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Web-based oral health promotion program for older adults: Development and preliminary evaluation

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ABSTRACT

Objective: This study reports on the impact evaluation of a Web-based oral health promotion programme aimed at improving the oral health knowledge, attitudes, practices and self-efficacy of independent-living older adults from Melbourne, Australia.
Methods: With ethics approval from the University of Melbourne, a convenience sample of volunteers 55 years or older was invited to participate in a study to test a web-based oral health promotion program. Consenting volunteers were asked to undergo a structured interview as part of the pre-intervention data collection. The intervention was based on the ORHIS (Oral Health Information Seminars/Sheets) Model and involved computer interaction with six oral health presentations, with no direct oral health professional input. A one group pre-test–post-test quasi-experimental design was chosen to evaluate the intervention. A series of paired *t*-tests were used to compare pre-test with post-test results.
Results: Forty-seven active, independent-living older adults participated in this evaluation. After the intervention participants responded with higher levels of achievement than before participating in this Web-based oral health program. Participants showed significant improvements in oral health attitudes (4.10 vs. 4.94; $p < 0.01$), knowledge (18.37 vs. 23.83; $p < 0.0001$), and self-efficacy (84.37 vs.89.23; $p < 0.01$), as well as, self-reported oral hygiene practices (i.e., frequency of use of dental floss) ($p < 0.05$).
Conclusion: The e-ORHIS approach was successful in improving oral health knowledge, attitudes and self-efficacy. As such, it represents a helpful approach for the design of (oral) health interventions in older adults. Further evaluation with a larger sample is required to test the long-term impact including the economic evaluation of the e-ORHIS approach.

1. Introduction

The World Health Organization has reiterated the priority of health for older people through its program "Ageing and life-course" underpinned by the concept of "active ageing" [1]. The concept of "active ageing" is the cornerstone for improving the health status and quality of life of senior citizens. Active ageing is accomplished by strategies to encourage and empower older adults with the requisite skills and knowledge to maintain good physical, psychological, social, and spiritual health [1]. In this context, one widely acclaimed strategy is to promote health-related learning so that older adults are enabled to gain the awareness and knowledge necessary for self-care and illness prevention [2].

Older people contribute to society, within their families, communities, and economic productivity via formal or informal channels, or through volunteer work [1,3]. Older people are a valuable resource to the society; when they are healthy. Nonetheless, older adults form a group at special risk of oral diseases which need timely intervention. Furthermore, due to retaining more of their natural teeth, the sizeable proportion of older people in the new millennium constitute a group with diverse and complex dental needs. Coronal and root caries, tooth wear, and periodontal disease, are some common dental problems among dentate older adults.

Oral health is integral to general health [4]. Oral diseases and conditions can have profound effects on eating, speaking, sleeping, comfort, pain, appearance, self-esteem, and social relationships, which are of paramount importance in older adults. In addition, recent research has highlighted the dynamic and complex relationships between the oral health and general health of older adults because several oral diseases share risk factors with chronic dis-

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eases, for example, smoking is associated with periodontal disease, lung cancer, and ischaemic heart disease [4]. Moreover, oral diseases can exacerbate underlying general diseases and complicate and frustrate their favourable management, which is the theoretical underpinning for "medically necessary dental treatment" and the inclusion of dental care in the management of chronic and complex medical problems [5].

Health promotion interventions are key to improving oral health in later life as they encourage older adults to be proactive in regard to their health. Traditionally, there have been very limited oral-health promotion activities for older adults. This is influenced by several myth: such as, older adults are not willing to change their attitudes and behaviours; older adults are difficult to recruit and work with; lifestyle and behavioural changes will have minimal impact on the physical health and longevity of older adults; and health promotion will not be cost-effective for older adults [6]. Contrary to such assumptions, recent research has provided evidence on the positive outcomes of oral-health promotion activities among older adults [7,8]. Oral-health promotion is particularly desirable in view of the demographic composition and the annual cost of health, in particular oral health, for this cohort.

In this respect, it has been suggested that the use of Information and Communication Technology (ICT), such as home computers, internet and other communication devices, can significantly improve the quality of life of older adults, and facilitate cost-effective care [9]. Nonetheless, for ICT to be efficient and effective, older adults must be willing and able to use them. As an initial step towards developing such a model, this study developed and evaluated the impact of an interactive Web-based oral health promotion program aimed at improving the oral health knowledge, attitudes, practices and self-efficacy of independent-living older adults living in Melbourne, Australia.

2. Material and methods

Different theories can be used as the focus of interventions to understand the process by which change occurs. Nonetheless, the Social Cognitive Theory (SCL) is particularly well placed for this purpose, as it helps explain the relationship between personal experience, social norm, and the influence of different environments on individual behaviors. In fact, health behaviour has been widely studied in connection with Social Cognitive Theory [10]. Furthermore, a review of eHealth intervention indicated that the majority of studies (11 out of 13) were based on Social Cognitive Theory (SCT) [11].

SCT states that behaviour is a function of individuals' expectations of the consequences of the action (outcome expectations), their abilities to execute the action (self-efficacy), and their beliefs that the action will achieve a desired outcome (response efficacy). Self-efficacy refers to the expectations or beliefs individuals hold about their personal ability to perform a behavior. Self-efficacy expectations are positively and significantly associated with the initiation and maintenance of healthy behaviours [12]. Self-efficacy has predicted a range of health behaviours including oral self-care and dental visits [13–18]. In the social cognitive model, behaviour, cognitive and other personal factors, and environmental events all operate as interacting determinants that influence each other bidirectionally [10].

2.1. Population and sample

In order to achieve our objectives, power calculations indicated a minimum sample size of 42 participants would be necessary to detect a mean difference of four-tenths (0.40) of the standard deviation between observations of participants (pre-test vs. post-test), at an 85% chance of explaining that proportion of the variance at unidirectional significance criterion of 0.05 [19]. A 20% attrition rate was expected over the 12 months duration of this study; therefore, 55 older adults were recruited initially.

The target participants were males and females 55 years or older, living in the City of Whittlesea, and functioning independently in the community. People over 50 years of age makeup 26.1% of the total population of the City of Whittlesea. Recognising this reality, the City of Whittlesea has identified Positive Ageing as one of its key priorities. The Positive Ageing is a partnership of agencies working in the aged services sector. We recruited participants through Whittlesea's Positive Ageing Team and community organisations aimed at older adults within the City of Whittlesea. We chose this city because they have programs for older adults, with approximately 1000 people in their database. Due to the difficulties of accessing participants, a convenience sampling was used. Additionally, parts of the city were among the first where the National Broadband Network (NBN) rollout was scheduled.

2.2. Procedure

After receiving ethics approval from the University of Melbourne, an information letter was sent through Whittlesea's Positive Ageing Team to older adults in that database. The Positive Ageing Team is a partnership of agencies working in the Aged services sector with approximately 1000 people in its database who are residing in the City of Whittlesea. A research assistant contacted members of the program who responded to the invitation to participate and arranged meetings to discuss this project. Those who consented were asked to complete a face-to-face oral health interview. The interview included questions on socio-demographic characteristics; self-reported oral health status; utilisation of oral health services; oral hygiene practices; and oral health attitudes and knowledge [7]. A series of questions assessed the participants' access to technology and their internet usage (Access, activites, and frequency), and level of computer knowledge and skills. Computer knowledge and skills were classified as 'Basic', 'Competent', or 'Advanced'.

The oral health interview contained two standard questions commonly used in Australian surveys about the frequency of brushing and flossing [20]. Thirty-eight items were used to measure oral health knowledge. These items included knowledge about signs and symptoms, and prevention of dental caries (5 and 7, respectively), signs and symptoms, and prevention of periodontal disease (7 on each), and signs and symptoms, and causes of oral cancer (4 and 8, respectively). In order to quantify oral health knowledge responses, three oral health knowledge subscales were developed by adding up each correct answers about symptoms, causes and prevention of a) dental caries; b) periodontal disease; and c) oral cancer. In addition, the scores of these three knowledge subscale, were added up creating an overall knowledge score.

Oral health attitudes were measured by six items concerned with the inevitability of oral disease in older adults, the desirability of keeping natural teeth, and the value of preventive behaviours, such as self-examination and cleaning teeth regularly. One additional item assessed the value of natural teeth over dentures. An attitudes score was computed by adding the positive responses across all of the attitudes items. Higher scores represented more positive attitudes.

The instrument also included a validated 8-item scale about the individual's confidence (1: Not at all confident to 5: Completely confident) in their ability to prevent oral diseases (*Self-efficacy*) [21]. Six items focused on oral health self-efficacy, and two on general health. The scale was developed by Wiedenfeld and Kiyak, and demonstrated high internal consistency (alpha = 0.92) [22], and correlated with changes in oral health behaviours over time