

# UNIVERSALITY OF HOPE IN PATIENT CARE: THE CASE OF MOBILE APP FOR DIABETES

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## ABSTRACT

In this paper we investigate the human value of hope in the self-management systems used by the patients with diabetes to manage their chronic health conditions. We use value sensitive design (VSD) framework to uncover the value instances revealed in our interviews with patients with diabetes. The value instances identified in the interview transcript map to components of hope theory: goal, agency, and pathways. We recommend technology features that allow patients with diabetes to achieve their goals in life while managing their chronic conditions.

**KEYWORDS:** Value Sensitive Design, Hope, Self-management, Healthcare, Diabetes, Agency, Pathways.

*“Hope” is the thing with feathers -  
That perches in the soul -  
And sings the tune without the words -  
And never stops - at all -  
  
I’ve heard it in the chilliest land -  
And on the strangest Sea -  
Yet - never - in Extremity,  
It asked a crumb - of me.*

*- Emily Dickinson*

## 1. INTRODUCTION

As information and communication technologies (ICTs) advance, their uses and applications become more diverse and complex. These complex technologies are designed and used by humans and therefore, need a human-centric approach. The human-centric ICTs in the

healthcare context play a major role in improving patients' lives (Bardhan, Chen, & Karahanna, 2017). These ICTs should be sensitive to the values of the patients (Dadgar & Joshi, 2018).

The value sensitive design (VSD) framework has proven to be an effective tool in identifying and explaining the human values of technology users and their development and change over time (Friedman, Howe, & Felten, 2002). In this paper we investigate the value of hope in the patients with diabetes. Specifically, we identify the instances of the value of hope for the patients with diabetes and recommend technology features that could support them.

## **2. HOPE AND SELF-MANAGEMENT**

Hope in the theory of hope is defined as the perceived capability to derive pathways to desired goals, and motivate oneself via agency thinking to use those pathways (Snyder, 2000). Setting and attainment of goals are central in how the construct of hope is conceptualized by Snyder. People have higher hope when they believe their goals are attainable. Pathways to desired goals are necessary for hopeful thoughts. People who can realize and pursue pathways toward their desired goals stay hopeful over time. The sense of agency in achieving their goals through purposeful pathways motivates and empowers patients. The agency and pathway components of hope are distinct but entangled. At difficult times when people face barriers towards their goals, the strong sense of agency enables them to tackle the barriers. Positive and negative emotions are the result of the perceived success in achieving goals. Perceived success in achieving goals creates positive emotions in people and perceived failure triggers negative emotions.

We investigate how these components of hope theory can be supported using ICTs. We use VSD to identify value instances of hope for the patients with diabetes who use mobile app to self-manage their chronic conditions. The value instances identified in the interviews bridge the support needed from hope interventions implicated in technology features (see Table 1).

## **3. METHOD**

We have used VSD to develop interview strategies and criteria that will reveal the values of the patients with diabetes (Friedman & Hendry, 2019). We interviewed 20 patients with diabetes. In the first meeting, patients were introduced to a mobile app that they could use to manage their diabetes, its symptoms, and life style changes. After the first meeting, patients used the mobile app to manage their diabetes for one week. In the second meeting, patients were interviewed about their experience with the diabetes mobile app and their needs and concerns. Interviews were transcribed and analyzed based on VSD to identify value instances that map to the hope components. Next we make recommendations that how technology can support these values instances and hope components necessary to create and maintain hope in the patients with chronic diseases and conditions.

## **4. RESULTS AND DISCUSSION**

Hope instances identified and extracted from interviews with patients with diabetes illustrate how this value manifests in different variations in patients' lives. These value instances could be supported effectively by technology features. The hope components with one example of value instance and technology features are provided in Table 1.

Table 1. An instance of the value of hope extracted from interview data, hope components mapped to the value instance, and technology features that can support this value instance and hope components.

Value Instances	Hope components	Technology features
<p>“I felt upset [when I knew I was diagnosed with prediabetes] because all my life I had done the right things. I had exercised, I had eaten right and even when I had to stop exercising I still ate right and so I was very disappointed. I was angry at my muscle disease and I was upset, I almost started crying because I was just ... One more thing that has gone wrong with my health because of my other disease, so yeah, I was upset. I at first told the doctor that I didn’t want to take anything. I was mad. I didn’t want to do this because it was admitting that I had diabetes or pre-diabetes or whatever.”</p>	Goal: healthy life style	<p>Digital coaches are intelligent technology-based services that simulate human coaches and reinforce patients on their pathways toward goals and enhance patients’ agency by providing motivational messages, techniques, and resources in real time.</p>
	Agency: lack of agency reflected in negative emotions – “I was very disappointed”, “I almost started crying”, “I was upset”, “I was mad”.	
	Pathway: exercise and eating right – “I had exercised, I had eaten right and even when I had to stop exercising I still ate right”	

In Table 1 an example of a value instance mapped to hope components with support of technology features is provided to illustrate how value-sensitive technologies support goal-oriented agency and pathways in patients with diabetes. A patient diagnosed with diabetes expressing and describing negatives emotions indicates an underlying issues with patient’s agency and available pathways. The available pathways towards a healthy life style for this patient have not been effective in achieving her goals to live a healthy life style. The ineffective pathways undermine patients’ feeling of agency. The patient questions her abilities in achieving goals and develops negative emotions of being upset and mad. Digital coaches enhance patients’ agency by motivating patients along the way in pursuit of their goals. An empowered patient with higher agency can tackle barriers and negative emotions in achieving goals. Digital coaches designed in the diabetes mobile app provide guidance, resources, and emotional support. The real time and on-demand access to digital coaches increases patients’ motivations in achieving their goals by reinforcing and reaffirming patients’ thoughts towards their goals.

**5. CONCLUSION**

In this work in progress study we being to explore the role of ICTs in supporting and enhancing patients’ hope to self-manage their diabetic chronic conditions. We use VSD to design interview strategies and questions for patients with diabetes to identify their needs and desires to use a diabetes mobile app and self-manage their chronic conditions. We use hope theory components of agency, pathways, and goal to translate value instances of hope into supportive technology features.

This study provides guidance and recommendations for the healthcare providers and system developers to assist patients with diabetes self-manage their chronic conditions. The paper instantiates value of hope in the context of ICT-enabled self-management of diabetes and

illustrates how system developers can design and develop technology features and healthcare providers to use those technology features to enhance the feeling of agency in the patients and provide effective pathways towards their goals.

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