES IN APP DESIGN

Challenges with communication, particularly about expectations, led to an App that required a lengthier development process than initially intended and did not have all planned features. The digital design company was not able to offer PHIA-compliant server storage, which led to time delays associated with the contracting process to allow the app to operate within high-security University protected data storage systems. These issues came as a surprise to the research team as server needs were not discussed during initial meetings with the digital design company. Initial consultations with our PAB informed our desired App features, which included App-embedded mood tracking, a social support forum, interactive activities, and engaging videos, as well as tailored push-notifications based on each participant's app usage. Initial consultations with the digital design company suggested that this was feasible within a budget of 120 000$, as in-kind contributions could include features pulled from other Apps the company designed. Therefore, we applied for and successfully received research grant funding for this amount. However, during the App development process, no features were pulled from other apps and most expected features were dropped due to budget constraints. App design and testing

were conducted with continuous involvement from our PAB, but their suggested revisions, which were consistent with initial consultations, were rejected by the digital design company due to budgetary constraints. The research team had to implement alternatives, many outside the App interface (see Table 1), leading to a mHealth program that was less functional and misaligned with the user needs put forth by our PAB.

Table 1: Main planned BEAM mHealth features and implemented mHealth features

Planned feature	Implemented feature
Usage-related and catch-up push notifications	Recurrent, generic push notifications
App-embedded mood tracking	Self-directed mood tracking through external survey
App-embedded discussion forum	Web-based discussion forum through third-party software linked on App
App-embedded interactive videos	App-embedded videos of slides with voiceover; YouTube links for users for whom App-embedded videos did not work

As can be seen in Table 1, the only planned App-embedded feature that was developed are videos, but these proved challenging as well. We had planned for engaging, live action videos, for which the digital media company initially suggested help could be provided for production. It became clear during App development that this help would not be provided. As the research team does not include communication designers, we recorded videos of slides with voiceovers to be downloaded onto the App. Videos did not load for many participants due to (a) incompatibility of the video player with some devices, which was not solved by the digital design company for a second trial, and (b) video file formats and sizes, for which the research team had not received instructions and was not aware of options. Thus, videos had to be uploaded to YouTube, with external links provided for participants for whom the videos did not work on the App.

3 CHALLENGES IN DATA COLLECTION

Another challenge was difficulty ensuring relevant usage data was being collected. In initial consultations and the early App development phase, we were advised by the digital design company that we would be able to track any variable of interest. During App development, variables of interest were provided to the digital design company. As the pilot trial data came, the custom events developed by the digital design company did not match the variables we aimed to examine in our research (see Table 2). While some automatically collected Google Analytics events were useful (e.g., total time spent on the App, session start), the data was lost due to the Google Analytics default data retention period setting, which was not mentioned or modified by the digital media company in setting up our account.

Table 2: Examples of research variables and equivalent misaligned and aligned analytics events

Variable (what the researchers wanted tracked)	Misaligned analytics events (what the designers implemented)	Aligned analytics event (what would have satisfied the researchers' needs)
Time spent on each video per week	Time spent on App	Number of seconds user watches each video
Number of videos started	Video finished loading	User starts watching the video after it is initially loaded
Number of videos watched	User accessing the video page	User watching video to the end, or to prespecified number of minutes/seconds

4 IMPROVING COMMUNICATION AND BRIDGING THE KNOWLEDGE GAP

An overarching theme of these challenges was that tacit and domain knowledge was assumed by both parties, highlighting the need to recognize and bridge the knowledge gap between academic and industry partners. We believe clear and

thorough pre-agreement discussions by digital design companies regarding the research team's previous work and knowledge in mHealth can avoid some challenges. This includes clarifying general knowledge of the tech industry standards (e.g., required time and costs for App features and App maintenance) as well as more specific base knowledge (e.g., video upload formats that may introduce problems with buffering and reduce user experience). On the researcher side, it is important to explain the research question(s), treatment targets, hypothesized active mechanisms, and user needs. All desired features should be clearly delineated during agreement discussions, and data collection needs not assumed to be understood by tech teams. Desired variables should be clearly defined and translated into trackable App events, ideally before App development. Tech teams and communication designers should ensure health researchers that are new to mHealth are aware of these needs and co-develop these trackable events with them.

Many discussions with the digital design company were centered around the development of a Minimum Viable Product (MVP) [6], which was not a familiar concept for the research team. While it is standard for the tech industry to develop an MVP as a prototype to acquire investment into an improved App, this approach may not be ideal for academics for whom the standard is to have a complete evidence-based intervention to support effectiveness and acquire further funding, with simplification occurring at later stages for feasibility and implementation in the community. Thus, in retrospect, we believe some issues may have arisen from academic MVP needs being different from Tech industry MVPs, and these differences being lost in translation. More research is needed to assess to what degree there is a misalignment between designer and researcher perspectives and how to best support collaborations between academia and the tech industry, and potentially to develop MVP models for academic partnerships with the Tech industry.

Overall, following this experience and our continued involvement in developing this mHealth program, we would recommend clear company policies regarding work with new mHealth clients and standardized onboarding processes outlining the development process and clarifying client knowledge and support needs. Furthermore, documenting pre-agreement discussions could help avoid dissatisfaction during App development, e.g., a Memorandum of Agreement could be developed to detail the agreed terms as well as the roles and commitments of the research team and design company.

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