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# Influence of Design Elements in Mobile Applications on User Experience of Elderly People

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## Abstract

Technology in the field of health care has taken a step forward for making health maintenance easy on a daily basis. With a gradual increase in the elderly population, it is important to provide them with facilities made accessible through technological innovations. But it is observed that the elderly show reluctance to the use of new technology such as mobile applications. In this paper, an effort is made to overcome this barrier with the study of both elderly user experiences and user interface design of an mHealth application and an analysis of the relation between them.

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*Keywords:* User experience; User interface design elements; Health care; Usability.

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## 1. INTRODUCTION

Usage of mobile technologies has become a trend and also a mandatory tool for today's life. They are mostly used by populations of developed and underdeveloped countries. Various applications are being introduced in these mobile devices under different categories like entertainment, health, lifestyle etc. which make them useful for a multitude of different tasks. In recent years, mobile applications have become relatively more important as it is observed that usage of these applications is being suggested by the health care centers. Mobile phones, tablets, PDAs and iPad etc are the devices that form the main platform for the mHealth services. The mobile applications providing health services can be used to monitor patient's health, providing information on different areas of medicine and promote health and fitness for healthy lifestyle. The success of any type of application depends on how well it is being used by the user i.e. the usability and how well it is suited to the user's requirements based on their experience<sup>1</sup>. User experience encompasses elements such as the usefulness and usability of an application or technology<sup>2,3</sup>. Hence, it is visible that the concepts of usability and user experience are similar and partly overlapping. Therefore, to develop a mobile application with a higher degree of quality and functionality and to measure the effect of the service provided by the

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applications on the users, user experience is measured. This paper deals with the study of user interface design elements (text size, font, color etc.) of a mobile application that affects the user experience of the elderly population. The information gathered with the use of prototype version is analyzed and compared to the existing information made available after the use of Glucosio application. This comparison directs the author to conclude the effects of user interface design elements on the user experience of elderly people in using an mHealth application.

## **2. MOBILE HEALTH (M-HEALTH)**

Mobile health has evolved in the form of more or less stand-alone applications for support of healthy life-style and self-management of chronic diseases<sup>4</sup>. The rapid expansion of mobile information and communications (ICT) technologies within health service delivery and public health system has created a range of new opportunities to deliver new forms of interactive health services to patients, clinicians and caregivers<sup>5</sup>. One of the leading technologies with which the interactions are made easy are the mHealth applications for healthy lifestyle and self-management of protracted diseases. Many such applications have been released in the market in relation to diabetes. Diabetes is one of such diseases which must be monitored regularly for balancing the blood glucose levels in the body. Today's mobile applications focus on being trendy with fast responding abilities. This increases the usability of the application by the youth of the society who are the majority population. But it is known that diabetes is common in the elderly population<sup>6</sup>. Therefore, the design of these applications should be favourable for this category of the population as well.

### **2.1 Tools Related to M-health**

In the present situation, the tools to measure user experience in mHealth applications are through a survey or QoE probe. According to Martínez-Pérez.et.al<sup>7</sup>, a survey is one of the tools to measure users Quality of experience (QoE)<sup>7</sup>. The survey tool uses the Likert scale in a survey questionnaire that involves different types of aspects related to content quality, availability, performance, appearance etc. of the selected mobile application. The tool proposed by Farnaz Fortrousi for user experience is known as QoE probe. It is an application used in Android and iOS devices, integrated with selected mobile application through an API<sup>8</sup>. The purpose of this tool is to capture user experience by collecting feedback from the user. It helps us to monitor requirements in run-time<sup>8</sup> and also collects usage logs and QoE from the users in the form of feedback.

### **2.2 User Interface Design Elements**

Mobile applications for older adults need to be meaningful, engaging, easy to use, usable and motivate the adoption of technology<sup>9</sup>. The elderly's preferences in the design of user interface are often neglected, thus making it difficult for them to the mobile applications. It is demonstrated that "a mobile device or application, if carefully designed, can be used effectively by older people<sup>10</sup>." The base for the studies on elderly people is that "elderly people want to stay and live in their homes as independently and as long as possible<sup>11</sup>." Various design guidelines and design principles were discussed in the previous studies describing how the user interface design of the mobile application can be presented, for elderly people convenience. To frame a user interface, different aspects of the interface need to be considered. These aspects are termed as the user interface design elements. Mobile design guidelines, UU principles, mobile health guidelines, inclusive design guidelines<sup>1</sup>, World wide web consortium guidelines in mobile context<sup>12</sup>, are referred to conclude the user interface design elements suitable for elderly users.

## **3. RESEARCH METHODOLOGY**

The research methodology includes problem description and research design.

### **3.1 Problem Description**

Currently, a large number of mobile applications are framed to assist the self management of people who have both type 1 and type 2 diabetes. People aged 50 or older suffer disproportionately from diabetes mellitus, particularly type 2 diabetes<sup>8,13</sup>. From the Diabetes App Market report, very few patients of this target group utilize diabetes apps to support their treatment<sup>13</sup>. The proper design of the user interface helps to reduce the reluctance in adopting the application usage. This study of user experience directs the application designers to understand the usability as well as the satisfaction levels of the users while using the application. One of the big hurdles for deploying ambient assisted living systems in the real world is technology acceptance by the older adults<sup>14</sup>. The hurdle is also applicable for

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