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The role of self-efficacy in dental patients' brushing and flossing: Testing an extended Health Belief Model

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Abstract

Objective: In an effort to examine the decreasing oral health trend of Australian dental patients, the Health Belief Model (HBM) was utilised to understand the beliefs underlying brushing and flossing self-care. The HBM states that perception of severity and susceptibility to inaction and an estimate of the barriers and benefits of behavioural performance influences people's health behaviours. Self-efficacy, confidence in one's ability to perform oral self-care, was also examined.

Methods: In dental waiting rooms, a community sample ($N = 92$) of dental patients completed a questionnaire assessing HBM variables and self-efficacy, as well as their performance of the oral hygiene behaviours of brushing and flossing.

Results: Partial support only was found for the HBM with barriers emerging as the sole HBM factor influencing brushing and flossing behaviours. Self-efficacy significantly predicted both oral hygiene behaviours also.

Conclusion: Support was found for the control factors, specifically a consideration of barriers and self-efficacy, in the context of understanding dental patients' oral hygiene decisions.

Practice implications: Dental professionals should encourage patients' self-confidence to brush and floss at recommended levels and discuss strategies that combat barriers to performance, rather than emphasising the risks of inaction or the benefits of oral self-care.

1. Introduction

The oral status of public sector dental patients in Australia has declined since the 1960s [1]. The Australian Institute of Health and Welfare (2008) attributes the disparity in oral health status between the general population and public sector patients to limited access to dental services and socioeconomic status of the public patients. Plaque control remains a most effective means of improving individuals' oral condition [2]. Mechanical methods, such as brushing and flossing, are the easiest method to reduce the incidence of plaque. However, in general, there is poor adherence to recommended dental regimens.

1.1 Models of Preventative Health Behaviour

One predictive model of preventive health behaviours is the Health Belief Model (HBM) [3], an expectancy-value theory drawing on threat perception and behavioural evaluation. Threat perception involves two key beliefs: the susceptibility to and the consequences (severity) of contracting a health condition. Behavioural evaluation comprises the benefits of performing health behaviours and barriers impeding performance. Additional factors, including demographic characteristics, act as modifiers of behaviour by influencing motivation and perceptions rather than having a direct influence [4]. There is a paucity of research examining the HBM within the dental field, although some studies show support [5,6]. Although there are other well validated decision-making models (e.g., Theory of planned behaviour; [7]; Protection motivation theory; [8]) that have been applied successfully to health behaviours including oral self-care, the HBM was chosen in the present study given the contextual issue of a public debate about a proposed introduction of fluoridated water in the State. As debate included individuals' risk perceptions of developing tooth decay/gum disease, we utilised a decision-making model that included specific assessments of people's perceived susceptibility and severity about contracting a health condition/disease.

1.2 The Role of Self-Efficacy

Another model explaining people's behaviour is Social Cognitive Theory (SCT) [9]. 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 has predicted a range of health behaviours including oral self-care [10-12] and is often included in other health behaviour models, including the HBM, where it has improved the predictive efficacy of the model [13-18].

1.3 The Present Study

Given the paucity of research examining the HBM in the dental field, the current study of dental clinic patients investigated the performance of oral hygiene behaviours. It was expected that the HBM factors (susceptibility, severity, benefits, and barriers) would predict brushing and flossing behaviour (hypothesis 1). In addition, self-efficacy was expected to predict brushing and flossing after accounting for the HBM factors (hypothesis 2). The role of additional background variables of appointment and patient type, gender, age, oral hygiene knowledge (shown to impact on oral self-care; [19]) and floss ownership were explored also.

2. Methods

2.1. Participants

Ninety two participants (41 males, 51 females), with an average age of 41.2 years (*SD* = 17.0 years; range = 18 to 79 years) were recruited from a public dental hospital (*n* = 80) and private dental clinic (*n* = 12). Participants included general waitlist patients (*n* = 15) and emergency clinic patients (*n* = 77). Upon satisfying English language inclusion criteria, the participation rate from those eligible was 46.8%. All participants reported owning a toothbrush, with 66.3% owning dental floss.

2.2. Procedure

The study received ethical clearance from the University Human Research Ethics Committee. Public patients, recruited from the waiting room of a large dental hospital in Australia were approached individually by the female researcher. In the private clinic, administrative staff directed patients willing to participate in a study to the researcher.

The researcher explained the project's purpose, voluntary nature, confidentiality, and use of written consent. Upon completing the questionnaire, participants were offered a toothbrush and dental floss, without any associated instructions, as a thank-you gift.

2.3. Measures

Respondents completed scales assessing the HBM factors (susceptibility, severity, benefits, barriers) and self-efficacy (see Table 1). All items were rated on five point Likert scales from 1 (*strongly disagree*) to 5 (*strongly agree*) adapted from HBM literature [7, 20-22] and were averaged to create scales. Respondents completed demographic items (including self-rated knowledge of oral hygiene; 1 *very poor* to 7 *excellent*). The two dental behaviours, twice daily brushing and daily flossing, were based on Australian Dental Association recommendations.

(Insert Table 1 about here)

Susceptibility was measured using four items assessing perceived risk of developing oral disease. The scale was reliable ($\alpha = .80$).

Severity was measured using eight items assessing the perceived consequences of oral disease The severity scale possessed only low reliability ($\alpha = .53$).

Benefits were measured using five item scales for both brushing and flossin*g*. The brushing benefits scale possessed only low reliability ($\alpha = .47$) whilst the flossing benefits scale was reliable ($\alpha = .75$).

Barriers were assessed using 10 item scales for both brushing and flossing. Both scales were reliable (α = .81 and .76, respectively).

Self-efficacy was assessed using three self-efficacy items (14, 20) for both brushing and flossing. The brushing scale possessed slightly low reliability (α = .67) and was less reliable for flossing (α = .61).

Brushing behaviour was measured with the item: "During the last week, how often did you brush your teeth?"; 1 *not at all*, 2 *once a week*, 3 *every second day*, 4 *once a day*, 5 *twice a day*. *Flossing behaviour* was measured with the item: "During the last week, how often did you floss your teeth?"; 1 *not at all*, 2 *once a week*, 3 *every second day*, 4 *once a day*.

2.4 Statistical Analyses

Hierarchical multiple regression analyses using centred variables assessed demographic variables, HBM factors, and self-efficacy in predicting brushing and flossing.

3. Results

Most participants brushed their teeth at least twice a day (59.6%) but few (16.0%) flossed once a day**.**

3.1. HBM Factors and Self-Efficacy

The predictive ability of demographic factors (Step 1), HBM factors (Step 2), and self-efficacy (Step 3) for participants' oral self-care was evaluated via hierarchical regressions.

3.1.1. Tooth brushing

Demographic variables significantly predicted brushing behaviour, explaining 14.6% of variance. The HBM factors accounted for an additional, significant 20.5% of variance and self-efficacy added a significant 7.2% of variance. In the final model, accounting for 42.4% of the variance, the significant predictors were age, barriers, and self-efficacy (see **Table 2**).

3.1.2. Dental flossing

The demographic variables significantly predicted flossing behaviour, accounting for 41.6% of variance. The HBM variables accounted for an additional, significant 16.7% of variance and self-efficacy explained an additional 2.3% of variance. In the final model, accounting for 60.6% of the variance, the significant predictors were age, gender, floss ownership, barriers, and self-efficacy (see **Table 2**).

(Insert **Table 2** about here)

4. Discussion and conclusion

4.1. Discussion

There was only limited support for the HBM in predicting oral self-care with perceived barriers predicting people's brushing and flossing behaviours. Self-efficacy also emerged as a significant predictor of both behaviours. Neither benefits nor the threat perception variables of susceptibility and severity predicted oral self-care, supporting suggestions that dental caries is not typically viewed as serious as other conditions (e.g., cancer) [5].

Consistent with previous research [5,6], barriers predicted oral hygiene behaviours, suggesting that clinical interventions should target barrier reduction processes. With only limited support for hypothesis 1, the findings suggest that the HBM may not be the most useful approach to understand and predict oral self-care. Supporting hypothesis 2, self-efficacy emerged as a significant additional predictor, indicating that decisions to brush and floss are influenced by whether individuals consider that these behaviours can be performed successfully. The low prevalence of floss usage may be attributed to the relative age of the sample and inability or lack of necessity due to increased inter-dental space. The

demographics factor predicting oral self-care were age (older) for brushing and age (older), gender (female) and floss ownership for flossing.

As most participants were emergency clinic (public) patients, cautious interpretation is needed in generalising these findings to other dental settings. Additionally, there may have been differences in the findings based on practitioner effects which should be examined in further studies. Future research may also consider exploring participant oral status further, for example their dental status relative to the general population. Some scale reliabilities were low, as found for HBM scales previously [13, 19], suggesting that future HBM research should prioritise developing reliable scale measures. Finally, instead of self-report behaviour, objective clinical outcomes, such as full clinical examinations measuring plaque [23] or residual floss samples [11], would be preferable.

4.2. Conclusion

Only limited support was found for the HBM with barriers, and the extended model inclusion, self-efficacy, predicting oral self-care. Threat perception factors were not predictive, consistent with research that planning strategies are more relevant for oral self-care than risk perceptions [11, 24].

4.3. Practice implications

Targeting patient confidence in their abilities to brush and floss and reducing psychological and physical barriers to performance may be the best strategies to encourage oral self-care.

I confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story.

References

[1] Australian Institute of Health and Welfare. Oral health of adults in the public dental sector. Canberra: Australian Research Centre for Population Oral Health, 2008.

[2] Ciancio S. Improving oral health: current considerations. J Clin Periodontol 2003;30:4-6.

[3] Rosenstock IM. Why people use health services. Milbank Mem Fund Q 1966;44:94-127

[4] Clark NM, Becker MH. Theoretical models and strategies for improving adherence and disease management. In: Shumaker AA, Schron EB, Ockene JK, McBee WL, editors. The handbook of health behavior change. 2nd ed. New York: Springer, 1998.

[5] Chen MS, Land KC. Testing the health belief model: LISREL analysis of alternative methods of causal relationships between health beliefs and preventative dental behavior. Soc Psychol Q 1986;49:45–60.

[6] Tan BS, Ng KH, Esa R. Health beliefs in oral cancer: Malaysian estate Indian scenario. Patient Educ Couns 2001;42:205–211.

[7] Ajzen I. The theory of planned behavior. Organ Beh Hum Decis Processes 1991; 50:179–277.

[8] Rogers R. Cognitive and physiological processes in fear based attitude change: a revised theory of protection motivation. In: Cacioppo J, Petty R, editors. Social psychophysiology: a sourcebook. New York: Guildford Press, 1983; 153-176.

[9] Bandura A. Self-efficacy: toward a unifying theory of behavioral change. Psychol Rev 1977; 84:191-215.

[10] McCaul KD. Adherence to dental regimens. In: Gochman DS, editor. Handbook of health behavior research II: provider determinants. New York: Plenum, 1997;303-319.

[11] Schüz B, Sniehotta FF, Wiedemann A, Seeman R. Adherence to daily flossing regimen in university students: effects of planning when, where, how and what to do in the face of barriers. J Clin Periodontol 2006;33:612–619.

[12] Stewart JE, Wolfe GR, Maeder L, Hartz GW. Changes in dental knowledge and self-efficacy scores following interventions to change oral hygiene behavior. Patient Educ Couns 1996;27:269-277.

[13] Abraham S, Sheeran P. The health belief model. In: Conner M, Norman P, editors. Predicting health behavior. 2nd ed. New York: Open University Press, 2005:23-61.

[14] Norman P, Brain K. An application of the extended health belief model to the prediction of breast self examination among women with a family history of breast cancer. Br J Health Psychol 2005;10:1–16.

[15] Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the health belief model. Health Educ Q 1988;15:175-183.

[16] Sullivan KA, & Waugh DJ. Toward the development of the cerebrovascular attitudes and beliefs scale (CABS): a measure of stroke-related health beliefs. Top Stroke Rehabil 2007;14:41-51.

[17] Wdowik MJ, Kendall PA, Harris MA, Auld G. Expanded health belief model predicts diabetes self-management in college students. J Nutr Educ 2001;33:17-23.

[18] Webb TL, Sheeran P. Does changing behavioral intentions engender behavioral change? a meta-analysis of the experimental evidence. Psychol Bull 2006;132:249–268.

[19] Farsi JMA, Farghaly MM, Farsi, N. Oral health knowledge, attitude and behaviour among Saudi students in Jeddah City. J Dent 2004;32:47–53.

[20] Champion VL. Instrument development for health belief model constructs. Adv Nurs Sci 1984;6:73-85.

[21] Nakazono TT, Davidson PL, Andersen RM. Oral health beliefs in diverse populations. Adv Dent Res 1997;11:235–244.

[22] Stewart JE, Strack S, Graves P. Development of oral hygiene self-efficacy and outcome expectancy questionnaires. Community Dent Oral Epidemiol 1997;25:337–342.

[23] Borkowska ED, Watts TLP, Weinman J. The relationship of health beliefs and psychological mood to patient beliefs adherence and oral hygiene behaviour. J Clin Periodontol 1998;25:187-193.

[24] Sniehotta FF, Araujo Soares V. Randomised controlled trial of a one-minute intervention changing oral self-care behavior. J Dent Res 2007;86:41– 645.