Towards Development Guidelines for eHealth Interventions that Support Self-Management of Cardiovascular Diseases: A Holistic, Theory-Based, and Cross-Cultural Approach

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Abstract. Cardiovascular diseases constitute an alarming crisis for health care worldwide. Technology-based self-management support is proposed as a potential solution. However, both the problem and the solution are complex, dynamic, and are influenced by a combination of multiple factors. This project aims to outline a holistic, theory-based, and cross-cultural approach for the development of eHealth interventions supporting self-management of cardiovascular diseases. The project has resulted in a review of multidisciplinary frameworks, theories, and models. However, questions remain regarding the key factors for tailoring interventions to cross-cultural contexts, and how to facilitate this knowledge for intervention designers.

Keywords: Cardiovascular Diseases, Self-Management, eHealth Holistic Development

1 Self-Management Support of Cardiovascular Diseases

1.1 The Complexity of the Health Care Problem

Cardiovascular diseases (CVD) constitute an alarming health care crisis due to their prevalence worldwide [1, 2]. To lessen the burden that CVD cause to health care systems, the provision of effective, sustainable self-management support to the patients is considered a key cornerstone of treatment [3]. Self-management is a complex, dynamic, and time-consuming activity. For patients, it demands the engagement with multiple behaviors and goals (e.g. patients are prompted to become physically active or quit smoking). On the other hand, supporting self-management is also enlisted in the many

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time-consuming tasks of health care providers [4] (e.g. bureaucracy in reporting patient management). Because of the above, the actual level of self-management achieved by a patient will be determined by a combination of multiple factors (e.g. the characteristics of their condition, their biopsychosocial state, or the surrounding physical, social, and organizational contexts [5]). The interplay of multiple factors hints towards the complexity of the problem itself. However, generating a solution also entails unique challenges, which are discussed below.

1.2 Holistic Development of Electronic Health Interventions

Electronic health (eHealth) can be defined as the use of technology to support health, well-being, and health care [6]. There is already evidence about the potential of technology-based interventions to support self-management [7, 8]. However, research on eHealth is conducted from the perspective of multiple scientific disciplines, which can often cause overlap or challenges in the accumulation of knowledge. In this regard, the multidisciplinarity of eHealth is an example of the natural complexity of the proposed solution to a wicked problem such as the CVD health care crisis. To present a concrete example, consider how an eHealth intervention must take the assessment or recommended treatment of a health care provider (medical science), then select motivational prompts or messages that can promote adherence to key behaviors (behavioral science), and finally deliver them in a salient, persuasive way to the patient (human-technology interaction science). To tackle this, a holistic, multidisciplinary development of eHealth is recommended [9, 10]. A holistic approach is defined as one that aims to recognize the importance of the whole and the interdependence of its parts [10]. In a practical sense, this proposes that the interaction and reciprocal influence between contextual, technological, and human factors should be emphasized early and often during eHealth development, and be informed by multidisciplinary perspectives [9, 10]. In this light, it is proposed that a holistic development approach must consider multiple perspectives, from different fields of science, to integrate and analyze various key factors (e.g. individual and contextual differences).

1.3 Use of Theories, Models, and Frameworks to Capture, Curate, and Accumulate Knowledge

Given the vast and overwhelming amount of research done in the fields of CVD, self-management, and eHealth, it is a remarkable challenge to capture and generate a holistic understanding of the problem and any potential solution. One proposed way to tackle this is to focus on the most structured approaches, such as those informed by clearly described theories, models, or frameworks. For example, frameworks for the development of eHealth interventions are widely available [9, 11, 12]. Likewise, eHealth development has been extensively informed by theoretical models that explain underlying mechanisms of behavior change, technology adoption, or the improvement of health [13]. For example, the Persuasive Systems Design is a widely known model that proposes means for selecting persuasive technology features that work best to help users reach their own personal goals [14] or those related to a recommended treatment.

2 Project Aim: Towards Development Guidelines to Tailor eHealth Interventions to Cross-Cultural Contexts

The aim of this project is to advance our understanding about how to undertake a holistic development of eHealth interventions to effectively support self-management of CVD. The project is composed of several key stages (Figure 1). Primarily, the project takes a holistic approach, meaning it seeks to integrate the (structured) knowledge that already exists and build upon that. That is why the first task of the project was to bridge the multidisciplinary gap in the field of eHealth, which was done via a review of multiple theories, models, and frameworks within the scope of the project [15, 16]. In parallel, the project takes a theory-based approach, meaning it attempts to understand and integrate the propositions of relevant models of science to understand key factors of the problem and the proposed solution. To do this, the project is using the Middle Range Theory of Self-Care of Chronic Illness to [17] inform both a patient-centered study (to investigate key differences in the self-management needs of patients) and an expert-based vignette survey (to assess expert preferences of persuasive design features for each self-management needs). Finally, the project seeks to deliver practical guidelines about how to adapt eHealth interventions to different settings. To do this, lo-fi prototypes will be generated and evaluated with cross-cultural samples of patients. Currently, the main research questions that this project is addressing are: What key features are best and for whom in interventions aiming to improve self-management of CVD through eHealth? How can we facilitate holistic, theory-based understanding and decision-making of intervention designers?

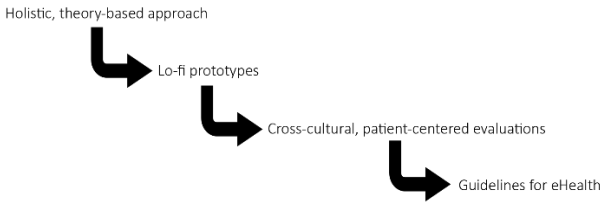

Fig. 1. Key stages of the project using a holistic, theory-based and cross-cultural approach

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