

A Mobile Phone Enabled Health Promotion Program for Middle-Aged Males *

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Abstract— The prevalence of chronic diseases among middle aged males outweigh their female counterparts in developed countries. To prevent this, delivery of health promotion programs targeting lifestyle modifications of physical activity and nutrition in middle-aged males has been essential, but often difficult. ManUp health promotion program was a recent initiative that uses current advances in information and communication technology (ICT) to reach the middle-aged males. One of the key components of the ICT approach was the development of smartphone application to enable middle-aged men to uptake the program with their own mobile phone. The smart phone application was aimed at providing varied level of challenges towards physical activity and healthy eating behavior, with interactive and motivational feedback SMS messages. The ManUp program was recently implemented and trialed in a randomized control trial in Gladstone and Rockhampton, Queens. This paper describes the components of the smart phone application integrated within the ManUp health promotion program.

I. INTRODUCTION

The prevalence of chronic disease in males (364.8 per 100,000) is more than their female (246.4 per 100,000) counterparts in the general Australian population [1]. This increased prevalence of chronic disease mainly due to intake of fast foods, and the lack of physical activity from modern industrialization [2,3]. The middle aged males are the difficult and hard-to-reach group to promote physical activity and healthy, particularly those living in the regional and rural parts of developed countries [4]. Promotional approaches of health promotion through printed materials to have been found to be largely ineffective [5]. A consortium of institutions, such as the Central Queensland University, CSIRO, and University of Western Sydney, was awarded research opportunity to address through an Information Communication Technology (ICT) based strategy. This ICT based strategy used the smart phone and internet with WEB2.0, to deliver a lifestyle modification of physical activity and nutrition to middle-aged men (aged 35–54

years), with the support of Queensland Health [6]. This health promotional strategy was called ManUp.

This paper is focused on describing the mobile applications in the delivery of intervention components, and user interface developed to trial among middle aged males in regional Queensland town of Gladstone, Australia.

II. METHOD AND MANUP SETUP

The ManUp program was designed to promote active life style and healthy eating behaviors, based on the well recognized goal setting strategy. The approach specifically taken for middle-aged males was the provision of predefined challenge goals, defined according to intensity or strength and duration (see below). Participants had the choice of either an individual and/or a group challenge(s). The individual challenge enabled self-monitoring of their progress. Group challenge enabled them to engage friends/buddies or family to participate, through which theirs and group's progress can be monitored towards the challenge goals. Group's goal can also be shared with other groups. The progress of their achievement are not only made available graphical plots via status bar but are spurred by motivational SMS to help achieve the goals set in their challenges. More comprehensive graphical plots are also made available within an associated ManUp internet portal, where data is synchronized and updated. This will not only help participants to track the progress, but also acts as interventions to motivate them to complete the program.

Seven types of challenges have been predefined. They include six exercise challenges (Walking, Cycling, Sports, Swimming, Strengthening and Running) and one nutrition challenge (Healthy Eating). Each type of challenge has three levels of strength (light (three weeks), mid strength (six weeks), and full strength: 12 weeks). Additionally, each exercise challenge can be recorded in two different units. For example, The Walking challenge can be either recorded as accumulated time in minute or total steps. Similarly, other types of exercises were assigned their time and unit according to the levels of strength required to be achieved. Healthy eating behavior goals were associated with the number of predefined healthy eating/drinking components that can be achieved daily.

The trial participants were given the choice of their preferred physical activity program and intensity levels for both physical activity and eating behavior to achieve over the period assigned in the challenge. On completion of each challenge either before or on the defined period, they could choose to continue with the same intensity level or move to a

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higher or lower level of the physical activity and healthy eating behavior program. More detailed information on the protocol was published recently in [6].

To deliver the intervention programs to the participants, two portals were developed in the ManUp system. One is designed for normal internet participants (ManUp website: <http://manup.org.au/> mainly provided by UWS); the other one is for mobile participants (www.mobile.manup.org.au mainly by CSIRO). The two portals were functionally similar in creating challenges, inputting observed or measured data entries, reviewing progress, and receiving motivational messages. The mobile web portal differed from ManUP website by a simplified UI designed for the smaller screen and easy navigation on the run via the mobile phone handset, and a messaging system to deliver mobile SMS. The architecture of the mobile portal is displayed in Fig1.

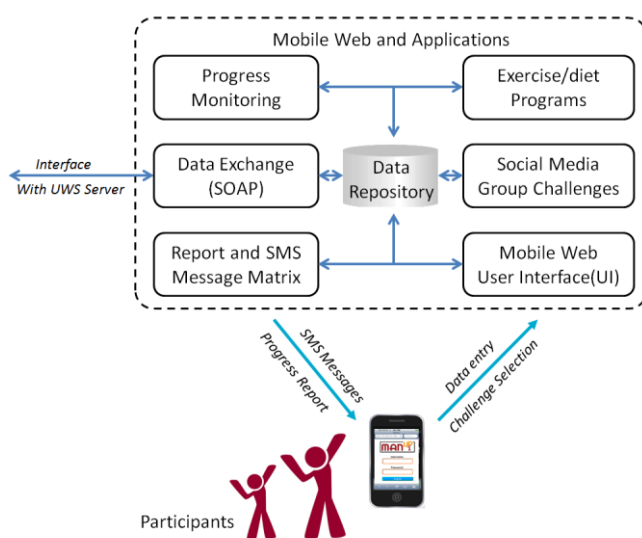


Figure 1. Architecture of the ManUp system, including six major components.

Mobile Web UI. The mobile web has the same functions as the computer UI, but was designed to be easily used through mobile phones. Through the UI, participants can select challenge programs, join groups, create challenges, upload observed or measured data entries, and review progress. Conventional password authentication is employed to secure the web application. To ensure the compatibility of application with mobile browsers, the W3C mobileOK checker was used as a validation tool in the development. Fig 2 displayed some samples of the UI including a user log-in page, a healthy eating questionnaire, a challenge to be selected, and progress of a challenge.

Automated Progress Monitoring. Recorded data of physical activity and nutritional challenges were monitored in real time. A back-end web application was developed to automatically check and report the progress towards the challenge goals. The progress is analyzed and reported on

two aspects. One aspect is the achievement towards the goal at scheduled dates. The system looks up the scheduled dates, compares the predicted and achieved goals, and sends SMS messages. The other aspect is the dynamic update of the percentage of goal achieved. When users input new entries, the system will update their progress of achievement and compare with predicted targets, and send the progress status in real time.

Exercise and Diet Programs. Seven types of predefined challenges are stored in the database. They include six exercise challenges (Walking, Cycling, Sports, Swimming, Strengthening and Running) and one nutrition challenge (Healthy Eating). Each type of challenge has three levels of strength (light (three weeks), mid strength (six weeks), and full strength: 12 weeks). Different unit options are also provided. For example, walking can be measured by duration and distance. Each program is given a given goal. The goal setting is based on well recognized knowledge and recommended guidelines. Through the different levels of strength, participants will finally achieve recommended exercise levels and healthy eating behaviors. Participants can also create goals suitable for themselves. This will enable and motivate them to do more beyond the rigid guidelines.

Social Media and Group Challenge. To promote engagement the application also enable participants create a group challenge and invited other people such as friends and family members to join in the group.

Matrix Message System. Motivational messages were provided through the course of each challenge weekly (Light strength) or fortnightly (Mid and Full strengths). Matrix Messages are given according to the type (applicable to physical activity), strength, unit, goal achievement state, and a corresponding motivational message. For example, if a user achieves the goal of light-strength Walking challenge in the first week, user will receive a message: "You're in week 1 of your light strength walking challenge. So far you're on track to finish the challenge in time. Keep it up!". If the user's challenge was not achieved, the message will be "You're in week 1 of your light strength walking challenge. Unfortunately you're not keeping up. Go for a 10 minute walk during your break at work.".

Data Exchange (SOAP). The mobile web portal is also connected with the ManUp website through a data exchange interface. The Simple Objective Access Protocol (SOAP) was used for the connection. This will allow data to be synchronized and shared between the two portals.

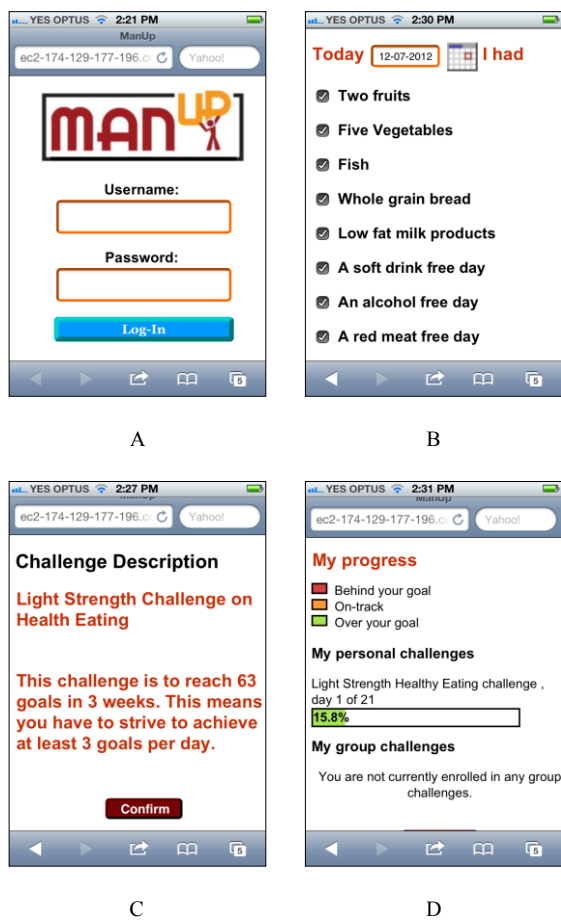


Figure 2. A: a challenge description provided through the mobile web application. B: a progress report provided through the mobile web application.

III. EVALUATIONS AND FUNCTIONALITIES

Evaluate the health promotion approach of physical activity and healthy eating behaviors, the mobile ManUp application was implemented in a randomized controlled trial (RCT) conducted in regional cities of Gladstone and Rockhampton, Queensland, Australia. The participants recruited in one arm of the ICT intervention were middle-aged males aged 35 to 54 years old who owned a mobile telephone. Details of the complete protocol was recently published in reference [6]. The RCT was recently completed and the data from the mobile phone intervention is currently being evaluated for analysis of uptakes and adherence of mobile intervention within the ICT-based health promotion delivery.

IV. DISCUSSION

Health promotion of physical activity and healthy eating behaviors has been particularly difficult in middle aged males. The penetration of mobile phones among Australian

adults is more than 85% [7]. The advent of smart phones has made delivery of information and applications easy to reach [8]. The ManUp program has employed this in its ICT-strategy for health promotion to the target one of the most hard-to reach groups, the regional middle-aged males, who are predominantly shift workers in industries. The ManUp program utilizes the inherent competitive nature of males to provide goals that are challenging to themselves and their buddies.

The mobile phone intervention program enables a level of flexibility for those who are not normally working between 5 and 9 pm, as in the majority of workers in Gladstone and Rockhampton. Unlike many smart phone applications, the ManUp application has been designed to be interactive in its automated intervention on the challenge chosen for his physical activity and healthy eating behavior program. This included a regular updates of the progress made and motivational messages that would lead to completion of their challenges in the nominated timeframes. Furthermore, the mobile application in the ManUp program was designed through generic mobile-web application to leverage the smart phone internet capability to be able to reach a wider user groups independent of mobile technology platforms. Standardizations of mobile internet protocols and languages, such as HTML 5 and mobile Java scripts, are increasingly improving the compatibility and functionalities of mobile web applications. The National Broadband network with extensive internet and mobile coverage and high communication data rates [9] will dramatically enhance the fundamental infrastructure, and accommodate wide applications of innovative mobile telecommunication and internet technologies to improve the health promotion outcomes.

Although the ManUp program addresses the issue to reach difficult groups of the population, psychological nature of males in their middle-age remains more complex. Hence, the ManUp was implemented in an RCT to investigate its reach and adoption. The RCT was only recently completed and the results of which are currently being analyzed. Provided the outcome of this RCT is positive in its health promotion and behavior change, application towards enhanced ICT strategies of health promotion could be developed to address the prevalence of obesity and chronic diseases.

V. SUMMARY

The prevalence of chronic disease in middle aged men is higher than their female counterparts in the general population. Changing inactive lifestyle and poor nutrition in men to ease the prevalence of the disease has been essential, but often difficult. To address this issue, we developed a ManUp program that aimed towards promoting active life style and healthy eating behaviors in this selected population group. A mobile phone based solution was provided as a part of the ManUp program to improve the uptake and adherence of the program. The paper demonstrated that the mobile solution integrates essential components to help participants

manage their exercise and motivate them to engage and adhere to the program. A clinical trial was recently conducted in regional cities of Gladstone and Rockhampton, Queensland, Australia. The data from the mobile phone intervention is currently being evaluated. It is expected that the mobile based solution could be an option that provides an effective intervention to improve the uptake and adherence of a ManUp health promotion program.

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