

Determinants of oral hygiene behavior in the Dominican Republic

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ABSTRACT

Objectives: The aim of this study was to identify predictors of oral hygiene behavior based on the theory of planned behavior among dental care seekers in the Dominican Republic. In addition, measures of oral health knowledge and the expected social outcomes of having healthy teeth were examined. **Methods:** In this cross-sectional study, 92 participants, who were visited by Dutch dental professionals from the Foundation Bocas Sanas Holanda-Maimón, completed voluntarily a culturally adapted questionnaire. The individuals' clinical oral health status was also assessed. **Results:** A regression analysis was used to model the prediction, and it accounted for 32.4% of the variance. Only attitude, social norms and perceived behavioral control emerged as significant predictors of the intention to perform adequate oral hygiene behavior. In these multivariate analyses, oral health knowledge and expected social outcomes of having healthy teeth were not related significantly to intention. **Conclusions:** This study illustrates how the theory of planned behavior may be used as a basis to design adequate interventions for people in developing and underdeveloped countries. Moreover, it also suggests that oral hygiene-related interventions aimed at improving oral hygiene behavior need to be specifically adjusted to or designed for the target population.

Key words: Behavioral science, Dominican Republic, oral health promotion, psychosocial aspects of oral hygiene behavior

INTRODUCTION

Dental caries is the most prevalent oral disease in children, and can be seen as one of the most prevalent infectious diseases in the world; approximately 95% of the world's population suffers from this disease¹. For instance, for the period 1981–2000, the World Health Assembly adopted, as the first global indicator of oral health status, an average of less than three decayed, missing, filled permanent teeth (DMFT < 3) at the age of 12 years². In 1986, in the Dominican Republic, DMFT = 6 and, in 2008, there was a decrease to DMFT = 3.9³. However, most oral diseases are not life threatening, although they may have negative effects on the quality of life (QoL) of children and adults. For example, if caries remains untreated, toothache is a consequence. After caries treatment, however, children's QoL can improve. Thus, oral health is an important part of an individual's general health and is essential to QoL¹. Although the importance of health and personal hygiene is widely acknowledged, espe-

cially in developing and underdeveloped countries, it seems that health systems are not performing as well as they could or should⁴. The World Health Organization (WHO) has called for a reorientation of oral health systems towards prevention and health promotion. The Oral Health Program (ORH) of WHO emphasizes the application of evidence-based strategies in oral health promotion and prevention, as well as in the treatment of oral diseases worldwide⁵. The identification and assessment of the psychological determinants of oral hygiene behavior (OHB) within subgroups are therefore of great importance for the development of oral health care interventions that effectively target the determinants in subgroups. The theory of planned behavior (TPB^{6–8}) is used as a basis for understanding the psychology of OHB: one would expect that OHB is determined by an individual's attitude towards OHB, social norms (SNs) and perceived behavioral control (PBC). In line with this, Freeman and Linden⁹ found that tooth brushing and the use of additional cleaning aids were associated with a more positive attitude

towards oral health, and with supportive norms of 'important others', such as the dentist, family and friends. The present study aimed to examine the psychosocial determinants of OHB among dental care seekers – a mixed population of black and white people – in the Dominican Republic.

The Dominican Republic occupies two-thirds of the Island of Hispaniola, which it shares with the Republic of Haiti. The total population is 8,562,541¹⁰. In the Dominican Republic, there are 7000 dentists, but most dental professionals work in private clinics. As oral health care is very expensive, and 75% of people do not have health insurance, a greater part of the population has no dental assistance¹¹. In addition, as self-care practices are essential for the promotion of oral health, it is important to re-organize oral health prevention to fit better the needs and expectations of people in a particular culture or region. As a result of differences in lifestyle and risk factors that arise from environmental, economic, social and behavioral causes, such as poor living conditions and poor education, as well as differences in traditions with regard to oral self-care, oral hygiene interventions need to be embedded within oral health systems that are financially fair for disadvantaged and poor population groups¹².

METHODS

Authorization and ethical approval for participation in this cross-sectional study were obtained from the University of Applied Sciences, Utrecht, the Netherlands and the Foundation Bocas Sanas Holanda-Maimón (Rhenen, the Netherlands). Moreover, the dental care seekers were asked if they were willing to take part in the study on a voluntary basis. They were free to refuse participation, and no pressure was exerted to take part in the study. Therefore, written informed consent was waived and only verbal informed consent was obtained.

Participants and procedure

Participants were local people who were visited by Dutch dental professionals from the Foundation Bocas Sanas Holanda-Maimón. In total, 92 participants completed voluntarily a culturally adapted questionnaire in the waiting room before dental screening, whereas the data for some of these dental care seekers were collected through a semi-structured interview by a translator. In addition, the clinical oral health status of individuals was examined by a dental hygienist.

Measures

The questionnaire for the sample in the Dominican Republic was based on the questionnaire used in earlier

OHB determinant studies^{13–15}. The questionnaire was checked and translated into Spanish as its mother tongue by a native Spanish speaker of Dominican Republic descent. In total, 66 items were divided into several parts, including a few demographic questions. The level of education was categorized as low, medium or high. In the Dominican Republic, a low educational level refers to primary school, medium level to secondary school/vocational training and high level to advanced vocational training/college/university training.

Regulatory focus in the domain of health^{16–18} was measured using 10 items. The *promotion focus* scale consisted of four items (example item: 'In general, I am focused on promoting a good general health') (Cronbach's $\alpha = 0.83$). The *prevention focus* scale consisted of six items (example item: 'In general, I am focused on preventing a bad general health') (Cronbach's $\alpha = 0.75$). Responses ranged from 1 = strongly disagree to 5 = strongly agree. Sum scores in the ranges 4–20 and 4–30 indicated more promotion-focused or more prevention-focused individuals, respectively. The higher the score per scale, the more promotion-focused or prevention-focused the individuals tended to be.

Expected social outcomes (ESOs) of having healthy teeth were assessed with a scale of six items (Cronbach's $\alpha = 0.83$): 'People judge each other in part on the basis of their teeth'; 'In social contacts well maintained teeth are important'; 'It is embarrassing when someone has badly maintained teeth'; 'Someone's teeth are important for the first impression he or she makes'; 'I appreciate it when people with whom I socialize have well maintained teeth'; and 'In social contacts fresh breath is important'. Responses varied from 1 = disagree to 5 = agree, and a sum score was computed by adding all items that measured the concept ESO (range, 6–30).

The OHB index is a measure of the extent to which people engage in optimal oral care, as defined by professional standards^{13–16}. A culturally adapted version of this OHB index included eight items with respect to tooth brushing, interdental cleaning and tongue cleaning. The OHB sum score of this index was in the range 0–16. A higher sum score indicated a higher level of oral self-care.

Next, before assessing the variables of the TPB, the focal adequate OHB was described as 'brushing your teeth twice a day (once after breakfast and once before going to sleep), using a soft-bristled toothbrush and fluoride-containing toothpaste; brushing softly/without pressure for at least 2 min; brushing stepwise by making small strokes – sort of massage – near the gum, along the inside and the outside, and on the jackdaw areas. In addition to tooth brushing, daily interdental cleaning (i.e. use of floss, tooth sticks or interdental brushes) and tongue cleaning are also recommended.'

The *attitude* (ATT) towards this described focal OHB was measured using nine worded statements in a semantic differential format (Cronbach's $\alpha = 0.94$). Participants were asked to indicate how they evaluated the recommended OHB, e.g. 1 = unimportant to 7 = important, and so on: unpleasant–pleasant, unhealthy–healthy, negative–positive, annoying–not annoying, not useful–useful, boring–exciting, painful–painless and stupid–smart. Higher sum scores (range, 9–63) indicated a more positive attitude towards an optimal OHB.

Intention to perform adequate OHB within 1 year and within 6 months was measured using a sum score constructed from four items per scale (within 1 year: $\alpha = 0.70$; within 6 months: $\alpha = 0.76$), e.g. 'Do you intend to perform optimal OHB as described, within 1 year?', and 'Do you intend to perform optimal OHB as described, within the next 6 months?' Responses ranged from 1 = absolutely not to 7 = absolutely yes. 'Is it likely that you will start to perform optimal OHB as described, within 1 year?', and 'Is it likely that you will start to perform optimal OHB as described, within the next 6 months?' Responses ranged from 1 = totally unlikely to 7 = totally likely. The intention sum score was in the range 4–28 per scale. A higher sum score per scale indicated a higher intention to perform oral hygiene self-care within 1 year or 6 months, respectively.

SNs towards the described focal OHB were assessed by asking the participants to rate the perceived opinions of different significant others with respect to taking better care of their teeth. They answered the question: 'What do other people think you have to do with respect to taking better care of your teeth as mentioned in the prescribed OHB?', e.g. 'my dentist', 'my partner', 'my (best) friends', 'my colleagues' and 'my nearest family (parents, brothers and sisters)'. This seven-point scale for SNs was based on five items (Cronbach's $\alpha = 0.87$). A sum score on this SN scale was in the range 5–35.

PBC was measured using a sum score constructed from three items (Cronbach's $\alpha = 0.85$), i.e. 'If I wanted to, I could take care of my teeth as mentioned in the prescribed OHB', answered with the endpoints 1 = don't agree to 5 = agree, 'I find it difficult or easy to take care of my teeth based on the daily prescribed OHB', answered with the endpoints 1 = difficult to 5 = easy, and 'I do succeed in taking care of my teeth based on the daily OHB', answered with the endpoints 1 = don't agree to 5 = agree. The sum score on this five-point scale was in the range 3–15.

In all three domains, high sum scores indicated a positive attitude, strong perceived approval from significant others and a high level of PBC of the described focal OHB.

Oral health knowledge (OHK) was measured with an index consisting of seven items to reveal the status of the individual's OHK, i.e. 'For teeth maintenance, it doesn't matter how many times I eat during a day, as long as there is no sugar in the food'; 'To prevent caries, I have to brush especially on the crown covers'; 'When brushing one's teeth it is important to put little pressure on the tooth brush'; 'The more often I brush my teeth in a day, the better it is for my teeth'; 'A gum inflammation can disappear by itself'; 'Gum bleeding is a sign of periodontal disease'; 'The older you get, the more your teeth color'. All items could be scored with 1 = yes or 0 = no, and a sum score was computed (range, 0–7), so that a total OHK score was formed for each respondent. The higher the total score, the higher the individual's knowledge of oral health issues.

An individual's clinical oral health status was registered by a dental hygienist. The relatively simple record of an individual's clinical oral health status was categorized as: category I, healthy dentition (i.e. no caries and no gum disease); category II, slightly unhealthy dentition (i.e. minimal caries and gingival problems); category III, mutilated dentition (i.e. one to five missing teeth); category IV, mutilated dentition (i.e. more than five missing teeth).

Statistical analyses

The Statistical Package for Social Sciences 16.0 (SPSS, Chicago, IL, USA) was used for data analysis. The internal consistency of the scales used was assessed by Cronbach's α . Linear regression analyses were performed to identify the determinants that accounted for a significant proportion of the variance in OHB.

RESULTS

Characteristics of participants

The Dominican Republic sample included 92 dental care seekers (60% female) with a mean age of 31.6 years (SD = 12 years). Spanish as the national language was spoken by 98% as their mother tongue. About one-quarter (26%) of the participants in the sample were married, and 63% reported having children. Only 19% of the participants had a high level of education, 45% had a medium level and 28% had a low level. The recorded list of the individuals' clinical oral health status showed that only 16% of the participants had healthy teeth (category I) and 12% had slightly unhealthy dentition (category II). Almost two-thirds of the participants (65%) had mutilated dentition (category III, one to five missing teeth) and 7% had mutilated dentition (category IV, more than five missing teeth).

Table 1 Ranges, means and standard deviations (SDs) for the main variables

Variable	Mean (SD)	Range
Promotion focused*	14.09 (4.99)	0–20
Prevention focused†	19.57 (6.79)	0–30
Expected social outcomes‡	25.78 (5.27)	6–30
Oral hygiene behavior*	11.87 (2.05)	7–16
Intention within 1 year§	22.91 (5.36)	9–28
Intention within 6 months¶	22.91 (5.61)	4–28
Attitude**	51.96 (12.8)	9–63
Social norm†	27.08 (8.94)	5–35
Perceived behavioral control*	13.7 (2.43)	3–15
Oral health knowledge‡	3.7 (1.02)	0–7

n* = 92; †*n* = 91; ‡*n* = 83; §*n* = 88; ¶*n* = 90; *n* = 73.

The means, standard deviations and ranges of the total score on the OHB index were computed, and the distribution of scores was approximately normal. The individual OHB score is an indicator of self-reported oral hygiene self-care practices. The mean scores with standard deviations and the ranges of the main variables for the whole sample are presented in Table 1. It can be seen that dental seekers reported comparatively similar outcomes on the promotion-focused and prevention-focused scales. The participants attached great value to the positive social outcomes of having healthy teeth; in particular, in social contacts, well-maintained teeth and fresh breath were found to be important, above all for first impressions. Participants evaluated the focal OHB very positively and, moreover, they stated the intention to perform optimal OHB as described, within 6–12 months. Their knowledge of oral health was moderate, and the distribution of scores was approximately normal. Although some of the participants had no dentist (12%) or a partner (10%) and no colleagues (5%), they reported remarkable pressure from their social environment to perform OHB. It is worth nothing that the participants perceived pressure mainly from their friends and family. They felt they had good control over carrying out oral hygiene self-care practices, and they stated that they were a role model for their social environment, especially their children. For instance, the findings of the OHB index showed that 89% of the respondents brushed their teeth as recommended, twice a day. In addition, 86% of participants brushed their teeth before breakfast in the morning and two-thirds brushed their teeth before they went to sleep. Almost one-half of the participants brushed their teeth for 2 min each time; 73% cleaned their tongue twice daily and 23% once a day. Less than one-quarter (22–26%) of the participants reported the use of any interdental cleaning methods, and 75% used fluoride-containing toothpaste.

In addition, correlation analyses were carried out to establish the direction and magnitude of the associations between all the main variables. OHB was not

Table 2 Correlations between the theory of planned behavior (TPB) variables and the intention to perform adequate oral hygiene behavior within 1 year

Variable	1	2	3	4
Intention within 1 year	–			
Attitude	0.40**	–		
Social norms	0.44**	0.64**	–	
Perceived behavior control	0.28**	0.78**	0.58**	–

***P* < 0.001.

Table 3 Linear regression of intention to perform oral hygiene behaviour (OHB) within 1 year on the theory of planned behaviour (TPB) variables, including expected social outcome (ESO) and oral health knowledge (OHK)

Determinant	Intention to perform OHB within 1 year (β)
Attitude (ATT)	0.18*
Social norms (SNs)	0.30*
Perceived behavioral control (PBC)	0.17***

In total model (**P* < 0.001; ***P* < 0.05; ****P* < 0.06). *R*² = 0.32, *F*(5,59) = 7.14, *P* < 0.001.

found to correlate with all the main variables. However, intention to perform OHB within 1 year was found to correlate positively and significantly with the TPB variables: ATT, SN and PBC. According to the TPB, all relations are in the expected directions (Table 2).

Finally, linear regression analysis was performed to examine the multivariate relationships of the TPB variables and the two additional variables, ESO and OHK, with intention to perform OHB within 1 year (Table 3). All variables were entered at once. This model proved to be significant, *F*(5,59) = 7.14, *P* < 0.001, and accounted for 32.4% of the variance in self-reported intention to perform OHB within 1 year. The TPB variables ATT and SN emerged as significant predictors of intention. PBC was marginally significantly related to the intention to perform OHB within 1 year.

DISCUSSION

The results of this study show that the predictors of the intention to perform OHB were determined in the Dominican Republic sample. The culturally adapted version of the OHB index appears to be a useful method for assessing and evaluating oral hygiene self-care practices of dental care seekers^{14–16}. Especially noteworthy is the fact that the total scores of the OHB index in the Dominican Republic sample were normally distributed, as they were in a Dutch sample¹³. In addition, the total scores of the index for OHK were

also normally distributed; many scales or indices used in the behavioral sciences have a skewed distribution.

Although, overall, the power of the TPB in predicting the intention to perform OHB within 1 year was substantial, the TPB did not predict the actual reported OHB in this study. That is, clear differences emerged between the Dominican Republic and other islands in the Caribbean and Nepal¹⁵, not in the importance of the TPB predictors, but in the prediction of the intention to perform OHB, or in OHB itself.

In the Dominican Republic sample, SNs and ATT were found to be significant determinants of the intention to perform OHB within 1 year. Thus, in the Dominican Republic, individuals are more inclined to engage in OHB when they perceive more favorable norms towards OHB, and when they have a more positive attitude towards it. In this sample, however, PBC was also an important predictor of the intention to perform OHB. Thus, the perceived task complexity of OHB self-care practices and the feelings of control over OHB also seem to be important. Generally, differences in psychological determinants between cultural groups must be related to environmental and cultural differences. For example, for the Dominican Republic, positive social outcomes, such as having white teeth and a bright smile, are very important¹⁹. In this sample, ESOs and OHK were not associated with the intention to perform OHB, or with OHB itself.

To conclude, the findings of this study are in line with the results of the Caribbean and Nepalese study¹⁵, and show that the importance of the TPB constructs for the intention to perform OHB depends on the context. In the Dominican Republic, the intention to perform OHB was determined by the influence of family and friends, attitude and, marginally, by PBC. When developing interventions to improve OHB, these differential associations should be considered. The promotion of OHB should be primarily geared towards attitude change in a more positive direction, and SNs with respect to appropriate OHB must be supported by peers and parents. In addition, the promotion of oral hygiene self-care should be geared towards increasing PBC. Instruction and feedback by important others as significant mediators would be the most effective method of executing the appropriate OHB in this context. The integrative insight gained into the factors that influence OHB is absolutely needed for the development of specific oral health interventions for people in the Dominican Republic. It is also needed for the implementation of evidence-based, simple and cost-effective preventive approaches in public health systems. This study may assist all oral health professionals but, in this context, especially the health professionals from Bocas Sanas Holanda-Maimón working with cultural subgroups to educate them with regard to oral health and a change in their OHB²⁰. As shown in previous studies, dental hygienists, in particular, may

play a central role in promoting OHB, and may deliver this preventive oral health message globally^{13-16,21}. Nowadays, dentists are at times less primarily focused on the education of patients, and on the promotion of adequate oral health, preferring to treat rather than prevent oral diseases²². Moreover, dental care provided only by dentists is generally costly and unrealistic in low-income and middle-income countries¹². Therefore, dental hygienists may be the primary professionals involved in preventive oral health care, as they are well trained to promote desirable OHB by adequate professional communication with all types of people all over the world¹⁴⁻¹⁶. The present study illustrates how the TPB may be used as a basis to assess adequate tailored interventions in the Dominican Republic.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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